



US007039715B2

(12) **United States Patent**
England et al.

(10) **Patent No.:** **US 7,039,715 B2**
(45) **Date of Patent:** **May 2, 2006**

(54) **METHODS AND SYSTEMS FOR A RECEIVER TO ALLOCATE BANDWIDTH AMONG INCOMING COMMUNICATIONS FLOWS**

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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 745 days.

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(21) Appl. No.: **10/152,112**

(22) Filed: **May 21, 2002**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2003/0221008 A1 Nov. 27, 2003

Disclosed are methods and systems for a receiver to autonomously allocate bandwidth among its incoming communications flows. The incoming flows are assigned priorities. When it becomes necessary to alter the allocation of bandwidth among the flows, the receiver selects one of the lower priority flows. The receiver then causes the selected flow to delay sending acknowledgements of messages received to the senders of the messages. In most modern protocols, senders are sensitive to the time it takes to receive acknowledgements of the messages they send. When the acknowledgement time increases, the sender assumes that the receiver is becoming overloaded. The sender then slows down the rate at which it sends messages to the receiver. This lowered sending rate in turn reduces the amount of bandwidth used by the flow as it comes into the receiver. This frees up bandwidth which can then be used by higher priority flows.

(51) **Int. Cl.**
G06F 15/16 (2006.01)

(52) **U.S. Cl.** **709/232; 709/233; 370/235**

(58) **Field of Classification Search** **709/206, 709/207, 223, 224, 225, 226, 228, 232, 233, 709/234, 235; 370/235**

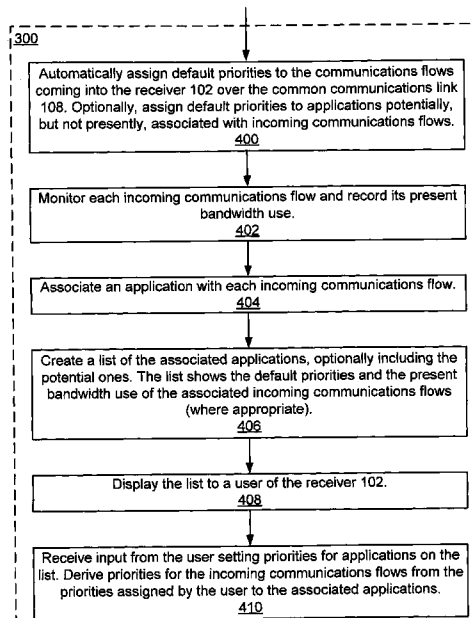
See application file for complete search history.

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41 Claims, 13 Drawing Sheets



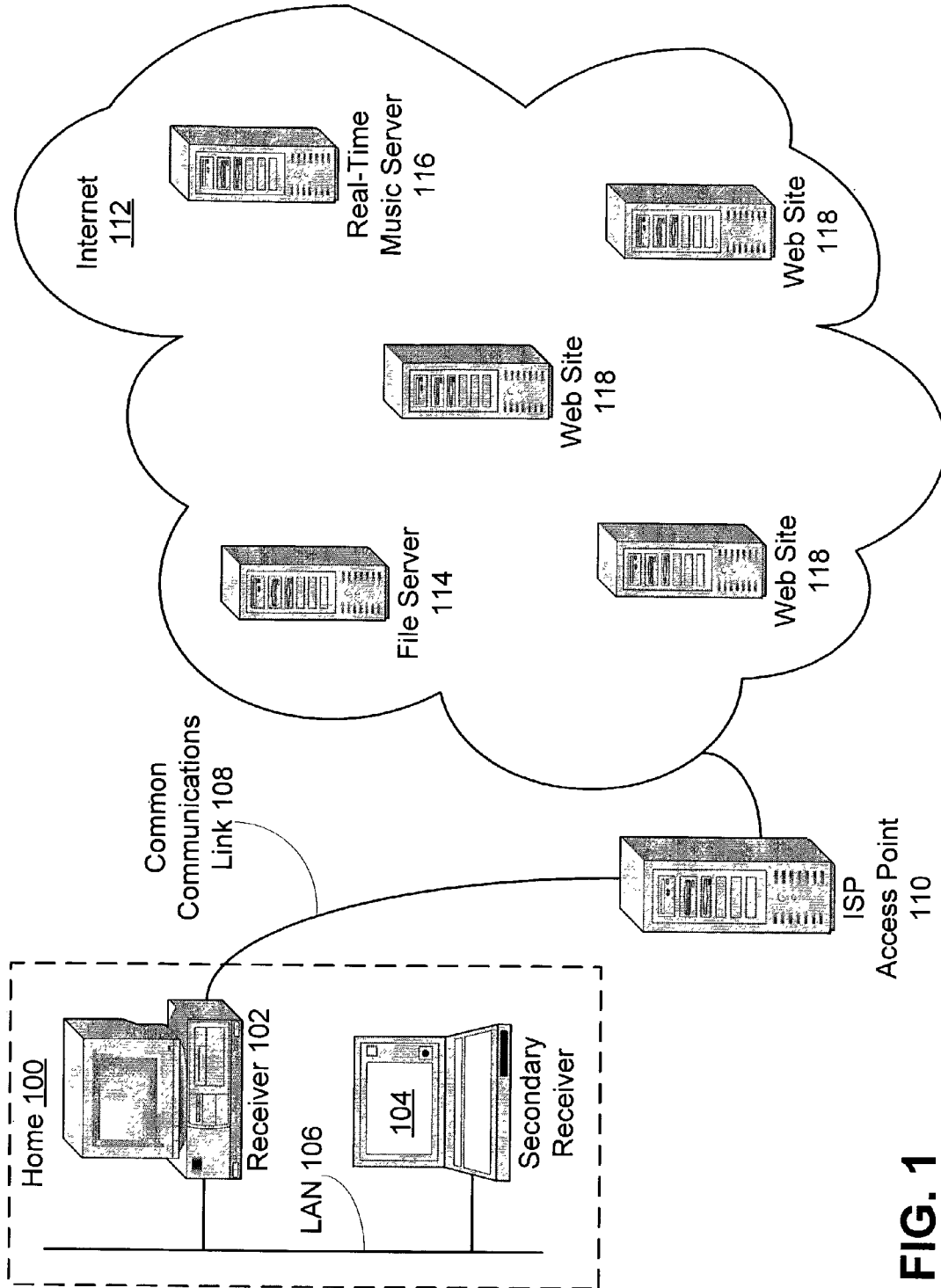


FIG. 1

FIG. 2

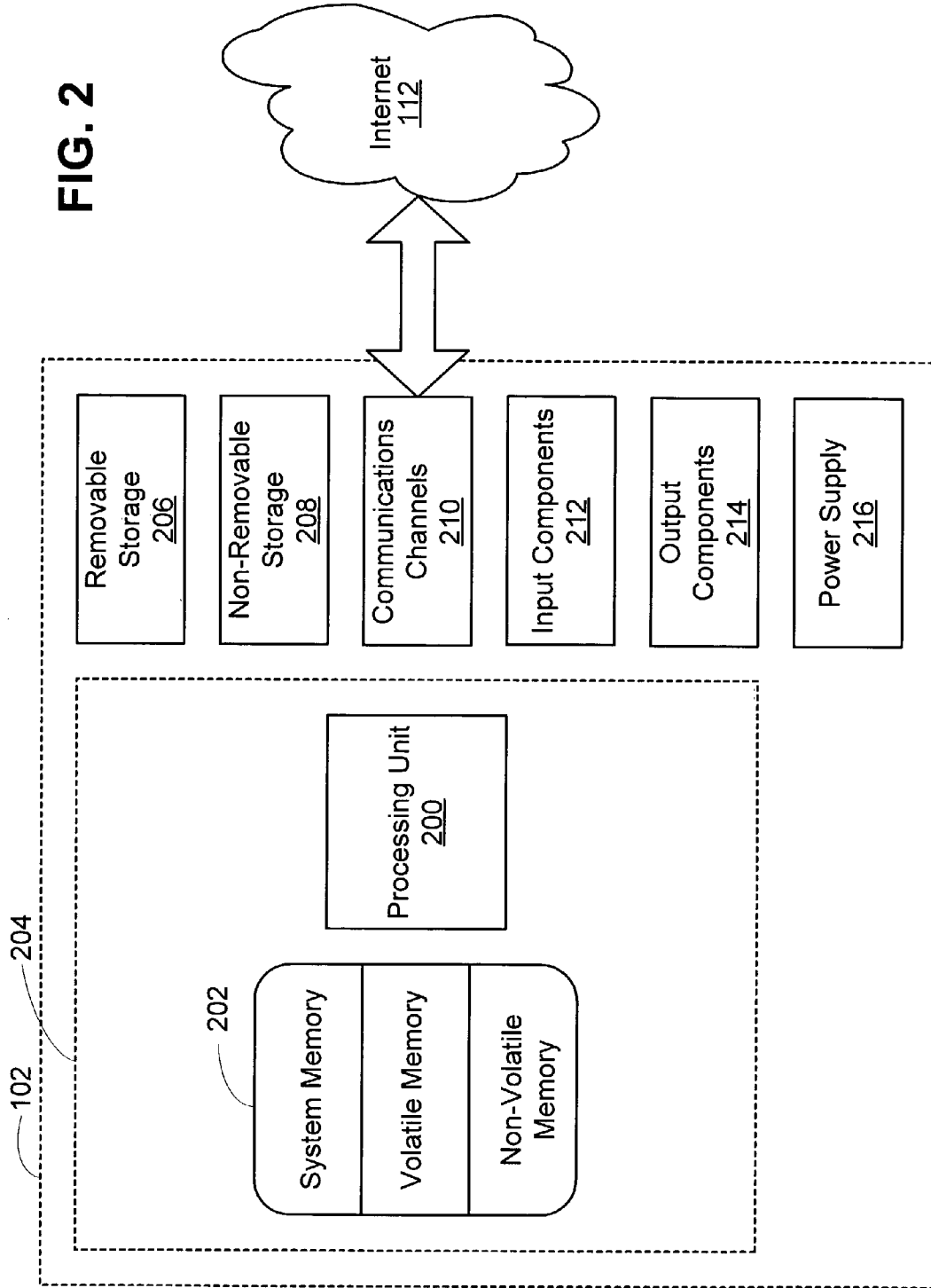


FIG. 3

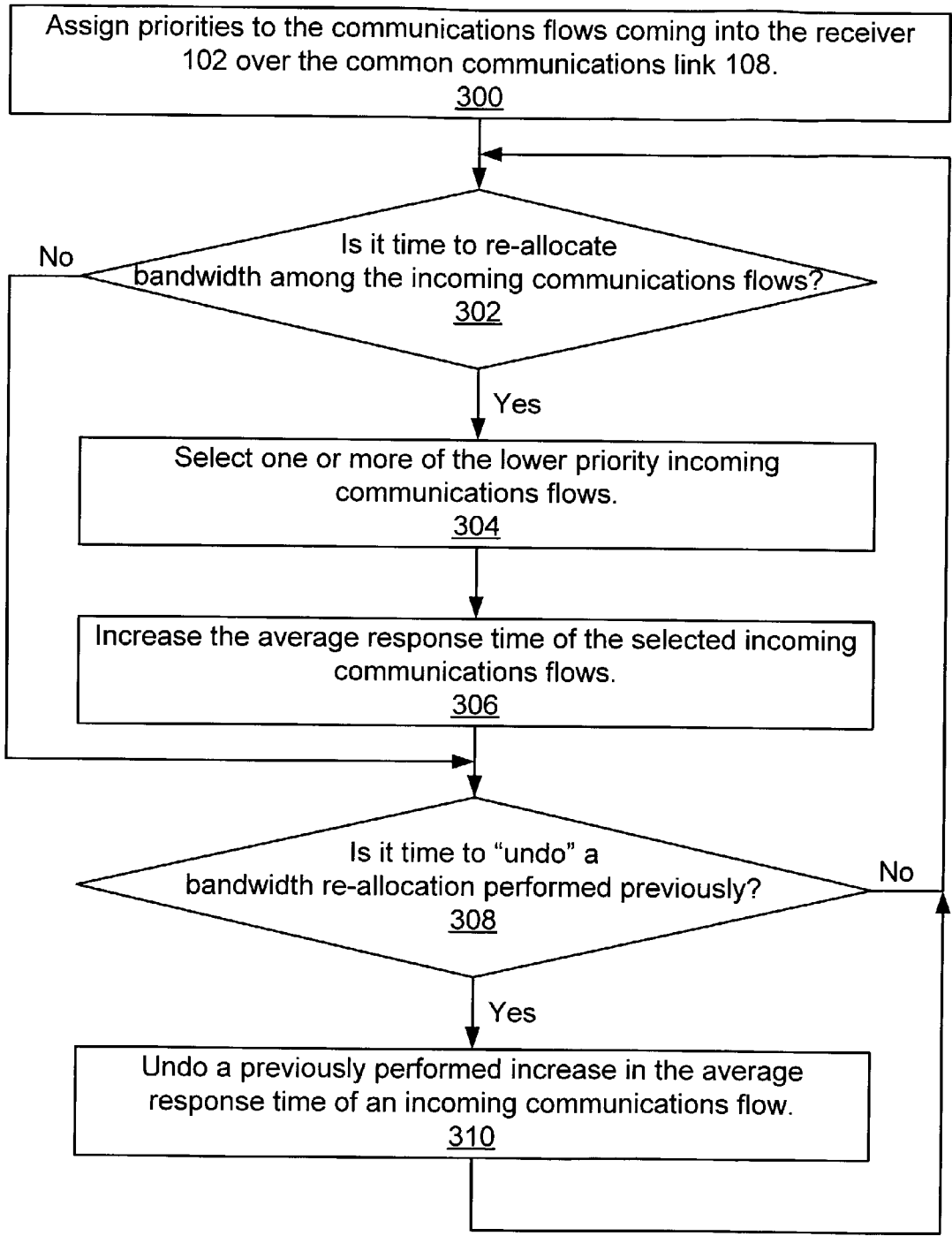
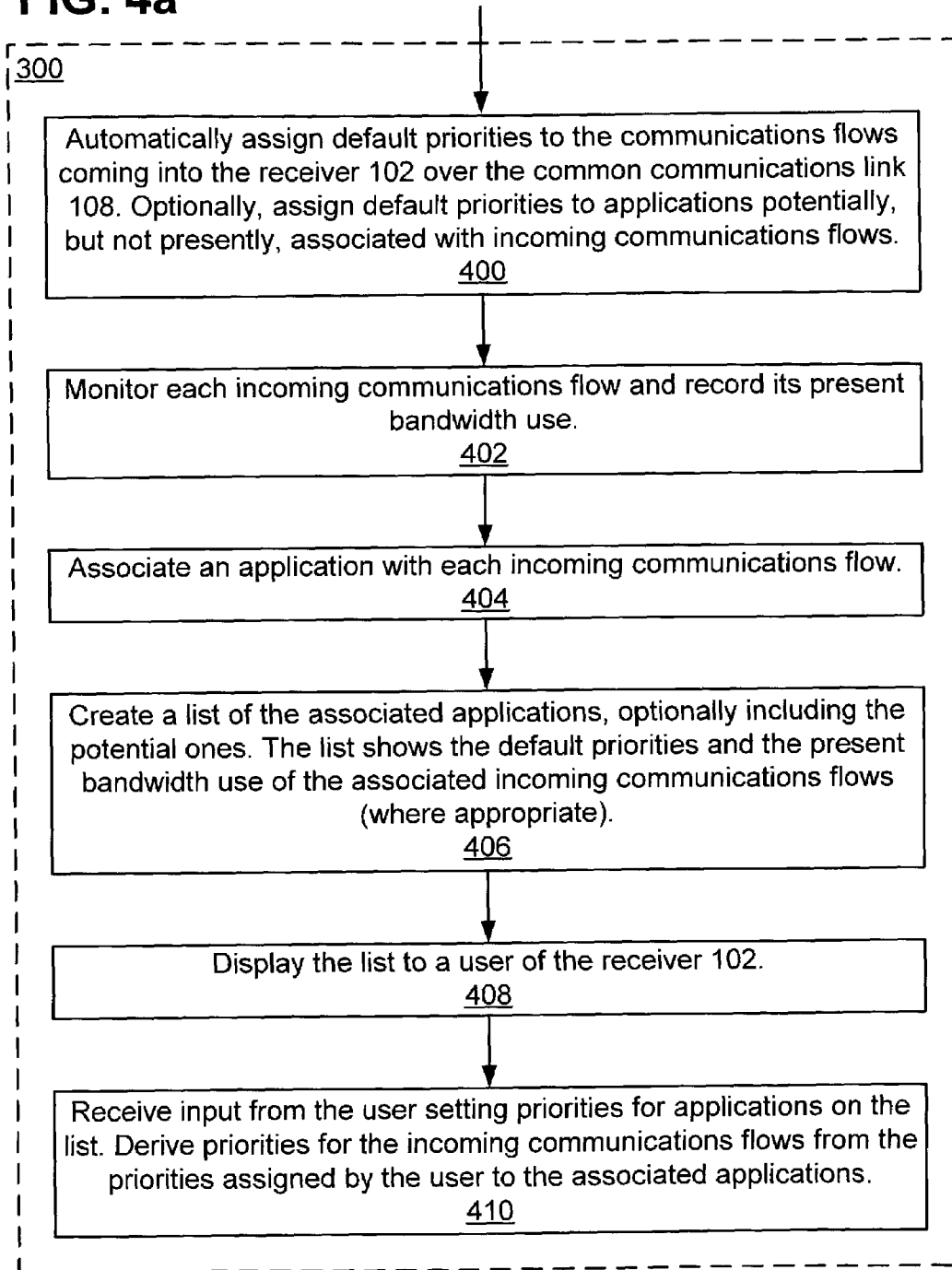


FIG. 4a



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