



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

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(54) **SYSTEM AND METHOD FOR
RECOGNIZING APPLICATION-SPECIFIC
FLOWS AND ASSIGNING THEM TO
QUEUES**

6,243,667 B1 6/2001 Kerr et al.
6,286,052 B1* 9/2001 McCloghrie et al. 709/238
6,292,832 B1 9/2001 Shah et al.
6,308,148 B1 10/2001 Bruins et al.
6,320,845 B1 11/2001 Davie

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(Continued)

(*) Notice: Subject to any disclaimer, the term of this
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OTHER PUBLICATIONS

RSVP Support for Low Latency Queueing, Cisco Systems Incorporated, San Jose, CA, Jul. 24, 2000, pp. 1-18.

(Continued)

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(51) **Int. Cl.**
G06F 15/173 (2006.01)
G06F 15/16 (2006.01)

(57) **ABSTRACT**

(52) **U.S. Cl.** **709/240**; 709/224; 709/231;
709/238; 709/241

(58) **Field of Classification Search** 709/223–225,
709/231–233, 236, 238–240
See application file for complete search history.

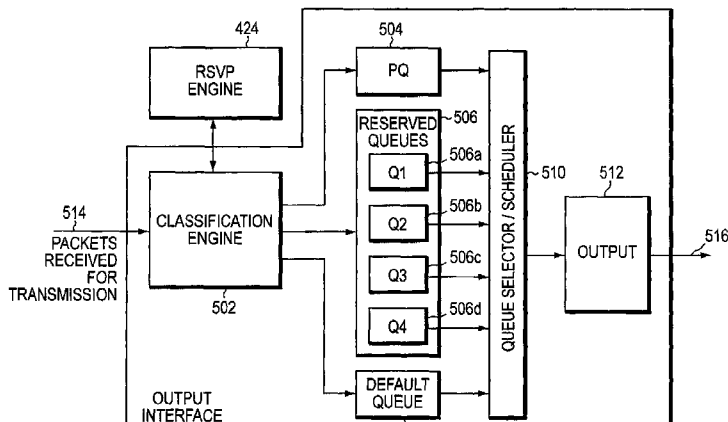
A system assigns network traffic flows to appropriate queues and/or queue servicing algorithms based upon one or more flow parameters contained in reservation requests associated with the traffic flows. The system may be disposed at an intermediate network device within a computer network. The intermediate network device includes a reservation engine, a packet classification engine, an admission control entity, a traffic scheduler, and a flow analyzer. The flow analyzer includes or has access to a memory that is pre-programmed with one or more heuristic sets for use in evaluating the flow parameters of reservation requests. When a reservation request that includes one or more flow parameters characterizing the bandwidth and/or forwarding requirements of the anticipated traffic flow is received, the flow analyzer applies the heuristic sets. Depending on which set of heuristics, if any, the parameters satisfy, the flow analyzer selects the appropriate queue and/or queue servicing algorithm for the flow.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,519,689 A * 5/1996 Kim 370/232
5,765,032 A 6/1998 Valizadeh
5,926,458 A * 7/1999 Yin 370/230
6,006,264 A 12/1999 Colby et al.
6,034,945 A 3/2000 Hughes et al.
6,088,734 A * 7/2000 Marin et al. 709/232
6,091,709 A 7/2000 Harrison et al.
6,091,725 A 7/2000 Cheriton et al.
6,104,998 A * 8/2000 Galand et al. 704/500
6,111,877 A 8/2000 Wilford et al.
6,157,955 A * 12/2000 Narad et al. 709/228
6,167,445 A 12/2000 Gai et al.
6,188,698 B1 2/2001 Galand et al.
6,192,032 B1* 2/2001 Izquierdo 370/230

28 Claims, 10 Drawing Sheets



U.S. PATENT DOCUMENTS

6,353,616	B1 *	3/2002	Elwalid et al.	370/443
6,463,470	B1	10/2002	Mohaban et al.	
6,466,984	B1	10/2002	Naveh et al.	
6,640,248	B1 *	10/2003	Jorgensen	709/226
6,654,373	B1 *	11/2003	Maher, III et al.	370/392
6,665,273	B1	12/2003	Goguen et al.	
6,690,647	B1 *	2/2004	Tang et al.	370/235
6,738,361	B1 *	5/2004	Immonen et al.	370/328
6,744,767	B1 *	6/2004	Chiu et al.	370/395.21
6,909,708	B1 *	6/2005	Krishnaswamy et al. ...	370/352
7,072,336	B2 *	7/2006	Barany et al.	370/389

OTHER PUBLICATIONS

VoIP Call Admission Control Using RSVP, Cisco Systems Incorporated, San Jose, CA, Aug. 7, 2000, pp. 1-16.
White Paper: DiffServ-The Scalable End-to-End Qos Model, Cisco Systems, Incorporated, San Jose, CA, Mar. 1, 2001, pp. 1-16.

Davie, B., Implementing Qos for Packet Telephony, Packet Magazine, Cisco Systems Incorporated, San Jose, CA, Apr. 2000, pp. 1-6.
Wroclawski, J., Integrated Service Mappings for Differentiated Services Networks, Internet Engineering Task Force, Internet Draft, draft-ietf-issll-ds-map-01.txt, <http://www.ietf.org>, Feb. 2001, pp. 1-19.
Wroclawski, J., Specification of the Controlled-Load Network Element Service, Internet Engineering Task Force, Request for Comments (RFC) 2211 <http://www.ietf.org>, Sep. 1997, pp. 1-19.
Bernet, Y., et al., A Framework for Integrated Services Operation over Diffserv Networks, Internet Engineering Task Force, Request for Comments (RFC) 2998, <http://www.ietf.org>, Nov. 2000, pp. 1-31.
Bernet, Y., et al., Application and Sub Application Identity Policy Element for Use with RSVP, Internet Engineering Task Force, Request for Comments (RFC) 2872, <http://www.ietf.org>, Jun. 2000, pp. 1-6.

* cited by examiner

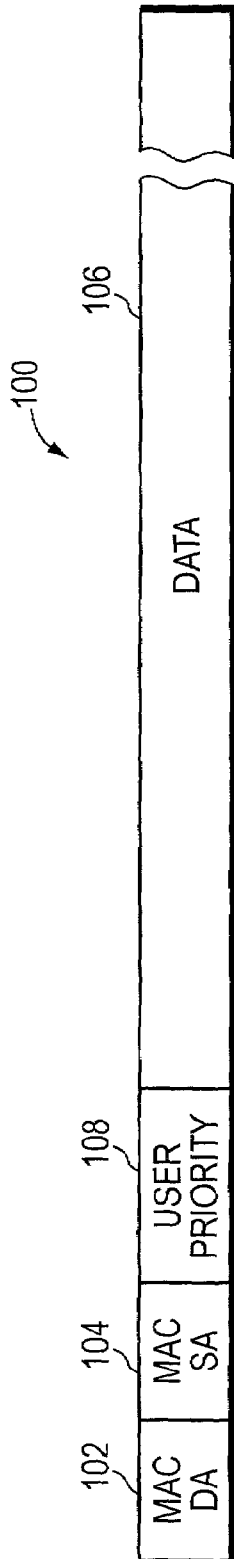


FIG. 1A (PRIOR ART)

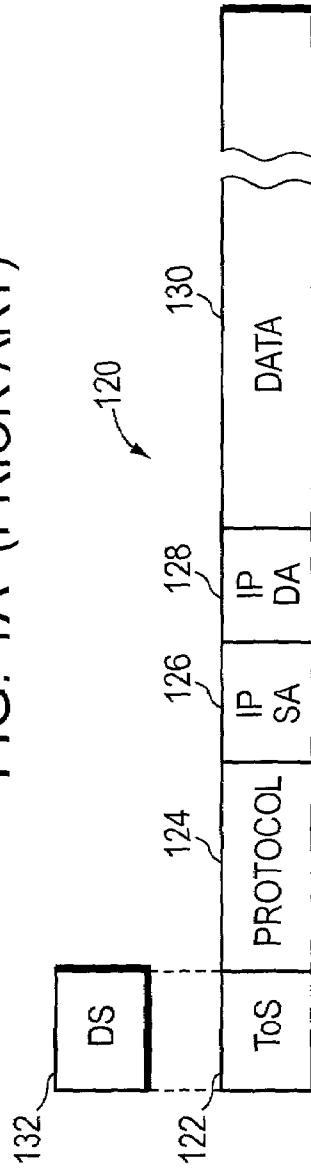


FIG. 1B (PRIOR ART)

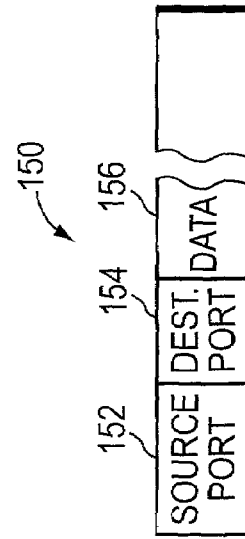


FIG. 1C (PRIOR ART)

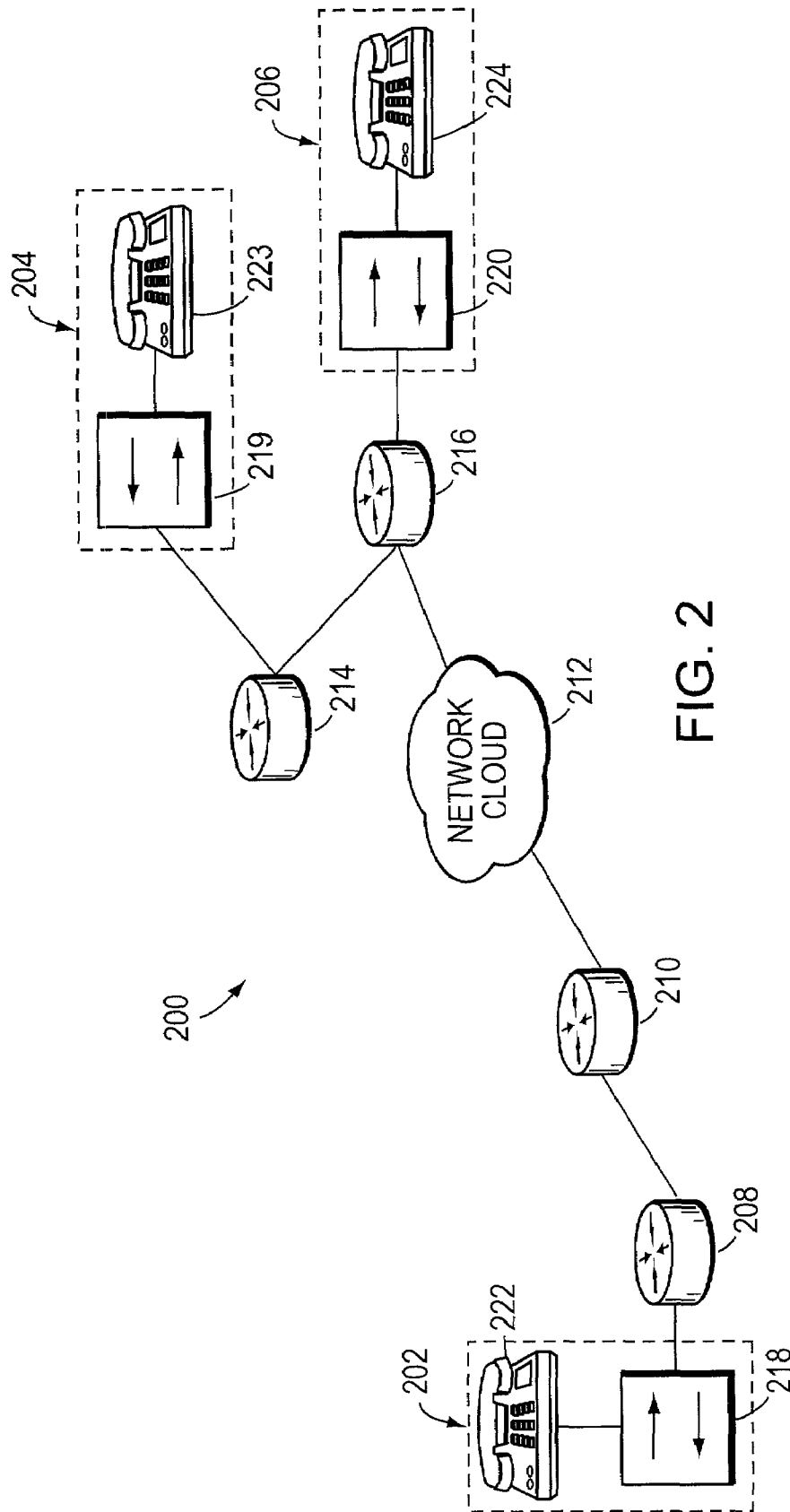


FIG. 2

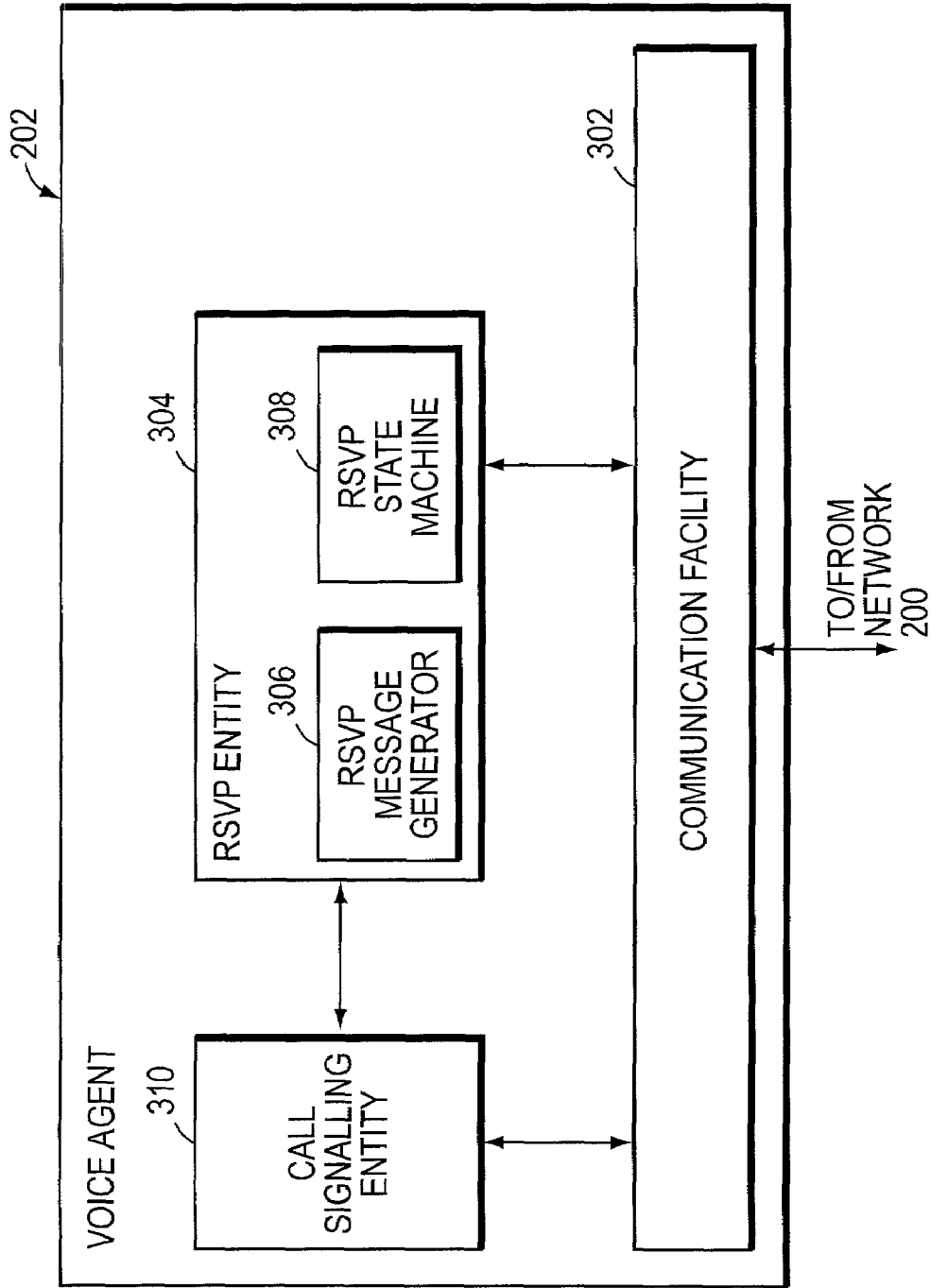


FIG. 3

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