TO:

Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450

filed in the U.S. Di		for the	1116 you are hereby advised that District of Delaware s 35 U.S.C. § 292.):	a court action has been on the following
DOCKET NO.	DATE FILED 11/30/2012	U.S. DI	STRICT COURT for the District	of Dolaware
PLAINTIFF Safe Storage LLC	11/30/2012		DEFENDANT Silicon Graphics Internation	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK		HOLDER OF PATEN	T OR TRADEMARK
1 6,978,346	12/20/2005	Safe	Storage LLC	
2				
3				
4				
5				
DATE INCLUDED	INCLUDED BY	e, the following	patent(s)/ trademark(s) have been Answer Cross B	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK		HOLDER OF PATEN	T OR TRADEMARK
1				
2				
3				
4				
5				
In the abo	ove—entitled case, the follow	ving decision ha	s been rendered or judgement issu	led:
DECISION/JUDGEMENT				
CLERK		(BY) DEPUTY	CLERK	DATE

TO:

Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450

In Complia filed in the U.S. Di		or 15 U.S.C. § 1116 you are hereby advised that for the District of Delaware	a court action has been on the following
☐ Trademarks or	Patents. (the patent	action involves 35 U.S.C. § 292.):	
DOCKET NO.	DATE FILED 11/30/2012	U.S. DISTRICT COURT for the District	of Delaware
PLAINTIFF		DEFENDANT	
Safe Storage LLC		NetApp, Inc.	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER DE PATEN	T OR TRADEMARK
1 6,978,346	12/20/2005	Safe Storage LLC	
2			
3			
4			
5			
DATE INCLUDED	INCLUDED BY	, the following patent(s)/ trademark(s) have been Amendment	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK		T OR TRADEMARK
1			
2			
3			
4			
5			
In the abo	ove—entitled case, the follow	ing decision has been rendered or judgement issu	aed:
DECISION/JUDGEMENT			
CLERK		BY) DEPUTY CLERK	DATE

TO:

Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450

In Complia filed in the U.S. Di	-	5 U.S.C. § 1116 you are hereby advised that a court action for the District of Delaware	on the following
☐ Trademarks or	☑ Patents. (☐ the patent action	on involves 35 U.S.C. § 292.):	
DOCKET NO.	DATE FILED 11/30/2012	U.S. DISTRICT COURT for the District of Delay	ware
PLAINTIFF		DEFENDANT	
Safe Storage LLC		Hitachi Data Systems Corporation	:
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRA	ADEMARK
1 6,978,346	12/20/2005	Safe Storage LLC	
2			
3			
4			
5			
		following patent(s)/ trademark(s) have been included:	
DATE INCLUDED	INCLUDED BY	adment	☐ Other Pleading
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRA	ADEMARK
1			
2			
3			
4			
5			
	ove—entitled case, the following de	ecision has been rendered or judgement issued:	
DECISION/JUDGEMENT			
CLERK	(BY)	DEPUTY CLERK	DATE

TO:

Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450

In Complianum In		15 U.S.C. § 1116 you are hereby advised that for the District of Delaware	t a court action has been on the following
☐ Trademarks or	✓ Patents. (the patent ac	tion involves 35 U.S.C. § 292.):	
DOCKET NO.	DATE FILED 11/30/2012	U.S. DISTRICT COURT for the District	of Delaware
PLAINTIFF		DEFENDANT	
Safe Storage LLC		Hewlett-Packard Compan	у
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATEN	T OR TRADEMARK
1 6,978,346	12/20/2005	Safe Storage LLC	
2			
3			
4			
5			
DATE INCLUDED	INCLUDED BY	e following patent(s)/ trademark(s) have been	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATEN	T OR TRADEMARK
1			
2			
3			
4			
5			
In the abo	ove—entitled case, the following	decision has been rendered or judgement issu	aed:
DECISION/JUDGEMENT			
		477	
CLERK	ВУ) DEPUTY CLERK	DATE
	I		

TO:

Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450

filed in the U.S. Dis	strict Court	for the District of Delaware on the following on involves 35 U.S.C. § 292.):
DOCKET NO.	DATE FILED 11/30/2012	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF Safe Storage LLC	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Defendant Dot Hill Systems Corp.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,978,346	12/20/2005	Safe Storage LLC
2		
3		
4		
5		
DATE INCLUDED	INCLUDED BY	ne following patent(s)/ trademark(s) have been included: nendment
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 IRADEMARK NO.	OK TRADEWARK	
2		
3		
4		
5	ve—entitled case, the following	g decision has been rendered or judgement issued:
5	ve—entitled case, the following	g decision has been rendered or judgement issued:

TO:

Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450

In Complia filed in the U.S. Di		5 U.S.C. § 1116 you are hereby advised that a court action has been for the District of Delaware on the following
☐ Trademarks or	Patents. (the patent acti	ion involves 35 U.S.C. § 292.):
DOCKET NO.	DATE FILED 11/30/2012	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF		DEFENDANT
Safe Storage LLC		Dell Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,978,346	12/20/2005	Safe Storage LLC
2		
. 3		
4		
5		
DATE INCLUDED	In the above—entitled case, the INCLUDED BY	endment
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		
In the abo	ove—entitled case, the following	decision has been rendered or judgement issued:
DECISION/JUDGEMENT		
CLERK	(BY)	DATE DATE

PART B - FEE(S) TRANSMITTAL

	OCT 1 2 2005 2	this form, together wi	th applicable f	fee(s), to: <u>M</u> or <u>F</u> :	P.O. Box 1450 Alexandria, Vir ax (571) 273-2885	or Patents ginia 22313-1450	
/3	INSTRUCTIONS: Use for appropriate. All father co Mucated unless corrected mainter and be notification	orm should be used for tran orrespondence including the below or directed otherwise ons.	smitting the ISSU Patent, advance or in Block 1, by (a	JE FEE and Proders and notifical pecifying a	UBLICATION FEE (if required in the content of the c	nired). Blocks 1 through 5 swill be mailed to the current; and/or (b) indicating a sep	should be completed where t correspondence address as arate "FEE ADDRESS" for
	CURRENT CORRESPONDEN	CE ADDRESS (Note: Use Block 1 for 7590 07/11/2005	any change of address)		Note: A certificate of Fee(s) Transmittal. The papers. Each addition	f mailing can only be used fais certificate cannot be used al paper, such as an assignme of mailing or transmission.	or domestic mailings of the for any other accompanying ent or formal drawing, must
10/	12400 WILSHIRE SEVENTH FLOO LOS ANGELES, (PR CA 90025-1030	z ZAFMAN		I hereby certify that to States Postal Service addressed to the Matransmitted to the US	rtificate of Mailing or Tran his Fee(s) Transmittal is beir with sufficient postage for fi il Stop ISSUE FEE address PTO (371) 273-2885, on the	ng deposited with the United rst class mail in an envelope above, or being facsimile date indicated below.
	13/2005 CCHAU2 000 FC:2501	00088 09753245 700.00 OP			h	mullo C	(Signature)
02	FC:8001 FC:1504	30.00 DP 300.00 DP				10/1/65	(Date)
•	APPLICATION NO.	FILING DATE		FIRST NAMED	INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
	09/753,245	12/29/2000		Sung-Hoor	n Baek	51876P219	8804
	APPLN. TYPE nonprovisional	SMALL ENTITY YES	ISSUE F \$700		PUBLICATION FEE \$300	TOTAL FEE(S) DUE \$1000	DATE DUE 10/11/2005
	EXAM	MINER	ART UN	IIT	CLASS-SUBCLASS] .	
	LIM, k	KRISNA	2153		711-114000	-	
	CFR 1.363). Change of correspon- Address form PTO/SB/1 "Fee Address" indica	ce address or indication of "Fo dence address (or Change of 122) attached. ation (or "Fee Address" Indica or more recent) attached. Use	Correspondence	(1) the nam or agents OI (2) the name registered at 2 registered	ing on the patent front page, 1 as of up to 3 registered pate R, alternatively, e of a single firm (having as ttorney or agent) and the nar patent attorneys or agents. If the will be printed.	a member a 2	TLOR TZAFIIA
	3. ASSIGNEE NAME ANI	D RESIDENCE DATA TO B	E PRINTED ON T	THE PATENT ((print or type)		
	PLEASE NOTE: Unless recordation as set forth in	s an assignee is identified be n 37 CFR 3.11. Completion	elow, no assignee of this form is NO	data will appea T a substitute fo	ar on the patent. If an assignment.	nee is identified below, the	document has been filed for
		iee AND TELECON CH INSTITU	1M UNICA	B) RESIDENCE F TIONS		of Korea	
		e assignee category or catego				orporation or other private gr	oup entity Government
	4a. The following fee(s) are Tssue Fee	e enclosed:	46	D. Payment of Fo	``		
		small entity discount permitte	·d)	/_	the amount of the fee(s) is en y credit card. Form PTO-203		
	Advance Order - # o				tor is hereby authorized by count Number 02-26		credit any overpayment, to
•		s (from status indicated above SMALL ENTITY status. See	,	_	nt is no longer claiming SMA		
	The Director of the USPTO NOTE: The Issue Fee and F interest as shown by the rec	is requested to apply the Issu Publication Fee (if required) vords of the United States Pare	ne Fee and Publicate vill not be accepted and Trademark				
	Authorized Signature	En	#>		Date	10/5/09	
	Typed or printed name _	ERCS-HYM	AN	 · · · · · · · · · · · · · · · · · ·	Registration	No. 30, 139	
;	This collection of information	on is required by 37 CFR 1.3	11. The informatio	on is required to	obtain or retain a benefit by	the public which is to file (an	d by the USPTO to process

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce to Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

A

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

08791

7590

07/11/2005

BLAKELY SOKOLOFF TAYLOR & ZAFMAN 12400 WILSHIRE BOULEVARD SEVENTH FLOOR LOS ANGELES, CA 90025-1030

EXAMINER

LIM, KRISNA

ART UNIT PAPER NUMBER

2153 DATE MAILED: 07/11/2005

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/753,245	12/29/2000	Sung-Hoon Baek	51876P219	8804

TITLE OF INVENTION: APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700	\$300	\$1000	10/11/2005

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. <u>PROSECUTION ON THE MERITS IS CLOSED</u>. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
- B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.
- II. PART B FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.
- III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

Page 1 of 3

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail

Mail Stop ISSUE FEE Commissioner for Patents P.O. Box 1450

			or <u>Fa</u>		ginia 22313-1450	
INSTRUCTIONS: This fo appropriate. All further coindicated unless corrected maintenance fee notification	rm should be used for tran- rrespondence including the I below or directed otherwise ns	smitting the ISSU Patent, advance ord in Block 1, by (a)			uired). Blocks 1 through 5 sl will be mailed to the current s; and/or (b) indicating a sepa	hould be completed where correspondence address as trate "FEE ADDRESS" for
CURRENT CORRESPONDENCE 08791 7	CE ADDRESS (Note: Use Block 1 for 590 07/11/2005			papers. Each addition	f mailing can only be used for his certificate cannot be used it al paper, such as an assignment te of mailing or transmission.	or domestic mailings of the for any other accompanying ent or formal drawing, must
BLAKELY SOK 12400 WILSHIRE SEVENTH FLOO LOS ANGELES, (R	z ZAFMAN		Ce I hereby certify that t States Postal Service addressed to the Ma transmitted to the US	ertificate of Mailing or Trans his Fee(s) Transmittal is being with sufficient postage for fir ill Stop ISSUE FEE address PTO (571) 273-2885, on the d	mission g deposited with the United st class mail in an envelope above, or being facsimile late indicated below.
20011102220,						(Depositor's name)
						(Signature)
				L		(Date)
APPLICATION NO.	FILING DATE	1	FIRST NAMED II	NVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/753,245	12/29/2000	- ·	Sung-Hoon	Baek	51876P219	8804
TITLE OF INVENTION: A	APPARATUS FOR REDUNI	DANT INTERCON	INECTION BET	rween multiple host	S AND RAID	
APPLN. TYPE	SMALL ENTITY	ISSUE FI	EE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$700		\$300	\$1000	10/11/2005
EXAM	MINER	ART UN	IT	CLASS-SUBCLASS	· .	
LIM, I	KRISNA	2153	-	711-114000	-	
1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.		Correspondence	(1) the name or agents OR (2) the name registered att 2 registered	g on the patent front page, is of up to 3 registered pate, alternatively, of a single firm (having as omey or agent) and the nar patent attorneys or agents. In will be printed.	a member a 2 mes of up to	
		elow, no assignee of this form is NO	data will appear Γ a substitute for		mee is identified below, the co	locument has been filed for
4a. The following fee(s) are	e assignee category or catego	<u> </u>	. Payment of Fe	e(s):	Corporation or other private gr	oup entity Government
☐ Rublication Fee (No.	emall antity discount narmitte	ad)	A check in the amount of the fee(s) is enclosed.			
Publication Fee (No small entity discount permitted) Advance Order - # of Copies			☐ Payment by credit card. Form PTO-2038 is attached. ☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, t			credit any overpayment, to
5. Change in Entity Status	s (from status indicated above	e)	Deposit Accou	nt Number	(enclose an extra c	copy of this form).
	SMALL ENTITY status. See				ALL ENTITY status. See 37 C	
The Director of the USPTC NOTE: The Issue Fee and interest as shown by the rec	o is requested to apply the Iss Publication Fee (if required) cords of the United States Pat	ue Fee and Publica will not be accepted ent and Trademark	tion Fee (if any) d from anyone o Office.	or to re-apply any previou ther than the applicant; a re	sly paid issue fee to the applic gistered attorney or agent; or t	ation identified above. he assignee or other party in
Authorized Signature				Date		
Typed or printed name			<u> </u>	Registratio	on No	
This collection of information application Confidentia	ion is required by 37 CFR 1.3	311. The information	on is required to		the public which is to file (an	

an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
09/753,245	12/29/2000	Sung-Hoon Baek	. 51876P219 8804		
08791	7590 07/11/2005		EXAM	IINER	
	KOLOFF TAYLOR & REBOULEVARD	z ZAFMAN	LIM, K	RISNA	
SEVENTH FLO			ART UNIT	PAPER NUMBER	
LOS ANGELES	, CA 90025-1030		2153		
			DATE MAILED: 07/11/200	5	

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 857 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 857 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571) 272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.

Y 1		
	Application No.	Applicant(s)
Nation of Allowskiller	09/753,245	BAEK ET AL.
Notice of Allowability	Examiner	Art Unit
	Krisna Lim	2153
The MAILING DATE of this communic All claims being allowable, PROSECUTION ON THE Nerewith (or previously mailed), a Notice of Allowance NOTICE OF ALLOWABILITY IS NOT A GRANT OF I of the Office or upon petition by the applicant. See 37	MERITS IS (OR REMAINS) CLOSED in (PTOL-85) or other appropriate commu PATENT RIGHTS. This application is si	this application. If not included nication will be mailed in due course. THIS
1. \boxtimes This communication is responsive to <u>the amend</u>	dment filed 5/11/05.	•
2. The allowed claim(s) is/are <u>1-9</u> .		
3. The drawings filed on 23 August 2004 and 29 E	<u>December 2000</u> are accepted by the Exa	miner.
 4. Acknowledgment is made of a claim for foreig a) All b) Some* c) None of the priority documents o	ments have been received. ments have been received in Application a priority documents have been received in Application a priority documents have been received a priority document and priority documents. NG DATE" of this communication to file abandon this application. BLE. Ist be submitted. Note the attached EXA which gives reason(s) why the oath or heets") must be submitted. If Draftsperson's Patent Drawing Review Date I Examiner's Amendment / Comment or the such in the header according to 37 CFF the deposit of BIOLOGICAL MATE.	in No In this national stage application from the a reply complying with the requirements MINER'S AMENDMENT or NOTICE OF declaration is deficient. (PTO-948) attached in the Office action of a drawings in the front (not the back) of a 1.121(d). RIAL must be submitted. Note the
Attachment(s) 1. ☑ Notice of References Cited (PTO-892) 2. ☐ Notice of Draftperson's Patent Drawing Review (3. ☐ Information Disclosure Statements (PTO-1449 of Paper No./Mail Date 4. ☐ Examiner's Comment Regarding Requirement for of Biological Material	PTO-948) 6. Interview Su Paper No./î r PTO/SB/08), 7. Examiner's	ormal Patent Application (PTO-152) mmary (PTO-413), Mail Date Amendment/Comment Statement of Reasons for Allowance
U.S. Patent and Trademark Office PTOL-37 (Rev. 1-04)	Notice of Allowability	Part of Paper No./Mail Date 062605

DHPN-1002 / Page 11 of 158

Application/Control No. Applicant(s)/Patent Under Reexamination 09/753,245 BAEK ET AL. Notice of References Cited Art Unit Examiner Page 1 of 1 2153 Krisna Lim **U.S. PATENT DOCUMENTS Document Number** Date Classification Name Country Code-Number-Kind Code MM-YYYY 11-2004 711/114 US-6,820,171 Weber et al. US-В С US-US-D US-Ε US-F US-G US-Н US-US-J κ US-US-L US-**FOREIGN PATENT DOCUMENTS** Document Number Date Country Name Classification Country Code-Number-Kind Code MM-YYYY Ν 0 Ρ Q R s Т **NON-PATENT DOCUMENTS** Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) U ٧ W

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).) Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

U.S. Patent and Trademark Office PTO-892 (Rev. 01-2001)

Х

Notice of References Cited

Part of Paper No. 062605

 	Notes	

Application/Control No.	Applicant(s)/Patent under Reexamination					
09/753,245	BAEK ET AL.					
Examiner	Art Unit					
Krisna Lim	2153					

SEARCHED								
Class	Subclass	Date	Examiner					
711	114	6/26/2005	KL					
709	250	6/26/2005	KL					
710	38	6/26/2005	KL					
370	360, 412	6/26/2005	KL					
		٠						
	, , ,							
		,						

INTERFERENCE SEARCHED								
Class	Subclass	Date	Examiner					
711	114	6/26/2005	KL					
709	250	6/26/2005	KL					

SEARCH NOT (INCLUDING SEARCH	ES STRATEGY)
	DATE	EXMR
EAST	6/26/2005	KL
•		
-		







United States Patent and Trademark Office

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
WWW.USDIO.GOV

Bib Data Sheet

CONFIRMATION NO. 8804

SERIAL NUMBER 09/753,245	FILING DATE 12/29/2000 RULE		CLASS 709	GRO	UP ART UNIT DOCKE		ATTORNEY DOCKET NO. 51876p219			
APPLICANTS Sung-Hoon Baek, Teajon, KOREA, REPUBLIC OF; Joong-Bae Kim, Taejon, KOREA, REPUBLIC OF; Yong-Youn Kim, Taejon, KOREA, REPUBLIC OF;										
** CONTINUING DATA **********************************										
GRANTED ** 04/11	REIGN FILING LICENS 2001		** SMALL E	ENTIT	Y **					
Foreign Priority claimed 35 USC 119 (a-d) condition met Verified and Acknowledged E	Allowance	er D tials	STATE OR COUNTRY KOREA, REPUBLIC OF	DRA			DRAWING CLAIR			INDEPENDENT CLAIMS 1
ADDRESS 08791						_				
TITLE Apparatus for redun	dant interconnection be	tween m	ultiple hosts a	nd raid	ı	-				
FILING FEE FEE RECEIVED No.	S: Authority has been g	given in redit DE	Paper		1.1 1.1 time)	8 Fees ((Pro	cessing Ext. of		



Application/Control No.	Applicant(s)/Patent under Reexamination			
09/753,245	BAEK ET AL.			
Examiner	Art Unit			
Krisna Lim	2153	•		

				IS	SUEC	LASSI	FICATIO	NC		
		ORI	GINAL				CRO	SS REFERENC	E(S)	
CLA	ASS		SUBCLASS	CLASS			SUBCLASS (C	ONE SUBCLASS	S PER BLOCK)	
71	11		114	709	250					
INTE	RNA	FIONA	L CLASSIFICATION							
GO	6	F	13/00							
G O	6	F	12/00							
			1							
			1			<i>ر</i> ۔ ا	+			
			1			177_	ļ ₃			
(Assistant Examiner) (Date)				ant Examiner) (Date) (D						Ulowed: 9
Legal Instruments Examiner) (Pate)						Y EXAMINE	- b/ c	O.G. Print Claim(s)	O.G. Print Fig	
, C-,	an an	HISUU	monto Examiner) (mans)	N.	•	,	,	1	4

Claims renumbered in the same order as presented by applicant							☐ CPA		☐ T.D.			☐ R.1.47						
Final	Original		Final	Original		Final	Original	Final	Original		Final	Original		Final	Original		Final	Original
	1			31 -			61		91			121			151			181
	2			32			62		92			122			152			182
	3			33			63		93			123			153			183
	4			34			64		94			124			154			184
	5			35			65		95			125			155			185
	6			36			66		96			126			156			186
	7			37			67		97			127			157			187
	8			38			68		98			128			158			188
	9			39			69		99			129			159			189
	10			40			70		100			130			160			190
	11			41			71		101			131			161			191
	12			42			72		102			132			162			192
	13			43			73		103			133			163			193
	14			44			74		104			134			164			194
	15			45			75		105			135			165			195
	16			_46			76		106			136			166			196
	17			47			77		107			137			167			197
	18			48			78		108			138			168			198
	19			49			79		109			139			169			199
	20			50			80		110			140			170			200
	21			51			81		111			141			171			201
	22			52			82		112			142			172			202
	23			53			83		113			143			173			203
	24			54			84		114			144			174			204
	25			55			85		115			145			175			205
	26			_56			86		116			146			176			206
	27			57			87		117			147			177			207
	28			58			88		118			148			178			208
	29			59			89		119			149			179			209
	30			60			90		120			150			180			210

Index of Claims

Application	/Control	No.
-------------	----------	-----

09/753,245 Examiner

Applicant(s)/Patent under Reexamination

BAEK ET AL.

Art Unit

Krisna Lim

2153

7	Rejected
1	Allowed

_	(Through numeral) Cancelled
	Postmistad

Z	Non-Elected
1	Interference

A	Appeal
0	Objected

Cla	aim					Date	€				CI	aim			[Date					Cla	aim				Dat	е			
									П				П			П	Т	Τ						Т	Т	Т				
Final	Original	6/26/05		i				i			Final	Original									Final	Original			1					
Ē	Ĕ	3/26					:				這	Ĕ				Ĺ	-				Ē)riç						}		
		_										0																		Ŀ
1	1	==							П			51					$_{L}$					101								
2_	2	=										52										102								
3 -	3	=										53										103								
4	4	=										54										104								
5	5	=										55						L	Ш			105								╛
6	6	=										56				Ш	<u>l</u> .		Ш			106				⊥_	L		┙	╝
7	7	=						L				57		┸	Щ	Ш		\perp	Ш			107			\perp	\perp	<u> </u>		\bot	_
8	8	=						L	Ш	_		58		\perp	Ш	Ш		┸	Ш			108		\perp						
9	9	=						L.,		_		59		\perp		Ш		┸	Ш			109		\perp	┸		L		_	_
	10	$ldsymbol{ld}}}}}}$	Ц					L.	Ш	_		60						_	Ш			110		\perp	\perp	↓.	L		_	_
L	11	L.	Ш					L	Ш	_	L	61		_	\sqcup	Ш		1_	Ш]	111	$\perp \!\!\! \perp$		\perp	1_	<u> </u>			_
	12		Ш		Ш			L_	\sqcup	_	<u> </u>	62	$oxed{oxed}$	4_	Щ	Ш	丄	1_	Ш			112	\perp	\perp	\perp	\perp	\perp			_
<u></u>	13		Щ		Ц	Ш		<u> </u>		_		63	$\sqcup \!\!\! \perp$		Щ	\sqcup	4	_	Ш			113		_	4	4	<u> </u>	Ш	_	_
Щ_	14	<u> </u>	Щ			Ш		Ш	\sqcup	_		64	$\sqsubseteq \sqsubseteq$	_	\sqcup	Щ		_	Ш			114	_	\bot	4	╀-	ـــــ	\sqcup	4	_
\perp	15	lacksquare	Щ	_	Щ	Ш		L		_		65	oxdot					4_	Ш			115	\perp	\bot	\bot	\bot	\vdash	\Box	_	_
	16		Ц	_					Н	_		66	-			Ш	\bot	_	Ш			116			_	_	Ļ		4	_
<u></u>	17		Ш			Ш		Ш	\sqcup	_		67		4	\sqcup	\sqcup		4_	Ш			117		\bot	\bot	1_	<u> </u>	\sqcup	_	4
	18	<u> </u>	Ц	_				L_	Ш	_		68		 	lacksquare	\sqcup		╀	Ш			118		_	_	_	<u> </u>		4	4
	19	Ľ	Ш	_		Ш		ļ	\sqcup	_		69		_		Ш	\bot	_	Ш			119	_	4	4	4	L.			4
	20		Ш	_				ļ	\sqcup			70				\sqcup		┸	\sqcup			120	_	4		┿	<u> </u>		_	_
	21			_				L	\sqcup	_		71			lacksquare	Щ	\bot	_	Ш			121	_	_	4	4_	L	_	_	4
<u></u>	22							_	\sqcup	_		72		4	$oxed{oxed}$	\sqcup		_	Ш			122		4	1		ļ_		_	_
	23		_	\dashv	_				Н			73		-	<u> </u>	\sqcup		4—	Ш			123	\dashv	4	\bot	_	ļ		4	4
	24	_		_	\Box				\vdash			74	\vdash	┿	Ш	\vdash	+	╀	Ш			124		4	4-		├	_		4
	25		\dashv		\sqcup				\vdash	-		75		—	_	Н		 -	Ш			125	_	+	+	+	L		4	4
	26	H	\dashv	\dashv	\Box	\dashv		\vdash	\vdash	-		76	\vdash		\vdash	\vdash	+	+	Н			126	_	+	+	+			_	4
\vdash	27	-						-	╌		├──	77	\vdash	-	\vdash	\dashv	+	+	Н	-		127	-	+	+	+	⊢	_	\dashv	4
	28	-			\dashv			<u> </u>	╌┼			78	\vdash	+	Н	-	+	-	Н			128	+	+	+	+	⊨	_	+	4
-	29	Н	\dashv	\dashv	.	\dashv	_	<u> </u>	\vdash			79		+	Н	-	+		Н			129	\dashv	+	+	+	H		-	4
-	30	H	-					-	1.			80		+	\vdash	\dashv		 		-		130		+	+	+			\dashv	\dashv
	31	Н	\dashv	ᆛ	\dashv	\dashv		Н				81	-	+-	\vdash	\vdash	+	+	Н			131	-	+	+	┼	-	_	+	4
	32 33	Н	\dashv	\dashv	\dashv	\vdash		\vdash	┰			82 83	\vdash	+	\vdash	∺	+	+	Н			132 133	-+	+	+	+-	\vdash		+	\dashv
	34	\vdash	\dashv	\dashv	\dashv	\vdash		\vdash	┼┼	\dashv	 	84	\vdash	+	\vdash	$\vdash \vdash$	+	+	${f H}$		-	134	+	+	+	+	-		+	\dashv
\vdash	35	Н		-			-	\vdash		\dashv	<u> </u>	85	$\vdash \vdash$	+	\vdash	\vdash	\dashv	╁	$\vdash \vdash$			135		+	+	+	╁╌	\dashv	\dashv	\dashv
\vdash	36	H	\dashv		\dashv	\vdash		\vdash	\vdash			86	$\vdash \vdash$	+	\vdash	\dashv	+	+	Н	-		136	+	+	+	+	\vdash	\dashv	\dashv	\dashv
-	37	\vdash		-	-	\vdash	-	Н	\vdash	-	\vdash	87	\vdash	+	H	\dashv		+	H	-		137	\dashv	+	+	+	\vdash	\dashv	+	\dashv
\vdash	38	\vdash	\dashv	-	\dashv		=	H	\vdash		<u> </u>	88	\vdash	+-	\vdash	\dashv	+	+	Н	-		138	\dashv	+	+	+	\vdash	\dashv	\dashv	\dashv
\vdash	39	H	\dashv	-	\dashv	\dashv		\vdash	 		\vdash	89	\vdash	+	\vdash	\vdash	-+-	+	H	i i		139	\dashv	╁	+-	+-	-		+	\dashv
Н	40	H	+	ᅱ	\dashv	\dashv	\neg	Н	\vdash		 	90		1	Н	-	\dashv	+	\vdash	 		140	-	+	+	T	\vdash	\dashv	\dashv	\dashv
$\vdash \vdash$	41	H	\dashv	\dashv		\dashv		$\vdash \vdash$	+	-	 	91	-	+-	H	\dashv	\dashv	+	$\vdash \vdash$			141	\dashv	\top	+	+		\dashv	\dashv	\dashv
\vdash	42	Н						 	\vdash		 	92	$\vdash \vdash$	+-	\vdash		+	+	\vdash			142	\dashv	+	+	+		\dashv	\dashv	\dashv
	43	\vdash	\dashv	-		-	-	Н	\vdash	-		93	-	\top	Н	- 1		+	Н		\dashv	143	\dashv	\top	\top	T		\dashv	\dashv	\dashv
\vdash	44		\dashv	\neg	\dashv	-	\neg	Н	\vdash	-	 	94	+	+	\vdash		\dashv	+	Н		\neg	144	\dashv	+	\top	\top		\dashv	\dashv	\dashv
$\vdash \vdash$	45	Н		\rightarrow	\dashv	\dashv	\neg	Н		-	· · · · · · ·	95	+	+	Н	+	+	+-	H	 	\neg	145	\top	\top	\top	T	П	\dashv	十	┪
\vdash	46	\vdash	\dashv	\dashv	1	\dashv		Н	\vdash	-		96	\vdash	+	H	-	\dashv	+	H		$\neg \neg$	146	\dashv	+	\top	T	\Box	\dashv	十	\dashv
М	47		\dashv	寸	\dashv	\dashv	\neg	Н		-	· · · · · ·	97	\vdash	+	H	\vdash	+	T	Н			147	\dashv	\top	\top	\top	Н	\dashv	十	\dashv
М	48		寸	\dashv	$\neg \dagger$	\dashv		H		-		98		+	╁╌┤	\dashv	\dashv	\top	H			148	\dashv	十	十	†	H	一	十	\dashv
	49	\Box	寸	7	寸			Н	\vdash	1	\vdash	99		\top	tΠ	\dashv	\dashv		Н			149	\neg	\top	\top	1	Т	_	7	7
П	50		寸	\dashv		\neg	\dashv	\vdash				100		1	П	\dashv	\dashv	\top	П		\neg	150	\neg	7	十	Τ	П	$\neg \uparrow$	┪	\neg
					_	_	_		_									_		-						_				_

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	5230	Host and RAID	US-PGPUB; USPAT	OR	ON	2005/06/26 17:56
L2	967	l1 and RAID adj2 controller	US-PGPUB; USPAT	OR	ON	2005/06/26 17:56
L3	62	12 and network adj4 interface adj4 controller	US-PGPUB; USPAT	OR	ON	2005/06/26 17:57
L4	62	I3 and host	US-PGPUB; USPAT	OR ·	ON	2005/06/26 17:57
L5	49	I4 and (Hub or switch)	US-PGPUB; USPAT	OR	ON	2005/06/26 17:57
L6	64772 (redundant or duplicate or multiple or backup or standby) adj4 (interconnect\$ or connect\$ or interface)		US-PGPUB; USPAT	OR	ON	2005/06/26 17:59
L7	1297	I6 and I1	US-PGPUB; USPAT	OR	ON	2005/06/26 17:59
L8	300	I7 and I2	US-PGPUB; USPAT	OR	ON	2005/06/26 17:59
L9	33	I8 and I3	US-PGPUB; USPAT	OR	ON	2005/06/26 18:10
L10	1370	709/250.ccls.	US-PGPUB; USPAT	OR	ON	2005/06/26 18:17
L11	1694	711/114.ccls.	US-PGPUB; USPAT	OR	ON	2005/06/26 18:17
L12	439	710/38.ccls.	US-PGPUB; USPAT	OR	ON	2005/06/26 18:18
L13	1467	370/360, "412".ccls.	US-PGPUB; USPAT	OR	ON	2005/06/26 18:18
L14	4890	l10 or l11 or l12 or l13	US-PGPUB; USPAT	OR	ON	2005/06/26 18:18
L15	905	I14 and I6	US-PGPUB; USPAT	OR	ON	2005/06/26 18:18
L16	262	l15 and RAID	US-PGPUB; USPAT	OR	ON	2005/06/26 18:18
L17	70	I16 and network same interface same controller	US-PGPUB; USPAT	OR	ON	2005/06/26 18:19
L18	62	l17 and (hub or switch)	US-PGPUB; USPAT	OR	ON	2005/06/26 18:19

						Application or Docket Number								
	PATENT APPLICATION FEE DETERMINATION RECORD Effective October 1, 2000													
_		Eneci	ive Octob	er 1, 20				<u> </u>	<u> </u>	15	36	<u> 245</u>		
		CLAIMS AS	S FILED - (Column			mn 2)	SM/		רודא:		OR	OTHER SMALL		
TC	OTAL CLAIMS		ි ලී				R	ATE	FE	Έ	1	RATE	F	EE
FC)R		NUMBER	FILED	BMUN	ER EXTRA	BAS	IC FE	355	.00	OR	BASIC FEE	710	0.00
TOTAL CHARGEABLE CLAIMS 8 minus 20=						X	\$ 9=			OR	X\$18=			
INDEPENDENT CLAIMS minus 3 =						×	40=			OR	X80=			
MU	LTIPLE DEPEN	NDENT CLAIM P	RESENT				1,1	35=	П		OR	+270=		
• 11	the difference	in column 1 is	less than z	ero, enter	r "0" in c	olumn 2	TC	TAL	35	5	OR	TOTAL	H	
	C	LAIMS AS A	MENDE	- PAR	ŤII	• • •					1	OTHER	THE	.
		(Column 1)		(Colui		(Column 3)	SN	IALL	ENTI	TY	OR	SMALL	ENTI	ĪΥ
ENTA		CLAIMS REMAINING AFTER AMENDMENT		HIGH NUM PREVK PAID	BER OUSLY	PRESENT EXTRA	R	ATE	ADI TION FE	VAL		RATE	TIO	DI- NAL EE
AMENDMENT	Total	. 9	Minus	2	ع ا	. 🔗	X	9=			OR	X\$18= ·		
AME	Independent	. 2	Minus	••• •	3	• 2	×	40=		\Box	OR	X80=		
	FIND! PHESE	ENTATION OF ME	JETIPLE DEI	PENUENI	CCAIM	لـــــــــــــــــــــــــــــــــــــ	+1	35=			OR	+270=		
								TOTAL		∌	OR ,	TOTAL ADDIT, FEE	_	
		(Column 1)		(Colur	nn 2)	(Column 3)	A001	1. / CC						
8		CLAIMS REMAINING		HIGH NUM		PRESENT			ADI		ſ		AC	DI-
ENT		AFTER AMENDMENT		PREVIO PAID	JUSLY	EXTRA	R/	ATE	TION FE			RATE	–	NAL EE
AMENOMENT B	Total	. 9	Minus	.0	ට _	=/	X	9=			OR	X\$18=		
AME	Independent	NTATION OF MU	Minus	EMPENT	<u> </u>		X	10=			OR	X80=		
	PINOTPRESE	· ·	·	ENOCIA	CONIM	لـــــــــــــــــــــــــــــــــــــ	+1	35=		\Box	OR	+270=		
			•					OTAL FEE		7	OA .	TOTAL		
		(Column 1)		(Colum	na 2):	(Column 3)	ADUIT	. PEE			,			
		CLAIMS		RIGH	EST		_		ADD)I-	ſ		Δľ	DI-
AMENDMENT C		REMAINING AFTER AMENOMENT		PREVIO PAID I	USLY	PRESENT EXTRA	RA	TE	TION FE	AL		RATE	TIO	NAL EE
Š	Total	•	Minus	44		2	xs	9=			OR	X\$18=		·
ME	Inebnequent	•	Minus	•••		=	χá	0=			_	×80=		
٢	FIRST PRESE	NTATION OF ML	ALTIPLE DEF	PENDENT	CLAIM		 			\dashv	OR			
• 44	the entry is estimated	me 1 in lace then th	a agent la agen		*M' in act	uma 2	+13				OR [+270=		
** (f the "Highest Nur	nn 1 is less than th mber Previously Pa	id For IN THIS	S SPACE is	less than	20, enter "20."	ADDIT	OTAL FEE			OR A	TOTAL LODIT, FEE		
		mber Previously Pa ber Previously Pak					lound in	the ap	propriat	e box	in colu	µmo 1.		

FORM FTO-875 (Rev. 8/00)

Palani and Trademark Office, U.S. DEPARTMENT OF COMMERCE



REPLY UNDER 37 CFR 1.116 EXPEDITED PROCEDURE TECHNOLOGY CENTER 2100

Attorney's Docket No.: 051876P219

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application for:

Sung-Hoon Baek

Serial No.: 09/753,245

Filed: December 29, 2000

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

Examiner: John R. Brancolini

Art Group: 2153

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Mail Stop RCE Commissioner for Patents Post Office Box 1450 Alexandria, Virginia 22313-1450

Sir:

In connection with the Final Office Action mailed February 10, 2005, regarding the above-referenced application, Applicants respectfully request consideration of the following amendments and remarks below.

IN THE CLAIMS

Please amend claims as follows:

Claim 1 (Currently Amended): An apparatus for a redundant interconnection between multiple hosts and a RAID, comprising:

a plurality of first RAID controlling units and a second RAID controlling unit for processing a requirement of numerous host computers, the first RAID controlling unit including a first network controlling unit and a second network controlling unit, and the second RAID controlling unit including a third network controlling unit and a fourth network controlling unit; and

a plurality of connection units for connecting the plurality of first RAID controlling units and the second RAID controlling unit to the numerous host computers, wherein each of the plurality of first RAID controlling units and the second RAID controlling unitincludes a plural number of network interface controlling units for directly exchanging exchange information with the numerous host computers and a network interface controlling unit included in another RAID controlling units, through the plurality of connecting units, and the first network controlling unit exchanges information with the fourth network controlling unit, and the second network controlling unit exchanges information with the third network controlling unit.

Claim 2 (Original): The apparatus as recited in claim 1, wherein said respective RAID controlling units are connected to the plurality of individual connecting units.

Claim 3 (Currently Amended): The apparatus as recited in claim 2, wherein said plural number of the network interface controlling units are athe first network interface controlling unit being connected to the connecting unit of one side and a-the second network interface controlling unit being connected is coupled to the connecting unit of another side.

Claim 4 (Currently Amended): The apparatus as recited in claim 3, wherein

the first network interface controlling unit and the third network interface

controlling unit processes the requirement of the numerous host computers; and the second network interface controlling unit and the fourth network controlling unit is are used for communication between the respective first RAID controlling units and the second RAID controlling unit when the respective first and second RAID controlling units are not faulty and the second network interface controlling unit and the fourth network controlling unit is are used for executing a function of the first network interface controlling unit and the third network controlling unit included in the respective RAID controlling unitswhen the respective one of the first RAID controlling unit and the second RAID controlling unit is faulty.

Claim 5 (Currently Amended): The apparatus as recited in claim 1, wherein said plurality of connecting units have <u>at least three</u> connection ports more than three, the two <u>of the at least three</u> connection ports among them being is connected coupled to <u>said one of the first</u> network interface controlling unit <u>and the third network controlling unit</u> and the rest <u>of the</u> connection ports thereof-being provided as a hub equipment connected with the numerous host computers.

Claim 6 (Currently Amended): The apparatus as recited in claim 1, wherein said plurality of connecting units have the at least three connection ports more than three, the two of the at least three connection ports among them being are connected coupled to said one of the first network interface controlling unit and the third network controlling unit and the rest of the connection ports thereof being provided as a network switch equipment connected with the numerous host computers.

Claim 7 (Currently Amended): The apparatus as recited in claim 1, wherein said plurality of connecting units have the at least five connection ports more than five, the four of the at least five connection ports among them being connected to said one of the first network interface controlling unit and the third network controlling unit and the rest of the connection ports thereof being provided as a switch connected with the numerous host computers.

Claim 8 (Currently Amended): The apparatus as recited in claim 1, wherein said RAID controlling unit, said network interface controlling unit and said connecting unit are respectively constructed in a pair, the first network interface controlling unit of a-the first RAID controlling unit being connected to a first connecting unit, the second network interface controlling unit of said first RAID controlling unit being connected to a second connecting unit, the first-third network interface controlling unit of a-the second RAID controlling unit being connected to the second connecting unit, and the second-fourth network interface controlling unit of the second RAID controlling unit being connected to the first connecting unit.

Claim 9 (Currently Amended): An apparatus for a redundant interconnection between multiple host computers and a RAID, the apparatus comprising:

a plurality of connection units for connecting the host computers and the RAID;

a first and a second RAID controllers, included in the RAID, each of which having a first network interface controller and a second network interface controller for processing requests from the plurality of the host computers connected through the plurality of the connection units,

wherein the first network interface controller in the first RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the second RAID controller,

wherein the first network interface controller in the second RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the first RAID controller,

wherein the second network interface controller in the first RAID controller is used for fault tolerance by performing functions of the first network interface controller in the second RAID controller when the second RAID controller is faulty, and

wherein the second network interface controller in the second RAID controller is used for fault tolerance by performing functions of the first network

interface controller in the first RAID controller when the first RAID controller is faulty, and

wherein the first network controlling unit in the first RAID controlling unit exchanges information with the second network controlling unit in the second RAID controlling unit, and the second network controlling unit in the first RAID controlling unit exchanges information with the first network controlling unit in the second RAID controlling unit.

REMARKS

Claims 1-9 were examined and reported in the Office Action. Claims 1-9 are rejected. Claims 1 and 3-9 are amended. Claims 1-9 remain. Applicant notes that the limitations "third network controlling unit" and "fourth network controlling unit" are used to distinguish the first and second network controlling units in each RAID controller. Therefore, no new matter is added.

Applicants request reconsideration of the application in view of the following remarks.

I. <u>35 U.S.C. §102(b)</u>

It is asserted in the Office Action that claims 1-9 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,812,754 issued to Lui et al. ("Lui"). Applicant respectfully traverses the aforementioned rejection for the following reasons.

According to MPEP §2131, "'[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' (Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). 'The identical invention must be shown in as complete detail as is contained in the ... claim.' (Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test, i.e., identity of terminology is not required. (In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990))."

Applicant's amended claim 1 contains the limitations of "[a]n apparatus for a redundant interconnection between multiple hosts and a RAID, comprising: a first RAID controlling unit and a second RAID controlling unit for processing a requirement of numerous host computers, the first RAID controlling unit including a first network controlling unit and a second network controlling unit, and the second RAID controlling unit including a third network controlling unit and a fourth network controlling unit; and a plurality of connection units for connecting the first

RAID controlling unit and the second RAID controlling unit to the numerous host computers, wherein the first RAID controlling unit and the second RAID controlling unit directly exchange information with the numerous host computers through the plurality of connecting units, and the first network controlling unit exchanges information with the fourth network controlling unit, and the second network controlling unit exchanges information with the third network controlling unit."

Applicant's amended claim 9 contains the limitations of "[a]n apparatus for a redundant interconnection between multiple host computers and a RAID, the apparatus comprising: a plurality of connection units for connecting the host computers and the RAID; a first and a second RAID controllers, included in the RAID, each of which having a first network interface controller and a second network interface controller for processing requests from the plurality of the host computers connected through the plurality of the connection units, wherein the first network interface controller in the first RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the second RAID controller, wherein the first network interface controller in the second RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the first RAID controller, wherein the second network interface controller in the first RAID controller is used for fault tolerance by performing functions of the first network interface controller in the second RAID controller when the second RAID controller is faulty, and wherein the second network interface controller in the second RAID controller is used for fault tolerance by performing functions of the first network interface controller in the first RAID controller when the first RAID controller is faulty, and wherein the first network controlling unit in the first RAID controlling unit exchanges information with the second network controlling unit in the second RAID controlling unit, and the second network controlling unit in the first RAID controlling unit exchanges information with the first network controlling unit in the second RAID controlling unit."

In other words, Applicant's claimed invention includes two network interface controlling units in each RAID controlling unit for fault tolerance. The first

network interface controlling unit of one RAID controller is connected to a second network controlling unit of the other RAID controller through a connecting unit. The second network interface controlling unit of the one RAID controller is connected to a first network interface controlling unit of the other RAID controller through the connecting unit. The second network interface controlling unit of one RAID controller receives information from the first network interface controlling unit of the other RAID controller through a connecting unit, such as a switch and a hub, in the normal state. Furthermore, the second network interface controlling unit of one RAID controller performs the role of the first network interface controlling unit of the other RAID controller when the first network interface controlling unit of the other RAID controller is faulty.

Lui discloses a RAID system having a fiber channel arbitrated loop. Lui, however, does not teach, disclose or suggest two network interface controlling units included in each RAID controller. That is, in Fig. 3 of Lui, there only one controller SERDES 336 is shown (where controller SERDES 336 is similar to the RAID controller network interface controller of Applicant's claimed invention). Further, Lui discloses a RAID including only one RAID controlling unit having only one serializer/deserializer module, which is similar to the RAID controller network interface controller of Applicant's claimed invention.

It is asserted in the Office Action that Liu discloses two network controlling units in a RAID controller because Liu discloses "[the host loops are coupled to either local or remote host computers 108 through port bypass circuits (PBCs) and serializer/de-serializer modules 336 in RAID controllers 302. In this preferred embodiment, only two host connections are shown in each RAID controller 302." This assertion, however, does not teach, disclose or suggest two network controlling units in each RAID controller. Moreover, Liu does not teach, disclose or suggest "... a first RAID controlling unit and a second RAID controlling unit for processing a requirement of numerous host computers, the first RAID controlling unit including a first network controlling unit and a second RAID controlling unit, and the second RAID controlling unit including a third network controlling unit and a fourth network controlling unit; ... wherein ... the first network controlling unit exchanges information with the fourth network controlling unit, and the second network

controlling unit exchanges information with the third network controlling unit," or "the first network controlling unit in the first RAID controlling unit exchanges information with the second network controlling unit in the second RAID controlling unit, and the second network controlling unit in the first RAID controlling unit exchanges information with the first network controlling unit in the second RAID controlling unit."

Therefore, since Lui does not disclose, teach or suggest all of Applicant's amended claims 1 and 9 limitations, Applicant respectfully asserts that a *prima facie* rejection under 35 U.S.C. § 102(b) has not been adequately set forth relative to Lui. Thus, Applicant's amended claims 1 and 9 are not anticipated by Lui. Additionally, the claims that directly or indirectly depend on claim 1, namely claims 2-8, are also not anticipated by Lui for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 102(b) rejections for claims 1-9 are respectfully requested.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending, namely 1-9, patentably define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR, & ZAFMAN

LLP

Dated: May 9, 2005

12400 Wilshire Boulevard Seventh Floor Los Angeles, California 90025 (310) 207-3800 CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail with sufficient postage in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia 22313-1450 on May 9, 2005.

Igan Sychoda





REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL

Address to: Mail Stop RCE Commissioner for Patents P.O. 1450 Alexandria, VA 22313-1450

Application No.	09/753,245					
Filing Date	December 29, 2000					
First Named Inventor	Sung-Hoon Baek					
Art Unit	2153					
Examiner Name	John R. Barncolini					
Attorney Docket Number	51876P219					

application. Request for Continued Examination (RCE) under 37 C.F.R. § 1.114 of the above-identified application. Request for Continued Examination (RCE) practice under 37 CFR § 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.								
1. Submission required under 37 C.F.R. § 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).								
 a. Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked. i. Consider the amendment(s)/reply under 37 C.F.R. § 1.116 previously filed on (Any unentered amendment(s) referred to above will be entered). 								
ii. Consider the arguments in the Appeal Brief or Reply Brief previously filed on iii. Other								
b. ☑ Enclosed i. ☑ Amendment/Reply iii. ☐ Information Disclosure Statement (IDS) ii. ☐ Affidavit(s)/Declaration(s) iv. ☐ Other								
 Miscellaneous a. Suspension of action on the above-identified application is requested under 37 C.F.R. § 1.103(c) for a period of months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. § 1.17(i) required) 								
b. Other								
Fees The RCE fee under 37 C.F.R. § 1.17(e) is required by 37 C.F.R. § 1.114 when the RCE is filed.								
 a. The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 02-2666. i. RCE fee required under 37 C.F.R. § 1.17(e) and any additional claims fee(s) ii. Extension of time fee (37 C.F.R. § 1.136 and 1.17) iii. Other: (\$.00) 								
b. 🖸 Check in the amount of \$395.00 enclosed 05/12/2005 AWONDAF1 00000095 09753245								
c. Payment by credit card (Form PTO-2038 enclosd) * 01 FC:2801 395.00 0P								
WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.								
SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED								
Name (Print/Type) Steven Laut (Print/Type) Steven Laut (Print/Type) Registration No. (Attorney/Agent) 47,736								
Signature Date May 9, 2005								
CERTIFICATE OF MAILING OR TRANSMISSION								
hereby certify that this correspondence is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. May 9, 2005								
Name (Print/Type) Jean Syoboda								
Signature Date May 9, 2005								

MAY 1 1 2005								
EEE TO A NOMITTAL	1	Complete if Known						
	Application Number	09/753,245						
for FY 2005	Filing Date	December 29, 2000						
Patent fees are subject to annual revision.	First Named Inventor	Sung-Hoon Baek						
Applicant claims small entity status. See 37 CFR 1.27.	Examiner Name	John R. Barncolini						
	Art Unit	2153						
TOTAL AMOUNT OF PAYMENT (\$) 395.00	Attorney Docket No.	51876p219						
METHOD OF PAYMENT (check all that apply)								
METHOD OF PAYMENT (check all that apply)								
	Other (please identify):							
	•	: Blakely, Sokoloff, Taylor & Zafman LLP						
☐ Check ☐ Credit card ☐ Money Order ☐ None ☐	Deposit Account Name hereby authorized to: (c	Blakely, Sokoloff, Taylor & Zafman LLP theck all that apply) indicated below, except for the filing fee						
 Check ☐ Credit card ☐ Money Order ☐ None ☐ Deposit Account Deposit Account Number: 02-2666 For the above-identified deposit account, the Director is ☐ Charge fee(s) indicated below Charge any additional fee(s) or underpayment of fee 	Deposit Account Name hereby authorized to: (c Charge fee(s)	Blakely, Sokoloff, Taylor & Zafman LLP theck all that apply) indicated below, except for the filing fee						

Deposi	Deposit Account Deposit Account Number: 02-2666 Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP											
	For the above-identified deposit account, the Director is hereby authorized to: (check all that apply) Charge fee(s) indicated below Charge any additional fee(s) or underpayment of fee(s) Under 37 CFR §§ 1.16, 1.17, 1.18 and 1.20.											
FEE CALC	ULATI	ON										
1. EX Total Claims Independent Claims Multiple Depe	endent	P - 2	20 <u> </u>	Extra Claims Fee from below Fee Paid 0								
				Fee Description								
Code (1202 1201 2 1203 3 1204 3	(\$) Co 50 22 200 22 860 22 800 22	ode 202 201 203 204	(\$) 25 C 100 Ir 180 M 150 ***	Claims in excess of 20 Independent claims in excess of 3 Aultiple Dependent claim, if not paid Reissue independent claims over original patent Reissue claims in excess of 20 and over original patent DTAL (1) (\$) 0.00	**or number previously paid, if greater, For Reissues, see below							
	DITION Entity Fee											
Code	(\$)	Code	(\$)	Fee Description	Fee Paid							
1051	130	2051	65	Surcharge - late filing fee or oath								
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.								
2053	130	2053	130	Non-English specification								
1251	120 450	2251	60 226	Extension for reply within first month								
1252 1253	1,020	2252 2253	225 510	Extension for reply within second month Extension for reply within third month								
1254	1,590	2254	795	Extension for reply within fourth month	 							
1255	2,160	2255	1,080	Extension for reply within fifth month								
1401	500	2401	250	Notice of Appeal								
1402	500	2402	250	Filing a brief in support of an appeal	<u> </u>							
1403	1,000	2403	500	Request for oral hearing								
1451 1460	1,510 130	2451 2460	1,510 130	Petition to institute a public use proceeding Petitions to the Commissioner								
1460	50	1807	130 50	Processing fee under 37 CFR 1.17(q)	 							
1806	180	1806	180	Submission of Information Disclosure Stmt								
1809	790	1809	395	Filing a submission after final rejection (37 CFR § 1.129(a))								
1810	790 l	2810	395	For each additional invention to be examined (37 CFR § 1.129(b))	 							
	e (enecify)	20.0	BCE.									

1810 790 Other fee (specif		litional invention to be examined (3	37 CFR § 1.129(b))	29(b))				
		SUBTOTAL (2)		(\$)	395.00			
SUBMITTED B	Υ				Com	plete (if applicable)		
Name (Print/Type)	Steven Laut		Registration No. (Attorney/Agent)	47,736	Telephone	(310) 207-3800		
Signature	1	- H			Date	05/09/05		

Based on PTO/SB/17 (12-04) as modified by Blakely, Sokoloff, Taylor & Zafman (wlr) 12/15/2004. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450



UNITED STATES PATENT AND TRADEMARK OFFICE



UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov

APPLICATION NO.]	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO			
09/753,245		12/29/2000	Sung-Hoon Baek	51876p219	. 8804			
8791	7590	02/10/2005	EXAM	INER				
		LOFF TAYLOR &	ZAFMAN	BRANCOLINI, JOHN R				
SEVENTH		DULEVARD		ART UNIT	PAPER NUMBER			
LOS ANGE	ELES, CA	90025-1030	2153					
				DATE MAILED: 02/10/200	5			

Please find below and/or attached an Office communication concerning this application or proceeding.

		Application No.	Applicant(s)							
		09/753,245	BAEK ET AL.							
	Office Action Summary	Examiner	Art Unit							
		John R Brancolini	2153							
 Period for	The MAILING DATE of this communication app. Reply	ears on the cover sheet with the c	orrespondence address							
A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION. - Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication. - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely. - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication. - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).										
Status										
1) Responsive to communication(s) filed on 23 August 2004.										
2a)⊠ T	This action is FINAL . 2b) This action is non-final.									
* *	3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under <i>Ex parte Quayle</i> , 1935 C.D. 11, 453 O.G. 213.									
Disposition of Claims										
4) \(\times \) \(4) ☐ Claim(s) 1-9 is/are pending in the application. 4a) Of the above claim(s) is/are withdrawn from consideration. 5) ☐ Claim(s) is/are allowed. 6) ☐ Claim(s) 1-9 is/are rejected. 7) ☐ Claim(s) is/are objected to.									
Applicatio	n Papers	•								
9)□ T	he specification is objected to by the Examiner	r.								
10)⊠ T	he drawing(s) filed on 23 August 2004 is/are:	a)⊠ accepted or b)□ objected t	o by the Examiner.							
Д	Applicant may not request that any objection to the o	drawing(s) be held in abeyance. See	e 37 CFR 1.85(a).							
	Replacement drawing sheet(s) including the correcting the correction is objected to by the Expension is a content of the Expension in the Expension is content of the Expension in the Expension in the Expension is content of the Expension in the	• • • •	• •							
Priority un	nder 35 U.S.C. § 119									
12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f). a) All b) Some * c) None of: 1. Certified copies of the priority documents have been received. 2. Certified copies of the priority documents have been received in Application No 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)). * See the attached detailed Office action for a list of the certified copies not received.										
Attachment(s		_								
Attachment(s) Notice of References Cited (PTO-892)										

Application/Control Number: 09/753,245

Art Unit: 2153

DETAILED ACTION

This action in response to Amendment filed August 23, 2004.

Claims 1-9 are currently pending in the application.

Drawings

Objections to the drawings are withdrawn due to amendments to the Specification.

Claim Objections

Objections to claims 3 and 8 are withdrawn due to amendment.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Lui et al. (US Patent 5812754), hereinafter referred to as Lui.

In regards to claim 1, Lui discloses an apparatus for a redundant interconnection between multiple hosts and a RAID, comprising:

 A plurality of RAID controlling units for processing a requirement of numerous host computers (Figure 3 shows items 302 A and B, separate RAID controllers). Application/Control Number: 09/753,245

Art Unit: 2153

A plurality of connecting units for connecting the plurality of RAID controlling units
to the numerous host computers (In Figure 3, controller chassis 344 contains a
plurality of connecting units, the connections between the local hosts and the
host loops, see also col 5 lines 36-40).

• Wherein each of the plurality of RIAD controlling units includes a plural number of network interface controlling units for directly exchanging information with the numerous host computers and a network interface controlling unit included in another RAID controlling units, through the plurality of connecting units (each separate RAID unit interacts directly with a host loop, which in turn communicates directly through a port bypass circuit and a serializer/deserializer for communication with the local host, col 5 lines 24-40).

In regards to claim 2, Lui discloses the respective RAID controlling units are connected to the plurality of individual connecting units (Figure 3 shows several individual connecting units connected to the RAID controlling units, see also col 5 lines 36-40).

In regards to claim 3, Lui discloses plural number of the network interfacing controlling units are a first network interface controlling unit being connected to the connecting unit of one side and a second network interface controlling unit being connected to the connecting unit of another side (Figure 3 shows the two separate Raid

Page 3

Application/Control Number: 09/753,245 Page 4

Art Unit: 2153

controllers, each with a host loop which acts as a network interface controlling unit, as discussed in claim 1).

In regards to claim 4, Lui discloses: the first network interface controlling unit processes the requirement of the numerous host computers (the first host loop is provided for communication to a local host, col 5 lines 36-38); and the second network interface controlling unit is used for communication between the respective RAID controlling units when the respective RAID controlling units are not faulty and the second network interface controlling unit is used for executing a function of the first network interface controlling unit included in the respective RAID controlling units when the respective RAID controlling unit is faulty (when an error is detected, the control of the network interface function can be switched from the first to the second host loop, thereby insuring the fault tolerance is provided, col 6 lines 11-32).

In regards to claim 5, Lui discloses the plurality of connecting units have connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a hub equipment connected with the numerous host computers (in Figure 3, the connection chassis shows a plurality of connecting units, two of the connection ports being used to connect to the host loops, and the rest used in a hub, or switching manner, for the various host computers).

Application/Control Number: 09/753,245 Page 5

Art Unit: 2153

In regards to claim 6, Lui discloses the plurality of connecting units have the connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a network switch equipment connected with the numerous host computers (in Figure 3, the connection chassis shows a plurality of connecting units, two of the connection ports being used to connect to the host loops, and the rest used in a hub, or switching manner, for the various host computers).

In regards to claim 7, Lui discloses the plurality of connecting units have the connection ports more than five, the four connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a switch connected with the numerous host computers (in Figure 3, the connection chassis shows a plurality of connecting units, with at least 6 points of connection including the host loops, two of the connection ports being used to connect to the host loops, and the rest used in a hub, or switching manner, for the various host computers).

In regards to claim 8, Lui discloses the RAID controlling unit, the network interface controlling unit and the connecting unit are respectively constructed in pairs, the first network interface controlling unit of a first RAID controlling unit being connected to a first connecting unit, the second network interface controlling unit of said first RAID controlling unit being connected to a second connecting unit, the first network interface

Application/Control Number: 09/753,245 Page 6

Art Unit: 2153

controlling unit of a second RAID controlling unit being connected to the second connecting unit, and the second network interface controlling unit of the second RAID controlling unit being connected to the first connecting unit (in Figure 3, one can see that each of the RAID controlling unit, the network controlling unit [the host loop] and the connecting unit [the chassis back plane individual connections] are in pairs, and the crossover of the fibre wiring allows for the first set of components to communicate with the second set, see also col 6 lines 11-32 for how the bypasses occur between the component sets in case of an error).

In regards to claim 9, Lui discloses apparatus for a redundant interconnection between multiple host computers and a RAID, the apparatus comprising:

- A plurality of connection units for connecting the host computers and the RAID (Figure 3 shows items 302 A and B, separate RAID controllers).
- A first and a second RAID controllers, included in the RAID, each of which having
 a first network interface controller and a second network interface controller for
 processing requests from the plurality of the host computers connected through
 the plurality of the connection units (In Figure 3, controller chassis 344 contains a
 plurality of connecting units, the connections between the local hosts and the
 host loops, see also col 5 lines 36-40, additionally figure 7 shows multiple RAID
 controllers).
- Wherein the first network interface controller in the first RAID controller supplies
 data to the host computers connected through the plurality of connection units

Art Unit: 2153

and processes information transmitted from the second network interface controller in the second RAID controller (each separate RAID unit interacts directly with a host loop via a network controller, which in turn communicates directly through a port bypass circuit and a serializer/deserializer for communication with the local host, col 5 lines 24-40).

- Wherein the first network interface controller in the second RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the first RAID controller (each separate RAID unit interacts directly with a host loop via a network controller, which in turn communicates directly through a port bypass circuit and a serializer/deserializer for communication with the local host, col 5 lines 24-40).
- Wherein the second network interface controller in the first RAID controller is used for fault tolerance by performing functions of the first network interface controller in the second RAID controller when the second RAID controller is faulty (when an error is detected, the control of the network interface function can be switched from the first to the second host loop, thereby insuring the fault tolerance is provided, col 6 lines 11-32).
- Wherein the second network interface controller in the second RAID controller is
 used for fault tolerance by performing functions of the first network interface
 controller in the first RAID controller when the first RAID controller is faulty (when
 an error is detected, the control of the network interface function can be switched

from the first to the second host loop, thereby insuring the fault tolerance is provided, col 6 lines 11-32).

Response to Arguments

Applicant's arguments as presented in the Remarks section:

1. Lui does not disclose or teach two separate network controlling units included in one RAID controller.

In response to argument 1, the examiner respectfully disagrees with application. As shown in Figure 3, Lui provides multiple RAID controllers. In each controller, multiple, in this case two, network controlling units are shown on the controller backplane. Each of these controller units are directly connected to one of two individual network controlling units on the individual RAID controller, marked on each controller as 326.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John R Brancolini whose telephone number is (571) 272-3948. The examiner can normally be reached on M-Th 7am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess can be reached on (571) 272-3949. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Applicant(s)/Patent Under Reexamination Application/Control No. 09/753,245 BAEK ET AL. Notice of References Cited Art Unit Examiner Page 1 of 1 John R Brancolini 2153

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
×	Α	US-5,812,754	09-1998	Lui et al.	714/6
*	В	US-6,192,485	02-2001	Takita et al.	714/6
*	C	US-6,609,213	08-2003	Nguyen et al.	714/4
	D	US-			
	Ε	US-			
	F	US-			
	G	US-			
	Н	US-			
	ı	US-			
	٦	US-			
	К	US-			
	L	US-			
	М	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	0					
	Р					
	Q				******	
	R					
	S					
	Т					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	\ \	
	w	
	×	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).) Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

U.S. Patent and Trademark Office PTO-892 (Rev. 01-2001)

Notice of References Cited

Part of Paper No. 20050207

			lı	ıd	ex	. O	f (Cla	in	าร						'	AP	DIIC	atic	on i	NO.					Αţ	эрш	anı	t(S)				
										 							09/	753	3,2	45						BA	٩EK	(E)	ГΑ	L.			
																		mii									t Ur				T		
																		-				•				^ -							
		* 18811	!		122		.== [L								Joh	in F	<u> </u>	rar	rcol	nı_				21	53	_					
	/ Rejected (Through numer										٦	г	Г					П															
			√	R	eje	cte	d			-1	((TI	hrou Cá	igh n	um	era	1)		N	N	on-	Elec	ted		A		Ар	pea	al				
			_				_			-	Cancelled					4	H						\Box	_									
			=	Α	llo	we	d			÷	Restricted							ı	Ir	Interference				o		Obj	ecte	ed					
						-			Į								╛						Ш										
1	Cla	aim	Γ		-			 e			Claim					Dat	e			7::::	CI	aim	1	Date						\neg			
		<u>a</u>	4											-Fa					Γ						П	Т				П	Т		
	Final	Original	6/10/04	4/04									Final	Original									Final	Original									
	ш	ŏ	9	2									ш	ဝံ	ŀ								"	ō									
		1		√-						\Box				51	\Box	工	土							101									
		2	1		Ш	<u> </u>	Ш	Ц	4	4	_			52	-	_	- -	↓_	<u> </u>	Н	_	4	<u> </u>	102	Ш	_	_	1	<u> </u>	\sqcup	_	4	
		3	1	7	Н	-	Н	-	\dashv	\dashv	\dashv			53 54	+	+	+	╁	├	\vdash	+	-	<u> </u>	103 104	\vdash	\dashv	+	╁	┝	Н	+	\dashv	
		5	Ì	Ì	Н	-	Н		\dashv	\dashv		•		55	\top	\top	+	+	╁		+	7		105	H	十	+	\dagger		H	+	\dashv	
		6	1	1										56			I							106	П	\Box	\blacksquare	$oxed{\Box}$					
		7	1	< <				\vdash	\dashv	\dashv	-	ŀ		57 58	+	+	+	╁	⊢	H		-	<u> </u>	107 108	$\vdash \vdash$	\dashv	+	╀	├	\vdash	+	4	
		9	 `	7			Н		\dashv	\dashv		ŀ		59	\dashv	+	+	+	H		\dashv	-	\vdash	109	H	十	+	\dagger	\vdash		\dashv	\dashv	
		10												60			\perp]		110				1					
		11 12	-	_			_	\sqcup	_	4	_			61 62	+	+	+	+	L	H	+	4	<u> </u>	111 112	\sqcup	\dashv	+	+	<u> </u>	Н	-	_	
		13	-						-	-				63	+	+		+-	╁╌	H	-	-	<u> </u>	113	H	\dashv	+	╁╾	\vdash	\vdash	-	\dashv	
		14												64										114		\perp							
		15	_					-	-		-			65	-		+	+	┡	 	\dashv	-	<u> </u>	115		+	+	╄	<u> </u>	\sqcup	_	4	
		16 17	\vdash	-	-		Н	\dashv	\dashv	\dashv	\dashv	ŀ		66 67	\dashv	+	+	+	╁╾	╁╌┧	+	-	 	116 117	1-1	-+	+	╁	┢	H	+	\dashv	
		18												68];;;		118		士						1	
		19	_		<u> </u>		_			-	-			69	-	+	+	-	┡	\sqcup	+	-	<u> </u>	119		4	+	\bot	<u> </u>		_	4	
		20 21					Н	H	\dashv	+	\dashv			70 71	\dashv	+	+	+	\vdash	\vdash	+	-	 	120 121	\vdash	\dashv		╁	<u> </u>	H	\dashv	\dashv	
İ		22												72										122								ゴ	
		23							4		_			73	_	_	_	\perp	<u> </u>	\sqcup	\perp	_	<u> </u>	123	Ш	4	\perp	\perp	-			4	
		24 25						H	-	\dashv	\dashv	ŀ		74 75	+	-		+	-	H	-	-	 	124 125	\vdash	\dashv	+	╫	\vdash	H	\dashv	\dashv	
		26										ľ		76		\top					\perp			126		\dashv		\perp			\top	_	
		27	_							Д.				77	_		4	1	L		_	_		127	Ш		1					\Box	
ŀ		28 29					H	H		\dashv	\dashv			78 79	+	+	+	-	-		-	-		128 129	H	+	+	+	<u> </u>	\vdash	\dashv	-	
ŀ		30		Н				\exists						80	\perp	\pm	\perp	\top	T	\Box	+	-		130	\Box	\dashv	+	+	\vdash	\Box	\dashv	\dashv	
ļ		31							\Box	\Box				81	\dashv	Ţ	Ţ	1]		131		ightharpoonup	#				1	\Box	
		32 33	-	\vdash	<u> </u>	H	Н	$\vdash \vdash$	\dashv	\dashv	\dashv	•		82 83	-+	+	+	+-	-	\vdash	\dashv	-	<u> </u>	132 133	$\left - \right $	\dashv	+	+	\vdash	$\vdash \vdash$	+	\dashv	
		34		H			H	H			\exists	ŀ		84	\dashv	\perp	+	†	\vdash	\vdash	+	7		134	\vdash	\dashv	+	+	\vdash	H	\dashv	\dashv	
		35												85		\Box	\perp			П	\Box			135			\bot				\Box	\exists	
}		36 37	<u> </u>		H		\vdash	\dashv	\dashv		-			86 87	+	+	+	+	-	\vdash	\dashv	-	<u> </u>	136 137	\vdash	4	+	+	\vdash	H	+	\dashv	
		38		_	H	-	\vdash	\vdash		\dashv	\dashv	ŀ		88	+	+	+	+-	\vdash		\dashv	-		137	$\vdash \vdash$	\dashv	+	+	\vdash		+	\dashv	
İ		39								\sqsupset				89		\downarrow	1			\square	\Box]		139									
		40 41			H		Ц	$\vdash \dashv$	_	4	4			90 91	-	+	\perp	+		\sqcup	-	-	<u> </u>	140	$\vdash \vdash$	4	1	4_	<u> </u>	-	_	4	
ŀ		42		Н	Н	H	Н	\vdash	\dashv	\dashv	\dashv			91	\dashv	+	╁	+	\vdash	$\vdash \vdash$	十	-	 	141 142	H	+	+	╁╌	├-	\vdash	\dashv	\dashv	
ļ		43								丁				93	1	丁	上				士]		143									
		44	LĪ			LĨ				_	4			94	1	\perp	\bot	<u> </u>	L	\Box	\bot	-	<u> </u>	144	П	\bot		\bot		\prod	\bot	_	
}		45 46	\vdash	\vdash	\vdash	\vdash	\vdash	$\vdash \vdash$	\dashv	\dashv	\dashv	ŀ		95 96	\dashv	+	+	+	\vdash	H	+	-	 	145 146	$\vdash \vdash$	\dashv	+	+	\vdash	 	\dashv	\dashv	
ł		47												97		土		工]		147	口	士	上	上	匚		\Box		
		48				\sqcup	\square	Н	_	4	_			98		\perp	\perp	1	<u> </u>	\Box	\dashv	- :::		148	\Box	\bot	\perp	\perp	\vdash	$oxed{oxed}$	[\dashv	
ŀ		49 50	H	\vdash	Н	\vdash	Н	\vdash	\dashv	\dashv	\dashv			99 100	+	+	+	+	\vdash	$\vdash \vdash$	\dashv	-	 	149 150	╁┼	╁	+	+	\vdash	╁╌┼	+	\dashv	
l			ш		-	لب	لـــا	ليب		_	:											::::	ــــــــــــــــــــــــــــــــــــــ						1	<u> </u>	L		

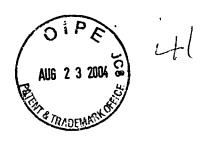


Application No.	Applicant(s)	
09/753,245	BAEK ET AL.	
Examiner	Art Unit	
John R Brancolini	2153	

	SEAR	CHED	
Class	Subclass	Date	Examiner
. 709	201-3, 217-9, 223-4, 239-40	5/11/2004	8
709	244		\mathcal{T}
 .			
***		-	
<u> </u>			

INTERFERENCE SEARCHED												
Class	Subclass	Date	Examiner									
	I <u> </u>											

SEARCH NOT (INCLUDING SEARCH		<u> </u>
	DATE	EXMR
Consult Z. Maung PE 2154 Discuss claims and possible transfer as well as classes for search	5/10/2004	
East Image and Text Search Image 709, 711 Text attached	5/11/2004	B
NPL Search IEEE "RAID connectiont"	5/11/2004	%
Discuss Amended claims with Dinh Prior Art of record discussed as remaining a 102 rejection	2/4/2005	No.
		`



Attorney's Docket No.: 051876P219

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application for:

Sung-Hoon Baek

Serial No.: 09/753,245

Filed: December 29, 2000

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

Examiner: John R. Brancolini

Art Group: 2153

RECEIVED

AUG 2 7 2004

Technology Center 2100

AMENDMENT AND RESPONSE TO OFFICE ACTION

Mail Stop Amendment Commissioner for Patents Post Office Box 1450 Alexandria, Virginia 22313-1450

Sir:

In connection with the Office Action mailed May 20, 2004, regarding the above-referenced application, Applicants respectfully request consideration of the following amendments and remarks below.

IN THE SPECIFICATION

Please amend the paragraph beginning on page 1, line 25 as follows:

As shown in the drawing, such system independently uses two RAID controllers 140, 141, and has an independent connection with network interface controllers 110, 111 of the host computers the RAID 130 includes two RAID controllers 140, 141 and each of RAID controllers 140, 141 includes network interface controllers 150, 151. The network interface controllers 150, 151 of the RAID controllers 140, 141 are independently connected to network interface controllers 110, 111 of the host computers 100, 101 through communication links 120, 121 such as a copper line and an optical fiber. That is, such system has twice the bandwidth and twice the performance. However, there is such a problem that a loss of data occurs when one out of two RAID controllers 140, 141 has a trouble, in other words, this system does not become the fault tolerant system.

Please amend the paragraph beginning on page 2, line 8 as follows:

In order to provide fault tolerance not provided in Fig. 1, two RAID controllers 230, 231 and host computers 200, 201 are connected with each other through a hub or switch 210 in one network RAID 240 includes two RAID controllers 230, 231 and two RAID controllers 230, 231 and host computers 200, 201 are connected with each other through a hub or switch 210 in one network. The RAID controller 230 includes a pair of network interface controllers 220 and 221 and the RAID controller 231 includes a pair of network interface controllers 222 and 223. Thus, even though one RAID controller 230 or 231 has a trouble, all of the host computers 200, 201 are connected to a RAID controller that does not have a trouble. That is, this RAID controller not having the trouble serves as a role of the controller that has the trouble. Also, since the RAID controllers 230, 231 should exchange information with each other by preparing in advance against some trouble, the RAID controllers 230, 231 are connected with each other through communication controllers 221, 222. However, in this case only a half of performance for the bandwidth provided in Fig. 1 can be obtained.

Please amend the paragraph beginning on page 2, line 26 as follows:

The construction shown in the drawing partially represents a systematic connection between a RAID and host computers, which is extracted from contents disclosed in the U. S. Patent No. 5,812,754. The RAID 340 includes two RAID controllers each of which has network interference controllers 330, 331 and four ports 310, 311, 320 and 321. However, this construction has no any difference from that of Fig. 2, in the structure of a communication network, and in case that one out of two host computers 300, 301 has rather a trouble, there is caused a problem that a network is broken. Thus, this construction is inferior to the construction of Fig. 2.

Please amend the paragraph beginning on page 8, line 14 as follows:

As shown in Fig. 4, the present invention can be constructed by a method of internally installing the hubs 440, 441 in the RAID 490, and as shown in Fig. 5, it can be constructed by using the hubs 510, 520 for use of an external installation the host computers 500, 501, 502, 503, 504 and 505 are connected to the RAID 530 by using external hubs 510 and 520.

Please amend the paragraph beginning on page 8, line 19 as follows:

As shown in the drawing, Fig. 6 can have a function of Fig. 4a plurality of host computers 600, 601, 602, 604 and 605 are connected to RAID through a network switch 610. In other words, information from a second network interface controller 622 of a first RAID controller 620 is sent to a first network interface controller 632 of a second RAID controller 630, and information from a second network interface controller 632 of the second RAID controller 630 is transmitted to a first network interface controller 621 of the first RAID controller 620. Further, information from the first network interface controller 631 of the second RAID controller 630 is transmitted to the second network interface controller 622 of the first RAID controller 620. Also, information from the first network interface controller 621 of the first RAID controller 620 is sent to the second network interface controller 632 of the second RAID controller 630.

IN THE CLAIMS

Please amend claims as follows:

Claim 1 (Currently Amended): An apparatus for a redundant interconnection between multiple hosts and a RAID, comprising:

a plurality of RAID controlling units for processing a requirement of numerous host computers; and

a plurality of connection units for connecting the plurality of RAID controlling units to the numerous host computers; and

, wherein each of the plurality of RAID controlling units includes a plural number of network interface controlling units respectively contained into the plurality of RAID controlling units, for directly exchanging information directly with the numerous host computers and an opposite a network interface controlling unit provided within an opposite included in another RAID controlling units, through the plurality of connecting units.

Claim 2 (Original): The apparatus as recited in claim 1, wherein said respective RAID controlling units are connected to the plurality of individual connecting units.

Claim 3 (Currently Amended): The apparatus as recited in claim 2, wherein said each network interface controlling unit is constructed by in a pair, namely two, and is contained into the plurality of RAID controlling units, plural number of the network interface controlling units are a first network interface controlling unit of said network interface controlling unit being connected to the connecting unit of one side and a second network interface controlling unit thereof being connected to the connecting unit of another side.

Claim 4 (Currently Amended): The apparatus as recited in claim 3, wherein said each network interface controlling unit further comprises:

the first network interface controlling unit for processing processes the requirement of the numerous host computers; and

the second network interface controlling unit <u>is</u> used for fault tolerance in a communication between the respective RAID controlling units when the respective

RAID controlling units do not have the occurrence of the error, are not faulty and said the second network interface controlling unit being is used for executing a function of the first network interface controlling unit included in the respective RAID controlling units of the RAID controlling unit having the occurrence of the error in case that when one given RAID controlling unit has the occurrence of the error the respective RAID controlling unit is faulty.

Claim 5 (Original): The apparatus as recited in claim 1, wherein said plurality of connecting units have connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a hub equipment connected with the numerous host computers.

Claim 6 (Original): The apparatus as recited in claim 1, wherein said plurality of connecting units have the connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a network switch equipment connected with the numerous host computers.

Claim 7 (Original): The apparatus as recited in claim 1, wherein said plurality of connecting units have the connection ports more than five, the four connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a switch connected with the numerous host computers.

Claim 8 (Currently Amended): The apparatus as recited in claim 1, wherein said RAID controlling unit, said network interface controlling unit and said connecting unit are respectively constructed by in a pair, the first network interface controlling unit of a first RAID controlling unit being connected to a first connecting unit, the second network interface controlling unit of said first RAID controlling unit being connected to a second connecting unit, the first network interface controlling unit of a second RAID controlling unit being connected to the second connecting unit, and the second network interface controlling unit of the second RAID controlling unit being connected to the first connecting unit.

Claim 9 (New): An apparatus for a redundant interconnection between multiple host computers and a RAID, the apparatus comprising:

a plurality of connection units for connecting the host computers and the RAID;

a first and a second RAID controllers, included in the RAID, each of which having a first network interface controller and a second network interface controller for processing requests from the plurality of the host computers connected through the plurality of the connection units,

wherein the first network interface controller in the first RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the second RAID controller,

wherein the first network interface controller in the second RAID controller supplies data to the host computers connected through the plurality of connection units and processes information transmitted from the second network interface controller in the first RAID controller,

wherein the second network interface controller in the first RAID controller is used for fault tolerance by performing functions of the first network interface controller in the second RAID controller when the second RAID controller is faulty, and

wherein the second network interface controller in the second RAID controller is used for fault tolerance by performing functions of the first network interface controller in the first RAID controller when the first RAID controller is faulty.

REMARKS

Claims 1-8 were examined and reported in the Office Action. Claims 1-8 are rejected. Claims 1, 3, 4, and 8 are amended. New claim 9 is added. New Claim 9 is based on the original specification, page 7 line 8 to page 8 line 8, page 9 lines 5 to 14, Fig. 4 and Fig. 5. Therefore, no new matter is added. Claims 1-9 remain.

Applicants request reconsideration of the application in view of the following remarks.

I. <u>In the Drawings</u>

Figures 1, 2 and 3 are objected to because only that which is old is illustrated. The Figures are also objected to for not including reference numerals 450 and 490. Additionally, the Figures are objected to for including reference numerals not mentioned in the specification. Applicant has amended Figures 1-3 with the addition of the legend --Prior Art--. Applicant has added reference numerals 450 and 490 to Figure 4. Applicant has amended the specification to include the reference numerals previously not mentioned in the specification. Approval is respectfully requested.

II. <u>35 U.S.C. §102(b)</u>

It is asserted in the Office Action that claims 1-8 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,812,754 issued to Liu et al. ("Liu"). Applicant respectfully traverses the aforementioned rejection for the following reasons.

According to MPEP §2131, "'[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.' (Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). 'The identical invention must be shown in as complete detail as is contained in the ... claim.' (Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)). The elements must be arranged as required by the claim, but this is not an ipsissimis verbis test,

i.e., identity of terminology is not required. (In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990))."

Applicant's amended claim 1 contains the limitations of "[a]n apparatus for a redundant interconnection between multiple hosts and a RAID, comprising: a plurality of RAID controlling units for processing a requirement of numerous host computers; and a plurality of connection units for connecting the plurality of RAID controlling units to the numerous host computers, wherein each of the plurality of RAID controlling units includes a plural number of network interface controlling units for directly exchanging information with the numerous host computers and a network interface controlling unit included in another RAID controlling units, through the plurality of connecting units."

In other words, Applicant's claimed invention includes two network interface controlling units, such as the first network interface controlling unit and the second network interface controlling unit, in one RAID controller for fault tolerance. The first network interface controlling unit of one RAID controller is connected to a second network controlling unit of the other RAID controller through a connecting unit. The second network interface controlling unit of the one RAID controller is connected to a first network interface controlling unit of the other RAID controller through the connecting unit. The second network interface controlling unit of one RAID controller receives information from the first network interface controlling unit of the other RAID controller through a connecting unit, such as a switch and a hub in normal state. Furthermore, the second network interface controlling unit of one RAID controller performs the role of the first network interface controlling unit of the other RAID controller when the first network interface controlling unit of the other RAID controller when the first network interface controlling unit of the other RAID controller is faulty.

Lui discloses a RAID system having a fiber channel arbitrated loop. Lui, however, does not teach, disclose or suggest two network interface controlling units included in one RAID controller. That is, in Fig. 3 of Lui, there only one controller SERDES 336 is shown (where controller SERDES 336 is similar to the RAID controller network interface controller of Applicant's claimed invention). Further, Lui discloses a RAID including only one RAID controlling unit having only one serializer/de-

serializer module, which is similar to the RAID controller network interface controller of Applicant's claimed invention. Distinguishable, in Applicant's claimed invention two network interface controllers are included in one RAID controlling unit, which prevents a decrease of bandwidth when the RAID controlling unit is faulty.

Therefore, since Lui does not disclose, teach or suggest all of Applicant's amended claim 1 limitations, Applicant respectfully asserts that a *prima facie* rejection under 35 U.S.C. § 102(b) has not been adequately set forth relative to Lui. Thus, Applicant's amended claim 1 is not anticipated by Lui. Additionally, the claims that directly or indirectly depend on claim 1, namely claims 2-8, are also not anticipated by Lui for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 102(b) rejections for claims 1-8 are respectfully requested.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending, namely 1-9, patentably define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR, & ZAFMAN

LLP

Dated: August 19, 2004

12400 Wilshire Boulevard Seventh Floor Los Angeles, California 90025 (310) 207-3800 CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail with sufficient postage in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia 22313-1450 on August 19, 2004.

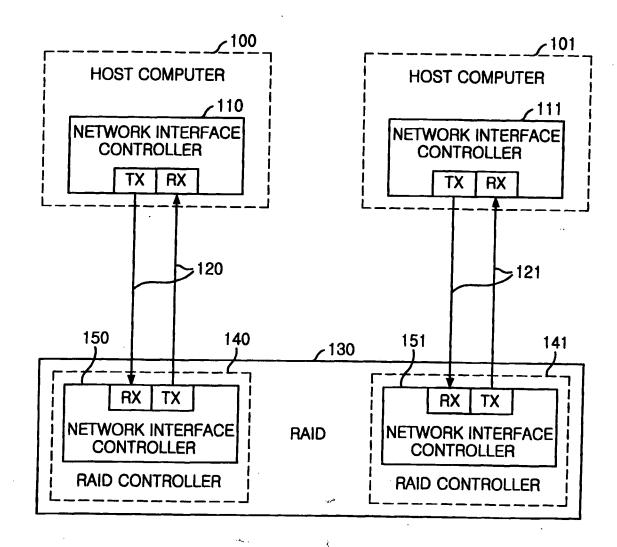
Jean S√oboda

By:



FIG. 1

--PRIOR ART--



Blakely, Sokoloff, Taylor & Zafman LLP (310) 2 Title: APPARATUS FOR REDUNDANT INTERCONNECTION (310) 207-3800 BETWEEN MULTIPLE HOSTS AND RAID - UTILITY

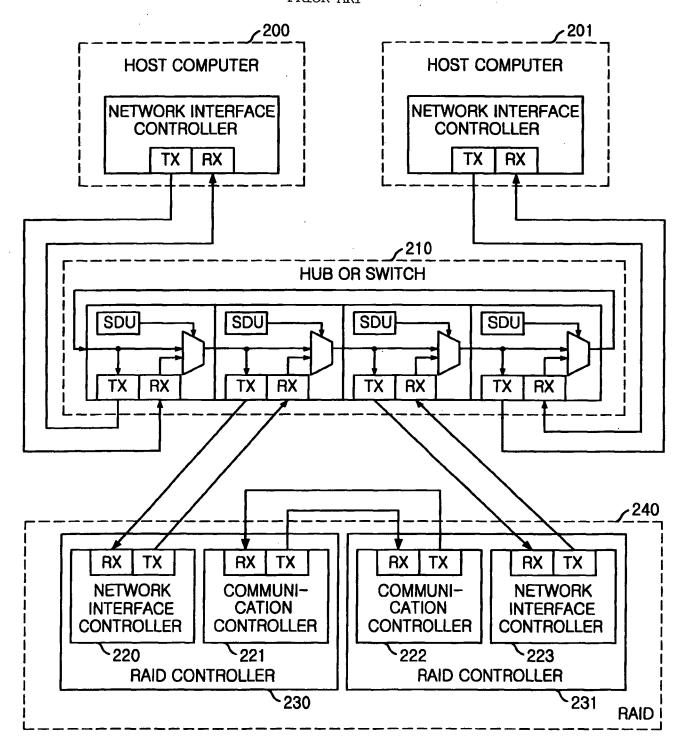
1st Named Inventor: Sung-Hoon Baek

Docket No.: 51876P219 Application No.: 09/753,245 Sheet: 1 of 4

DHPN-1002 / Page 54 of 158

REPLACEMENT SHEET

FIG. 2 --PRIOR ART--



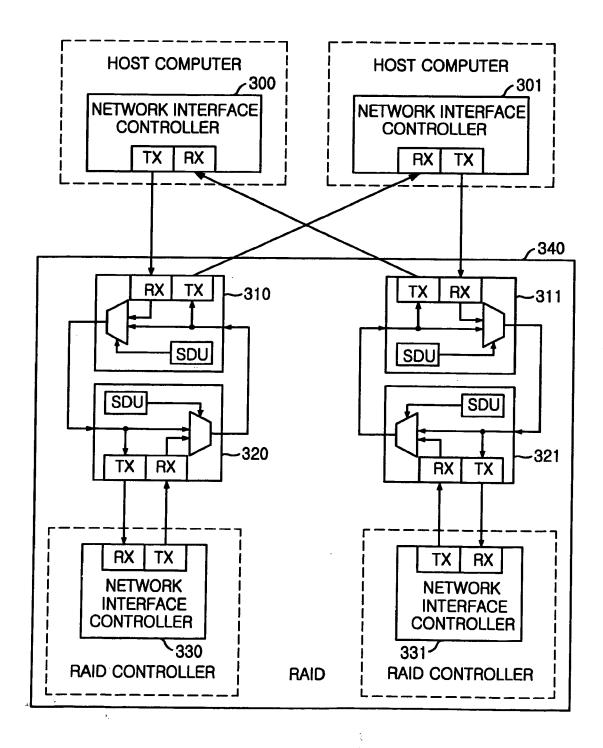
Blakely, Sokoloff, Taylor & Zafman LLP (310) 2 Title: APPARATUS FOR REDUNDANT INTERCONNECTION (310) 207-3800 BETWEEN MULTIPLE HOSTS AND RAID - UTILITY

1st Named Inventor: Sung-Hoon Baek Application No.: 09/753,245 Docket No.: 51876P219

DHPN-1002 / Page 55 of 158 Sheet: 2 of 4



FIG. 3
--PRIOR ART--



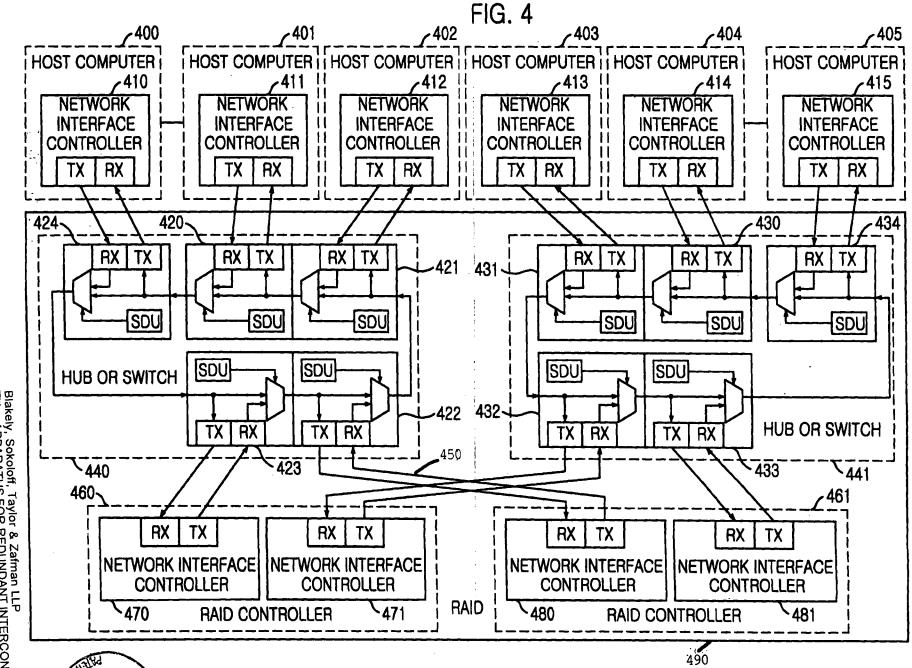
Blakely, Sokoloff, Taylor & Zafman LLP (310) 207-3800
Title: APPARATUS FOR REDUNDANT INTERCONNECTION

BETWEEN MULTIPLE HOSTS AND RAID - UTILITY

1st Named Inventor: Sung-Hoon Baek

Application No.: 09/753,245 Docket No.: 51876P219

Sheet: 3 of 4 DHPN-1002 / Page 56 of 158



Blakely, Sokoloff, Taylor & Zafman LLP
Title: APPARATUS FOR REDUNDANT INTERCONNECTION
BETWEEN MULTIPLE HOSTS AND RAID - UTILITY
1st Named Inventor: Sung-Hoon Baek
Application No.: 09/753,245
Sheet: 4 of 4

2 3 2004

D

AUG 2 3 2004 C

TRANSMITTAL FORM (to be used for all correspondence after initial filing) Total Number of Pages in This Submission Application No. O9/753,245 Filing Date December 29, 2000 First Named Inventor Sung-Hoon Back Art Unit 2153 Examiner Name John R. Barncolini Attorney Docket Number 51876P219

	ENCLO	SURES (check	all that apply)		
Fee Transmittal	Form	Drawing(s)			After Allowance Communication to Group
Fee Attac	hed	Licensing-rela	ited Papers		Appeal Communication to Board of Appeals and Interferences
Amendment / Re	esponse	Petition			Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
After Fina Affidavits.	al /declaration(s)	Petition to Con Provisional Ap	nvert a oplication		Proprietary Information
Extension of Tim	ne Request	Power of Atto Change of Co	rney, Revocation rrespondence Address		Status Letter
Express Abando	nment Request	Terminal Dis	claimer ,		Other Enclosure(s) (please identify below):
Information Disc	losure Statement	Request for R	efund		Return receipt postcard
PTO/SB/0	08	CD, Number	of CD(s)		
Certified Copy of Document(s)	f Priority				RECEIVE
Response to Mis Incomplete Appl	ssing Parts/ ication	Remarks			AUG 2 7 2004
	c Filing Fee aration/POA				Technology Center 2
Response Parts und 1.52 or 1.5	e to Missing er 37 CFR 53				0,
	SIGNATUR	E OF APPLICANT	, ATTORNEY, OR	AGENT	
Firm	Steven Laut, R	Reg. No. 47,736			
<i>or</i> Individual name		/ /	AYLOR & ZA	FMAN	ILLP
Signature			T T		
Date	August 19, 20	004			
	CERTIF	ICATE OF MAILIN	G/TRANSMISSION	1	
					the date shown below with sufficient atents, P.O. Box 1450, Alexandria,
Typed or printed n	ame Jean Svobo	da			
Signature		-d		Date	August 19, 2004

Based on PTO/SB/21 (04-04) as modified by Blakely, Solokoff, Taylor & Zafman (w/r) 06/04/2004. SEND TO: Commissionar for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

AUB 2 3 2004 &

FEE TRANSMITTAL for FY 2004

Effective 10/01/2004. Patent fees are subject to annual revision.

Applicant claims small entity status. See 37 CFR 1.27.

TOTAL AMOUNT OF PAYMENT

0.00

(\$)

	Complete if Known	
Application Number	09/753,245	
Filing Date	December 29, 2000	
First Named Inventor	Sung-Hoon Baek	
Examiner Name	John R. Barncolini	
Art Unit	2153	
Attorney Docket No.	51876p219	

METHOD OF PAYMENT (check all that apply)				FE	E CALCULATI	ON (continu	ed)		
☐ Check ☐ Credit card ☐ Money ☐ Other ☐ None	3. A	DDITIO	NAL	FEES				-	
	Large	e Entity	ı Sma	ll Entity	,				
Deposit Account	Fee	Fee	Fee	Fee	_				
Deposit Account 02 2666	Code	(\$)	Code	(\$)	Fex	e Description		FeePaid	
Account Number 02-2666	1051	130	2051	65	Surcharge - late filing	fee or oath			
Deposit	1052	50	2052	25	Surcharge - late provis cover sheet.	sional filing fee or			
Account Name Blakely, Sokoloff, Taylor & Zafman LLP	2053	130	2053	130	Non-English specificati	ion			
The Commissioner is authorized to: (check all that apply)	1812	2,520	1812	2,520	For filing a request for		ation		
Charge fee(s) indicated below Credit any overpayments	1804	920 *	1804	920 1	 Requesting publication Examiner action 	n of SIR prior to			
Charge any additional fee(s) or underpayment of fees as required under 37		4 040 +		4.040.1		4 CID - 4		·	
Charge any additional reets) or underpayment or rees as required under 37 CFR §§ 1.16, 1.17, 1.18 and 1.20.	1805	1,840 *	1805	1,840 `	 Requesting publication Examiner action 	n of SIR after			
Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account	1251	110	2251	55	Extension for reply wit	hin first month			
FEE CALCULATION	1252	420	2252	210	Extension for reply with	hin second month			
1. BASIC FILING FEE	1253	960	2253	475	Extension for reply with	hin third month		 	
Large Entity Small Entity	1254	1,480	2254	740	Extension for reply wit	hin fourth month			
Fee Fee Fee Fee Description FeePaid	1255	2,010	2255	1,005	Extension for reply wit	hin fifth month			
	1404	330	2401	165	Notice of Appeal				
1001 770 2001 385 Utility filing fee	1402	330	2402	165	Filing a brief in suppor	t of an appeal			
1002 340 2002 170 Design filing fee	1403	290	2403	145	Request for oral hearing	ng			
1003 530 2003 266 Plant filing fee 1004 770 2004 385 Reissue filing fee	1451	1,510	2451	1,510	Petition to institute a p	ublic use proceedi	ng		
	1452	110	2452	55	Petition to revive - una	voidable	RECE	h	
1005 160 2005 80 Provisional filing fee	1453	1,330	2453	665	Petition to revive - unir	ntentional	ILCE	!∨⊏ ₩	
SUBTOTAL (1) (\$)	1501	1,330	2501	665	Utility issue fee (or rei		ALIC O. I	2004	
2. EXTRA CLAIM FEES Extra Fee from	1502	480	2502	240	Design issue fee	,	AUG 2 '	2004	
2. LATRA CLATTO Fee from Claims below Fee Paid	1503	640	2503	320	Plant issue fee	Т.,			
Total Claims 9 20 = 0 X 9.00 = \$0.00	1460	130	2460	130	Petitions to the Comm	issioner 160	chnology C	lenter 2 110	
Independent 2 3 = 0 x 43.00 = \$0.00	1807	50	1807	50	Prosessing fee under	37 CFR 1.17(q)			
Multiple Dependent =	1806	180	1806	180	Submission of Informa	ation Disclosure St	mt		
Large Entity Small Entity	8021	40	8021	40	Recording each paten				
Fee Fee Fee Fee Description					property (times number	er of properties)			
Code (\$) Code (\$)	1809	770	1809	385	Filing a submission aft (37 CFR § 1.129(a))	er final rejection			
1202 18 2202 9 Claims in excess of 20	4040	770	2040	205					
1201 86 2201 43 Independent claims in excess of 3	1810	770	2810	38 5	For each additional invexamined (37 CFR § 1				
1203 290 2203 145 Multiple Dependent claim, if not paid	1801	770	2801	385	Request for Continued	Examination (RCE	≣)	f	
1204 86 2204 43 **Reissue independent claims over original patent	1802	900	1802	900	Request for expedited				
1205 18 2205 9 **Reissue claims in excess of 20 and over					of a design application				
original patent	Other fe	e (specify)							
SUBTOTAL (2) (\$) 0.00		45 B 1 =		.					
**or number previously paid, if greater, For Reissues, see below	*Reduce	d by Basic F	ung Fee	Paid	\$	SUBTOTAL (3)	(\$)		
SUBMITTED BY						Comr	olete (if applical	ole)	
	R	egistratio	n No.	T	17.726				
Name (Print/Type) Steven Laut	(Attorney/Agent) 47,736 Telephone (310)					(310) 207	207-3800		
Signature						Date	08/19	/04	

Based on PTO/SB/17 (10-03) as modified by Blakely, Solokoff, Taylor & Zafman (wlr) 02/10/2004. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Signature

Date

								A	pplica	tion o	r Do	cket Num	ber	
	PATENT A	APPLICATIO	RD		_									
		Eneci	ive Octob	er 1, 20	000				M	5	36	045_		
		CLAIMS AS	FILED - (Column			mn 2)	SMA TYP	LLE	YTITY		OR.	OTHER SMALL I		
TC	TAL CLAIMS		8					RATE FEE) 	RATE		ΕE
FO	·R		NUMBER	FILED				BASIC FEE 355.00			OR	BASIC FEE	710	.00
то	TAL CHARGEA	BLE CLAIMS	8 min	us 20=	•		X	X\$ 9=			OR	X\$18=		
IND	EPENDENT CL	Aims	\ mi	nus 3 =	•		¥	40=		_		X80=	\dashv	
MU	LTIPLE DEPEN	IDENT CLAIM P	RESENT		L		-				OR		\dashv	
* 16	the difference	in column 1 is	loce than ze	ro onto	r "O" in c	noluma 2		35=		-	OR	+270=	\perp	
11						Oldinii Z	TC	TAL	35	5	OR	TOTAL		
	C	LAIMS AS A (Column 1)	MENDED	- PAH (Colu		(Column 3)	SM	IALL	ENTIT	ΓΥ (OR	OTHER SMALL		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGH NUM PREVI	EST BER OUSLY FOR	PRESENT EXTRA	R	ATE	ADI TION FE	IAL		RATE	TIO	DI- NAL EE
N O	Total	. 9	Minus	" 7	2	= 🔶	XS	§ 9=			OR	X\$18=		
ME	Independent	· 2_	Minus	***	3	= ~	X.	40=		٦,	OR	X80=		
	FIRST PRESE	NTATION OF M	JLTIPLE DEF	PENDEN.	CLAIM		41	35=		_	OR.	+270=		
								TOTAL	£	}	ا ۔	TOTAL		-
		(Column 1)		(Colu	3)	(Column 3)	ADDI	T. FEE		`لــــــــــــــــــــــــــــــــــــ	JH .	ADDIT. FEE		
		CLAIMS		HIGH	EST				ADE)I-	1		ΑΓ	DI-
AMENDMENT B		REMAINING AFTER AMENDMENT		PREVI	IBER OUSLY FOR	PRESENT EXTRA	R/	ATE	TION FEI	IAL		RATE	TIO	NAL EE
NON	Total	•	Minus	**	·	=	X	9=		d	ЭR	X\$18=		
AME	Independent	•	Minus	***		=	X	10 =		\Box	OR	X80=		
	FIRST PRESE	NTATION OF MU	JETIPLE DEF	ENDEN	CLAIM		+1	35=			OR.	+270=		
			•					TOTAL T. FEE		\dashv	I DR	TOTAL ADDIT. FEE		
		(Column 1)		(Colu	mn 2)	(Column 3)	AUUI	I. PEE		ر				
AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGH NUM PREVI	IEST BER OUSLY FOR	PRESENT EXTRA	RA	\TE	ADD TION FEI	AL		RATE	TIO	DDI- NAL EE
MOI	Total	•	Minus	**		=	XS	9=)R	X\$18=		
MEN	Independent	•	Minus	***		=	1	iO=		\neg		X8C=	\vdash	
A	FIRST PRESE	NTATION OF M	JLTIPLE DEF	ENDEN.	T CLAIM					'	OR		 	
+135= OR +270=														
•••	If the "Highest Nut If the "Highest Nut	mn 1 is less than tr mber Previously Pi mber Previously Pa aber Previously Pai	aid For" IN THI aid For" IN THI	S SPACE I	is less tha is less tha	n 20, enter "20." in 3, enter "3."	ADDI	OTAL I. FEE the ap	propriat			TOTAL ADDIT. FEE Jumn 1.		

FORM PTO-875 (Rev. 8/00) Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE





United States Patent and Trademark Office

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov

APPLICATION NO.	FILING DATE	FILING DATE FIRST NAMED INVENTOR		CONFIRMATION NO.
09/753,245 12/29/2000 Sung-Hoo		Sung-Hoon Baek	51876p219	8804
8791	7590 05/20/2004		EXAMI	NER
	SOKOLOFF TAYLOR &		BRANCOLIN	II, JOHN R
	HIRE BOULEVARD, SEVE .ES, CA 90025	NIH FLOOK	ART UNIT	PAPER NUMBER
	•		2153	4
			DATE MAILED: 05/20/2004	\sim \sim

Please find below and/or attached an Office communication concerning this application or proceeding.

X

		Application No.	Applicant(s)	\mathcal{L}
•		09/753,245	BAEK ET AL.	9
	Office Action Summary	Examiner	Art Unit	
		John R Brancolini	2153	
Period fo	The MAILING DATE of this communication a or Reply	appears on the cover sh	eet with the correspondence a	ddress
THE - External efter - If the - If NC - Failu Any	ORTENED STATUTORY PERIOD FOR REF MAILING DATE OF THIS COMMUNICATION nsions of time may be available under the provisions of 37 CFR SIX (6) MONTHS from the mailing date of this communication. period for reply specified above is less than thirty (30) days, a period for reply is specified above, the maximum statutory perior to reply within the set or extended period for reply will, by stareply received by the Office later than three months after the may be patent term adjustment. See 37 CFR 1.704(b).	N. 1.136(a). In no event, however, reply within the statutory minimun od will apply and will expire SIX (tute, cause the application to bec	may a reply be timely filed n of thirty (30) days will be considered tim 6) MONTHS from the mailing date of this ome ABANDONED (35 U.S.C. § 133).	
Status				•
1)🖂	Responsive to communication(s) filed on 29	December 2000.		
2a) <u></u> □	This action is FINAL . 2b)⊠ T	his action is non-final.		
3)□	Since this application is in condition for allow closed in accordance with the practice under	•		e merits is
Dispositi	ion of Claims	•		
5) <u></u> 6) <u> </u>	Claim(s) <u>1-8</u> is/are pending in the applicatio 4a) Of the above claim(s) is/are withd Claim(s) is/are allowed. Claim(s) <u>1-8</u> is/are rejected. Claim(s) <u>3,8</u> is/are objected to. Claim(s) are subject to restriction and	Irawn from consideratio		
Applicati	ion Papers			
10)⊠	The specification is objected to by the Exam The drawing(s) filed on 29 December 2000 in Applicant may not request that any objection to the Replacement drawing sheet(s) including the corrupted oath or declaration is objected to by the	s/are: a) ☐ accepted o he drawing(s) be held in a rection is required if the dr	beyance. See 37 CFR 1.85(a). awing(s) is objected to. See 37 C	DFR 1.121(d).
Priority (ınder 35 U.S.C. § 119			
12) <u>□</u> a)l	Acknowledgment is made of a claim for foreign All b) Some * c) None of: 1. Certified copies of the priority docume 2. Certified copies of the priority docume 3. Copies of the certified copies of the papplication from the International Buresee the attached detailed Office action for a light specified.	ents have been received ents have been received riority documents have eau (PCT Rule 17.2(a))	d. d in Application No been received in this Nationa .	ıl Stage
Attachmen	t(s)			
	e of References Cited (PTO-892)		rview Summary (PTO-413)	
3) 🛛 Infor	e of Draftsperson's Patent Drawing Review (PTO-948) mation Disclosure Statement(s) (PTO-1449 or PTO/SB/		er No(s)/Mail Date ce of Informal Patent Application (PT er:	⁻ O-152)

Art Unit: 2153

DETAILED ACTION

Claims 1-8 are pending in the application.

4

Priority

Priority has been claimed to Korean application number 2000-54807. The effective filing date of the application is September 19, 2000.

Information Disclosure Statement

The information disclosure statement (IDS) was submitted on December 29, 2000. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Drawings

Figures 1, 2 and 3 should be designated by a legend such as --Prior Art--because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 450, 490.

Art Unit: 2153

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

Fig 1, items 100, 101, 120, 121, 130, 150, 151.

Fig 2, items 220, 223, 240.

Fig 3, items 310, 311, 320, 321, 330, 331, 340.

Fig 5, items 500, 501, 502, 503, 504, 505, 530.

Fig 6, items 600, 601, 602, 603, 604, 605.

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

Claims 3 and 8 are objected to because of the following informalities: The phrasing "constructed by a pair". The intended meaning of the phrase is uncertain to the examiner, and for reference purposes in the application of prior art, the examiner is interpreting the phrase to mean "constructed in pairs".

Appropriate correction is required.

Art Unit: 2153

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Lui et al. (US Patent 5812754), hereinafter referred to as Lui.

In regards to claim 1, Lui discloses an apparatus for a redundant interconnection between multiple hosts and a RAID, comprising:

- A plurality of RAID controlling units for processing a requirement of numerous host computers (Figure 3 shows items 302 A and B, separate RAID controllers).
- A plurality of connecting units for connecting the plurality of RAID
 controlling units to the numerous host computers (In Figure 3, controller
 chassis 344 contains a plurality of connecting units, the connections
 between the local hosts and the host loops, see also col 5 lines 36-40).
- A plural number of network interface controlling units respectively
 contained into the plurality of RAID controlling units, for exchanging
 information directly with the numerous host computers and an opposite
 network interface controlling unit provided within an opposite RAID

Art Unit: 2153

controlling units, through the plurality of connecting units (each separate RAID unit interacts directly with a host loop, which in turn communicates directly through a port bypass circuit and a serializer/deserializer for communication with the local host, col 5 lines 24-40).

In regards to claim 2, Lui discloses the respective RAID controlling units are connected to the plurality of individual connecting units (Figure 3 shows several individual connecting units connected to the RAID controlling units, see also col 5 lines 36-40).

In regards to claim 3, Lui discloses each network interface controlling unit is constructed in a pair, namely two, and is contained into the plurality of RAID controlling units, a first network interface controlling unit of said network interface controlling unit being connected to the connecting unit of one side and a second network interface controlling unit thereof being connected to the connecting unit of another side (Figure 3 shows the two separate Raid controllers, each with a host loop which acts as a network interface controlling unit, as discussed in claim 1).

In regards to claim 4, Lui discloses each network interface controlling unit further comprises: the first network interface controlling unit for processing the requirement of the numerous host computers (the first host loop is provided for communication to a local host, col 5 lines 36-38); and the second network

Art Unit: 2153

interface controlling unit used for fault tolerance in a communication between the respective RAID controlling units when the respective RAID controlling units do not have the occurrence of the error, said second network interface controlling unit being for executing a function of the first network interface controlling unit of the RAID controlling unit having the occurrence of the error in case that one given RAID controlling unit has the occurrence of the error (when an error is detected, the control of the network interface function can be switched from the first to the second host loop, thereby insuring the fault tolerance is provided, col 6 lines 11-32).

In regards to claim 5, Lui discloses the plurality of connecting units have connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a hub equipment connected with the numerous host computers (in Figure 3, the connection chassis shows a plurality of connecting units, two of the connection ports being used to connect to the host loops, and the rest used in a hub, or switching manner, for the various host computers).

In regards to claim 6, Lui discloses the plurality of connecting units have the connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a network switch equipment connected with the numerous host computers (in Figure 3, the connection chassis shows a plurality

Art Unit: 2153

of connecting units, two of the connection ports being used to connect to the host loops, and the rest used in a hub, or switching manner, for the various host computers).

In regards to claim 7, Lui discloses the plurality of connecting units have the connection ports more than five, the four connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a switch connected with the numerous host computers (in Figure 3, the connection chassis shows a plurality of connecting units, with at least 6 points of connection including the host loops, two of the connection ports being used to connect to the host loops, and the rest used in a hub, or switching manner, for the various host computers).

In regards to claim 8, Lui discloses the RAID controlling unit, the network interface controlling unit and the connecting unit are respectively constructed in pairs, the first network interface controlling unit of a first RAID controlling unit being connected to a first connecting unit, the second network interface controlling unit of said first RAID controlling unit being connected to a second connecting unit, the first network interface controlling unit of a second RAID controlling unit being connected to the second connecting unit, and the second network interface controlling unit of the second RAID controlling unit being connected to the first connecting unit (in Figure 3, one can see that each of the RAID controlling unit, the network controlling unit [the host loop] and the

Art Unit: 2153

connecting unit [the chassis back plane individual connections] are in pairs, and the crossover of the fibre wiring allows for the first set of components to communicate with the second set, see also col 6 lines 11-32 for how the bypasses occur between the component sets in case of an error).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Takita et al. (US Patent 6192485), a redundant apparatus for connection to a controller, the apparatus including an active unit and a stand-by unit for fault tolerance.
- Nguyen et al. (US Patent 6609213), a method for connecting various computers to a hub which leads to a series of RAID drives, the system including a switching mechanism for fault tolerance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John R Brancolini whose telephone number is (703) 305-7107. The examiner can normally be reached on M-Th 7am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess can be reached on (703) 305-4792. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2153

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pairdirect.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (tollfree).

JRB

Notice of References Cited

Application/Control No. 09/753,245	Reexaminati	Applicant(s)/Patent Under Reexamination BAEK ET AL.		
Examiner	Art Unit			
John R Brancolini	2153	Page 1 of 1		

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	Α	US-5,812,754 A	09-1998	Lui et al.	714/6
	В	US-6,192,485 B1	02-2001	Takita et al.	714/6
	С	US-6,609,213 B1	08-2003	Nguyen et al.	714/4
	D	US-			
	E	US-			ü.
	F	US-			
	G	US-			·
	Н	US-			
	ı	US-			
	J	US-			
	К	US-			
	L	US-			
	М	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	Z					
	0					
	Р					
	ο					
	R					
	s				-	
	Т					

NON-PATENT DOCUMENTS

		Non-Fried Booklette
*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	w	
	×	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).) Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

U.S. Patent and Trademark Office PTO-892 (Rev. 01-2001)

Notice of References Cited

Part of Paper No. 5

Form PTO-1449 (Modified)	Atty Docket No. 51876p219	Application No.	
List of Patents & Publications Statement	Applicant(s): Sung-Hoon Baek, et	al.	
(Use several sheets if necessary)	Filing Date:	Group No.:	

U.S. PATENT DOCUMENTS

Exam. Initials		Document Number	Date	Name	Class	Sub- class	Filing Date (if appropriate)
ZAX .	ĀA	5,251,062	10/05/1993	Snitzer et al.			
633	AB	5,798,306	08/25/1998	Dickinson, Jr.			
3	AC	4,652,536	03/24/2087	Nakajima et al.			
7	AD						
	AE						
	AF						
	AG						
	AH						
	ΑĪ						
	AJ						
	AK						

FOREIGN PATENT DOCUMENTS

Exam. Initials		Document Number	Date	Country	Class	Sub- class	Trans Yes	slation No
	AL							
	AM							
	AN							
	AO							
	AP							
	AQ							

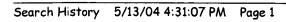
OTHER ART (Including Title, Author, Date, Pertinent Pages, etc.)

Exam. Initials		Document Identification
8	AR	Tellurite glass: a new candidate for fiber devices by J.S. Wang: Optical Materials 3 (1994) 187-203
3	AS	Structure and optical properties of rare earth doped zinc oxyhalide tellurite glasses by D.L. Sidebottom: Journl of Non-Crystalline Solids 222 (1997), pages 282-289
\$	AT	Raman spectra snd thermal analysis of a new lead-tellurium-germanate glass system by Z. Pan: Journl of Non-Crystalline Solids 210 (1997), pages 130-135

Date Considered: Mrs 12,2005 Examiner: _

Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication

L Number	Hits	Search Text	DB	Time stamp
-	6491	RAID	USPAT;	2004/05/10
			US-PGPUB	13:36
-	1540	RAID and interconnect	USPAT;	2004/05/10
ļ			US-PGPUB	10:17
-	352	(RAID and interconnect) and 709.clas.	USPAT;	2004/05/10
			US-PGPUB	10:17
-	290	((RAID and interconnect) and 709.clas.) and	USPAT;	2004/05/10 11:16
		redundant	US-PGPUB	
-	1	(((RAID and interconnect) and 709.clas.) and	USPAT;	2004/05/10
		redundant) and RAID.ti.	US-PGPUB	10:35
-	91	((RAID and interconnect) and 709.clas.) and	USPAT;	2004/05/10
+		redundant and @ad<20000919	US-PGPUB	11:26
-	6	RAID.ti. and redundant.ti.	USPAT;	2004/05/10
			US-PGPUB	13:36
-	1777	saitoh.in.	USPAT;	2004/05/10
			US-PGPUB	15:15
-	17	saitoh.in. and internet	USPAT;	2004/05/10
			US-PGPUB	15:15
-,	1	5812754.pn.	USPAT;	2004/05/11
		·	US-PGPUB	13:25
-	58	5812754.URPN.	USPAT	2004/05/11 13:14
-	25	redundant.ti. and 709.clas. and @ad>20001228	USPAT;	2004/05/11
			US-PGPUB	13:26
-	5	"753245"	USPAT;	2004/05/11
			US-PGPUB	14:02
-	252	711/114.ccls. and interconnect	USPAT;	2004/05/11
			US-PGPUB	14:03
-	149	711/114.ccls. and interconnect and @ad<20001229	USPAT;	2004/05/11
			US-PGPUB	14:03
-	5	711/114.ccls. and interconnect and @ad<20001229	USPAT;	2004/05/11
]		and redundant.ti.	US-PGPUB	14:03
-	62	711/114.ccls. and interconnect and @ad<20001229	USPAT;	2004/05/11
		and fault	US-PGPUB	14:03
-	44	711/114.ccls. and interconnect and @ad<20001229	USPAT;	2004/05/13
		and fault and RAID	US-PGPUB	08:55
-	2	("6275859" "6370142").PN.	USPAT	2004/05/13
				09:05



Please type a plus sign (+) inside this box + Approved for use through 10/31/2002 OMB 0651-0032

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1 53(b))

Attori	ney Docket No.	51876p219		
First .	Inventor or Applic	cation Identifier	Sung-Hoon Baek	1
Title	APPARATUS FO	R REDUNDANT	INTERCONNECTION BETWEEN M	IULTIE
Expre	ess Mail Label No	-	em014066885us	S.

	ATION ELEMENTS concerning utility patent application conte		DDRESS	TO:	Box Pate	t Commissiont Application, DC 202		1921
2. Applicant classes 37 CFR 3. Specification (preferred arrang - Descriptive - Cross Refe - Statement F - Reference for a comput		14	 CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix) Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) Computer Readable Form (CFR) Specification Sequence Listing on. CD-ROM or CD-R (2 copies), or ii Paper Statement verifying identity of above copies 					
- Brief Summ	nary of the Invention iption of the Drawings (if filed)		,	CCOMPAN	NYING	APPLICA	ATION PARTS	
- Detailed Dec - Claim(s) - Abstract of 4. Drawing(s) (3 5. Oath or Declara a. D. fo for Declara b. D. fo for Declara i. D. fo for Declara a. D. fo for Declara a. D. fo for Declara a. D. fo for J. fo for Declara a. D. fo for J. fo for Declara a. D. fo for J. fo for Declara a. D. for Declara a. D. for Declara a. D. fo for Declara a. D. for Declara a. D. for Declara a. D. for Declaration I. for CONTINUATION of Declaration Extraction Continuation Declaration De	the Disclosure 35 U.S.C.113) Total Sneets ation Total Pages Newly executed (original copy) Copy from a prior application (37 or continuation/divisional with Box 18 comp DELETION OF INVENTOR Signed statement attached inventor(s) named in the prisee 37 CFR 1.63(d)(2) and Data Sheet. See 37 CFR 1.76. IG APPLICATION, check appropriation Divisional Companies of the prise of the price of the	(S) deleting ior application, 1.33(b). state box, and supplentinuation-in-particular and supplementation	10.	37 CFR 3.73 (when there is all English Tran Information B(b) State n assignee) slation Do Disclosur DS)/PTC Amendment Posto iffically item py of Price iority is a Certifical ast attached equest for application and the another application and the another assignees and the another assignees and the another assignees and the another assignees and the another assignees and the another assignees and the another assignees and the another assignees as a signees are assignees as a signees are assignees as a signees are as a signees are as a signees are as a signees are as a signees are as a signees are as a signees are as a signees are as a signees are as a signees are a signees are as a signees are a	ment	Copies of II Citations P 503) ment(s) 35 USC 122(b)(2) D/SB/35 or its equity ary amendment:	DS (B)(i). ivalent.	
is considered a part of to can only be relied upon	the disclosure of the accompanying co when a portion has been inadvertently	y omitted from the	submitted a	application parts	eby incorp s.	orated by re	eference. The incorpo	ration
	17. CO	RRESPONDE	NCE AL	DDRESS				
Customer Numb	ber of Bar Code Label	*08791	*	а	r 🔲	Corresponde	ence address below	
Name	BLAKELY, SOKOLOFF			I LLP				
Address	12400 Wilshire Boulevard, Seventh Floor							
City	Los Angeles	State	Calif	ornia	Zip	Code	90025	
Country		Telephone	(310)	207-3800		Fax	(310) 820-5988	
Name (Print/Typ	Thomas M. Coeste	r, Reg. No. 3	9,637			T .		

Burden Hour Statement* This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

PTO/SB/17 (09-00)
Approved for use through 10/31/2002. OMB 0651-0032
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

FEE TRANSMITTAL for FY 2001

Petent fees are subject to annual revision

TOTAL AMOUNT OF PAYMENT

395.00
<i>3</i> 95.00

·						
Complete if Known						
Application Number						
Filing Date						
First Named Inventor	Sung-Hoon Baek, et al.					
Examiner Name						
Group Art Unit						
Attorney Docket Number	51876p219					

METHOD OF PAYMENT (check one)	FEE CALCULATION (continued)					
The Commissioner is hereby authorized to charge indicated fees and credit any over payments to.	3. 4	ADDIT	ONA	L FEI	Ē	
	Large	Entity	Small	Entity		
Deposit Account 02-2666	Fee		Fee	Fee	Fee Description	Fee Paid
Number L	Code 105	• /	Code 205	٠,,	Surcharge - late filing fee or oath	
Deposit Account Blakely, Sokoloff, Taylor & Zafman LLP	127		227		Surcharge - late provisional filing fee or	
Name Blakery, Sokoloff, Taylof & Zaithan EEF	'-'	00			cover sheet.	
Charge Any Additional Fee Required Under 37CFR 1.16 and 1.17	139	130	139	130	Non-English specification	
Applicant claims small entity status.	147	2,520	147	2,520	For filing a request for exparte reexamination	
See 37 CFR 1 27	112	920	112	920	Requesting publication of SIR prior to	
2. Payment Enclosed:		a.		_	Examiner action	
☐ Check ☐ Money ☐ Other Order	113	1,840	113	1,840	Requesting publication of SIR after Examiner action	
FEE CALCULATION	115	110	215	55	Extension for response within first month	
1. FILING FEE	116	390	216	195	Extension for response within second month	
Large Entity Small Entity	117		217		Extension for response within third month	
Fee Fee Fee Fee Description Fee Paid	1	1,390			Extension for response within fourth month	
Code (\$) Code (\$)	I	1,890			Extension for response within fifth month	
101 710 201 355 Utility filing fee \$355	119		219		Notice of Appeal	
106 320 206 160 Design filing fee	120		220		Filing a brief in support of an appeal	
107 490 207 245 Plant filing fee	121		221		Request for oral hearing	
108 710 208 355 Reissue filing fee	138	•			Petition to institute a public use proceeding Petition to revive - unavoidably	
114 150 214 75 Provisional filing fee	140		240		Petition to revive - unintentionally	
SUBTOTAL (1) (\$) 355.00		1,240 1,240			Utility issue fee (or reissue)	
2. EXTRA CLAIM FEES Foo from	143	•	242		Design issue fee	
Extra Claims below Fee Paid	144		244		Plant issue fee	
Total Claims 8 -20** = 0 X \$9.00 = 0.00	122		122		Petitions to the Commissioner	
Independent 1 -3** = 0 X \$40.00 = 0.00	123		123		Petitions related to provisional applications	
Multiple Dependent	126		126		Submission of Information Disclosure Stmt	
	581	40	581	40	Recording each patent assignment per	
Large Entity Small Entity					property (times number of properties)	40
Fee Fee Fee Fee Description Code (\$) Code (\$)	146	710	246	355	Filing a submission after final rejection (37 CFR 1.129(a))	
103 18 203 9 Claims in excess of 20	149	710	249	355	For each additional invention to be	1
102 80 202 40 Independent claims in excess of 3					examined (37 CFR 1.129(b))	
104 270 204 135 Multiple Dependent claim	179	710	279	355	Request for Continued Examination (RCE)	
109 80 209 40 **Reissue independent claims over original patent	169	900	169	900	Request for expedited examination of a design application	
110 18 210 9 **Reissue claims in excess of 20 and over onginal patent	Othe	er fee (s	specif	y)		
SUBTOTAL (2) (\$) 0.00		ح بالد	- ""	- F B-'	SUBTOTAL (3) (\$)	40.00
**or number of previously paid, if greater, For Reissues, see above	" Heduo	ea by Bas	sic Hiling	Fee Paid	300101AL (3) (4)	70.00

SUBMITTED B	3Y			Complete (if	applicable)
Typed or Printed Name	Thomas M. Coester, Reg. No. 39,637			Reg. Number	
Signature	Thomas Coeste	Date	12/29/00	Deposit Account User ID	02-2666

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

UTILITY APPLICATION FOR UNITED STATES PATENT

FOR

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

Inventor(s):

Sung-Hoon Baek et al.

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

Field of the Invention

5

10

15

20

25

The present invention relates to an apparatus for a redundant interconnection between multiple host computers and a redundant arrays of inexpensive disks (hereinafter, referred to as 'RAID'); and, more particularly, to an apparatus for a redundant interconnection between multiple host computers and multiple controllers of the RAID, which is capable of supporting a fault tolerance of the RAID controllers and simultaneously heightening performance.

Prior Art of the Invention

A RAID is a storage system based on a large capacity and a high performance, by using much quantity of disks, and is a fault tolerant system in which the disks or controllers etc. have a redundant nature. In general, the RAID has two controllers, which are used like a method shown in Fig. 1 or 2.

Fig. 1 is an exemplary block diagram showing a general connection method between the host computers and the RAID having the conventional two controllers.

As shown in the drawing, such system independently uses two RAID controllers 140, 141, and has an independent connection with network interface controllers 110, 111 of the host computers. That

10

20

25

is, such system has twice the bandwidth and twice the performance. However, there is such a problem that a loss of data occurs when one out of two RAID controllers 140,141 has a trouble, in other words, this system does not become the fault tolerant system.

Fig. 2 is an exemplary block diagram of a general host interface system having a communication interface for an error recovery between the conventional two controllers.

In order to provide fault tolerance not provided in Fig. 1, two RAID controllers 230, 231 and host computers 200, 201 are connected with each other through a hub or switch 210 in one network. Thus, even though one RAID controller 230 or 231 has a trouble, all of the host computers 200, 201 are connected to a RAID controller that does not have a trouble. That is, this RAID controller not having the trouble serves as a role of the controller that has the trouble. Also, since the RAID controllers 230, 231 should exchange information with each other by preparing in advance against some trouble, the RAID controllers 230, 231 are connected with each other through communication controllers 221, 222. However, in this case only a half of performance for the bandwidth provided in Fig. 1 can be obtained.

Fig. 3 is an exemplary block diagram showing a wiring method between a conventional RAID and the host computers.

The construction shown in the drawing partially represents a systematic connection between a RAID and host computers, which is extracted from contents disclosed in the U.S. Patent No. 5,812,754. However, this construction has no any difference from that of Fig. 2, in the structure of a communication network, and

20

25

in case that one out of two host computers 300, 301 has rather a trouble, there is caused a problem that a network is broken. Thus, this construction is inferior to the construction of Fig. 2.

5 Summary of the Invention

Therefore, it is an object of the present invention to provide an apparatus for a redundant interconnection between multiple host computers and a RAID, which is capable of supporting a fault tolerance of a RAID controller and simultaneously heightening a performance.

In accordance with the present invention, the apparatus for a redundant interconnection between multiple hosts and a RAID comprises a plurality of RAID controllers for processing requests of numerous host computers connected with one another through an industrial standard communication network such as fibre channel and performing fault tolerant function; a plurality of connecting units for connecting the plurality of RAID controllers to the numerous host computers; and a plural number of network interface controllers respectively contained into the plurality of RAID controllers, the network interface controllers being for exchanging information directly with each of opposite network interface controllers provided within the numerous host computers and within opposite RAID controllers, through the plurality of connecting units.

10

15

20

25

Brief Description of the Drawings

The above and other objects and features of the instant invention will become apparent from the following description of preferred embodiments taken in conjunction with the accompanying drawings, in which:

- Fig. 1 is an exemplary block diagram showing a general connection system between host computers and a RAID having conventional two controllers;
- Fig. 2 indicates an exemplary block diagram of a general host interface system having a communication interface for an error recovery between the conventional two controllers;
- Fig. 3 illustrates an exemplary block diagram of a wiring method between a conventional RAID and host computers;
- Fig. 4 is a block diagram showing one embodiment of a host interface system as an internal installment system between a RAID and host computers in accordance with the present invention;
- Fig. 5 depicts a block diagram providing one embodiment of a host interface system as an external installment system between a RAID and host computers in the present invention; and
- Fig. 6 is a block diagram showing one embodiment of a host interface system as a network switch between a RAID and host computers in the invention.

Preferred Embodiment of the Invention

Hereinafter, preferred embodiments of the present invention

10

15

20

25

will be described in detail with reference to the accompanying drawings.

Fig. 4 is a block diagram showing one embodiment of a host matching system as an internal installment system between a RAID and host computers in accordance with the present invention.

As shown in Fig. 4, in the inventive host interface system, a communication circuit is provided in order for an error recovery between two RAID controllers 460, 461, and the bandwidth between two groups as the host computers 400 to 405 and two RAID controllers 460, 461 becomes twice the single connection bandwidth. Also, in the inventive host interface system, even though one RAID controller 460 or 461 has an occurrence of a trouble, the bandwidth becomes twice the single connection bandwidth.

That is to say, in a RAID 490, two RAID controllers 460, 461 and hubs 440, 441 exist, and in each of the RAID controllers 460, 461, a pair of network interface controllers 470, 471; 480, 481 are provided. Herewith, the hubs 440, 441 are provided to connect a system connected to these hubs by one network and maintain the network even though one system has an occurrence of a trouble or a short of a line, and it can be as a hub or a switch. Hereinafter, they are named a "hub" altogether.

Hub ports, 420 to 424, 430 to 434, shown in Fig. 4 indicate an example for a simple internal structure of a fibre channel arbitrated loop hub, and this is based on an already well-known technique, thus there will be herein no more description therefore in the invention. The hub observes its corresponding communication network standard.

10

15

20

25

A network, in which the RAID controllers, the hubs and the host computers are connected with one another, corresponds to the industrial standard communication network such as fibre channel, asynchronous transfer mode (ATM) and InfiniBand etc. and they are hereinafter named a 'network'.

Network interface controllers, 410 to 415, contained into the host computers, 400 to 405, and the network interface controllers 470, 471, 480, 481 of the RAID controllers 460, 461 are connected with one another by two networks through two hubs 440, 441, and according to a sort of the networks, the network interface controller becomes a fibre channel controller, an ATM controller and an InfiniBand controller etc.

At this time, a communication line, representatively shown as 450 in the drawing, for connecting the network interface controller to the hub is a copper line or an optical fibre, which is matched to a corresponding standard.

Meanwhile, two network interface controllers 470, 471 of the first RAID controller 460 are respectively connected to two different hub ports 423, 432, and two network interface controllers 480, 481 of the second RAID controller 461 are respectively connected to two different hub ports 422, 433. The rest ports 420, 421, 424, 430, 431, 434 of the hubs 440, 441 are connected to the host computers 400 to 405. Just, there is no distinction between the hub ports 420 to 424 of the first hub 440 at all. Also, there is no distinction between the hub ports 430 to 434 of the second hub 441 at all.

The hub port connected to the host computer among the hub

10

15

20

25

ports of the hub 440, namely, 420, 421, 424, is more than one, and there is no limitation to the maximum number. Further, What it is connected to the host computer among the hub ports of the second hub 441, namely, 430, 431, 434, is more than one, and there is no limitation to the maximum number. The hub ports 424, 434 and the host computers 400, 405, which are shown as dot lines in Fig. 4, mean that there is no, or more than one hub port or host computer.

Since, in such construction, two independent networks are constructed; it has twice the bandwidth of the single network, and a communication passage between two RAID controllers needed to perform the fault tolerant function of two RAID controllers 460, 461 is formed. Thus, information from the second network interface controller 471 of the first RAID controller 460 is sent to the first network interface controller 481 of the second RAID controller 461. Also, information from the second network interface controller 480 of the second RAID controller 461 is transmitted to the first network interface controller 470 of the first RAID controller 460. Further, information from the first network interface controller 481 of the second RAID controller 461 is transmitted to the second network interface controller 471 of the first RAID controller 460, and information from the first network interface controller 470 of the first RAID controller 460 is sent to the second network interface controller 480 of the second RAID controller 461.

The first network interface controllers 470, 480 of two RAID controllers 460, 461 respectively supply data of the host computers 400 to 402 connected to the first hub 440 and the host computer 403 to 405 connected to the second hub 441, and process information

10

15

20

25

transmitted from the opposite network interface controllers 471, 481.

If any one out of two RAID controllers 460, 461 has an occurrence of an error, the RAID controller having the error occurrence is removed from the network, and a second network interface controller of an opposite RAID controller not having the error occurrence takes over a function of a first network interface controller of the RAID controller having the error occurrence.

Fig. 5 is a block diagram providing one embodiment of the host interface system as an external installation system between the RAID and the host computers in the present invention.

As shown in Fig. 4, the present invention can be constructed by a method of internally installing the hubs 440, 441 in the RAID 490, and as shown in Fig. 5, it can be constructed by using the hubs 510, 520 for use of an external-installation.

Fig. 6 is a block diagram showing one embodiment of the host interface system as a network switch between the inventive RAID and host computers.

As shown in the drawing, Fig. 6 can have a function of Fig. 4. In other words, information from a second network interface controller 622 of a first RAID controller 620 is sent to a first network interface controller 632 of a second RAID controller 630, and information from a second network interface controller 632 of the second RAID controller 630 is transmitted to a first network interface controller 621 of the first RAID controller 620. Further, information from the first network interface controller 631 of the second RAID controller 630 is transmitted to the second network

10

15

20

interface controller 622 of the first RAID controller 620. Also, information from the first network interface controller 621 of the first RAID controller 620 is sent to the second network interface controller 632 of the second RAID controller 630.

Just, there is no distinction between respective ports, representatively 611, of a network switch 610 at all and also, the internal structure of a network switch 610 can be configured according to a selection of a user (not shown in Fig. 6).

In accordance with the present invention, as afore-mentioned, even in a case of an error occurrence in a RAID controller, there exist two independent networks and two network interface controllers, and the bandwidth of a single network can be twice maintained. Accordingly, a function of fault tolerance between two RAID controllers can be constructed without a drop of the bandwidth.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without deviating from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

- 1. An apparatus for a redundant interconnection between multiple hosts and a RAID, comprising:
- a plurality of RAID controlling units for processing a requirement of numerous host computers;
 - a plurality of connecting units for connecting the plurality of RAID controlling units to the numerous host computers; and
 - a plural number of network interface controlling units respectively contained into the plurality of RAID controlling units, for exchanging information directly with the numerous host computers and an opposite network interface controlling unit provided within an opposite RAID controlling units, through the plurality of connecting units.
 - 2. The apparatus as recited in claim 1, wherein said respective RAID controlling units are connected to the plurality of individual connecting units.
- 3. The apparatus as recited in claim 2, wherein said each network interface controlling unit is constructed by a pair, namely two, and is contained into the plurality of RAID controlling units, a first network interface controlling unit of said network interface controlling unit being connected to the connecting unit of one side and a second network interface controlling unit thereof being connected to the connecting unit of another side.

10

15

4. The apparatus as recited in claim 3, wherein said each network interface controlling unit further comprises:

the first network interface controlling unit for processing the requirement of the numerous host computers; and

the second network interface controlling unit used for fault tolerance in a communication between the respective RAID controlling units when the respective RAID controlling units do not have the occurrence of the error, said second network interface controlling unit being for executing a function of the first network interface controlling unit of the RAID controlling unit having the occurrence of the error in case that one given RAID controlling unit has the occurrence of the error.

5. The apparatus as recited in claim 1, wherein said plurality of connecting units have connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a hub equipment connected with the numerous host computers.

20

25

6. The apparatus as recited in claim 1, wherein said plurality of connecting units have the connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a network switch equipment connected with the numerous host computers.

15

- 7. The apparatus as recited in claim 1, wherein said plurality of connecting units have the connection ports more than five, the four connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a switch connected with the numerous host computers.
- 8. The apparatus as recited in claim 1, wherein said RAID controlling unit, said network interface controlling unit and said connecting unit are respectively constructed by a pair, the first network interface controlling unit of a first RAID controlling unit being connected to a first connecting unit, the second network interface controlling unit of said first RAID controlling unit being connected to a second connecting unit, the first network interface controlling unit of a second RAID controlling unit being connected to the second connecting unit, and the second network interface controlling unit of the second RAID controlling unit being connected to the first connecting unit.

10

15

Abstract of the Disclosure

The apparatus for a redundant interconnection between multiple hosts and a redundant array of inexpensive disks (hereinafter, referred to as 'RAID'), which is capable of fault tolerance of RAID controllers supporting a simultaneously heightening a performance, comprises a plurality of RAID controlling units for processing a requirement of numerous host computers connected with one another through the industrial standard communication network and for fault tolerance; a plurality of connecting units for connecting the plurality of RAID controlling units to the numerous host computers; and a plural number of network interface controlling units respectively contained into the plurality of RAID controlling units, for exchanging information directly with an opposite network interface controlling unit provided within an opposite RAID controlling unit and the numerous host computers, through the plurality of connecting units.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ľ	n	re	the	App.	lication	of:
---	---	----	-----	------	----------	-----

SUNG-HOON BAEK, ET AL.

Art Group:

Application No.:

Examiner:

Filed:

For:

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN **MULTIPLE HOSTS AND RAID -**UTILITY

Assistant Commissioner for Patents Washington, D.C. 20231

TRANSMITTAL OF FORMAL DRAWINGS

Sir:

Enclosed herewith for filing in the above-identified U.S. Patent Application are the formal drawings, 6 sheets including 6 Figures. Applicant hereby authorizes any additional extension or petition fees under 37 C.F.R. §1.17 or credit for any overpayment to our Deposit Account No. 02-2666. A copy of the Fee Transmittal sheet is enclosed.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Thomas M. Coester, Reg. No. 39,637

12400 Wilshire Blvd., 7th Floor Los Angeles, California 90025

Telephone: (310) 207-3800

FIG. 1

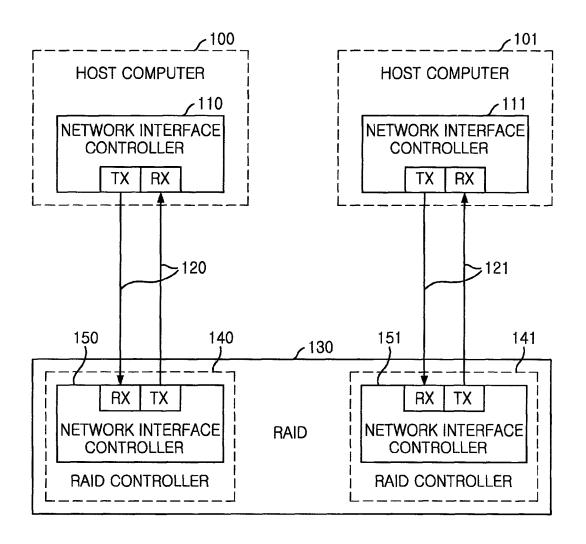


FIG. 2

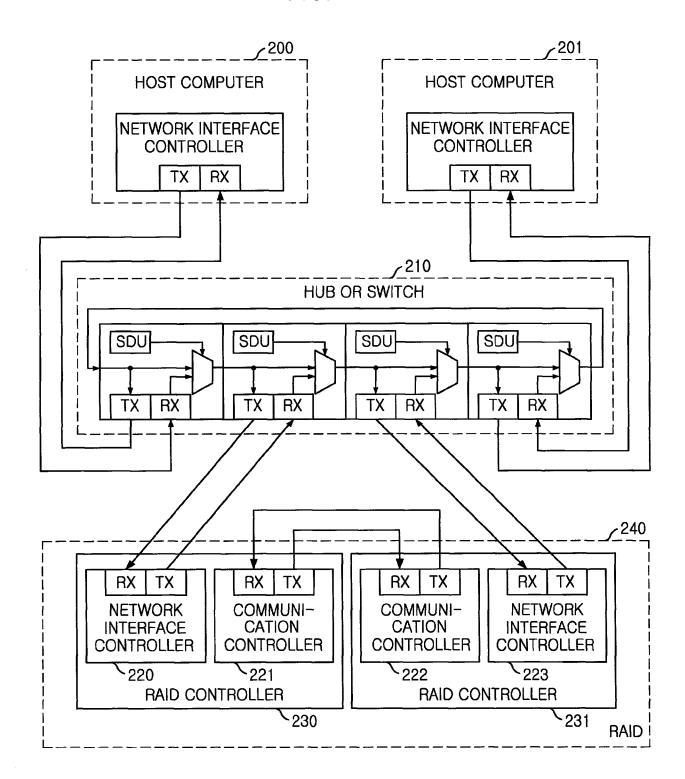
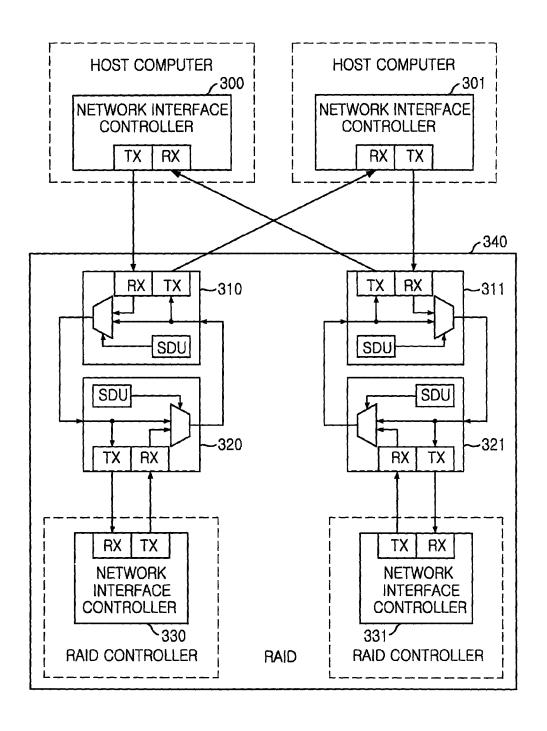
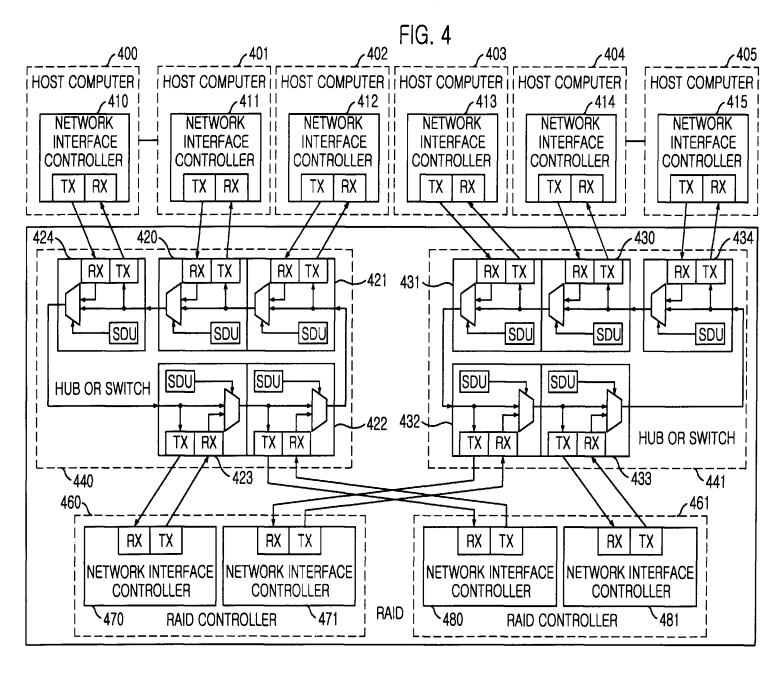
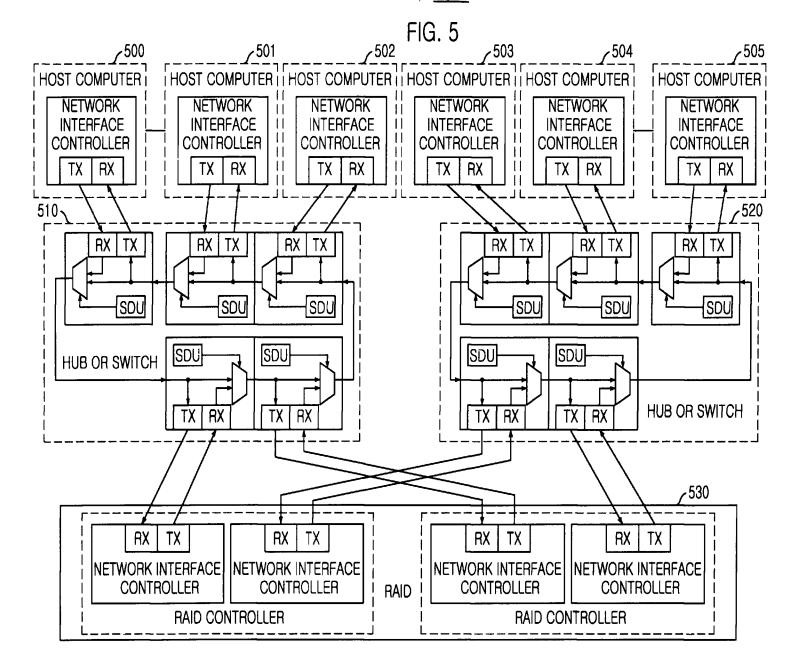


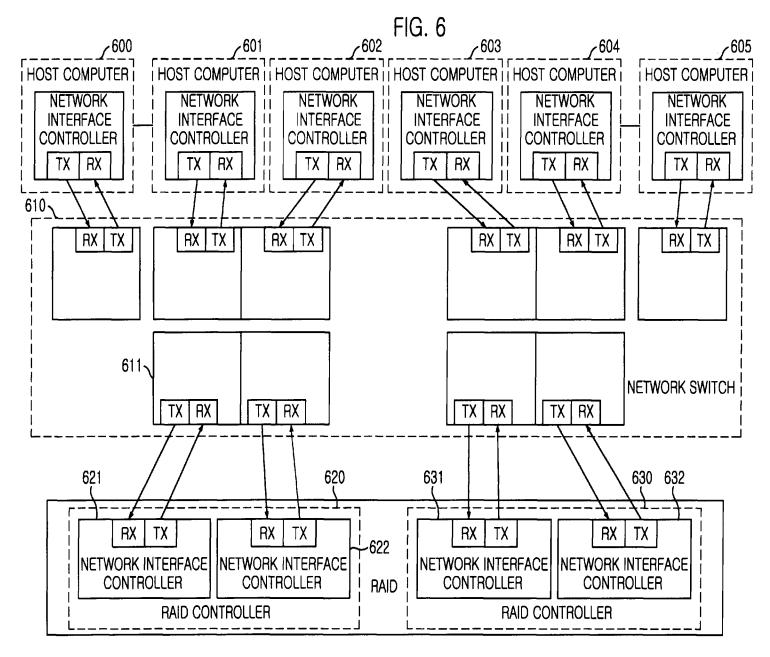
FIG. 3





SCANNED, # 14





Our Ref.: 51876. P219

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first an joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID the specification of which _x is attached hereto. was filed on Application Serial No. and was amended on (if applicable) I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I do not know and do not believe that the same was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a). I hereby claim foreign priority benefits under Title 35,, United States Code, Section 119, of ay foreign application(s) for patent or invertor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed: **Priority** Claimed Prior Foreign Application(s) 2000-54807 REPUBLIC OF KOREA 19 / 09 / 2000 (Day/Month/Year Filed) (Number) (Country) Yes Nο (Number) (Country) (Day/Month/Year Filed) Yes Nο (Day/Month/Year Filed) No (Number) (Country) Yes I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application: (Status -- patented, (Application Serial No.) (Filing Date) pending, abandoned) (Application Serial No.) (Filing Date) (Status -- patented, pending, abandoned)

The first way have made there is said the said that there are the first than the

I hereby appoint BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN, a firm including: Bradley J. Bereznak, revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor BAEK, SUNG-HOO	ON
Inventor's Signature	Date 1/6V. / 2000
Residence TAEJON	Citizenship REPUBLIC OF KOREA
(City, State)	(Country)
Post Office Address #103, 339-17 JUNMIN-DONG, Y	USONG-GU, TAEJON, KOREA
	<i>'</i>
Full Name of Second/Joint Inventor KIM, JOONG-BA	E
Inventor's Signature Kin Josephae	Date <u>Nov. 1. 2.600</u>
Residence TAEJON	Citizenship REPUBLIC OF KOREA
(City, State)	(Country)
Post Office Address #105-701, NAREA APT., JUNMI	N-DONG, YUSONG-GU, TAEJON,
305-390, KOREA	
Full Name of Third/Joint Inventor KIM, YONG-YOUN	Ţ
Inventor's Signature	Date Nov. 1. m
Residence TAEJON	Citizenship REPUBLIC OF KOREA
(City, State)	(Country)
Post Office Address #117-1002, HANBIT APT., 99	EOEUN-DONG, YUSONG-GU, TAEJON,
KOREA	
Full Name of Fourth/Joint Inventor	
Inventor's Signature	Date
Residence	Citizenship
(City, State)	(Country)
Post Office Address	
Full Name of Fifth/Joint Inventor	
Inventor's Signature	B
Residence	Citizenship
(City, State)	(Country)
Post Office Address	
<u> </u>	



Subclass	JE CLASSIFICATION
Class	SUE CLA

BEST AVAILABLE COPY

PATENT N	IUMBE
----------	-------

U.S. UTILITY Patent Application

P	O.I.P.E.	
IU	3	al A
SCANNED	A) QA	AA

PATENT DATE

	ICATION NO. 09/753245	CONT/PRIOR	CLASS 709	SUBCLASS	2 1 5%	EXAMINER BACK	neolini
PPLICANTS	Sung-Hoor Joung-Bae Yong-Your	: Kim		, , ,			•
₹	Apparatus	For red	undant	interconnec	tion betw	ween multiple	hosts and

		W.	(P %)				* 300.	340			e			3,01			.467	- X	10.00	1888	We !	S. 38	380	gar.	7 W C 300		7700.2	Section 18
								14	8.7888	p*4 .d) 4.	IS	SU	IŇ	G (CL	AS	SIF	FICA	TIC	NC			r e e e e e e e e e e e e e e e e e e e				
			O I	₹IG	INA	L.		## 1. %	*	grape et						V			CROS	3\$ R	EFE	RENC	E(S)			N. S.		
	•	للا	NS S	•			SU	BCI	.AS	S	**	¥.	CL	ASS	**		*	SUB	CLAS	S (OI	NE S	UBCL	ASS	PER	BLOCK	ς)		
	N. Pri			3/44		24				× •••		Anth	**	***	e.exin-ilin						30.57			1				
''IN	TE	RN	IAT	101	IAL	CL	ASS	SIFIC	CÃT	TION		THE STATE OF THE S		- 87			7			, કુંડ			1					
1	27	þ		8		7		* *			9				2				À									ij.
				N.						ř	7		* *			*	4-4		*									
					¢.*			1				*		r (M)	*			` "				,						
			2	(€ 4)	114		×	e ya	* *	%	2 43	**		13			A 1929				***			, A. Y.	Q (1)			*
		(S. 10)	* 3	9		420		· ×				1									Con	tinued o	on les	sue Slip	Inside	File J	acket	A 100 20

		· · ·	<u> </u>		
TERMINAL		DRAWINGS		CLAIN	IS ALLOWED
DISCLAIMER	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
		d •	4 4 .	<u> </u>	g se i go 🐗 🕜
. □ The term of this patent				NOTICE OF ALI	LOWANCE MAILED
subsequent to (date) has been disclaimed.	(Assistant E	xaminer)	(Date)	λ	^
The term of this patent shall		······································		٠	
not extend beyond the expiration date					
of U.S Patent. No				ISS	UE FEE
				Amount Due	Date Paid
· <u></u>	(Primary E	xeminer)	(Date)		
			الم ميور	ISSUE BA	TCH NUMBER
The terminalmonths of this patent have been disclaimed.					
uns patent nave been discialmed.	(Logal Instrume	nte Examiner)	(Date)		
WARNING:			•		
The information disclosed herein may be res Possession outside the U.S. Patent & Traden	tricted. Unauthorized on nark Office is restricted	lisclosure may be to authorized emp	prohibited by the U loyees and contract	nited States Code Title S ore only.	5, Sections 122, 181 and 368.
Form PTO-436A (Rev. 8/99)			FILED WITH:	DISK (CRF)	FICHE CD-ROM

(Attached in pocket on right inside flap)



BEST AVAILABLE COPY

9	EAR	CHE)
Class	Sub.	Date	Exmr.
709	201,202 203 217,218 219 223,224 239,240 244	5-11-04	S.
711	114		

INTER	FERENC	e sear	CHED
Class	Sub.	Date	Exmr.
	:		
	·		
•			

SEARCH (INCLUDING SEA)		
Cowar Z mus	Date	Exmr.
DECUSED CLAI PERSONSE TEMBER CLASSES FOR SCHRU	5.10. 84	B
SOUT SCHOOL MALE: 709, 711 TEXT. "REDUNDANT CONNECTION RAD" US, EPO, JAD	5-11-04	B
NPL SEARCH BEEEXPLOR "RAID CONVECTION"		

L	┙			L	┸	Ц.	_		_		4	_	_	Ľ	L	Ŧ	1	_		L	1	1	4	_	_	ļ.,	4	4	_	L	┖	╀	┵	┵	4	_	_	↓_	┶	Ŧ	┺	_	┸	1	↓.	┸	4	4	4		_	L.	٦,,	丄	┸	1	الد	Final	Jaim
6	ò	8	47	8	1	4	1	చ	2	2		6	မ္တ	8	4	<u> 1 3</u>	8	ၾ	翠	8	3 8	3	<u> </u>	မွ	23	\ a	3 9	2	8	25	24	2 2	1	3 2	의	8	19	8	1	ilē	ៀប៊	n J	1	ءُ دُ	3 :	:\a	5 0		۵	7	6	O	ه ار	ء [٠	3 2	Æ.	-)	Original	ΙĒ
Γ	T			Γ	T		٦			[]	T.					Γ	1				Γ	Ţ	Ţ			T		Î	``	_,				floor					L	Г		L		\mathbf{I}	L		Ι		á	S	3	4	4	Ó	1	¥	4		
_	T	\neg	Г	Т	Τ	Т	T			Г	Τ	7		Г	Γ	Τ	T			Γ	Τ	7	I			Τ	T	╗		Г	7	Т	Т	Т	T				Τ	Т	Τ	Т	T	Т	Τ	Т	Τ	П	П			Γ	15	Τ	Т	T	T		7
_	7		Г	T	1	\top	7		1	Τ	1	7			T	T	1				T	1	7				T	7				T	Τ	T	1				T	T	T	1		T	T	T	1	T	Т		Г	Г	Т	Τ		T	7		1
_	7	\dashv	Г	t	t	+	7	П	-	T	†	7	┪	\vdash	T	†	+	┪		\vdash	+	†	7		_	+	+	1		Т	T	T	T	T	7			T	1	T	Ť	1	+	十	+	+	†	+	7			+	Ť	T	T	十	+		1
	7	ᅱ	\vdash	t	+	╁	7	-	┝	┢	╁	7	-	┝	t	+	+	┪	_	┢	$^{+}$	+	7	_	-	╁	+	7	ᅥ	-	t	+	†	+	7		-	\vdash	十	+	十	+	+	+	+	Ť	+	╁	7	-	┝	╁╴	†	†	╁	十	7		٦,
	+	\dashv	┝	╀	╁	+	+	-	├-	⊢	╁	+	\dashv	-	╁	╁	+	┥	_	┝	╁	╁	+		_	╀╌	+	┪	٦	┝	╁	╁	╀	+	+	_	-	╁╴	╁	╀	┿	╁	╫	╁	╁	╁	╁	+	┥	-	┝	╁	╁	╁	┿	十	+		2
_	+		⊢	╀	+	+	+	_	-	⊢	╁	+	\dashv	⊢	╁	+	+	-	_	╁	╀	+	\dashv	_	-	╀╌	+	┥	\dashv	┝	╀	╁	╀	+	+	_	┝	┝	╀	+	+	╀	┿	╁	╀	+	+	╬	+		-	╀╌	╁	╀	+-	+	+		\dashv
_	4	_	<u> </u>	╀	4	4	4	_	┞	┞_	╀	4	4	-	₽	+	4	-		┡	+	+	4	_	_	╄	+	4	-	ļ	1	+-	+	+	4		-	-	╀	+	+	-	+	+	4-	∔	4	4	4	_	⊢	╀	+	+	+-	╀	4		4
_	4	_	L	Ļ	\downarrow	1	4		Ļ	Ļ.	╀	4	_	L	L	1	4	_	_	L	╀	4	4		_	L	4	4		L	L	L	L	4	4		L	L	1	╀	4	4	+	┵	1	1	4	4	4	_	L	╀	\downarrow	4	┸	1	4		4
	4		L	L	\perp	⅃.	_		L	L	┸	4		L	L	1	4		_		\perp	1	↲		_	L	4	_		L	L	┸	Ļ	\perp	┙		L.	L	┺	┸	┸	1	┸	Ŧ	1	1	┸	1	4		L.	L	J.	L	┵	\perp	\perp		╛
	1				1	1	1		L	L	L	┙		L	L		1		_	L	L		_		L	L	1				L	L	L	1		_				\perp	1	1	1	1	1	1	1	1	_			L.		1	1	L			1
Γ	Ţ		Γ	Ť	T	Т	╗		Γ	Т	Т	Т	7	Γ	Т	Т	Т	٦	_	Г	T	Т	ī			Т	Т	T			Т	Т	Т	Т	T	_		Γ.	Τ	Т	Т	T	Т	Т	Т	Τ	Т	Т	Т		Г	Т	Т	Т	Т	T	Т	Final	T
٥	al	٦	8	4	,†,	9	او	9	9	9	٠,	او	8	88	a	٠,	<u></u>	8	φ	α	3 8	.	ᇑ	8	13	1	1	7	7	7	†.	1 2	1.	ij.	7	7	6	l g	10	9 0	, 0	0 0	اه	3 8	, 1	٥١٥	ار	,	ᆈ	5	5	1,	3 8	, ;	3 8	٠,		Original	Clairin
-	읙	쁵	~	+	4	7	4	3	12	╀╧	+	믝	9	۳	₽	4	7+	5	-	1 4	+	4	7	٥	۳	10	4	긕	6	5	╀	٤١٥	4	٠	4	0	18	۳	+	10	10	7+*	+	١:	+	+ 6	4	4	쒸	7	ြီ	10	713	45	٠١٠	4-	=+	Original	+
Ļ.	4	-	<u> </u>	╀	- -	+	4		┞	-	╀	+	-	-	╀	+	+		_	╀	+	+	\dashv	_	⊢	╀	+	4	_	┝	╀	╁	+	+	+		├	+	╀	+	+	+	+	+	╀	+	+	+	4	_	-	∤-	+	╀	4	+	4		4
_	4	_	L	↓.	4	4	4		Ļ	╄	╁	4	_	L	↓	4	4	4		L	4	4	4		_	Ļ	4	4		<u> </u>	╀	4	4	4	4		Ļ	╀	╄	4	\bot	\perp	4	┺	4	+	4	4	4	_	_	Ļ	4	╀	4	+	4		4
	_	_	L	┸	4	4	4	_	L	┖	┸	4		L	L	4	4	_	_	L	\perp	4	4		L	L	4	_		L	L	1	1	1	4		L	Ļ	\downarrow	1	\downarrow	1	\downarrow	┸	1	1	1	1	4	_	L	L	\perp	┵	┸	┵	4		4
					1	1	_[L	L	1			L	L		1	_]	L	<u> </u>	L	1				L	l	_ 1		L	L	1_	1	1		_	L			L	L	Ĺ	\perp	\perp	l	L	1	1			L	L	\perp	L	L	L	\perp		
ľ				1							Ţ	Į					1			l		Ţ				Ţ	I	Į				Ţ											1		Ī		1	Ι	1				1	Τ		1]
Г	┪		Г	T	T	7			Γ	Γ	Т	7		Γ	Т	T	7			Π	7	7	7			Τ	T				Τ	T	Τ	T	1		Γ	Π	Τ	Γ	T	T	T	7	Τ	Τ	7	T	٦	_	Г	Т	Τ	Τ	Т	T	T		73
	┪	_	Г	1	Ť	1	┪	_	Ī	T	Ť	1		Γ	T	1	7			T	1	1	ヿ			Τ	7				T	1	T	1	7		Г	Τ	1	1	1	1	1	1	1	T	1	1	7	_	Г	1	1	T	1	T	ヿ		1
H	7	_	H	†	$^{+}$	-†-	┪		t	†-	t	+	-	t	$^{+}$	+	+	-	_	t	+	+	┪	_		t	+	7		┢	+	+-	+	+	7	_	H	✝	+-	+	t	+	+	╅	+	+	+	+	7	_	┝	╁	╁	+	╁	+	-†		1
H	+		⊢	╁	+	+	\dashv		\vdash	╁	+	\forall		\vdash	╁	+	+	\dashv	-	╁╴	╁	+	┪	_	┝	╁	ϯ	\dashv	_	┝	+	╁	╁	+	+	-	-	+	╁	╁	╁	+	╁	+-	╁	╁	╁	╁	┪		┝	╁	╁	十	╁	╁	+		\dashv
H	┪	-	⊢	╁	+	+	┪		┢	╁	╁	+	-	┢	╁╴	╁	+	-	-	╁╴	╁	+	┥	_	H	╁	+	+	-	┝	╁	╀╴	╁	+	+	_	┢	╁	+-	╁	╁	╁	+	+	┿	╁	+	+	-	_	├	╁	╁	╁	╅	╀	╅		4
L			Ц.	L					L.	L	_		_	L_						L		_		_	_	1_	ᆚ.			L	_		L	_		_	L	L_	_	_	٠.	_							_1		L_	1_	ــــــــــــــــــــــــــــــــــــــ	L		丄	_		L
_		_	_	_	_		_,	_	_	_				_	_	_			_	т—	_		_	_	_	_	_		_	_	_		_		_		_	_	_		-		_		_						_			_					_
L	_	_	<u> </u>	1	1	1	_	_	L	L	1	_		L	1	1	4		L	L	┸	1	╝	_	L	L	1		_	L	L	1	1	1	_		L	L	L	L		\perp	1	┸	\perp	\perp	1	1		_	L	L	L	L	\perp	┸	_1	Final	
ã	5	8	47	ŧ	6	45	1	五	42	4		3	139	8	9	3	띪	135	Ω	18		3	뙤	ଞ	8	Ī	ខ្លុំ[រុ	3	8	Ŕ	\$	3 5	1 8	3 :	2	8	19	128	13	i	<u> </u>		ءَ ا	3 2	: [5 8	8 8	副	ğ	ន	ไรี	श्रेह	٤	វិន្រី	; ē	3 0	Original	
	- [T.		_		T	T	Į			Γ	Ţ	ľ				Γ	Т	Ī		[T	1	T				Γ		1	Т	Τ	Т		Т	Τ					Γ	Т	Γ	Τ	T	Т		Τ
				T					Γ		T		_	Γ	Τ	T	1	_		Τ	Т	Т	7			Τ	1	٦		Г	Γ	Т	T	T	1		Γ	T	Τ	Т	Т	Т	Т	Т	Т	Т	Т	T				T	Т	Т	Т	Т	T		7
Г			Γ	Τ	_	T			T	T	T	_[_	1	T	Ť	7			Γ	T	T	٦		Γ	╁	7				T	┰	T	T	7		Г	T	1	Τ	T	1	1	\top	T	1	7	T	7			1	1	T	1	1	T		7
T	7	_		1	7	7	╗	_	T	1	1	┪		T	T	1	7		_	T	1	7	7			1	⇑	7	_		1	1	Ť	Ť	┪	_		1	Ť	1	Ť	1	1	✝	1	1	†	1	7		┪	T	Ť	1	1	1	1		1
t	4	_	1-	+	+	7	٦	_	✝	十	✝	7	_	t	╁	+	7		┝	╀	+	7	7	_	╁╴	✝	+	\dashv	_	┢	+	┿	+	+	+		H	t	۲	+	+	+	+	╫	+	+	+	+	┪	_	┝	\vdash	╁	۲	╁╴	+	+		٦,
t	-	-	t	+	\dashv	+	-	\vdash	✝	十	+	-	_	╁	十	+	-†		-	╁	+	+	┨	-	╁	+-	+	-	-	-	十	┿	+	+	+		\vdash	+-	╁	+	+	+	+	+-	╁	十	+	╅	┪	\dashv	-	╁	╁	╁	+	十	╅		18
۱		\vdash	╁	╁	+	+		\vdash	╁	+	+	-	-	╁	╁	+	-		-	╁	+	+	ᅱ	-	╁	╁	+	ᅱ	-	╁	╁	╁	╀	+	+		⊢	╁	╀	╁	╁	+	+	╁	╁	╁	+	+	-1	\dashv	-	╁	╁	╀	+	+	+		1
+		-	╀	+	+	-+		 	╀	+-	+	4	\vdash	╀	+-	+	-	_	-	+-	+	4	-	ļ	┞	╀	+	-4	Щ	 	╂	+	+	+	+		┞	╀	╀	╀	4	+	╀	+	+	+	4	4	4	4	<u> </u>	╀	+	╀	╀	+	4		1
+		<u> </u>	╀	4	4	4		<u> </u>	\perp	+	4	_	\vdash	 	+	4	_	_	-	╀	4	4	4	<u> </u>	╄-	╀	4	4	_	<u> </u>	╀	4	4	4	4		<u> </u>	\vdash	╀	Ļ	╀	4.	4	4.	4	4	4	4	4	_	_	L	Ļ	╀	1	Ļ	4		1
1		├ -	╂	4	-4	-		1	+	4	4	_	L -	+	4	4	4	<u> </u>	1	╀	4	4	_	—	1	1	4	_	_	1	╄	4	4	4	4	_	_	1	1	4	1	1	\perp	4	1	1	4	1	4	_	_	L	Ļ	1	┸	T	4		1
١		1		- 1	-	-		l	İ	1	- [l	1	1	-1		l		1	- 1	ı		l	1	1	- [1	1	1	- [ſ		ľ		I	Γ	I	T	Γ	T	Γ	T	T	T	Т	П		Γ	Т	П	T	Т	T		1

	str low		8 -	Allowed) Canceled Restricted
numeral)	A numeral) Ca	Allow n numeral) Cance Restr	Allowed Allowed Canceled Restricted	n numera
umeral)	Al numeral) Ca Ra	Allow numeral) Cance Restr	Allowed numeral) Cancelee	numera
neral)	Al neral) Ca Ra	Allow neral) Canco	Allowed Allowed Canceler Restrict	nera
₽ .	20 ≥ 3	Allow	Allowed	. = : :
	20 S ≥ 3	. Allow . Allow . Canco	. Allowed . Allowed . Canceled . Canceled . Restrict	: 7 : :

+1 = <

INDEX OF CLAIMS	Z	S
Rejected	_ :	Non-elected
Allowed	:	lnterference
Canceled	:	Appeal
Restricted (:	Objected

RESPONSE FORMALITY REVIEW	FORMALITY REVIEW	O.I.P.E. CLASSIFIER	FEE DETERMINATION	אכיטא
	22	,		INITIALS
	927			ID NO.
	04/1/01	1130		DATE

ISSUE SLIP STAPLE AREA (for additional cross references)

Please type a plus sign (+) inside thi

PTO/SB/05 (09-00)

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Please type a plus sign (+) inside thi



UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

ttorney Docket No. 51876p21

First Inventor or Application Identifier

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIME

Express Mail Label No.

em014066885us

Sung-Hoon Baek

APPLICATION ELEMENTS See MPEP chapter 600 concerning utility patent application contents	Assistant Commissioner for Patents ADDRESS TO: Box Patent Application Washington, DC 20231
Fee Transmittal Form (e.g. PTO/SB/17) (Submit an original, and a duplicate for fee processing) Applicant claims small entity status. See 37 CFR 1.27. Specification (preterred arrangement set forth below) Descriptive title of the Invention Cross References to Related Applications Statement Regarding Fed sponsored R & D Reference to sequence listing, a table, or a computer program listing appendix Background of the Invention	7. CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix) 8. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) a. Computer Readable Form (CFR) b. Specification Sequence Listing on: i. CD-ROM or CD-R (2 copies); or ii. Paper c. Statement verifying identity of above copies
Brief Summary of the Invention Brief Description of the Drawings (if filed)	ACCOMPANYING APPLICATION PARTS
- Detailed Description - Claim(s) - Abstract of the Disclosure 4. Drawing(s) (35 U.S.C.113) Total Sneets 6 5. Oath or Declaration Total Pages 2 a. Newly executed (original copy) b. Copy from a prior application (37 CFR 1.63 (for continuation/divisional with Box 18 completed) i. DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application (37 CFR 1.63(d)(2) and 1.33(b). 6. Application Data Sheet. See 37 CFR 1.76.	14. Seation, 15. Return Receipt Postcard (MPEP 503) (Should be specifically itemized) 15. Certified Copy of Priority Document(s) (if foreign priority is claimed) Request and Certification under 35 USC 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent Other: Request for priority.
☐ Continuation ☐ Divisional ☐ Continuatio	on-in-part (CIP) of prior application No:/
	Group/Art Unit: of the prior application, from which an oath or declaration is supplied under Box 4b, or divisional application and is hereby incorporated by reference. The incorporation rom the submitted application parts.
17. CORRESPO	ONDENCE ADDRESS
0	ar Correspondence address below 08791
Name BLAKELY, SOKOLOFF, TAYLO	OR & ZAFMAN LLP
Address 12400 Wilshire Boulevard, Seventh	h Floor
City Los Angeles St	tate California Zip Code 90025
Country U.S.A. Telepho	

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Thomas M. Coester, Reg. No. 39,637

Name (Print/Type)

Signature

DHPN-1002 / Page 102 of 158

			1
Under the	Paperwork	Reduction	Act

FEE TRANSMITTAL for FY 2001

Petent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT

i)	395.00

Complete if Known					
Application Number	 -				
Filing Date					
First Named Inventor	Sung-Hoon Baek, et al.				
Examiner Name					
Group Art Unit					
Attorney Docket Number	51876p219				

METHOD OF PAYMENT (check one)	FEE CALCULATION (continued)					
The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:	1. The Commissioner is hereby authorized to charge indicated fees and credit any over payments to: 3. ADDITIONAL FEE					
Deposit	Large Fee	Entity Fee	Small Fee	Entity Fee	Fee Description	Fee Paid
Account Number 02-2666	Code		Code			
Deposit	105	130	205	65	Surcharge - late filing fee or oath	
Account Name Blakely, Sokoloff, Taylor & Zafman LLP	127	50	227	25	Surcharge - late provisional filing fee or cover sheet.	
Charge Any Additional Fee Required Under 37CFR 1.16 and 1.17	139	130	139	130	Non-English specification	
Applicant claims small entity status.	147	2,520	147	2,520	For filing a request for ex parte reexamination	
2. Payment Enclosed:	112	920	112	920	Requesting publication of SIR prior to Examiner action	
Check Money Other	113	1,840	113	1,840	Requesting publication of SIR after Examiner action	
FEE CALCULATION	115	110	215	55	Extension for response within first month	
4 FUINO FEE	116	390	216	195	Extension for response within second month	
FILING FEE Large Entity Small Entity	117	890	217	445	Extension for response within third month	
Fee Fee Fee Fee Description Fee Paid	118	1,390	218	695	Extension for response within fourth month	
Code (\$) Code (\$)	128	1,890		945	Extension for response within fifth month	
101 710 201 355 Utility filing fee \$355	119	310	219		Notice of Appeal	
106 320 206 160 Design filing fee	120	310	220		Filing a brief in support of an appeal	
107 490 207 245 Plant filing fee	121	270			Request for oral hearing	
108 710 208 355 Reissue filing fee 114 150 214 75 Provisional filing fee	138 140	1,510 110	138 240		Petition to institute a public use proceeding Petition to revive - unavoidably	
	141	1,240	241	620	Petition to revive - unintentionally	
SUBTOTAL (1) (\$) 355.00	142	1,240	242	620	Utility issue fee (or reissue)	
2. EXTRA CLAIM FEES Fee from	143	440	243	220	Design issue fee	
Extra Claims _{below} Fee Paid	144	600	244	300	Plant issue fee	
Total Claims 8 -20** = 0 X \$9.00 = 0.00 Independent	122	130	122	130	Petitions to the Commissioner	
Claims 1 -3** = 0 X \$40.00 = 0.00	123	50	123	50	Petitions related to provisional applications	
Multiple Dependent =	126	180	126	180	Submission of Information Disclosure Stmt	
Large Entity Small Entity	581	40	581	40	Recording each patent assignment per property (times number of properties)	40
Fee Fee Fee Fee Description Code (\$) Code (\$)	146	710	246	355	Filing a submission after final rejection (37 CFR 1.129(a))	
103 18 203 9 Claims in excess of 20	149	710	249	355	For each additional invention to be	
102 80 202 40 Independent claims in excess of 3					examined (37 CFR 1.129(b))	
104 270 204 135 Multiple Dependent claim	179	710	279	355	Request for Continued Examination (RCE)	
109 80 209 40 **Reissue independent claims over original patent	169	900	169	900	Request for expedited examination of a design application	
110 18 210 9 **Reissue claims in excess of 20	O4h =	. 6a - 1-	nn=!#	.\		\vdash
and over original patent	Other	r fee (s	pecity	"——		
SUBTOTAL (2) (\$) 0.00	* Badu~	ed by Basi	o Eilina	Ena Daid	SUBTOTAL (3) (\$)	40.00
	nedulo	u uy bas	v i illiy	, cc rail	(0)	
CUDMITTED BY					1	

SUBMITTED BY				Complete (if	applicable)
Typed or Printed Name	Thomas M. Coester, Reg. No. 39,637			Reg. Number	
Signature	Thomas Coeste	Date	12/29/00	Deposit Account User ID	02-2666

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Please type a plus sign (+) inside thi



Please type a plus sign (+) inside thi

PTO/SB/05 (09-00)

Applied for use through 10/31/2002. OMB 0651-0032

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	51876p219		
		0 11	
First Inventor or Appli	cation identifier	Sung-Hoon	ваек

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIP

Express Mail Label No. em014066885us

	PLICATION ELEMENT er 600 concerning utility patent app	-	ADDRESS 1		Assistant Commiss Box Patent Applicat Washington, DC 20	ion	921
2. Applica See 37 3. Specific (preferred Description Cross Statem Referred Or a co	nsmittal Form (e.g. PTO/SB. n original, and a duplicate for fee point claims small entity stated of the point claims small entity stated of the 1.27. It cation To larrangement set forth below) ptive title of the Invention References to Related Appent Regarding Fed sponsion of the Invention of the Invention of the Invention of the Invention	nocessing) tus. al Pages 14 uplications ored R & D utable,		Computer Footide and/or collicable, all no Computer Specificati i.	•	dix) uence Submission CFR) g on: 1 (2 copies); or	•
- Brief S	Summary of the Invention Description of the Drawings	s (if filed)	AC	COMPANY	YING APPLIC	ATION PARTS	
- Claim(- Abstra 4. Drawings 5. Oath or De a. b. i. 6. Applica 18. If a CONTII Prior appliic	ct of the Disclosure (s) (35 U.S.C.113) To claration To Newly executed (origin Copy from a prior appli (for continuation/divisional with DELETION OF II Signed statement inventor(s) name see 37 CFR 1.63 tion Data Sheet. See 37 C	cation (37 CFR 1.63(d)) Box 18 completed) NVENTOR(S) It attached deleting d in the prior application (d)(2) and 1.33(b). CFR 1.76. Continuation-in Ininer The entire disclosure of the	10. 3 (M) 11. E 12. In S 13. P 14. (S) 15. (ii) 16. Ap 17. O upply the requisite n-part (CIP)	7 CFR 3.73(then there is an anglish Transloformation Dotatement (ID) reliminary Areturn Receipthould be specific ertified Copy of foreign priorequest and Copplicant must ther: Required Receipthous and Copplicant must be priored and copplicant must	assignee) ation Document (isclosure S)/PTO - 1449 mendment of Postcard (MPE cally itemized) of Priority Docurity is claimed) certification undet attach form PT (uest for priority point in application No:	Copies of IC Citations EP 503) Iment(s) r 35 USC 122(b)(2) O/SB/35 or its equivity Init:	(B)(i). valent.
can only be relied	upon when a portion has been	inadvertently omitted from 17. CORRESPON			m the second second to the second second		
Customer	Number of Bar Code Label	* 087	91*	σ	Correspond	ence address below	
Name	BLAKELY, SC	KOLOFF, TAYLOR	& ZAFMAN I	LLP			
Address	12400 Wilshire	Boulevard, Seventh Fl	oor				
City	Los Angeles	State	Californ	nia	Zip Code	90025	
Country	U.S.A.	Telephone	(310) 2	07-3800	Fax	(310) 820-5988	
Name (Pri	nt/Type) Thomas M	I. Coester, Reg. No	. 39,637				

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

Signature

FEE TRANSMITTAL for FY 2001

TOTAL AMOUNT OF PAYMENT

6)	395.0

Complete if Known					
Application Number	-	_			
Filing Date					
First Named Inventor	Sung-Hoon Baek, et al.				
Examiner Name					
Group Art Unit					
Attorney Docket Number	51876p219				

METHOD OF PAYMENT (check one)	FEE CALCULATION (continued)					
The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:	3. <i>A</i>	ADDIT	ONA	L FE	Ē	
Deposit Account Number 02-2666	Large Fee Code		Small Fee Code	Fee	Fee Description	Fee Paid
	105		205		Surcharge - late filing fee or oath	
Deposit Account Name Blakely, Sokoloff, Taylor & Zafman LLP	127		227		Surcharge - late provisional filing fee or cover sheet.	
Charge Any Additional Fee Required Under 37CFR 1.16 and 1.17	139	130	139	130	Non-English specification	
Applicant claims small entity status.	147	2,520	147	2,520	For filing a request for ex parte reexamination	
See 37 CFR 1.27	112	920	112	920	Requesting publication of SIR prior to	
Payment Enclosed:					Examiner action	
☐ Check ☐ Money ☐ Other ☐ Order	113	1,840	113	1,840	Requesting publication of SIR after Examiner action	
FEE CALCULATION	115	110	215	55	Extension for response within first month	ļ
1. FILING FEE	116	390	216	195	Extension for response within second month	<u> </u>
Large Entity Small Entity	117	890	217	445	Extension for response within third month	
Fee Fee Fee Fee Description Fee Paid		1,390		695	Extension for response within fourth month	ļ
Code (\$) Code (\$)	,	1,890			Extension for response within fifth month	
101 710 201 355 Utility filing fee \$355	119		219		Notice of Appeal	
106 320 206 160 Design filing fee	120		220		Filing a brief in support of an appeal	
107 490 207 245 Plant filing fee	121		221		Request for oral hearing	
108 710 208 355 Reissue filing fee		1,510			Petition to institute a public use proceeding Petition to revive - unavoidably	
114 150 214 75 Provisional filing fee	140		240		Petition to revive - unintentionally	
SUBTOTAL (1) (\$) 355.00	i	1,240 1,240			Utility issue fee (or reissue)	
2. EXTRA CLAIM FEES For from	143	•	243		Design issue fee	
Extra Claims below Fee Paid	144		244		Plant issue fee	
Total Claims	122		122		Petitions to the Commissioner	
Independent Claims 1 -3** = 0 X \$40.00 = 0.00	123		123		Petitions related to provisional applications	
Multiple Dependent =	126	180	126		Submission of Information Disclosure Stmt	
Large Entity Small Entity	581	40	581	40	Recording each patent assignment per property (times number of properties)	40
Fee Fee Fee Fee Description	146	710	246	355	Filing a submission after final rejection	
Code (\$) Code (\$)					(37 CFR 1.129(a))	
103 18 203 9 Claims in excess of 20	149	710	249	355	For each additional invention to be	
102 80 202 40 Independent claims in excess of 3					examined (37 CFR 1.129(b))	
104 270 204 135 Multiple Dependent claim	179	710	279	355	Request for Continued Examination (RCE)	
109 80 209 40 "Reissue independent claims over original patent	169	900	169	900	Request for expedited examination of a design application	
110 18 210 9 **Reissue claims in excess of 20 and over original patent	Othe	r fee (s	pecify	/)		
SUBTOTAL (2) (\$) 0.00 "or number of previously paid, if greater, For Reissues, see above	*Reduce	ed by Bas	c Filing	Fee Paid	SUBTOTAL (3) (\$)	40.00
SUBMITTED BY					Complete (if applic	cable)

SUBMITTED E	3Y			Complete (if	applicable)
Typed or Printed Name	Thomas M. Coester, Reg. No. 39,637			Reg. Number	
Signature	Thomas Coeste	Date	12/29/00	Deposit Account User ID	02-2666

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Group:

Examiner:

In re the Application of:

SUNG-HOON BAEK, ET AL.

Application No.:

Filed:

For:

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN **MULTIPLE HOSTS AND RAID -**

Assistant Commissioner for Patents Washington, D.C. 20231

TRANSMITTAL OF FORMAL DRAWINGS

Sir:

Enclosed herewith for filing in the above-identified U.S. Patent Application are the formal drawings, 6 sheets including 6 Figures. Applicant hereby authorizes any additional extension or petition fees under 37 C.F.R. §1.17 or credit for any overpayment to our Deposit Account No. 02-2666. A copy of the Fee Transmittal sheet is enclosed.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Thomas M. Coester, Reg. No. 39,637

12400 Wilshire Blvd., 7th Floor Los Angeles, California 90025

Telephone: (310) 207-3800

FIG. 1

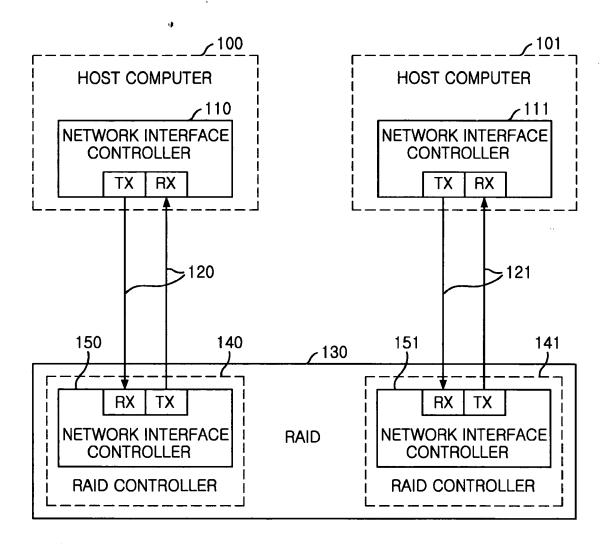


FIG. 2

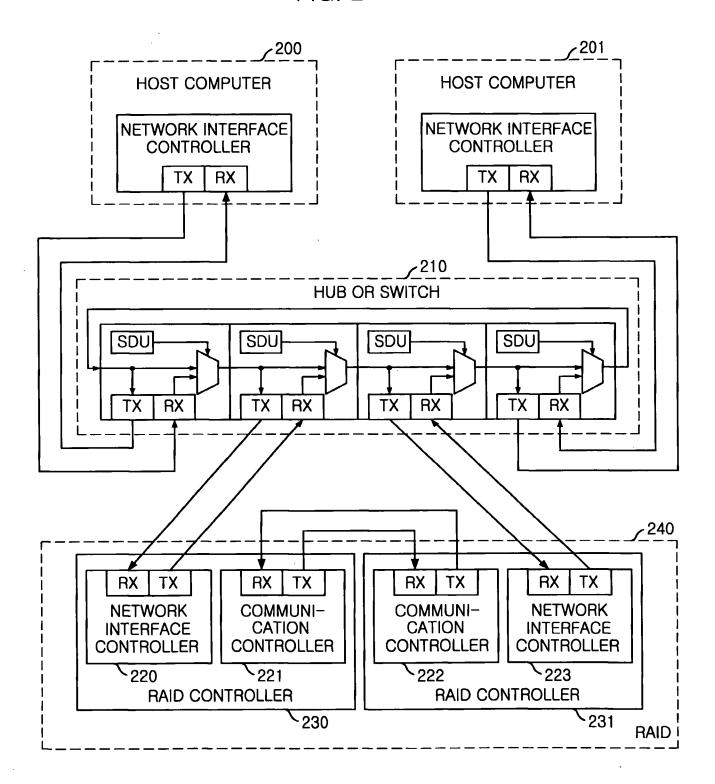
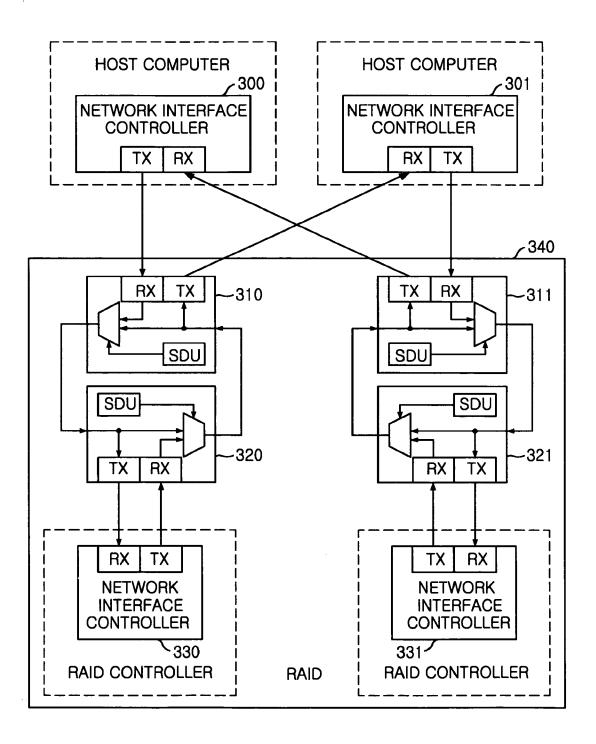
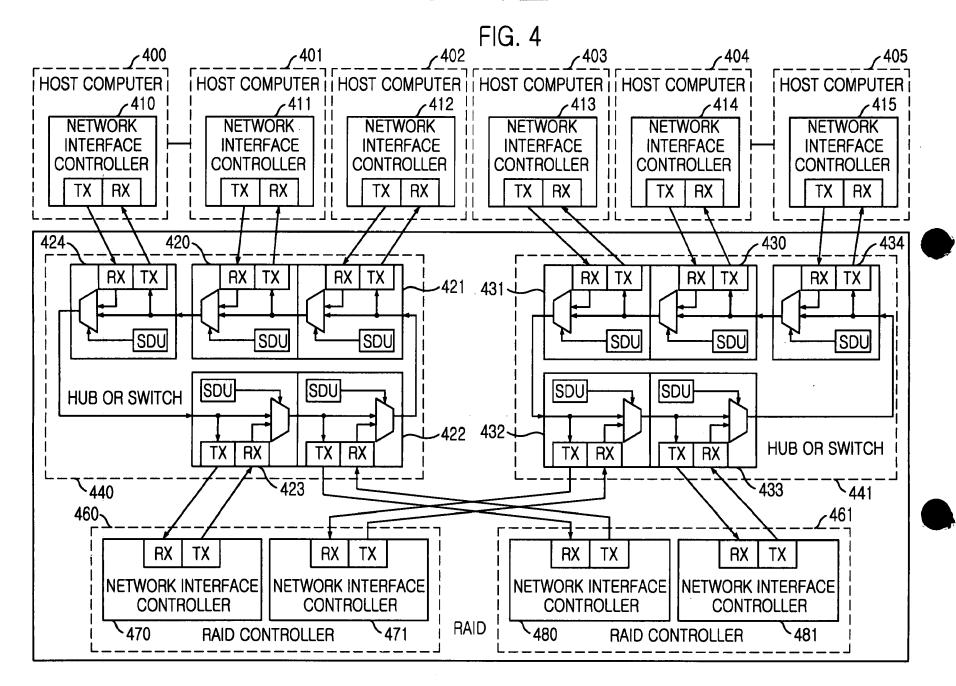
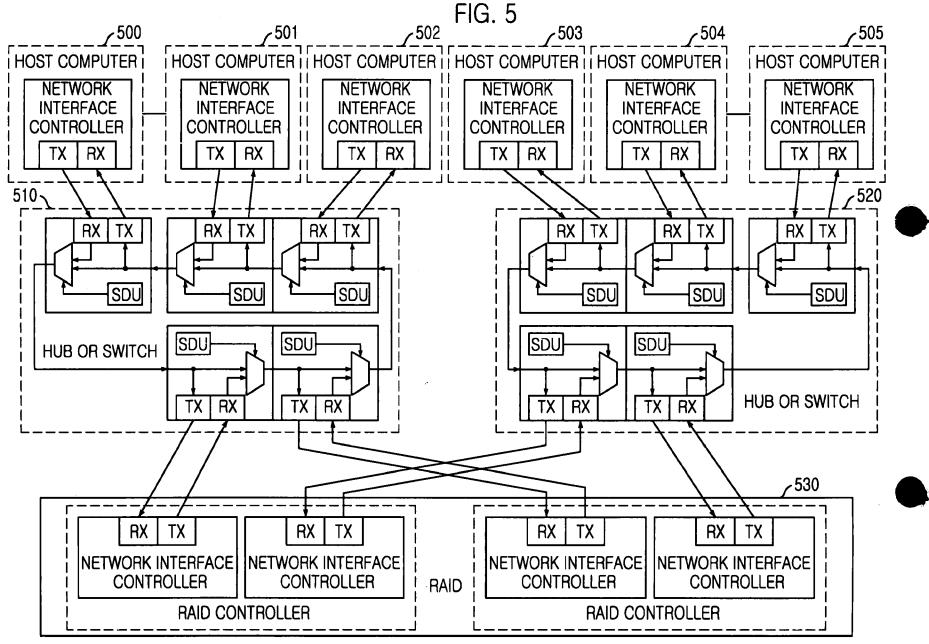


FIG. 3

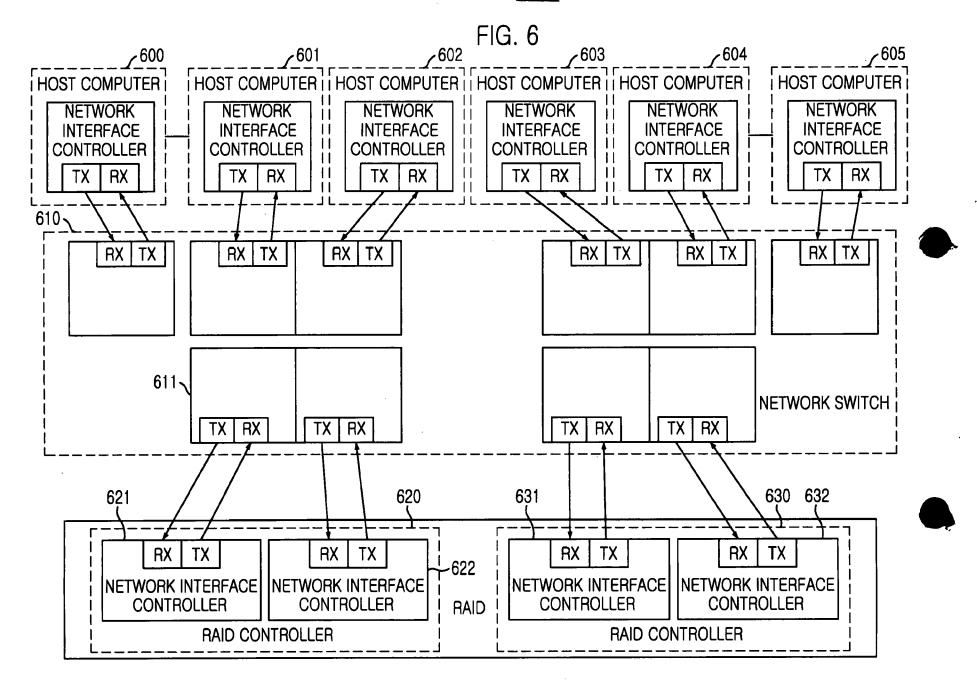




DHPN-1002 / Page 110 of 158



DHPN-1002 / Page 111 of 158



DHPN-1002 / Page 112 of 158

Our Ref. No.: 51876.P219 Express Mail No. EM014066885US

UTILITY APPLICATION FOR UNITED STATES PATENT

FOR

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

Inventor(s):

Sung-Hoon Baek et al.

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID

Field of the Invention

5

10

15

20

25

The present invention relates to an apparatus for a redundant interconnection between multiple host computers and a redundant arrays of inexpensive disks (hereinafter, referred to as 'RAID'); and, more particularly, to an apparatus for a redundant interconnection between multiple host computers and multiple controllers of the RAID, which is capable of supporting a fault tolerance of the RAID controllers and simultaneously heightening performance.

Prior Art of the Invention

A RAID is a storage system based on a large capacity and a high performance, by using much quantity of disks, and is a fault tolerant system in which the disks or controllers etc. have a redundant nature. In general, the RAID has two controllers, which are used like a method shown in Fig. 1 or 2.

Fig. 1 is an exemplary block diagram showing a general connection method between the host computers and the RAID having the conventional two controllers.

As shown in the drawing, such system independently uses two RAID controllers 140, 141, and has an independent connection with network interface controllers 110, 111 of the host computers. That

10

15

20

25

is, such system has twice the bandwidth and twice the performance. However, there is such a problem that a loss of data occurs when one out of two RAID controllers 140,141 has a trouble, in other words, this system does not become the fault tolerant system.

Fig. 2 is an exemplary block diagram of a general host interface system having a communication interface for an error recovery between the conventional two controllers.

In order to provide fault tolerance not provided in Fig. 1, two RAID controllers 230, 231 and host computers 200, 201 are connected with each other through a hub or switch 210 in one network. Thus, even though one RAID controller 230 or 231 has a trouble, all of the host computers 200, 201 are connected to a RAID controller that does not have a trouble. That is, this RAID controller not having the trouble serves as a role of the controller that has the trouble. Also, since the RAID controllers 230, 231 should exchange information with each other by preparing in advance against some trouble, the RAID controllers 230, 231 are connected with each other through communication controllers 221, 222. However, in this case only a half of performance for the bandwidth provided in Fig. 1 can be obtained.

Fig. 3 is an exemplary block diagram showing a wiring method between a conventional RAID and the host computers.

The construction shown in the drawing partially represents a systematic connection between a RAID and host computers, which is extracted from contents disclosed in the U.S. Patent No. 5,812,754. However, this construction has no any difference from that of Fig. 2, in the structure of a communication network, and

10

15

20

25

in case that one out of two host computers 300, 301 has rather a trouble, there is caused a problem that a network is broken. Thus, this construction is inferior to the construction of Fig. 2.

Summary of the Invention

Therefore, it is an object of the present invention to provide an apparatus for a redundant interconnection between multiple host computers and a RAID, which is capable of supporting a fault tolerance of a RAID controller and simultaneously heightening a performance.

In accordance with the present invention, the apparatus for a redundant interconnection between multiple hosts and a RAID comprises a plurality of RAID controllers for processing requests of numerous host computers connected with one another through an industrial standard communication network such as fibre channel and performing fault tolerant function; a plurality of connecting units for connecting the plurality of RAID controllers to the numerous host computers; and a plural number of network interface controllers respectively contained into the plurality of RAID controllers, the network interface controllers being for exchanging information directly with each of opposite network interface controllers provided within the numerous host computers and within opposite RAID controllers, through the plurality of connecting units.

10

15

20

Brief Description of the Drawings

The above and other objects and features of the instant invention will become apparent from the following description of preferred embodiments taken in conjunction with the accompanying drawings, in which:

- Fig. 1 is an exemplary block diagram showing a general connection system between host computers and a RAID having conventional two controllers;
- Fig. 2 indicates an exemplary block diagram of a general host interface system having a communication interface for an error recovery between the conventional two controllers;
- Fig. 3 illustrates an exemplary block diagram of a wiring method between a conventional RAID and host computers;
- Fig. 4 is a block diagram showing one embodiment of a host interface system as an internal installment system between a RAID and host computers in accordance with the present invention;
- Fig. 5 depicts a block diagram providing one embodiment of a host interface system as an external installment system between a RAID and host computers in the present invention; and
- Fig. 6 is a block diagram showing one embodiment of a host interface system as a network switch between a RAID and host computers in the invention.

25 Preferred Embodiment of the Invention

Hereinafter, preferred embodiments of the present invention

10

15

20

25

will be described in detail with reference to the accompanying drawings.

Fig. 4 is a block diagram showing one embodiment of a host matching system as an internal installment system between a RAID and host computers in accordance with the present invention.

As shown in Fig. 4, in the inventive host interface system, a communication circuit is provided in order for an error recovery between two RAID controllers 460, 461, and the bandwidth between two groups as the host computers 400 to 405 and two RAID controllers 460, 461 becomes twice the single connection bandwidth. Also, in the inventive host interface system, even though one RAID controller 460 or 461 has an occurrence of a trouble, the bandwidth becomes twice the single connection bandwidth.

That is to say, in a RAID 490, two RAID controllers 460, 461 and hubs 440, 441 exist, and in each of the RAID controllers 460, 461, a pair of network interface controllers 470, 471; 480, 481 are provided. Herewith, the hubs 440, 441 are provided to connect a system connected to these hubs by one network and maintain the network even though one system has an occurrence of a trouble or a short of a line, and it can be as a hub or a switch. Hereinafter, they are named a "hub" altogether.

Hub ports, 420 to 424, 430 to 434, shown in Fig. 4 indicate an example for a simple internal structure of a fibre channel arbitrated loop hub, and this is based on an already well-known technique, thus there will be herein no more description therefore in the invention. The hub observes its corresponding communication network standard.

10

20

25

A network, in which the RAID controllers, the hubs and the host computers are connected with one another, corresponds to the industrial standard communication network such as fibre channel, asynchronous transfer mode (ATM) and InfiniBand etc. and they are hereinafter named a 'network'.

Network interface controllers, 410 to 415, contained into the host computers, 400 to 405, and the network interface controllers 470, 471, 480, 481 of the RAID controllers 460, 461 are connected with one another by two networks through two hubs 440, 441, and according to a sort of the networks, the network interface controller becomes a fibre channel controller, an ATM controller and an InfiniBand controller etc.

At this time, a communication line, representatively shown as 450 in the drawing, for connecting the network interface controller to the hub is a copper line or an optical fibre, which is matched to a corresponding standard.

Meanwhile, two network interface controllers 470, 471 of the first RAID controller 460 are respectively connected to two different hub ports 423, 432, and two network interface controllers 480, 481 of the second RAID controller 461 are respectively connected to two different hub ports 422, 433. The rest ports 420, 421, 424, 430, 431, 434 of the hubs 440, 441 are connected to the host computers 400 to 405. Just, there is no distinction between the hub ports 420 to 424 of the first hub 440 at all. Also, there is no distinction between the hub ports 430 to 434 of the second hub 441 at all.

The hub port connected to the host computer among the hub

10

15

20

25

ports of the hub 440, namely, 420, 421, 424, is more than one, and there is no limitation to the maximum number. Further, What it is connected to the host computer among the hub ports of the second hub 441, namely, 430, 431, 434, is more than one, and there is no limitation to the maximum number. The hub ports 424, 434 and the host computers 400, 405, which are shown as dot lines in Fig. 4, mean that there is no, or more than one hub port or host computer.

Since, in such construction, two independent networks are constructed; it has twice the bandwidth of the single network, and a communication passage between two RAID controllers needed to perform the fault tolerant function of two RAID controllers 460, 461 is formed. Thus, information from the second network interface controller 471 of the first RAID controller 460 is sent to the first network interface controller 481 of the second RAID controller 461. Also, information from the second network interface controller 480 of the second RAID controller 461 is transmitted to the first network interface controller 470 of the first RAID controller 460. Further, information from the first network interface controller 481 of the second RAID controller 461 is transmitted to the second network interface controller 471 of the first RAID controller 460, and information from the first network interface controller 470 of the first RAID controller 460 is sent to the second network interface controller 480 of the second RAID controller 461.

The first network interface controllers 470, 480 of two RAID controllers 460, 461 respectively supply data of the host computers 400 to 402 connected to the first hub 440 and the host computer 403 to 405 connected to the second hub 441, and process information

10

15

20

25

transmitted from the opposite network interface controllers 471, 481.

If any one out of two RAID controllers 460, 461 has an occurrence of an error, the RAID controller having the error occurrence is removed from the network, and a second network interface controller of an opposite RAID controller not having the error occurrence takes over a function of a first network interface controller of the RAID controller having the error occurrence.

Fig. 5 is a block diagram providing one embodiment of the host interface system as an external installation system between the RAID and the host computers in the present invention.

As shown in Fig. 4, the present invention can be constructed by a method of internally installing the hubs 440, 441 in the RAID 490, and as shown in Fig. 5, it can be constructed by using the hubs 510, 520 for use of an external-installation.

Fig. 6 is a block diagram showing one embodiment of the host interface system as a network switch between the inventive RAID and host computers.

As shown in the drawing, Fig. 6 can have a function of Fig. 4. In other words, information from a second network interface controller 622 of a first RAID controller 620 is sent to a first network interface controller 632 of a second RAID controller 630, and information from a second network interface controller 632 of the second RAID controller 630 is transmitted to a first network interface controller 621 of the first RAID controller 620. Further, information from the first network interface controller 631 of the second RAID controller 630 is transmitted to the second network

10

15

20

interface controller 622 of the first RAID controller 620. Also, information from the first network interface controller 621 of the first RAID controller 620 is sent to the second network interface controller 632 of the second RAID controller 630.

Just, there is no distinction between respective ports, representatively 611, of a network switch 610 at all and also, the internal structure of a network switch 610 can be configured according to a selection of a user (not shown in Fig. 6).

In accordance with the present invention, as afore-mentioned, even in a case of an error occurrence in a RAID controller, there exist two independent networks and two network interface controllers, and the bandwidth of a single network can be twice maintained. Accordingly, a function of fault tolerance between two RAID controllers can be constructed without a drop of the bandwidth.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without deviating from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

- 1. An apparatus for a redundant interconnection between multiple hosts and a RAID, comprising:
- a plurality of RAID controlling units for processing a requirement of numerous host computers;

a plurality of connecting units for connecting the plurality of RAID controlling units to the numerous host computers; and

- a plural number of network interface controlling units respectively contained into the plurality of RAID controlling units, for exchanging information directly with the numerous host computers and an opposite network interface controlling unit provided within an opposite RAID controlling units, through the plurality of connecting units.
- 2. The apparatus as recited in claim 1, wherein said respective RAID controlling units are connected to the plurality of individual connecting units.
- 3. The apparatus as recited in claim 2, wherein said each network interface controlling unit is constructed by a pair, namely two, and is contained into the plurality of RAID controlling units, a first network interface controlling unit of said network interface controlling unit being connected to the connecting unit of one side and a second network interface controlling unit thereof being connected to the connecting unit of another side.

10

15

4. The apparatus as recited in claim 3, wherein said each network interface controlling unit further comprises:

the first network interface controlling unit for processing the requirement of the numerous host computers; and

the second network interface controlling unit used for fault tolerance in a communication between the respective RAID controlling units when the respective RAID controlling units do not have the occurrence of the error, said second network interface controlling unit being for executing a function of the first network interface controlling unit of the RAID controlling unit having the occurrence of the error in case that one given RAID controlling unit has the occurrence of the error.

5. The apparatus as recited in claim 1, wherein said plurality of connecting units have connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a hub equipment connected with the numerous host computers.

20

25

6. The apparatus as recited in claim 1, wherein said plurality of connecting units have the connection ports more than three, the two connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a network switch equipment connected with the numerous host computers.

10

15

- 7. The apparatus as recited in claim 1, wherein said plurality of connecting units have the connection ports more than five, the four connection ports among them being connected to said network interface controlling unit and the rest connection ports thereof being provided as a switch connected with the numerous host computers.
- 8. The apparatus as recited in claim 1, wherein said RAID controlling unit, said network interface controlling unit and said connecting unit are respectively constructed by a pair, the first network interface controlling unit of a first RAID controlling unit being connected to a first connecting unit, the second network interface controlling unit of said first RAID controlling unit being connected to a second connecting unit, the first network interface controlling unit of a second RAID controlling unit being connected to the second connecting unit, and the second network interface controlling unit of the second RAID controlling unit being connected to the first connecting unit.

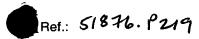
10

15

Abstract of the Disclosure

The apparatus for a redundant interconnection between multiple hosts and a redundant array of inexpensive disks (hereinafter, referred to as 'RAID'), which is capable of supporting а fault tolerance of RAID controllers and simultaneously heightening a performance, comprises a plurality of RAID controlling units for processing a requirement of numerous host computers connected with one another through the industrial standard communication network and for fault tolerance; a plurality of connecting units for connecting the plurality of RAID controlling units to the numerous host computers; and a plural number of network interface controlling units respectively contained into the plurality of RAID controlling units, for exchanging information directly with an opposite network interface controlling unit provided within an opposite RAID controlling unit and the numerous host computers, through the plurality of connecting units.





REDUNDANT

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

a patent is sought on the invention entitled

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first an joint inventor (if plural names are listed below) of the subject matter which is claimed and for which

APPARATUS FOR

My residence, post office address and citizenship are as stated below, next to my name,

INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID the specification of which __x__ is attached hereto. was filed on Application Serial No. and was amended on (if applicable) I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above. I do not know and do not believe that the same was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, ant that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a). I hereby claim foreign priority benefits under Title 35,, United States Code, Section 119, of ay foreign application(s) for patent or invertor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed: **Priority** Prior Foreign Application(s) Claimed 2000-54807 REPUBLIC OF KOREA 19 / 09 / 2000 (Day/Month/Year Filed) No Yes (Number) (Country) No (Day/Month/Year Filed) Yes (Number) (Country) (Day/Month/Year Filed) (Number) (Country) Yes No I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application: (Application Serial No.) (Filing Date) (Status -- patented, pending, abandoned) (Application Serial No.) (Filing Date) (Status -- patented,

pending, abandoned)

I hereby appoint BLAKELY, COLOFF, TAYLOR & ZAFMAN, a file cluding: Bradley J. Bereznak, revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

BAEK, SUNG-HOON	
24	Date Nov. 1. 2000
, = 0.	Citizenship REPUBLIC OF KOREA
State)	(Country)
17 JUNMIN-DONG, YUSON	
	· .
or KIM, JOONG-BAE	
Jong-par	Date <u> </u>
	Citizenship REPUBLIC OF KOREA
State)	(Country)
NAREA APT., JUNMIN-DO	NG, YUSONG-GU, TAEJON,
, KOREA	
KIM, YONG-YOUN	· · · · · · · · · · · · · · · · · · ·
Tom	Date Nov. 1. m
	Citizenship REPUBLIC OF KOREA
State)	(Country)
2, HANBIT APT., 99 EOEU	IN-DONG, YUSONG-GU, TAEJON,
r	
	Date
	Citizenship
State)	(Country)
,	
•	
	Date
	Date
	Citi-anahin
State)	Citizenship (Country)
State)	(Country)
	State) -17 JUNMIN-DONG, YUSON FOR KIM, JOONG-BAE State) NAREA APT., JUNMIN-DO , KOREA KIM, YONG-YOUN State) 2, HANBIT APT., 99 EOEU









United States Patent and Trademark Office

COMMISSIONER FOR PATENTS UNITED STATES PATENT AND TRADEMARK OFFICE WASHINGTON, D.C. 2023I www.uspto.gov

Bib Data Sheet

CONFIRMATION NO. 8804

SERIAL NUMBER 09/753,245	FILING DATE 12/29/2000 RULE		CLASS GROU		JP AR [*] 2152	T UNIT		ATTORNEY OCKET NO. 51876p219			
APPLICANTS Sung-Hoon Baek, Teajon, KOREA, REPUBLIC OF; Joong-Bae Kim, Taejon, KOREA, REPUBLIC OF; Yong-Youn Kim, Taejon, KOREA, REPUBLIC OF;											
** CONTINUING DATA **********************************											
GRANTED ** 04/11/2	EIGN FILING LICENS		** SMALL E	ENTITY	/ **						
Foreign Priority claimed 35 USC 119 (a-d) conditions Met after Moverified and Allowance Cakinowledged Allowance Examiner's Signature Initials STATE OR COUNTRY KOREA, REPUBLIC OF STATE OR COUNTRY KOREA, REPUBLIC OF											
ADDRESS 08791											
TITLE Apparatus for redund	ant interconnection be	tween mu	ltiple hosts a	nd raid							
All Fees 1.16 Fees (Filing)											
FILING FEE FEE RECEIVED No.	S: Authority has been of to charge/of for followin	UNT	1.17 Fees (Processing Ext. of								
355 No.	for followin		1.18 Fees (Issue)								
☐ Other ☐ Credit											



U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE FEE RECORD SHEET

01/05/2001 UYANG1 00000042 09753245

01 FC:201

355.00 OP

PTO-1556 (5/87)

*U.S. GPO: 2000-468-987/39595

PATENT APPLICATION FEE DETERMINATION RECORD

Application	or	Docket	Nun	nbei
-------------	----	--------	-----	------

Effective October 1, 2000

19762745

					_					<u> ၁</u> င			
		CLAIMS AS	(Column 1) (Column 2)					SMALL ENTITY TYPE			OTHER TH		
TC	TAL CLAIMS		ලි		alastidis.			RATE	FEE]	RATE	F	EE
FC	FOR NUMBER				NUME	BER EXTRA		BASIC FEE	355.00	OR	BASIC FEE	710	0,00
тс	TAL CHARGEA	BLE CLAIMS	8 mir	us 20=	*			X\$ 9=		OR X\$18=			
IND	EPENDENT CL	_AIMS	i *										
MULTIPLE DEPENDENT CLAIM PRESENT								.105		1	+270=		
* If	the difference	in column 1 is	less than ze	ero, ente	r "0" in d	column 2		+135= TOTAL	365	OR	TOTAL	+	
	C	LAIMS AS A	MENDER) - PAR	TII			IOIAL	355	Uh	OTHER	TH	
		(Column 1)		(Colui		(Column 3)	_	SMALL	ENTITY	OR	SMALL		
ENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGH NUM PREVIO PAID	BER OUSLY	PRESENT EXTRA		RATE	ADDI- TIONAL FEE		RATE	TIC	DDI- DNAL EE
AMENDMENT	Total	*	Minus	**		=] [X\$ 9=		OR	X\$18=		
AME	Independent	*	Minus	***		=		X40=		OR	X80=		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM								+135=		OR	+270=		
								TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE		
		(Column 1)		(Colu		(Column 3)				•			,
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGH NUM PREVIO PAID	BER OUSLY	PRESENT EXTRA		RATE	ADDI- TIONAL FEE		RATE	TIC	DDI- DNAL EE
NON	Total	*	Minus	**		=		X\$ 9=		OR	X\$18=		
AME	Independent	* NTATION OF MU	Minus	***	CLAIM]=	1 [X40=		OR	X80=		
	THIOTTHEOL	IVANOV OF MIC	DETIT EE DET	LIADEIAI	OLAIM		J [+135=		OR	+270=		
							-	TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE		
		(Column 1)		(Colur		(Column 3)	,						
AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGH NUM PREVIO PAID	BER DUSLY	PRESENT EXTRA		RATE	ADDI- TIONAL FEE		RATE	TIC	DDI- DNAL EE
NDN	Total	*	Minus	**		=		X\$ 9=		OR	X\$18=		
AME	Independent	*	Minus	***	- v-	=	!	χ40=		OR	X80=		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM													
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.													
**	f the "Highest Nur If the "Highest Nu	mber Previously Pa mber Previously Pa ther Previously Pai	id For" IN THI aid For" IN THI	S SPACE i S SPACE i	s less tha is less tha	n 20, enter "20.' in 3, enter "3."		TOTAL DDIT. FEE	ventiate h		TOTAL ADDIT. FEE		

						SERIAL N				FILING DATE				
		CI	AIM	201	JI V	•		09	15:32	945				
		OL	~	3 OI	4			APPLICAL				1		
	CLAIMS													
	ASF	ILED		TER NDMENT		rer Ndment	l l		*		*		*	
	IND.	DEP.	IND.	CSP.	IND.	DEP.	1		IND.	DEF.	IND.	DEF.	iND.	DEP.
1	1				 		1 1	51				 	1	
2		1.	-	-			† †	52				<u> </u>	<u> </u>	
3		1		····	 		1 1	53	<u> </u>			<u> </u>	 	
4		i	 				1 h	54				<u> </u>	<u> </u>	
5		i i			†		1	55						
6 .		1					1 1	56				† · · · · ·		
7		1 1	<u> </u>				1 1	57				· · · · · · · · · · · · · · · · · · ·	<u> </u>	
8		<u> </u>	<u> </u>		1		1	58			1			
9							1 1	59						
10							1 [60						
11] [61						
12								62			L			
13] [63						
14		<u> </u>			<u> </u>		1 1	64			<u> </u>	<u> </u>	<u> </u>	
15					<u> </u>	<u> </u>		65						
16			<u> </u>				↓	66			<u> </u>		ļ	
17			ļ		ļ	ļ .		67			ļ	<u> </u>	ļ	
18		 		<u> </u>	ļ		↓ ↓	68_			 	ļ	ļ	
19		ļ			 -			69_			<u> </u>	├	-	
20		 					ł ŀ	70			├ ┈─	 		<u> </u>
21	.				 	 	∤ ∤	71			 	 	├──	
22	 					ļ	┨	72			 	 	 	
23	 	 			 	 	- I	73 74			 	-	 	
25	 	 			ļ	 	1 H	75			├	 	 	
26		-		-		-	┨	76			├	-		
27			-			-	┨	77			 	 	 	
28			<u>- </u>	 	<u> </u>		┪	78	-		 	 	 	
29					<u> </u>		1 1	79			 	 	 	
30		<u> </u>	 	1	<u> </u>	 	1 1	80			 	 	} 	
31				<u> </u>	 	 	1 1	81			 	 	†	
32			<u> </u>				1 1	82				1		
33							1 1	83						
34							1 [84						
35							1 [85						
36] [86						
37] [87						
38] [88]		
39] [89		-				
40] [90						
41	ļ <u> </u>				ļ <u>.</u>	ļ	. l	91	igwdown			<u> </u>	<u> </u>	ļ
42	ļ			<u> </u>	Ь—		. J	92			 		 	ļ
43	 			<u> </u>	 		↓ 	93			 	 	1	ļ
44			 	<u> </u>	├		4. k	94			 	 	 	ļ
45	_	ļ	ļ		 	ļ	↓	95_			 	 	-	
46	 	ļ	 		 	ļ	∤ ŀ	96				 	 	
47	ļ		 	<u> </u>	 	 	∮ ŀ	97			 -		 	-
48		 	 	 	 		┪ ŀ	98 99	 		 	 -	 	
50			 		├	 	₁ ŀ	100			 	 	 	
	1	 _ -	 	 _	 	 	┪				 	 	 	
TOTAL IND.] _	<u> </u>	」 ↓	<u></u>	.	l l	TOTAL IND.		1	<u></u>	」_₽	<u></u>	ا ا
TOTAL DEP.					<u>L</u>] [TOTAL DEP.					<u></u>	
TOTAL CLAIMS	Ö			· ·				TOTAL						
	-						•							
				" MAY E	BE USED	FOR ADDI	ITIONAL CI	LAIMS OI	R ADMENE	DMENTS				
1														
											U.S.DE	PARTMEN	T OF COM	MERCE

Attorney Docket No.: 51876p219 Express Mail No.: em014066885us

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

SUNG-HOON BAEK, ET AL.

For:

APPARATUS FOR REDUNDANT

INTERCONNECTION BETWEEN MULTIPLE

HOSTS AND RAID - UTILITY

09/753245 09/753245 12/29/00

Honorable Commissioner of Patents and Trademarks Washington, D.C. 20231

Request for Priority

Sir:

Applicant respectfully requests a convention priority for the above-captioned application, namely Korean application number 2000-54807 filed September 19, 2000.

X

A certified copy of the document is being submitted herewith.

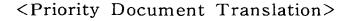
Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Dated:

Thomas M. Coester, Reg. No. 39,637

12400 Wilshire Blvd., 7th Floor Los Angeles, California 90025 Telephone: (310) 207-3800





THE KOREAN INDUSTRIAL PROPERTY OFFICE

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Industrial Property Office.

Application Number: 2000-54807 (Patent)

Date of Application: September 19, 2000

Applicant(s) : ELECTRONICS AND TELECOMMUNICATIONS

RESEARCH INSTITUTE

October 18, 2000

COMMISSIONER



대 한 민 국 특 허 청 KOREAN INDUSTRIAL PROPERTY OFFICE

별첨 시본은 아래 출원의 원본과 동일함을 증명함.

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Industrial Property Office.

출 원 번 호

특허출원 2000년 제 54807 호

Application Number

출 원 년 월 일

2000년 09월 19일

Date of Application

출 원

인 :

한국전자통신연구원

Applicant(s)



2000 10 18 년 월 일

청

COMMISSIONE



CERTIFIED COPY OF PRIORITY DOCUMENT

1020000054807 . 2000/10/2

【서류명】 특허출원서

【권리구분】 특허

【수신처】 특허청장

【참조번호】 0002

【제출일자】 2000.09.19

【발명의 명칭】 다중 호스트 컴퓨터와 레이드 사이의 중복연결을 위한 장

치

【발명의 영문명칭】 The Apparatus for Redundant Interconnection between

Multiple Hosts and RAID

【출원인】

【명칭】 한국전자통신연구원

【출원인코드】 3-1998-007763-8

【대리인】

【성명】 특허법인 신성 정지원

【대리인코드】9-2000-000292-3【포괄위임등록번호】2000-051975-8

【대리인】

【성명】 특허법인 신성 원석희

 【대리인코드】
 9-1998-000444-1

 【포괄위임등록번호】
 2000-051975-8

【대리인】

【성명】 특허법인 신성 박해천

【대리인코드】9-1998-000223-4【포괄위임등록번호】2000-051975-8

【발명자】

【성명의 국문표기】 백승훈

【성명의 영문표기】BAEK, Sung Hoon【주민등록번호】741208-1691110

【우편번호】 305-390

【주소】 대전광역시 유성구 전민동 339-17번지 103호

【국적】 KR

【발명자】

【성명의 국문표기】 김중배

【성명의 영문표기】 KIM, Joong Bae

【주민등록번호】 601123-1109134

【우편번호】 305-390

【주소】 대전광역시 유성구 전민동 나래아파트 105-701

【국적】 KR

【발명자】

【성명의 국문표기】 김용연

【성명의 영문표기】 KIM, Yong Youn

^{"%"} 【주민등록번호】 570807-1063533

【우편번호】 305-333

【주소】 대전광역시 유성구 어은동 99 한빛아파트 117-1002

【국적】 KR

【심사청구】 청구

【취지】 특허법 제42조의 규정에 의한 출원, 특허법 제60조의 규정

에 의한 출원심사 를 청구합니다. 대리인

특허법인 신성 정지원 (인) 대리인 특허법인 신성 원석희 (인) 대리인

특허법인 신성 박해천 (인)

【수수료】

【기본출원료】 19 면 29,000 원

 【가산출원료】
 0
 면
 0
 원

 【우선권주장료】
 0
 건
 0
 원

[심사청구료] 8 항 365,000 원

[합계] 394,000 원

【감면사유】 정부출연연구기관

【감면후 수수료】 197,000 원

【첨부서류】 1. 요약서·명세서(도면)_1통

2000/10/2

【요약서】

[요약]

본 발명은 다중 호스트 컴퓨터와 독립 디스크 중복배열(RAID: Redundant Array of Inexpensive Disks, 이하 '레이드'라 함) 사이의 중복연결을 위한 장치에 관한 것으로, 레이드 제어기의 결함허용을 지원함과 동시에 성능을 높일 수 있는 다중 호스트 컴퓨터와 레이드 사이의 중복연결을 위한 장치를 제공하기 위하여, 다중 호스트 컴퓨터와 레이드 사이의 중복연결 장치에 있어서, 산업 표준 통신망을 통하여 연결된 복수의 호스트 컴퓨터들의 요구를 처리하고 결함허용 기능을 수행하기 위한 다수 개의 레이드 제어 수단; 상기 다수의 레이드 제어 수단과 상기 다수의 호스트 컴퓨터 사이를 연결하기 위한 다수 개의 연결 수단; 및 상기 각 다수의 레이드 제어 수단 내에 포함되어 상기 다수의연결 수단을 통하여 상기 다수의 호스트 컴퓨터 및 상대 레이드 제어수단 내의 상대 망정합 제어 수단과 직접 정보를 교환하는 다수 개의 망 정합 제어 수단을 포함하며, 레이드 시스템 등에 이용됨.

【대표도】

도 4

【색인어】

레이드(RAID), 파이버 채널(Fibre Channel), 중복연결, 결함허용, 망 허브, 망 스위치

1020000054807 . 2000/10/2

【명세서】

【발명의 명칭】

다중 호스트 컴퓨터와 레이드 사이의 중복연결을 위한 장치{The Apparatus for Redundant Interconnection between Multiple Hosts and RAID}

【도면의 간단한 설명】

도 1 은 종래의 두 제어기를 가지는 레이드와 호스트 컴퓨터들 사이의 일반적인 연결방식의 구성예시도.

도 2 는 종래의 두 제어기 사이에 오류복구를 위한 통신정합을 가지는 일반적인 호 스트 정합방식의 구성예시도.

도 3 은 종래의 레이드와 호스트 컴퓨터 사이의 결선방식의 구성예시도.

도 4 는 본 발명에 따른 레이드와 호스트 컴퓨터 사이의 내장 시스템으로서의 호스 트 정합방식의 일실시예 구성도.

도 5 는 본 발명에 따른 레이드와 호스트 컴퓨터 사이의 외장 시스템으로서의 호스 트 정합방식의 일실시예 구성도.

도 6 은 본 발명에 따른 레이드와 호스트 컴퓨터 사이의 망 스위치로서의 호스트 정합방식의 일실시예 구성도.

* 도면의 주요 부분에 대한 부호의 설명

400 : 호스트 컴퓨터 440 : 허브 또는 스위치

2000/10/2

460 : 레이드 제어기

490 : 레이드

【발명의 상세한 설명】

【발명의 목적】

【발명이 속하는 기술분야 및 그 분야의 종래기술】

- 본 발명은 다중 호스트 컴퓨터와 독립 디스크 중복배열(RAID: Redundant Array of Inexpensive Disks, 이하 '레이드'라 함) 사이의 중복연결을 위한 장치에 관한 것으로, 더욱 상세하게는 레이드 제어기의 결함허용을 지원함과 동시에 성능을 높일 수 있는 다중 호스트 컴퓨터와 레이드의 다중 제어기 사이의 중복연결을 위한 장치에 관한 것이다.
- 시하 레이드는 다량의 디스크를 이용하는 고성능과 대용량의 저장 장치이며, 디스크나 제어기 등에 중복성이 있는 결함 허용 시스템이다. 일반적으로 레이드에는 두 개의 제어 기가 있고, 이 두 제어기는 도 1 이나 도 2 와 같은 방법으로 사용되었다.
- <12> 도 1 은 종래의 두 제어기를 가지는 레이드와 호스트 컴퓨터들 사이의 일반적인 연결방식의 구성예시도이다.
- 이러한 시스템은, 도면에 도시된 바와 같이, 두 레이드 제어기(140,141)를 독립적으로 이용하고 호스트 컴퓨터의 제어기(110,111)와 독립적인 연결을 가지고 있어서 두배의 대역폭과 두 배의 성능을 가진다. 그러나, 두 레이드 제어기(140, 141) 중 하나에고장이 발생하면 데이터의 손실이 발생하게 되는 문제점이 있다. 즉, 결함허용 시스템이되지 못한다.
- <14>도 2 는 종래의 두 제어기 사이에 오류복구를 위한 통신정합을 가지는 일반적인 호

1020000054807 . 2000/10/2

스트 정합방식의 구성예시도이다.

- 도 1 이 갖지 못한 결함허용을 제공하기 위해서 두 레이드 제어기(230,231)와 호스트 컴퓨터(200,201)들이 허브 또는 스위치(210)를 통하여 하나의 망으로 연결되어 있다. 그래서 하나의 레이드 제어기(230 또는 231)가 고장나더라도 모든 호스트 컴퓨터(200,201)는 고장나지 않은 레이드 제어기와 연결되므로, 이 고장나지 않은 레이드 제어기가 고장난 제어기의 역할까지 수행하게 된다. 그리고, 고장에 대비하여, 레이드 제어기(230,231)들은 서로 정보를 주고 받아야 하므로 통신 제어기(221,222)를 통하여 연결되어 있다. 하지만, 이러한 시스템의 경우에는 도 1 이 가지는 대역폭의 절반의 성능 밖에 갖지 못하는 문제점이 있었다.
- <16>도 3 은 종래의 레이드와 호스트 컴퓨터 사이의 결선방식의 구성예시도이다.
- 도면에 도시된 구성은 미국특허 5,812,754의 내용 중, 레이드와 호스트 컴퓨터-간의 시스템 연결에 대한 부분이다. 하지만 이에 따른 구성은 통신망의 구조가 도 2 와 다른 바가 없고, 오히려 두 호스트 컴퓨터(300,301) 중에 하나가 고장나면 망이 끊어지는 문제점이 있으므로 도 2 의 구성보다 못한 방식이다.

【발명이 이루고자 하는 기술적 과제】

본 발명은, 상기 문제점을 해결하기 위하여 안출된 것으로, 레이드 제어기의 결함 허용을 지원함과 동시에 성능을 높일 수 있는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결을 위한 장치를 제공하는데 그 목적이 있다. 102000054807 2000/10/2

【발명의 구성 및 작용】

- 시기 목적을 달성하기 위한 본 발명의 장치는, 다중 호스트 컴퓨터와 레이드 사이의 중복연결 장치에 있어서, 산업 표준 통신망을 통하여 연결된 다수의 호스트 컴퓨터들의 요구를 처리하고 결함허용 기능을 수행하기 위한 다수 개의 레이드 제어 수단; 상기다수의 레이드 제어 수단과 상기 다수의 호스트 컴퓨터 사이를 연결하기 위한 다수 개의연결 수단; 및 상기 각 다수의 레이드 제어 수단 내에 포함되어 상기 다수의연결 수단을 통하여 상기 다수의 호스트 컴퓨터 및 상대 레이드 제어수단 내의 상대 망 정합 제어수단과 직접 정보를 교환하는 다수 개의 망 정합 제어수단을 포함한다.
- <20> 상술한 목적, 특징들 및 장점은 첨부된 도면과 관련한 다음의 상세한 설명을 통하여 보다 분명해 질 것이다. 이하, 첨부된 도면을 참조하여 본 발명에 따른 바람직한 일 -실시예를 상세히 설명한다.
- - 도면에 도시된 바와 같이, 본 발명은 두 개의 레이드 제어기(460,461) 사이의 오류 복구를 위한 통신회로를 가지며, 두 집단의 호스트 컴퓨터(400 내지 405)들과 두 레이드 제어기(460,461) 사이의 대역폭이 단일 연결 대역폭의 두 배가 되고, 하나의 레이드 제 어기(460 또는 461)에 고장이 발생하더라도 대역폭이 단일 연결 대역폭의 두 배가 되는 호스트 정합방식이다.
 - <23> 즉, 레이드(490)에 두 개의 레이드 제어기(460,461)와 허브(440,441; 여기에 연결 된 시스템을 하나의 망으로 연결시켜주며, 한 시스템에 고장이 발생하거나 선이 단락되

1020000054807 2000/10/2

어도 망이 유지되는 장치로서, 허브 또는 스위치가 있으며, 이하, 이것들을 통틀어 '허브 '라고 칭한다)가 존재하고, 각 레이드 제어기(460,461)에는 한 쌍의 망 정합 제어기 (470,471; 480,481)가 있다.

- 도 4 에 도시된 허브 포트(420 내지 424, 430 내지 434)의 그림은 파이버 채널 아비트레이티드 루프(Fibre Channel Arbitrated Loop) 허브의 간단한 내부구조의 예로서,이미 공지된 기술이므로, 본 발명에서는 더 이상 설명하지 않기로 한다. 허브는 해당 통신 망 규격을 준수한다.
- 상기 레이드 제어기와 허브와 호스트 컴퓨터가 연결되어 있는 망은 산업 표준 통신 망이다. 이러한 통신망에는 대표적으로 파이버 채널(Fibre Channel)과 비동기식 전송 모 드(ATM: Asynchronous Transfer Mode)와 인피니밴드(InfiniBand) 등이 있다. 이하, 이 것들을 '망'이라 칭한다.
- 호스트 컴퓨터들(400 내지 405)이 갖고있는 망 정합 제어기(410 내지 415)와 레이드 제어기(460,461)의 망 정합 제어기(470,471,480,481)는 두 허브(440, 441)를 통하여두 개의 망으로 연결되어 있으며, 망의 종류에 따라서 망 정합 제어기는 파이버 채널 제어기, ATM 제어기, 인피니밴드(InfiniBand) 제어기 등이 된다.
- <27> 이때, 망정합 제어기 와 허브 사이를 잇는 통신선(대표 : 450)은 해당 규격에 맞는 구리선이나 광섬유이다.
- 한편, 첫째 레이드 제어기(460)의 두 망 정합 제어기들(470,471)은 각각 두개의 다른 허브 포트(423,432)에 연결되고, 둘째 레이드 제어기(461)의 두 망 정합 제어기들
 (480,481)도 각각 두개의 다른 허브 포트(422,433)에 연결된다. 허브(440,441)의 나머지

102000054807 2000/10/2

포트들(420,421,424,430,431,434)은 호스트 컴퓨터들(400 내지 405)과 연결된다. 단, 첫째 허브(440)의 허브 포트들(420 내지 424) 사이의 구분은 전혀 없다. 또한, 둘째 허브 (441)의 허브 포트들(430 내지 434) 사이의 구분도 전혀 없다.

- 첫째 허브(440)의 허브 포트 중 호스트 컴퓨터와 연결되는 것(420,421,424)은 한개이상이며, 최대 갯수의 제한은 없다. 또한 둘째 허브(441)의 허브 포트 중 호스트 컴퓨터와 연결되는 것(430,431,434)도 한개 이상이며, 최대 갯수의 제한은 없다. 도 4 에서 점선으로 표기된 허브 포트들(424,434)과 호스트 컴퓨터들(400, 405)은 없거나 한 개 이상임을 의미한다.
- ◇30 상기의 방법으로 구성하면, 두개의 독립된 망이 구성되므로 단일 망의 두배 대역폭을 가지고, 두 레이드 제어기(460,461)의 결합허용 기능을 위해서 필요한 두 레이드 제어기 간의 통신 통로가 형성된다. 그래서, 첫째 레이드 제어기(460)의 둘째 망 정합 제어기(471)가 보내는 정보는 둘째 레이드 제어기의 첫째 망 정합 제어기(481)가 받고, 둘 그차째 레이드 제어기(461)의 둘째 망 정합 제어기(480)가 보내는 정보는 첫째 레이드 제어기(460)의 첫째 망 정합 제어기(470)가 받는다. 또한 둘째 레이드 제어기(461)의 첫째 망 정합 제어기(481)가 보내는 정보는 첫째 레이드 제어기(460)의 둘째 망 정합 제어기(470)가 보내는 정보는 둘째 레이드 제어기(470)가 보내는 정보는 둘째 레이드 제어기(461)의 둘째 망 정합 제어기(470)가 보내는 정보는 둘째 레이드 제어기(461)의 둘째 망 정합 제어기(480)가 받는다.
 - 독 레이드 제어기들(460,461)의 첫째 망 정합 제어기들(470,480)은 각각 첫째 허브
 (440)에 연결된 호스트 컴퓨터들(400 내지 402)과 둘째 허브(441)에 연결된 호스트 컴퓨
 터들(403 내지 405)의 데이터를 공급하고, 상대 망 정합 제어기(471, 481)가 보내는 정
 보를 처리한다.

독 레이드 제어기들(460,461) 중 어느 하나에 오류가 발생하면, 두 허브들
 (440,441)에 의해서, 오류가 발생된 레이드 제어기는 망에서 제거되고, 오류가 나지 않
은 상대 레이드 제어기의 둘째 망 정합 제어기가 오류 발생된 레이드 제어기의 첫째 망
정합 제어기의 기능을 물려받는다.

- 도 5 는 본 발명에 따른 레이드와 호스트 컴퓨터 사이의 외장 시스템으로서의 호스 트 정합방식의 일실시예 구성도이다.
- 본 발명은 도 4 에 도시된 바와 같이 레이드(490)에 허브들(440,441)을 내장하는 방법으로 구성할 수도 있고, 도 5 에 도시된 바와 같이 외장형 허브들(510, 520)을 이용 하여 구성할 수도 있다.
- <35> 도 6 은 본 발명에 따른 레이드와 호스트 컴퓨터 사이의 망 스위치로서의 호스트 정합방식의 일실시예 구성도이다.
- ○36 도면에 도시된 바와 같이, 도 6 은 도 4 에 도시된 기능을 가질 수 있다. 즉, 첫째 레이드 제어기(620)의 둘째 망 정합 제어기(622)가 보내는 정보는 둘째 레이드 제어기 (630)의 첫째 망 정합 제어기(632)가 받고, 둘째 레이드 제어기(630)의 둘째 망 정합 제어기(632)가 보내는 정보는 첫째 레이드 제어기(620)의 첫째 망 정합 제어기(621)가 받는다. 또한 둘째 레이드 제어기(630)의 첫째 망 정합 제어기(631)가 보내는 정보는 첫째 레이드 제어기(620)의 둘째 망 정합 제어기(622)가 받고, 첫째 레이드 제어기(620)의 첫째 망 정합 제어기(621)가 보내는 정보는 둘째 레이드 제어기(630)의 둘째 망 정합 제어기(632)가 받는다.
- <37> 단, 망 스위치(610)의 각 포트(대표:611)의 구분은 전혀 없다.

이상에서 설명한 본 발명은 전술한 실시예 및 첨부된 도면에 의해 한정되는 것이 아니고, 본 발명의 기술적 사상을 벗어나지 않는 범위 내에서 여러 가지 치환, 변형 및 변경이 가능하다는 것이 본 발명이 속하는 기술분야에서 통상의 지식을 가진 자에게 있어 명백할 것이다.

【발명의 효과】

상기와 같은 본 발명은, 레이드 제어기의 오류 발생 시에도 두 개의 독립된 망과
 두 개의 망 정합 제어기가 존재하므로 단일 망 대역폭의 두 배를 유지할 수 있어, 대역
 폭의 저하없이 두 레이드 제어기 사이의 결합허용 기능을 구성할 수 있는 효과가 있다.

【특허청구범위】

【청구항 1】

다중 호스트 컴퓨터와 레이드(RAID : Redundant Array of Inexpensive Disks) 사이의 중복연결 장치에 있어서,

산업 표준 통신망을 통하여 연결된 다수의 호스트 컴퓨터들의 요구를 처리하고 결합하용 기능을 수행하기 위한 다수 개의 레이드 제어 수단;

상기 다수의 레이드 제어 수단과 상기 다수의 호스트 컴퓨터 사이를 연결하기 위한 다수 개의 연결 수단; 및

상기 각 다수의 레이드 제어 수단 내에 포함되어 상기 다수의 연결 수단을 통하여 상기 다수의 호스트 컴퓨터 및 상대 레이드 제어 수단 내의 상대 망 정합 제어 수단과 직접 정보를 교환하는 다수 개의 망 정합 제어 수단

을 포함하는 다중 호스트 컴퓨터와 레이드 사이의 중복연결 장치.

【청구항 2】

제 1 항에 있어서.

상기 각 레이드 제어 수단은,

상기 다수의 연결 수단과 각각 연결되는 것을 특징으로 하는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결 장치.

【청구항 3】

제 1 항에 있어서,

상기 각 망 정합 제어 수단은,

2개씩 쌍을 이뤄 상기 다수의 레이드 제어 수단에 포함되어, 제 1 망 정합 제어 수단은 일측의 연결 수단과 연결되고, 제 2 망 정합 제어 수단은 타측의 연결 수단과 연결되는 것을 특징으로 하는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결 장치.

= 01

【청구항 4】

` 제 3 항에 있어서,

상기 각 망 정합 제어 수단은,

상기 다수의 호스트 컴퓨터들의 요구를 처리하는 상기 제 1 망 정합 제어 수단; 및 상기 각 레이드 제어 수단에 오류가 발생하지 않을 시에 결함허용을 위한 상기 각 레이드 제어 수단 간의 통신에 이용되고, 소정의 어느 하나의 레이드 제어 수단에 오류가 발생한 경우에 상기 오류 발생 레이드 제어 수단의 제 1 망 정합 제어 수단의 기능을 수행하기 위한 제 2 망 정합 제어 수단

을 더 포함하는 다중 호스트 컴퓨터와 레이드 사이의 중복연결 장치.

【청구항 5】

제 1 항에 있어서.

상기 다수의 연결 수단은,

세 개 이상의 연결 포트를 가지고 있어, 두 연결 포트는 상기 망 정합 제어 수단과 연결되고, 나머지 연결 포트들은 다수의 호스트 컴퓨터들과 연결되는 산업 표준 망 허브 장치인 것을 특징으로 하는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결 장치.

【청구항 6】

제 1 항에 있어서,

상기 다수의 연결 수단은,

세 개 이상의 연결 포트를 가지고 있어, 두 연결 포트는 상기 망 정합 제어 수단과 연결되고, 나머지 연결 포트들은 다수의 호스트 컴퓨터들과 연결되는 망 스위치 장치인 것을 특징으로 하는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결 장치.

【청구항 7】

제 1 항에 있어서.

상기 다수의 연결 수단은,

다섯 개 이상의 연결 포트를 가지고 있어, 네 연결 포트는 상기 망 정합 제어 수단과 연결되고, 나머지 연결 포트들은 다수의 호스트 컴퓨터들과 연결되는 산업 표준 망스위치인 것을 특징으로 하는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결 장치.

【청구항 8】

제 1 항 내지 제 5 항 중 어느 한 항에 있어서,

상기 레이드 제어 수단과 상기 망 정합 제어 수단과 상기 연결 수단이 각각 쌍으로 이루어지되,

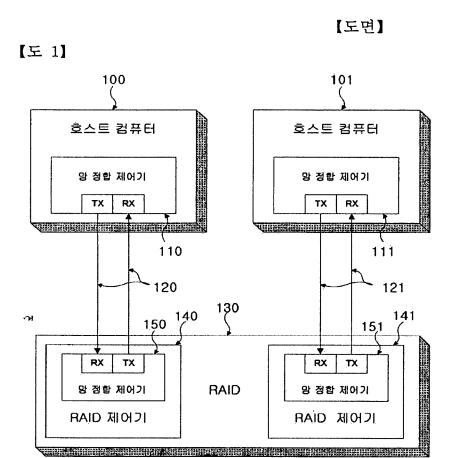
첫째 레이드 제어 수단의 첫째 망 정합 제어 수단이 첫째 연결 수단에 연결되고,

상기 첫째 레이드 제어 수단의 둘째 망 정합 제어 수단이 둘째 연결 수단에 연결 되고,

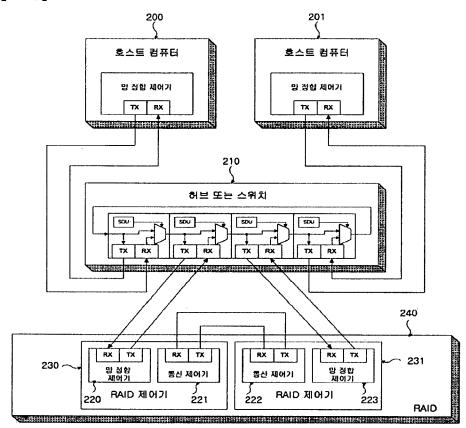
둘째 레이드 제어 수단의 첫째 망 정합 제어 수단이 상기 둘째 연결 수단에 연결되고,

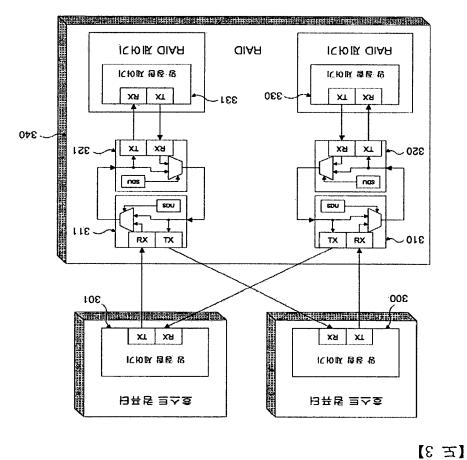
상기 둘째 레이드 제어 수단의 둘째 망 정합 제어 수단이 상기 첫째 연결 수단에 *** 연결된 것을 특징으로 하는 다중 호스트 컴퓨터와 레이드 사이의 중복 연결 장치.

-EEE



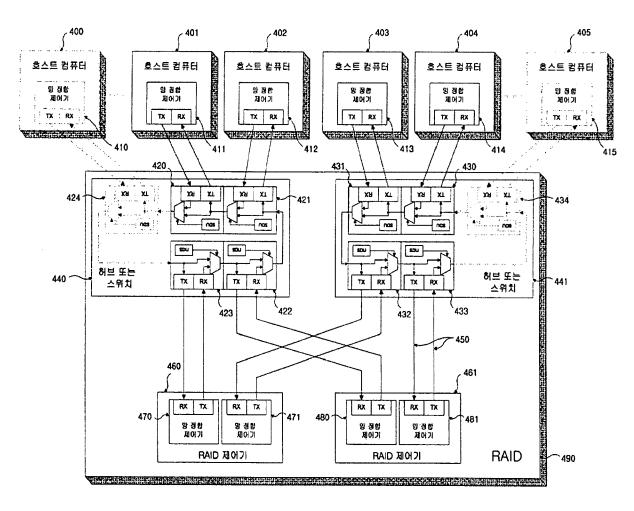
[도 2]



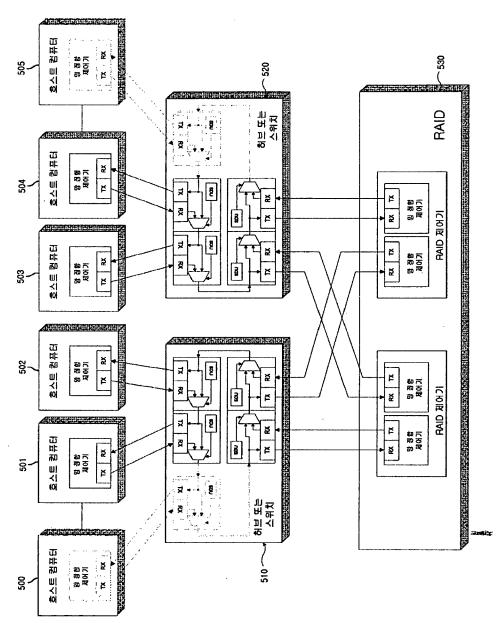


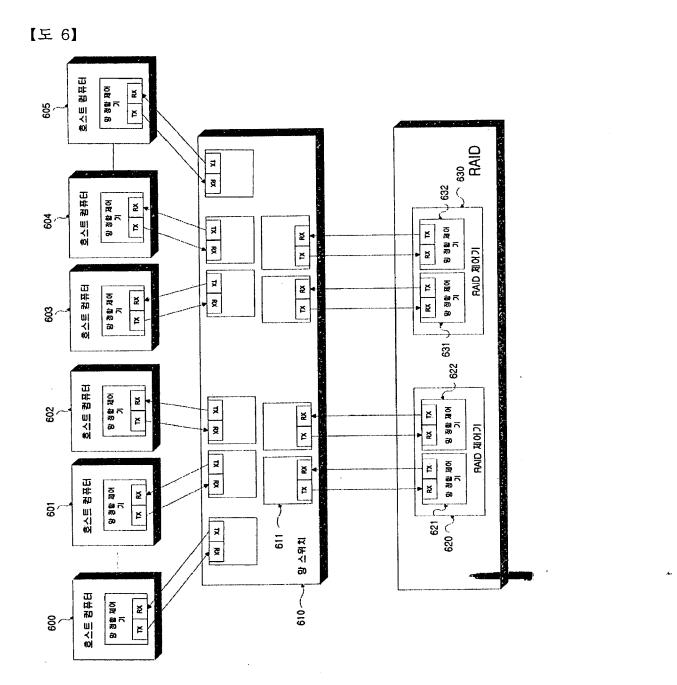
21-18

2000/10/2



[도 5]





Art Group:

Examiner:

51876p219 em014066885us



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:

SUNG-HOON BAEK, ET AL.

Application No.:

Filed:

For:

APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID -

UTILITY

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. §1.97

Assistant Commissioner for Patents Washington, D.C. 20231

Sir:

Pursuant to Rule 1.97, Applicant desires to make of record the reference(s) set forth on the attached Form PTO 1449. A copy of each reference is submitted herewith.

It is hereby stated that this Information Disclosure Statement is being filed within three months of the filing date of the subject application, therefore no petition or fee is required. However, in the event a petition is needed for consideration of this Information Disclosure Statement, Applicant hereby so petitions. Please charge any additional fee due to Deposit Account 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: 12/29/00

Thomas M. Coester, Reg. No. 39,637

12400 Wilshire Blvd., 7th Floor Los Angeles, California 90025 Telephone: (310) 207-3800



Information Disclosure Statements

U.S. Patent Application for APPARATUS FOR REDUNDANT INTERCONNECTION BETWEEN MULTIPLE HOSTS AND RAID Our Ref. No. <u>P00E6002/US/iw</u>

Reference Nos.: US5251062, US5798306, US4652536

Papers: (1) Tellurite glass: a new candidate for fiber devices

(2) Structure and optical properties of rare earth-doped zinc oxyhalide tellurite glasses

(3) Raman spectra and thermal analysis of a new lead-tellurium-germanate glass system