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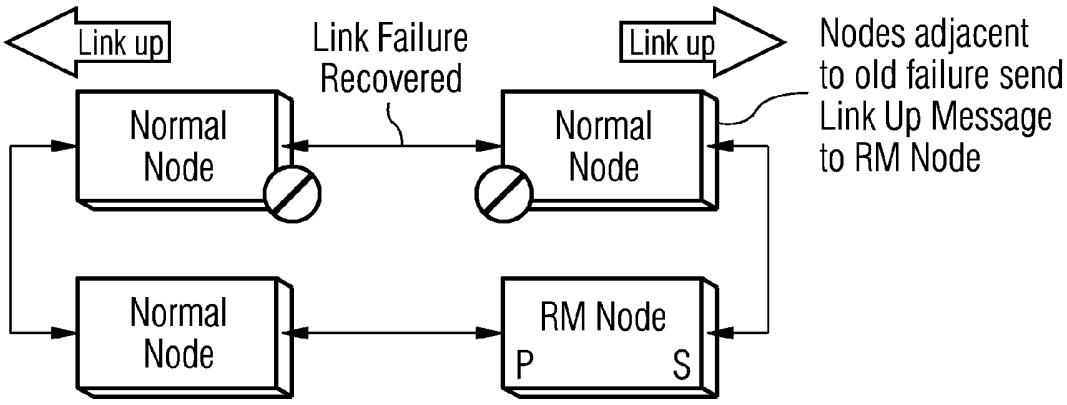
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** METHOD OF RESTORING A RING SYSTEM



(57) **Abstract:** In a system comprising nodes linked in a ring structure where data flows between the nodes, a method of operating the system after a link has become broken, comprising recovering said broken link and the system treating said recovered link as still broken and operating said system so as to block said recovered link. One of the nodes in said ring system is a redundancy manager node which sends messages to the other nodes to implement blocking of said recovered link. Only when another link becomes broken does the system start to use the previously recovered link.

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METHOD OF RESTORING A RING SYSTEM

This invention relates to a method of restoring a link in a system where the system comprises a number of node joined by links and is applicable to telecommunication systems and in particular Ethernet based systems.

Ethernet ring protection always creates traffic/service interruption when a broken link is restored and is created when the system switches back to normal position.

Ethernet ring protection always creates traffic/service interruption when a broken link is restored and the system switches back to normal position.

One of the nodes in an ERP ring is the redundancy manager (RM) node, which is responsible to co-ordinate blocking or unblocking of ERP ring links in order to create a loop-less topology.

From time to time links become broken and when the broken link becomes once again operational, the nodes adjacent to the link sent a "link up" notification to the RM node. The RM node in turn blocks one of its ports and sends an indication for the normal modes that the ring is re-established. This indication makes all nodes revert to normal state. This step unfortunately causes traffic and service interruption, triggered by e.g. flushing and filtering databases (MAC look-up tables) in all the nodes of the whole ring. This is shown in figure 1.

It is there for an object of the invention to overcome this problem.

By enhancing the protocol on the RM node it is possible to thus avoid the traffic interruption when the broken link is restored and still provide protection if another link is broken.

The invention comprises in a system comprising nodes linked in a ring structure where data flows between the nodes, a method of operating the system after a link has become broken, comprising recovering said broken link, and the system treating said recovered link as still broken and operating said system so as to block said link. One of said nodes in said ring system is a redundancy manager node which sends messages to the other nodes to implement blocking of said recovered link. The recovered link is treated as blocked until failure of another link occurs.

The invention will now be described with reference to figure 2 which shows a basic embodiment of the invention; the system hardware is identical to that of figure 1.

When a broken link becomes once more operational, the nodes adjacent to the link send the information to the RM node that the link is recovered, or the RM node it self perceives that the link is recovered. The RM node instead of sending an indication to the normal nodes to use the recovered link, sends them an indication to keep blocking the link; this way a new traffic interruption is avoided. When a new failure on another link occurs, the link down indication set by the nodes adjacent to the link will make the link usable once again.

CLAIMS

1. In a system comprising nodes linked in a ring structure where data flows between the nodes, a method of operating the system after a link has become broken, comprising recovering said broken link, and the system treating said recovered link as still broken and operating said system so as to block said link.

2. A method as claimed in claim 1 wherein one of said nodes in said ring system is a redundancy manager node which sends messages to the other nodes to implement blocking of said recovered link.

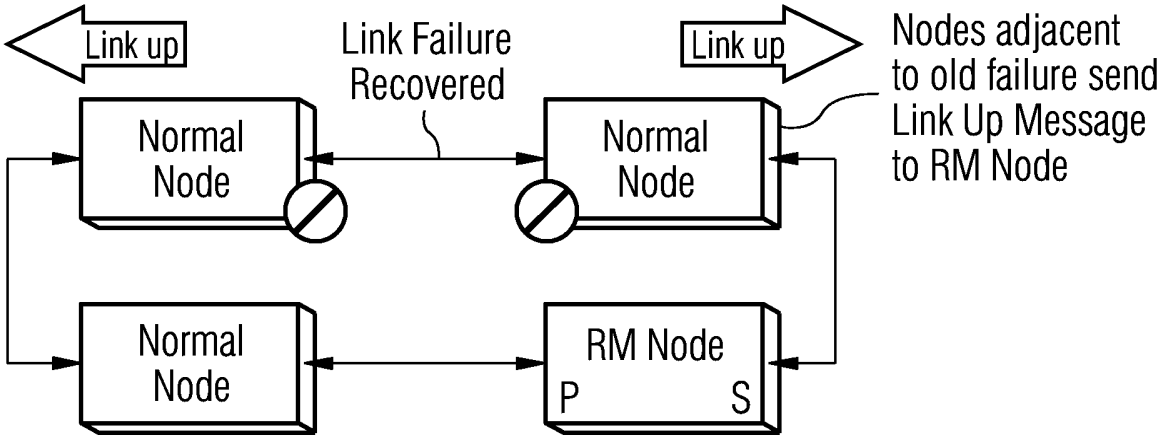
3. A method as claimed in claim 1 or 2 wherein said recovered link is treated as blocked until failure of another link occurs.

4. A method as claimed in claims 1,2 or 3 wherein said system is a computer or telecommunication system.

5. A method as claimed in claim 4 wherein said system is an Ethernet based system.

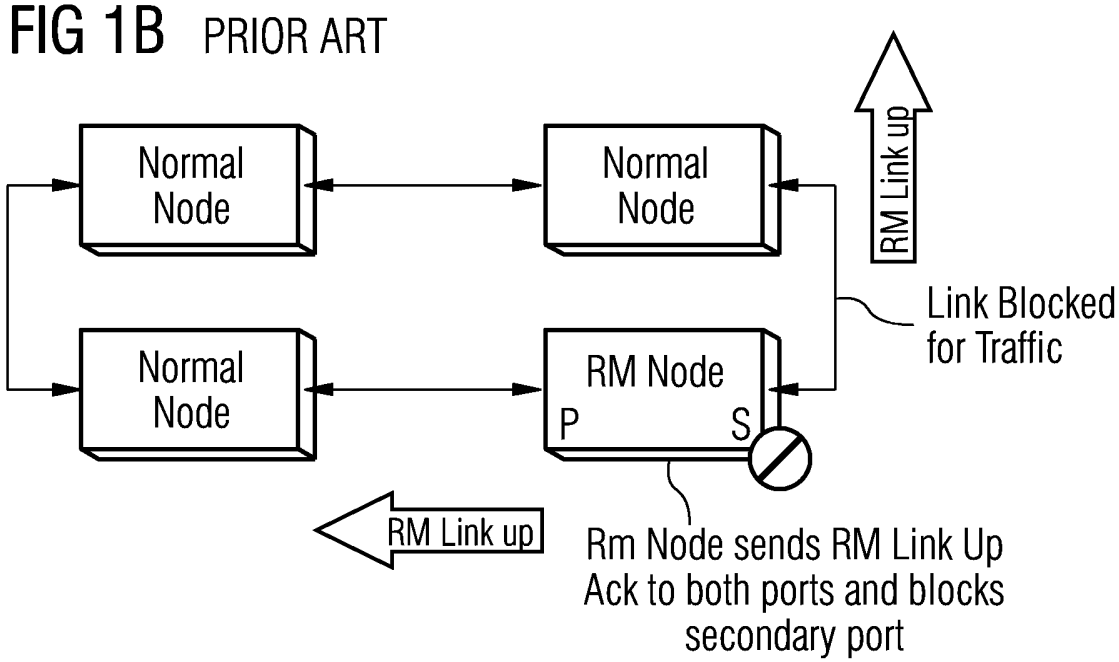
6. A system embodying any of the above methods.

FIG 1A PRIOR ART



Normal nodes inform RM node of recovery of broken link

FIG 1B PRIOR ART



RM node reverts operation to normal state

FIG 2A

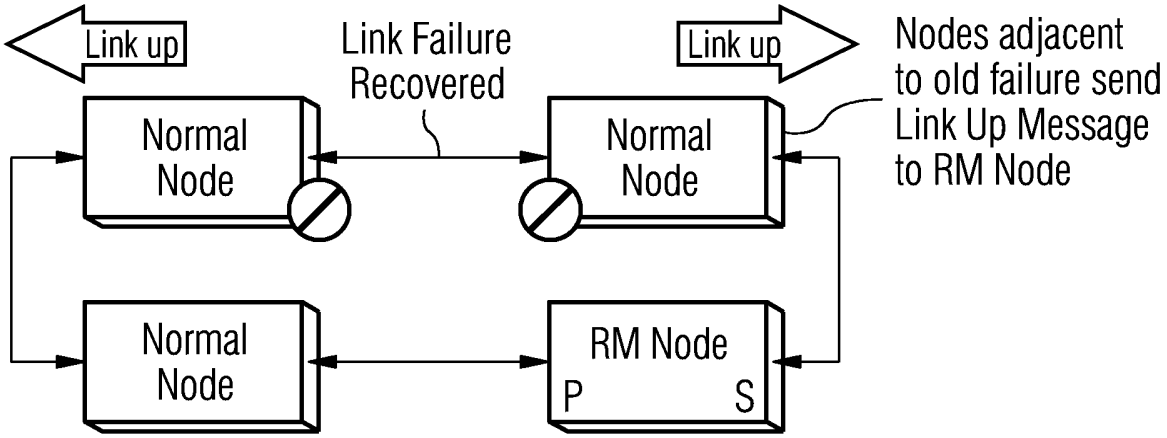
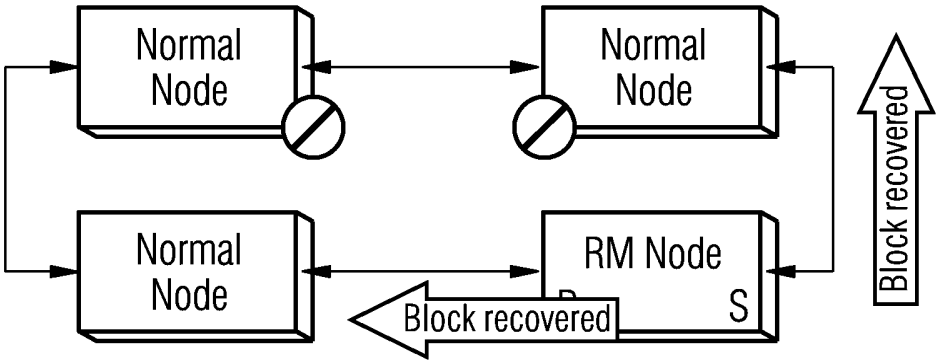

Link up
Link Failure Recovered
Link up
Nodes adjacent to old failure send Link Up Message to RM Node
Normal Node
Normal Node
Normal Node
RM Node
P
S

FIG 2B


Normal Node
Normal Node
Normal Node
RM Node
S
Block recovered
Block recovered

INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
H04L12/43

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 766 482 B1 (YIP MICHAEL ET AL) 20 July 2004 (2004-07-20)	1,2,4-6
A	figures 1-3,5 column 2, line 5 - line 26 column 5, line 14 - column 6, line 54	3
A	US 6 621 818 B1 (SZCZEPANEK ANDRE ET AL) 16 September 2003 (2003-09-16) column 3, line 5 - line 39; figure 9	1-6
A	DE 102 07 529 A1 (SIEMENS AG) 11 September 2003 (2003-09-11) paragraph '0003! - paragraph '0012!; figure 1	1-6

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2005/056906

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