



Art Unit 2665
Examiner Phuongchau Ba Nguyen

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In Re: Deepak Mansharamani et al.
Case: P4506
Serial No.: 09/800,678
Filed: March 6, 2001
Subject: **An Improved System for Fabric Packet Control**

To: The Commissioner of Patents and Trademarks
Washington, D.C. 20231

Dear Sir;

Amendment A

All of the claims standing for examination are presented below in their last-amended form. Those claims herein amended in the present response are marked (Amended). Those claims left unchanged are marked (Unchanged).

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B1
Q1

1. (Once Amended) A method for managing data traffic at switching element nodes in a fabric network, each switching element node having a plurality of input and output ports, comprising the steps of:
- (a) establishing at each input port, a number of virtual output queues equal to the number of output ports, each virtual output queue at each individual input port dedicated to an individual output port, storing only packets destined for the associated output port, for managing incoming data traffic; and
 - (b) accepting or discarding data at each virtual output queue directed to a queue according to the quantity of data in the queue relative to queue capacity.

2. (Unchanged) The method of claim 1 wherein, in step (b), all data is discarded for a full queue.

3. (Unchanged) The method of claim 1 wherein the queue manager monitors quantity of queued data in relation to a preset threshold, and begins to discard data at a predetermined rate when the quantity of queued data reaches the threshold.

4. (Unchanged) The method of claim 3 wherein the queue manager increases the rate of discarding as quantity of queued data increases above the preset threshold, discarding all data traffic when the queue is full.

5. (Once Amended) A switching element node for a fabric network, comprising:

a plurality of input and output ports; and

a number of virtual output queues at each input port equal to the number of output ports, each virtual output queue at each individual input port dedicated to an individual output port, storing only packets destined for the associated output port, for managing incoming data traffic;

characterized in that the queue manager accepts or discards data directed to a queue according to the quantity of data in the queue relative to queue capacity.

6. (Unchanged) The switching element of claim 5 wherein all data is discarded for a full queue.

7. (Unchanged) The switching element of claim 5 wherein the queue manager monitors quantity of queued data against a preset threshold, and begins to randomly discard data when the quantity of queued data exceeds

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a2

8. (Unchanged) The switching element of claim 7 wherein the queue manager increases the rate of discarding as the quantity of queued data increases above the preset threshold.

9. (Once Amended) A data router having external connections to other data routers, comprising:
an internal fabric network; and
a plurality of switching element nodes in the internal fabric network, each switching element node having a plurality of input and output ports, and at each input port, a number of virtual output queues equal to the number of output ports, each virtual output queue at each individual input port dedicated to an individual output port, storing only packets destined for the associated output port, for managing incoming data traffic;
characterized in that the queue manager accepts or discards data directed to a queue according to the quantity of data in the queue relative to queue capacity.

10. (Unchanged) The data router of claim 9 wherein all data is discarded for a full queue.

11. (Unchanged) The data router of claim 9 wherein the queue manager monitors quantity of queued data against a preset threshold, and begins to randomly discard data when the quantity of queued data exceeds the threshold.

12. (Unchanged) The data router of claim 11 wherein the queue manager increases the rate of discarding as the quantity of queued data increases above the preset threshold.

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-b5

REMARKS

The present amendment is responsive to the Office Action mailed in the above-referenced case on May 9, 2002. Claims 1-12 are presented for examination. The Examiner objects to the drawings, and rejects claim 1 under 35 U.S.C. 112, second paragraph, due to informalities. Claims 1-8 are rejected under 35 U.S.C. 102(b) has been anticipated by Kline (5,793,747), hereinafter Kline.

Regarding the Examiner's objection to drawings, applicant herein submits redlined drawings clearly labeling the numbers of reference with descriptive legends in accordance with the Examiner's requirements.

Regarding the Examiner's 112 rejection of claim 1, and the Examiner's merit rejection of claims 1-8, applicant has carefully studied the prior art cited and by the Examiner, and the Examiner's statements and rejections, and in response herein amends the claims to more particularly point out and distinctly claim the subject matter regarded as the invention. Applicant amends the language of the base claims to recite a method for managing data traffic at switching element nodes in a fabric network, each switching element node having a plurality of input and output ports, comprising the steps of (a) establishing, at each input port, a number of virtual output queues equal to the number of output ports, each individual output queue at each individual input port dedicated to an individual output port, storing only packets destined for the associated output port, and (b) accepting or discarding data at each virtual output queue according to the quantity of data in the queue relative to queue capacity.

In applicant's specification, with reference to the description for Fig. 2, a crossbar switch 203 in fabric card 201 is disclosed, crossbar 203 having multiple input and output ports. Crossbar 203 connects each port to every

other port, so that any incoming data packet can be output to any output port. In applicant's invention the nature of the queues at the input ports is that they are also virtual output queues, each input port having multiple input queues, one input queue for each output port. The output port in applicant's invention is a function of the headers in the incoming data packet, so the data is managed at the input port for the virtual output load. For example, for a data packet arriving at crossbar 203, which is to be crossed to a particular output port, there is, at each input port, a virtual queue for that particular output port. Every input port has an equal number of queues as there are output ports, and only those data packets are queued that are destined for that particular output port.

The system of applicant's invention as described in the specification manages, at the input port, the potential congestion at the output port. Applicant has thoroughly reviewed the prior art of Kline and is confident that Kline does not teach or suggest the subject matter of applicant's invention as discussed above and as recited in applicant's base claims as amended. Applicant argues that if there is a single queue at each output port, as in the prior art, there is congestion at the switch because every packet arriving must be passed through the switch before arriving at the destination queue, where it may be discarded. The distinct advantage of applicant's invention as recited in the claims as amended is that upon establishing a virtual output queue at each input port associated with each output port, data packets may be discarded prior to being transferred through the switch, thereby alleviating much of the data traffic load on the switch.

Applicant believes claims 1, 5 and 9 are patentable as amended and argued above, claims 2-4, 6-8 and 10-12 are then patentable on their own merits, or at least as depended from a patentable claim.

In view of the above arguments and amendments to the claims, it is clear that the reference provided by the Examiner does not anticipate or

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