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Wang et al.

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(54) **RAID METHOD AND DEVICE WITH NETWORK PROTOCOL BETWEEN CONTROLLER AND STORAGE DEVICES**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/527,904**

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Related U.S. Application Data

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(51) **Int. Cl.**⁷ **G06F 12/02**

(52) **U.S. Cl.** **711/114; 711/162; 711/154; 711/161; 370/355; 370/356**

(58) **Field of Search** 711/114, 4, 162, 711/161, 154; 709/200; 710/1; 370/351-356

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Primary Examiner—Mano Padmanabhan

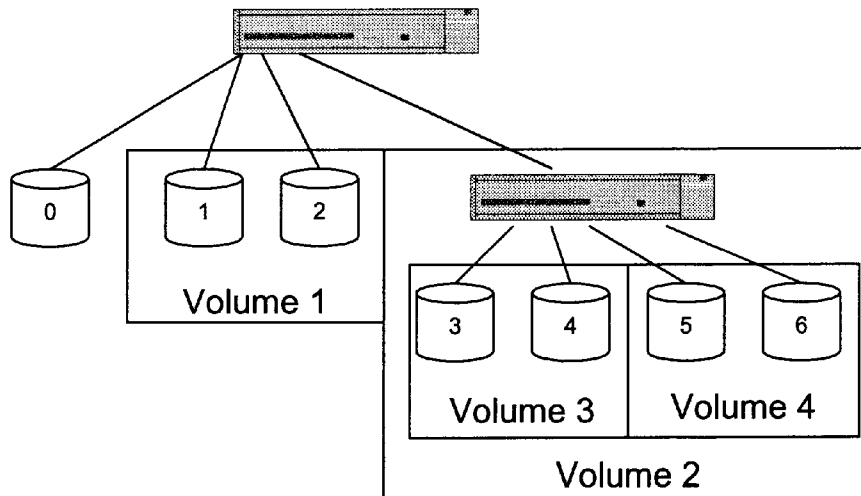
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(57) **ABSTRACT**

The present invention relates to transparent access to a redundant array of inexpensive devices. In particular, it provides a method and device for connecting redundant disk drives to a controller, preferably an intelligent switch, via a network. The disks are controlled by commands transported across the network. Commands may be SCSI, IDE/ATA or other commands. The network may comprise ethernet, fiber channel or other physical layer protocol. Commands can be encapsulated in IP packets and transmitted using either a reliable or unreliable transport protocol. Multicasting of packets from the controller to the multiple disk drives is part of the present invention.

74 Claims, 10 Drawing Sheets



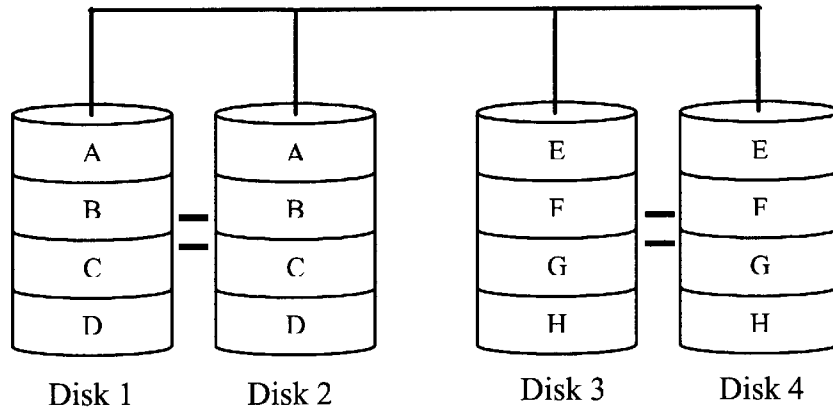


Fig. 1

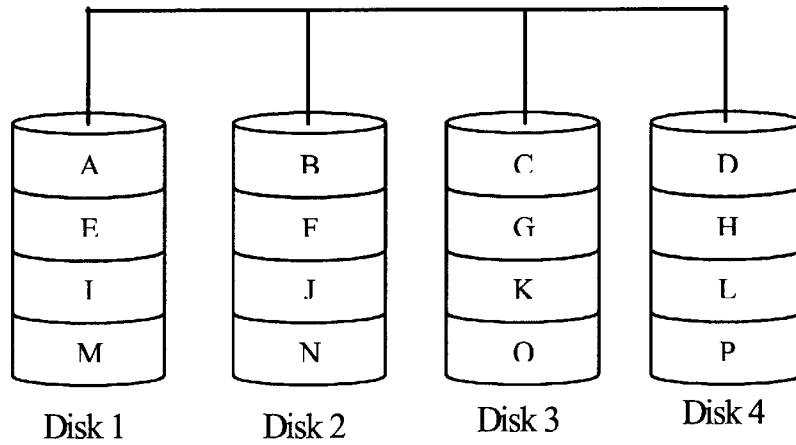


Fig. 2

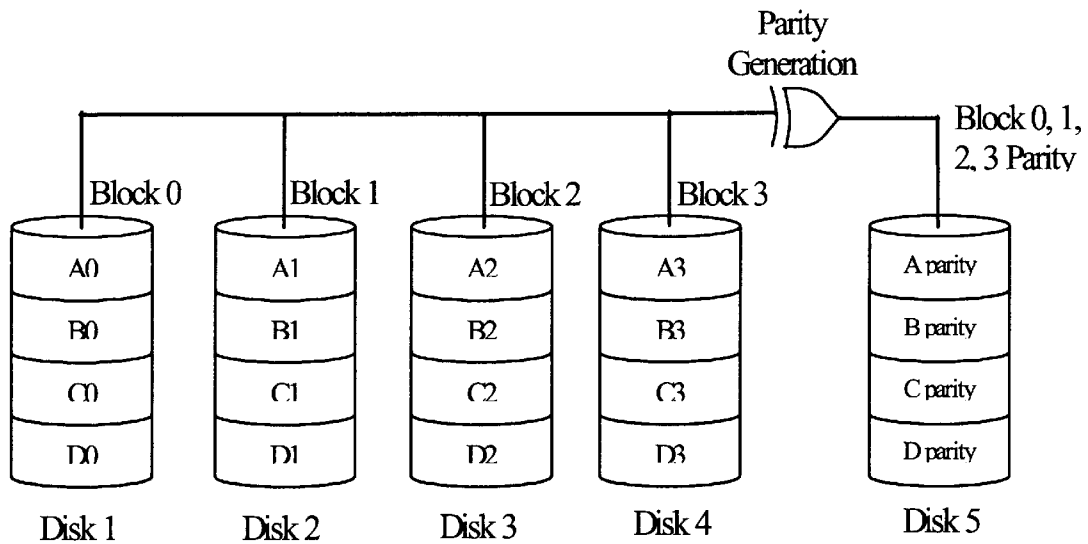


Fig. 3

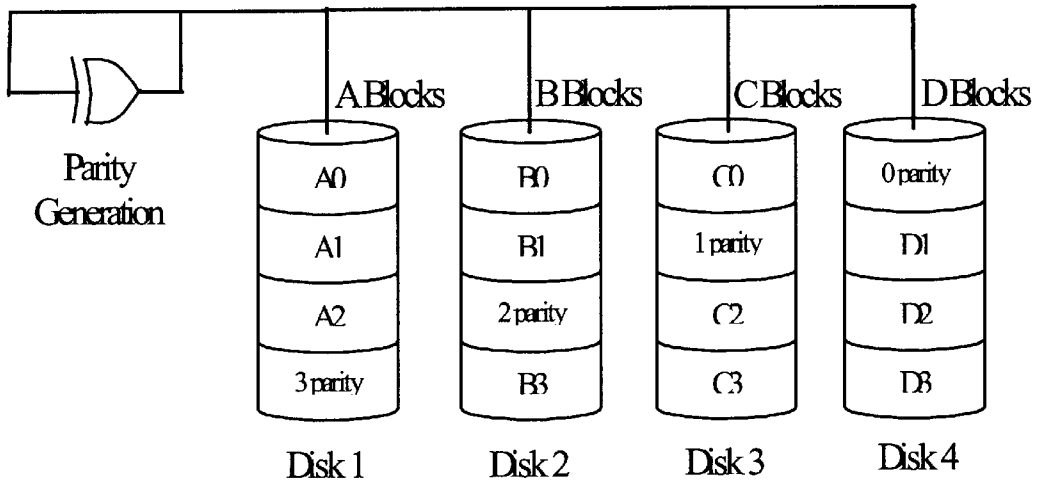


Fig. 4

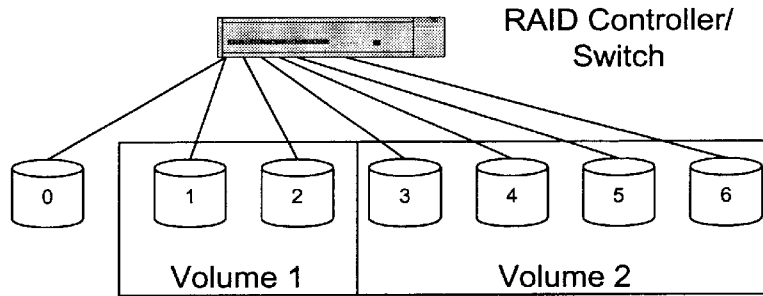


Fig. 5

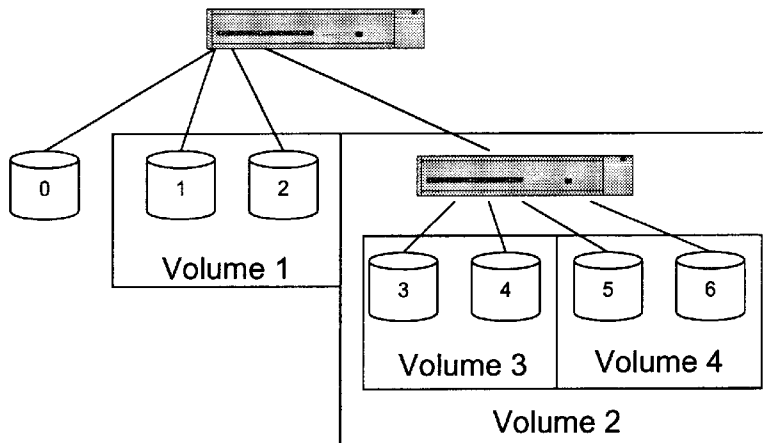


Fig. 6

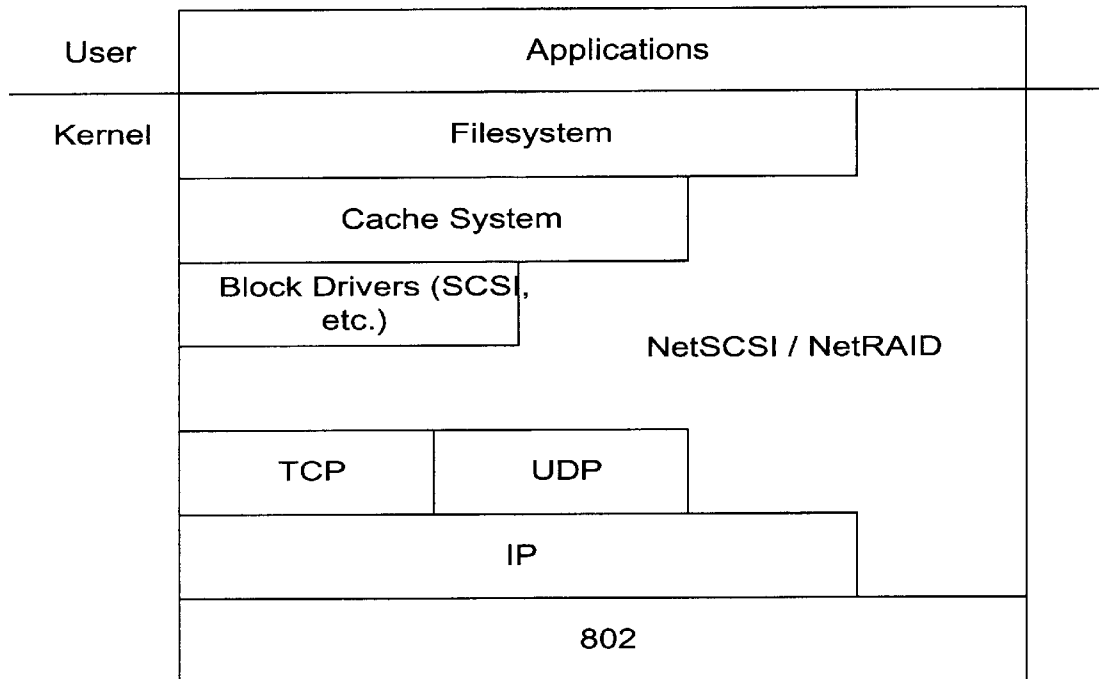


Fig. 7

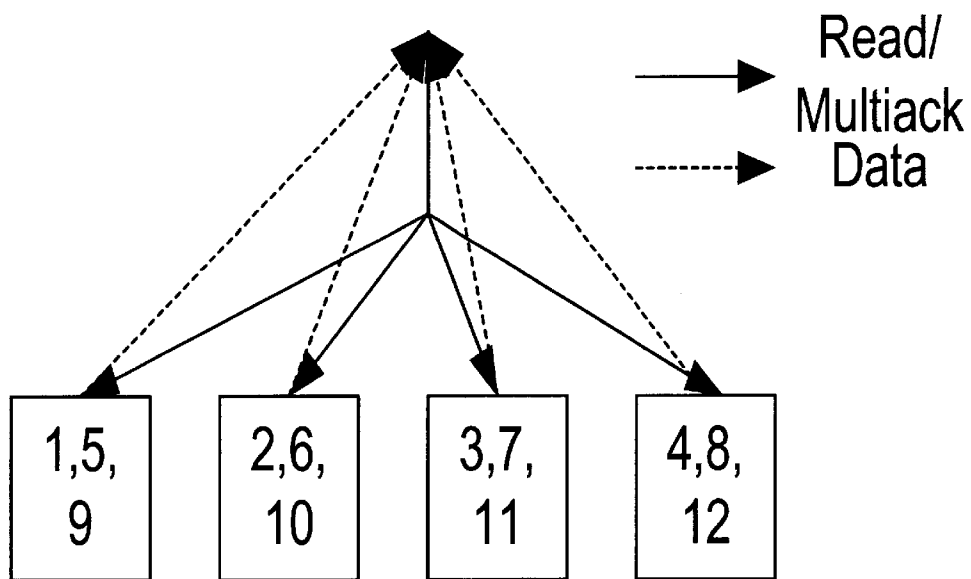


Fig. 8a

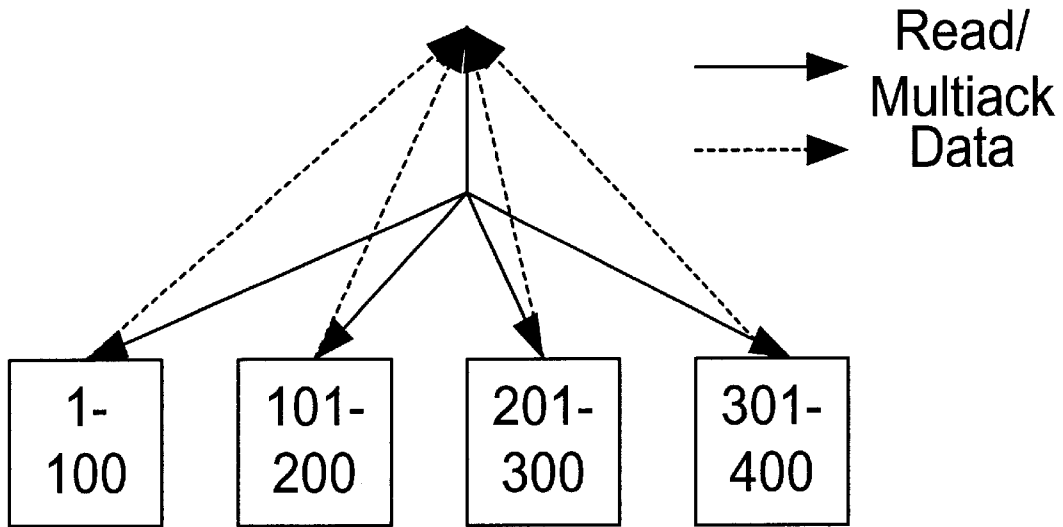


Fig. 8b

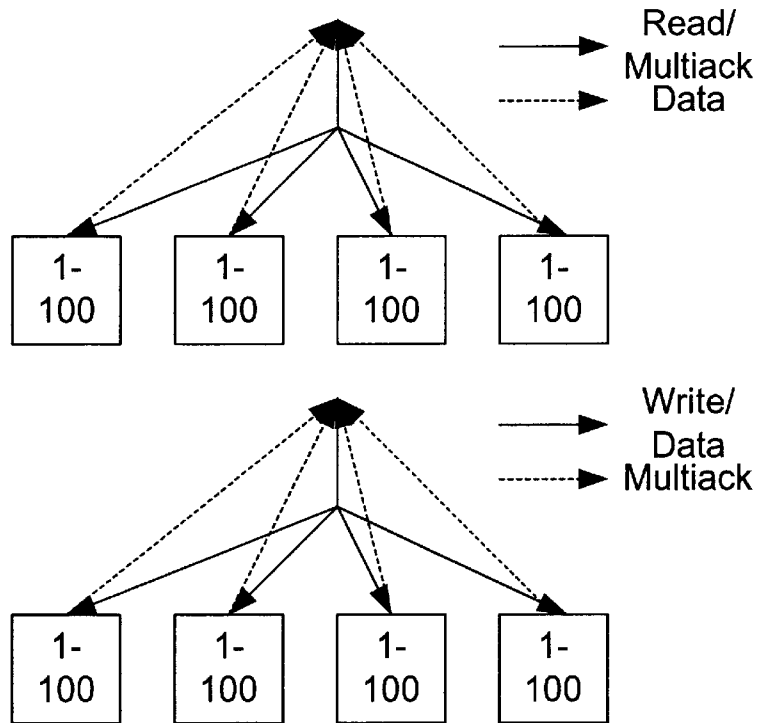


Fig. 8c

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