IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Art Unit 2665
Examiner Phuongchau Ba Nguyen

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;

Response B

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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1. (Twice 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 by providing a queue manager for monitoring quantity of queued data in relation to a preset threshold, and discarding data at a predetermined rate when the quantity of

queued data reaches the threshold.

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

Cancel claim 3.

4. (Once Amended) The method of claim 1 wherein in step C, 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. (Twice Amended) A switching element node for a fabric network, comprising:

a plurality of input and output ports;

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; and

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 by monitoring quantity of queued data against a preset threshold, and randomly discarding data when the quantity of queued data exceeds the threshold.

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

Cancel claim 7.

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. (Twice 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 by monitoring the quantity of queued data against a preset threshold, and begins to randomly discard data when the quantity of queued data exceeds the threshold.

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

Cancel claim 11.

12. (Once Amended) The data router of claim 9 wherein the queue manager increases the rate of discarding as the quantity of queued data increases above the preset threshold.

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REMARKS

The present amendment is responsive to the Office Action mailed in the above-referenced case on September 10, 2002, made final. Claims 1-12 are presented for examination. The Examiner rejects claims 1-2 under 35 U.S.C. 102(b) as being anticipated by Khacherian (US 5,768,257) herein Khacherian.

In response to the Examiner's rejection applicant herein amends the claims to positively recite 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 by monitoring the quantity of queued data against a preset threshold, and begins to randomly discard data when the quantity of queued data exceeds the threshold. Claims 3, 7, and 11 are herein cancelled as their limitations have been added to their respective base claims by amendment.

Regarding claims 3, 7 and 11, the Examiner states that Khacherian discloses that the queue manager (316, 326, Fig. 3) monitors quantity of queued data against a preset threshold, and begins to randomly discard data when the quantity of queued data exceeds the threshold (col. 1, lines 48-51, 55-63).

Applicant respectfully traverses the Examiner's interpretation of Khacherian. Applicant's claimed limitation specifically recites that 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. Applicant points out that randomly discarding data, and discarding data at a predetermined rate do not read on each other.

The portions of Khacherian (col. 1, lines 48-51, and 55-63), relied upon by the Examiner, specifically teach that even with buffer control it is sometimes necessary to drop cells. For instance, when cells come in on input ports 1 and 2, all destined for output 3, it is often the situation that more cells come in than can be output at output port 3. The cells begin to get queued up in the buffers. If this

situation continues long enough, the buffers get filled up, and cells need to be "dropped".

Khacherian continues to teach that prior solutions to buffer control fall into two basic categories: 1) input buffering with output control; 2) output buffering with output control. Khacherian teaches that input buffers are advantageous because smaller buffers are used and cells do not get transferred across the network fabric.

Applicant argues that said claimed limitations in applicant's invention are much more limiting than the broad demonstration of buffering described by Khacherian. There is no disclosure in Khacherian of monitoring queue capacity against a pre-set threshold. Khacherian drops cells when buffers are full. Khacherian teaches that cells begin to get queued up in the buffers. If this situation continues long enough, the buffers get filled up, and cells need to be "dropped".

Applicant's claimed method of monitoring queues, establishing preset thresholds for the queues, and discarding at a predetermined rate according to the preset thresholds are not taught in the art of Khacherian.

The main advantage of applicant's invention over the art is that each queue manager of applicant's invention has an ability to begin to drop packets at a pre-determined rate at some threshold in queue capacity short of a full queue. In certain further embodiments the queue manager may accelerate the rate of packet dropping as a queue continues to fill above the first threshold. In these instances the incidence of dropping packets is minimized and managed, and spread over more traffic than would be the case if dropping of packets were to begin only at a full queue, wherein all packets would be dropped until the queue were to begin to empty.

Another distinct advantage of the queue management scheme of the present invention is that the intelligence required is considerably lessened, and there is no addition to the traffic load by generating Flow Control indicators.

Applicant believes claims 1, 5 and 9 are patentable over the art of

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