Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex parte LINHAI HE

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Appeal No. 2002-0874
Application 09/124,278

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ON BRIEF

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Before HAIRSTON, FLEMING, and LEVY, ***Administrative Patent Judges.***

FLEMING, ***Administrative Patent Judge***.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1 through 32, all the claims pending in the instance application.

Invention

The invention relates to a push-out technique for shared memory buffer management in network nodes. See page 1 of Appellant's specification. A weighted queue length is maintained

in memory for each queue stored in the shared memory buffer. When a new data packet arrives at the network node to be stored in its appropriate queue and the buffer is full, a data packet is removed from the queue having the largest weighted queue length. This makes room in the buffer for the newly arrived data packet to be stored in the appropriate queue. See page 3 of Appellant's specification. The weighted queue length is maintained by adjusting the weighted queue length of a queue by an amount equal to the weight assigned to the traffic class of the data packet. These weights may be provisioned in order to implement different loss priorities among the traffic classes. See page 4 of Appellant's specification. With reference to figure 3, the weighted queue length is calculated as follows. First, each traffic class is assigned a weight based on its loss priority, the small weights corresponding to high priorities. This weight assignment may be provisioned on a per output port basis so that the same traffic class at different output ports may have different priorities. A weighted queue length is maintained for each connection queue stored in the buffer. When a data packet associated with a particular connection arrives at the network node, the data packet is stored in the associated connection queue and the weighted queue length of the connection queue is

incremented by an amount equal to the weight assigned to the traffic class of the connection. Similarly, when a data packet associated with a particular connection departs from the network node, the data packet is removed from the associated connection queue and the weighted queue length of the connection queue is decremented by the amount equal to the weight assigned to the traffic class of the connection. See page 6 of Appellant' specification.

Claim 1 is representative of Appellant's claimed invention and is reproduced as follows:

1. A method for managing a shared memory buffer in a network node comprising the steps of:

maintaining a weighted queue length for each of a plurality of queues stored in said shared memory buffer, said weighted queue length for each of said plurality of queues being a function of the type of data in the queue and the amount of data in the queue; and

upon receipt of a new data item to be added to a first one of said queues when said shared memory buffer is full:

determining a second one of said queues based on weighted queue length;

removing a data item from said second queue; and

adding said new data item to said first queue.

References

The references relied on by the Examiner are as follows:

Varma et al. (Varma) 5,959,993 Sep. 28, 1999
(Filing date Sep. 13, 1996)

Chao, "An ATM Queue Manager Handling Multiple Delay and Loss Priorities" IEEE 1995, pp. 652-659.

Rejection at Issue

Claims 1 through 32 stand rejected under 35 U.S.C. § 103 as being unpatentable over Varma in view of Chao.

Throughout the opinion, we make reference to the briefs[1] and answer.

OPINION

With full consideration being given to the subject matter on appeal, the Examiner's rejection and the arguments of the Appellant and the Examiner, for the reasons stated **infra**, we reverse the Examiner's rejection of claims 1 through 32 under 35 U.S.C. § 103.

[1] Appellant filed an appeal brief on June 29, 2001. Appellant filed a reply brief on January 23, 2002. The Examiner mailed an Office Communication on April 5, 2002, stating that the reply brief has been entered.

In rejecting claims under 35 U.S.C. § 103, the Examiner bears the initial burden of establishing a ***prima facie*** case of obviousness. **In re Oetiker**, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). **See also In re Piasecki**, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). The Examiner can satisfy this burden by showing that some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art suggests the claimed subject matter. **In re Fine**, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the Appellant. **Oetiker**, 977 F.2d at 1445, 24 USPQ2d at 1444. **See also Piasecki**, 745 F.2d at 1472, 223 USPQ at 788.

An obviousness analysis commences with a review and consideration of all the pertinent evidence and arguments. "In reviewing the [E]xaminer's decision on appeal, the Board must necessarily weigh all of the evidence and argument." **Oetiker**, 977 F.2d at 1445 24 USPQ2d at 1444. "[T]he Board must not only assure that the requisite findings are made, based on evidence of

record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion." **In re Lee**, 277 F.3d 1338, 1344, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002).

We note that independent claims 1, 9 and 17, each recite a weighted queue length. Specifically, claims 1 and 9 recite "said weighted queue length for each of said plurality of queues being a function of the type of data in the queue and the amount of data in the queue". Claim 17 recites "adjusting a weighted queue length of a queue by a weight value when adding a data packet to or removing a data packet from said queue".

Appellant argues that neither Varma or Chao teach or suggest a weighted queue length as claimed. See page 8 of the Brief. In particular, Appellant argues that Varma's Weighted Fair Queuing (WFQ) does not read on Appellant's claimed weighted queue length. Appellant points out that, because the claimed weighted queue length is determined by the combination of weights assigned to the traffic class of the connection queue and the number of data packets in the connection queue, the weighted queue length will continuously change as data packets are added and removed from the connection queue. On the other hand, the Varma patent teaches the use of WFQ where the weight of a connection is predetermined and does not change as the data packets are added

or removed. Appellant argues that the Varma patent does not teach or suggest weighted queue lengths as recited in Appellant's claims. See pages 9 and 10 of the brief.

Appellant further argues that, unlike WFQ systems, Appellant's system using the weighted queue length concept of the present invention permits the weighted queue length of individual queues to change as data packets are added or removed from the individual queues. Appellant argues that this definition of weighted queue lengths is clearly supported in the specification at page 6, line 22 through page 7, line 13, which states:

> A weighted queue length is maintained for each connection queue stored in the buffer. When a data packet associated with a particular connection arrives at the network node, the data packet is stored in the associated connection queue and the weighted queue length of the connection queue is incremented by an amount equal to the weight assigned to the traffic class of the connection. Similarly, when a data packet associated with a particular connection departs from the network node, the data packet is removed from the associated connection queue and the weighted queue length of the connection queue is decremented by an amount equal to the weight assigned to the traffic class of the connection. . . . When a new data packet arrives and finds that the shared memory buffer is full, the connection queue having the largest weighted queue length is selected and a data packet is removed from that connection queue.

Appellant argues that accordingly, since the weights of the individual queues in WFQ systems do not change as data is added

or removed from the individual queues, WFQ is not the same as the weighted queue length of the claimed invention. See pages 3 and 4 of Appellant's reply brief.

The Examiner argues that Varma does teach weighted queue lengths as claimed. In particular, the Examiner points us to column 7, lines 45 through 67. See pages 8 and 9 of the examiner's answer.

Upon our review of Varma, and in particular column 7, lines 45 through 67 of Varma, we fail to find that Varma teaches Appellant's claimed weighted queue length for each of the said plurality of queues being a function of type of data in the queue and the amount of data in the queue as recited in Appellant's claims. Varma teaches that a queue assigned a priority of zero will have a greater priority than a queue assigned a priority of one. Furthermore, Varma discloses that the controller 38 chooses the first priority group starting from zero for transmission. The controller 38 implements Round-Robin within priorities. From our review of Varma, we fail to find that Varma teaches Appellant's claimed weighted queue length for each of plurality

of queues being a function of a type of data in a queue and the amount of data in a queue. Therefore, we will not sustain the Examiner's rejection of claims 1 through 32 under 35 U.S.C. § 103.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	)	
MICHAEL R. FLEMING Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
STUART S. LEVY Administrative Patent Judge	)	

MRF:pgg

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