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Chandran et al.

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(54) **NETWORK TRAFFIC SHAPING USING TIME-BASED QUEUES**

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G06F 15/16 (2006.01)

(52) **U.S. Cl.** **709/200**; 370/230.1; 370/235; 370/395.4; 370/412; 719/314; 718/102

(58) **Field of Classification Search** 717/153; 370/412, 60, 229, 230, 395, 235, 429, 236.1, 370/395.42; 709/240
See application file for complete search history.

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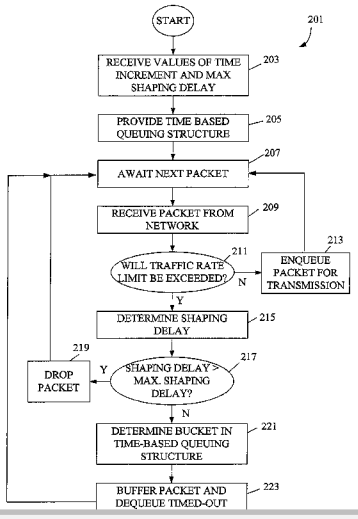
(57) **ABSTRACT**

A time-based buffering system buffers data based upon how long the data should be held in order to comply with a traffic shaping policy. The data's source or destination need not be considered in determining where to buffer the data. The time-based buffering system includes a collection of time-based queues, each of which has a different time to dequeue. The system controlling traffic shaping determines how long a particular piece of data should be buffered (a "traffic shaping delay") until it can be put on the network. Then, based upon that length of time, the system chooses one of the time-based of queues in which to buffer the data. That chosen queue has a dequeuing time that matches the traffic shaping delay. After the chosen queue dequeues its contents (at the specified time), it assumes a new dequeing time and is free to buffer new data that must be delayed by a time matching the new dequeuing time.

29 Claims, 11 Drawing Sheets



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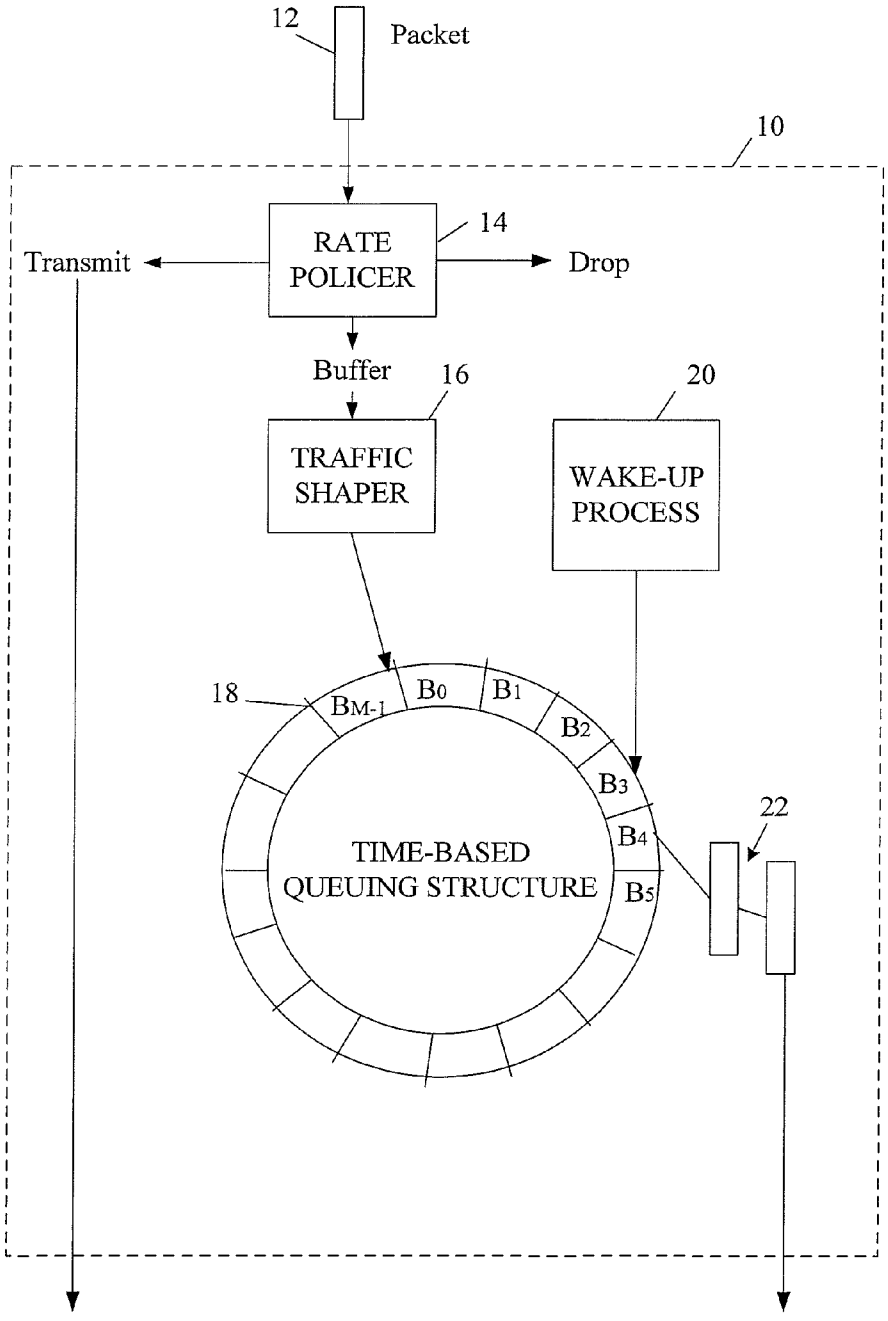

Figure 1

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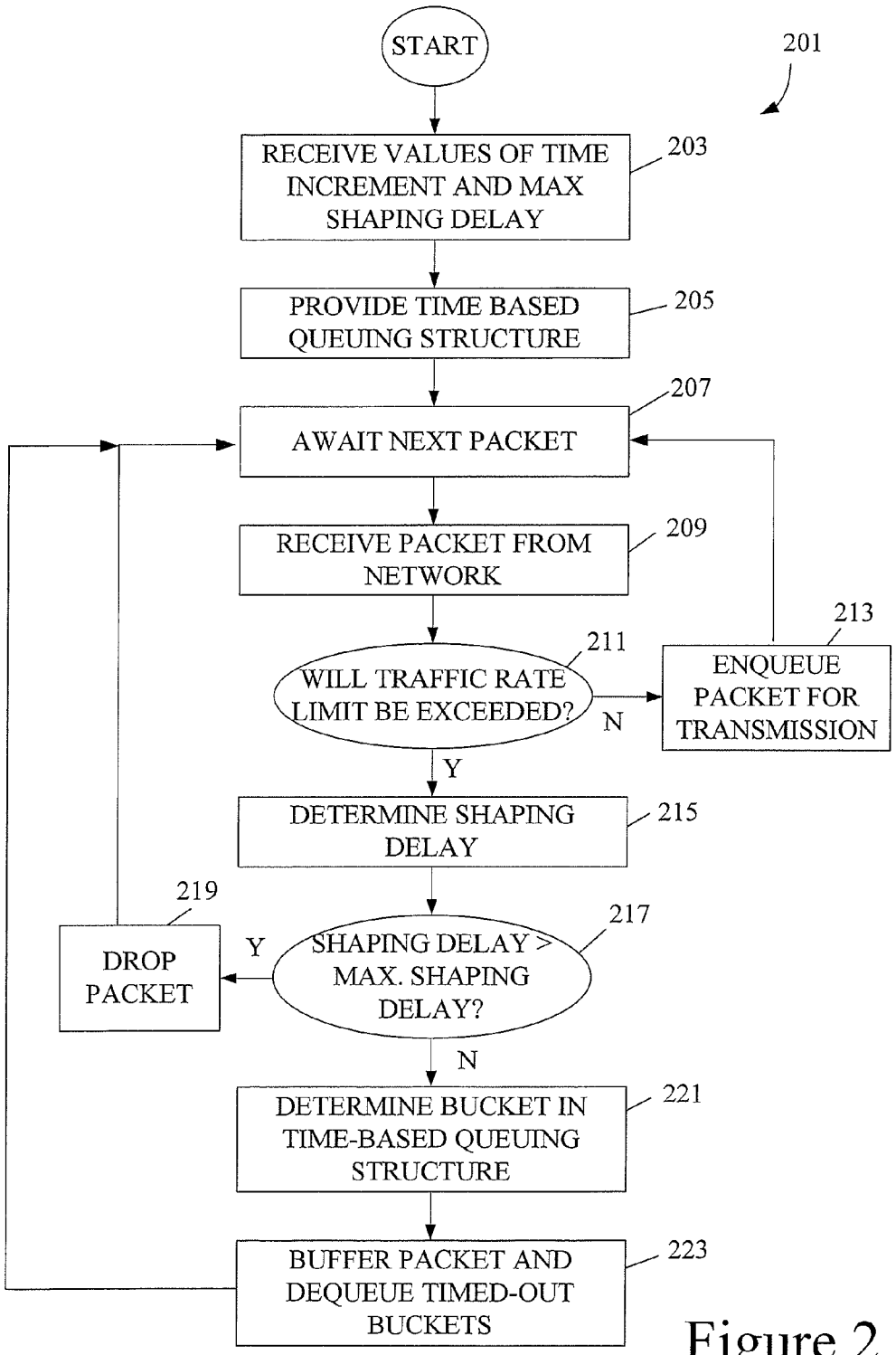

Figure 2

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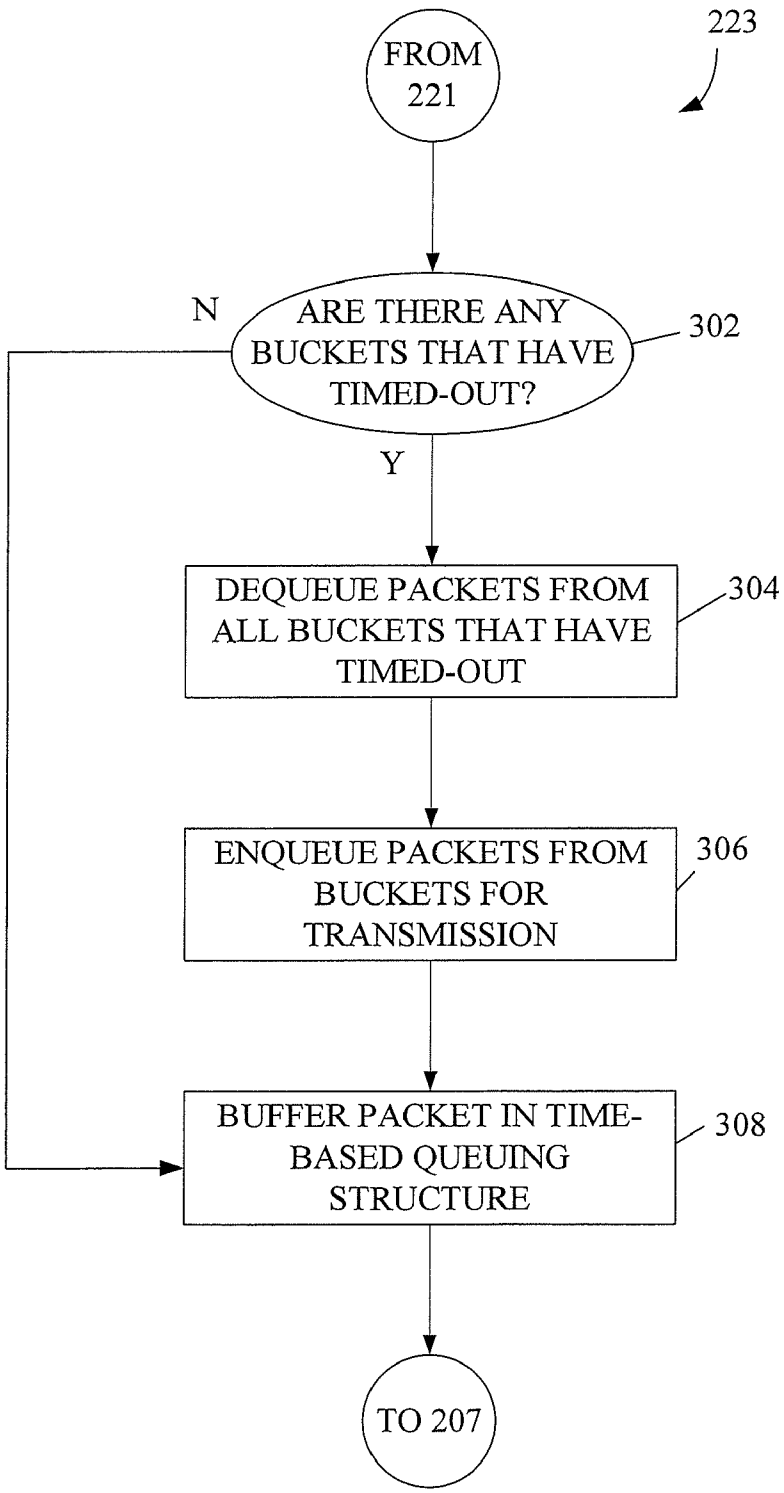

Figure 3

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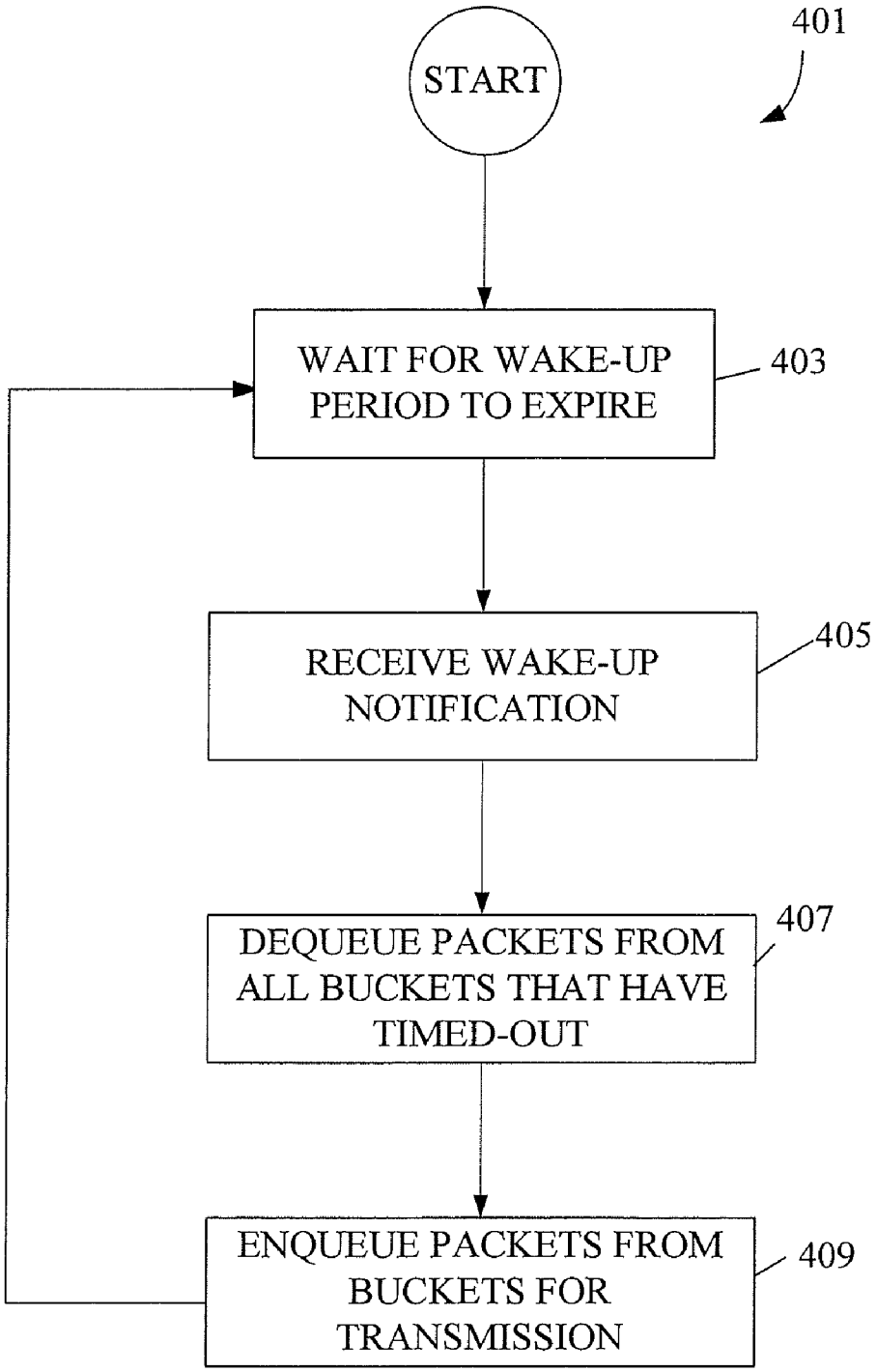

Figure 4

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