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Chiu et al.

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(54) **METHOD AND SYSTEM FOR DYNAMICALLY TRIGGERING FLOW-BASED QUALITY OF SERVICE SHORTCUTS THROUGH A ROUTER**

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(52) **U.S. Cl.** **370/235**; 370/351; 370/401

(58) **Field of Search** 370/230, 231, 370/232, 233, 235, 252, 254, 401, 402, 412, 413, 466, 474, 351

(56) **References Cited**

U.S. PATENT DOCUMENTS

- 5,412,654 A * 5/1995 Perkins 370/94.1
- 6,009,077 A * 12/1999 Firoiu et al. 370/230
- 6,252,857 B1 * 6/2001 Fendick et al. 370/254

OTHER PUBLICATIONS

Cell Switch Router (CSR) –label switching router supporting standard ATM interfaces, Hiroshi Esaki, Shigeo Matsuzawa, Akiyoshi Mogi, Ken-ichi Ngami, Tatsuya Jimmei, Toru Kon’no, Yasuhiro Katsube, R&D Center, Toshiba Corporation, Japan, SPIE vol 3233, pp. 2 thru 10.*

Reducing Overhead in Flow-Switched Networks: An Empirical Study of Web Traffic, Anja Feldman Jennifer Rexford, Ramon Cacere –AT&T Labs –Research, Florham Park, NJ, 1988 IEEE, pp. 1205 thru 1213.*

Adaptive Resource Management for Flow-Based IP/ATM Hybrid Switching Systems* –Hao Che, San-qi Li, Department of Electrical and Computer Engineering, University of Texas at Austin, Austin, Texas, Arthur Lin, Cisco Systems, Inc., CA IEEE, pp. 381 thru 389.*

IP Switching –ATM Under IP, Peter Newman, Greg Minshall and Thomas L. Lyon, IEEE/ACM Transactions on Networking, vol. 6, No. 2, Apr. 1988, pp. 117 thru 129.*

An Architecture for Differentiated Services, S. Blake, D. Black, M. Carlson, E. Davies, Z. Wang, W. Weiss, Lucent Technologies, Dec. 1998, The Internet Society (1998) pp. 1 thru 33.*

Specification of the Controlled-Load Network Element Service, J. Wrocklawski, MIT LCS, Sep. 1997, pp. 1 thru 17.*

Specification of Guaranteed Quality of Service, S. Shenker, C. Partridge, R. Guerin, Sep. 1997, pp. 1 thru 18.*

* cited by examiner

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(57) **ABSTRACT**

A method and system for dynamically triggering flow-based quality of service shortcuts through a router is disclosed. The method further includes the steps of receiving a data packet at a router, determining whether a shortcut has been set up for a data flow to which said packet belongs, checking the status of an onset trigger counter when no shortcut exists, and when a current value of said onset trigger exceeds an onset trigger value, setting up a new shortcut for said data packet belonging to said data flow. The method of the present invention includes a dynamic system for adjusting state variable to control the number of shortcuts in existence and the adjusting the shortcut set up rate for optimal router switching efficiency.

23 Claims, 7 Drawing Sheets

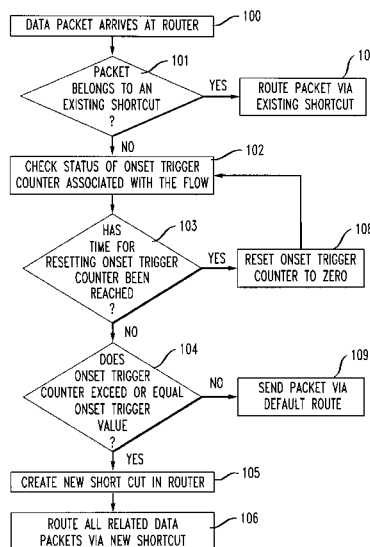


FIG. 1

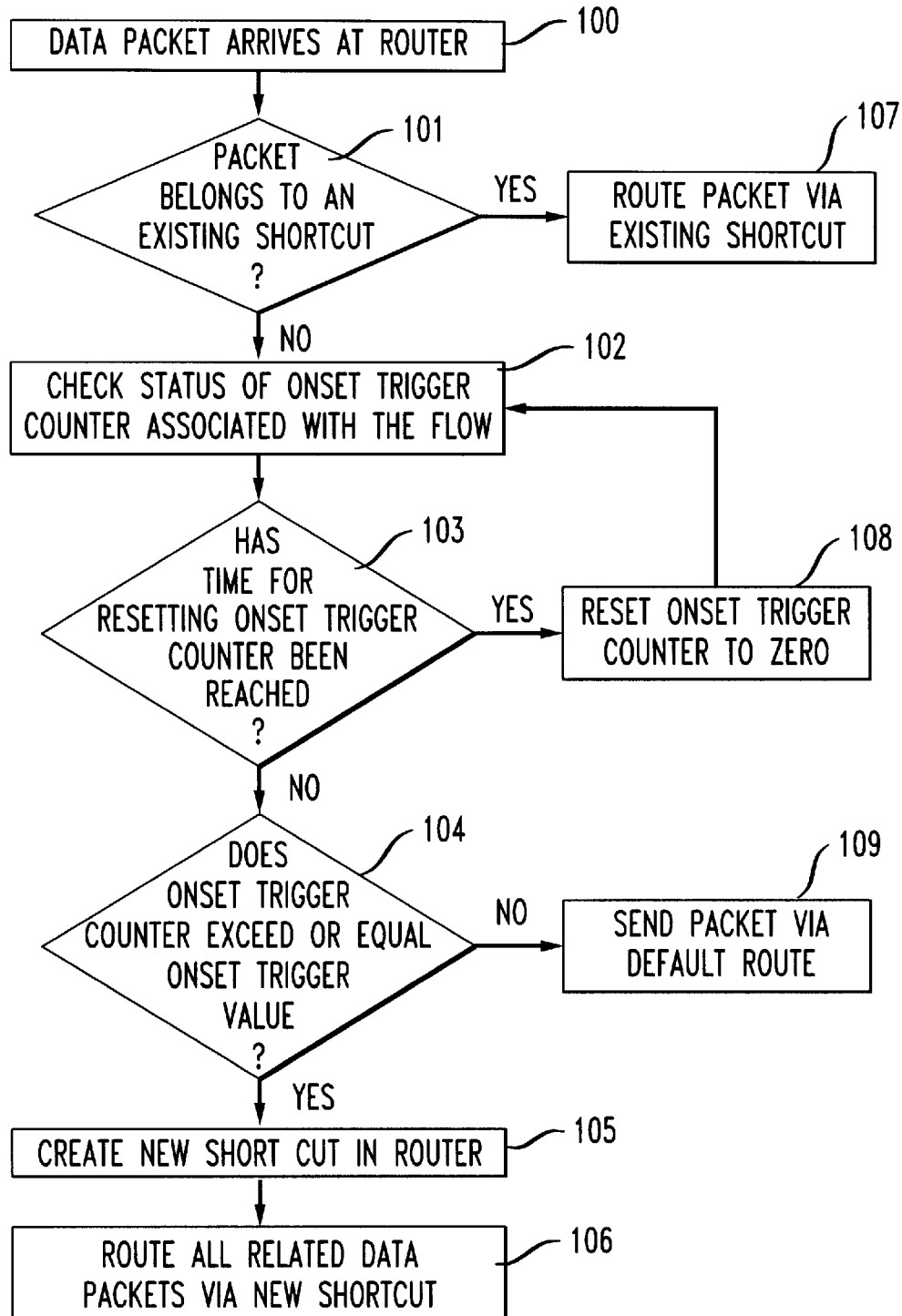


FIG. 1a

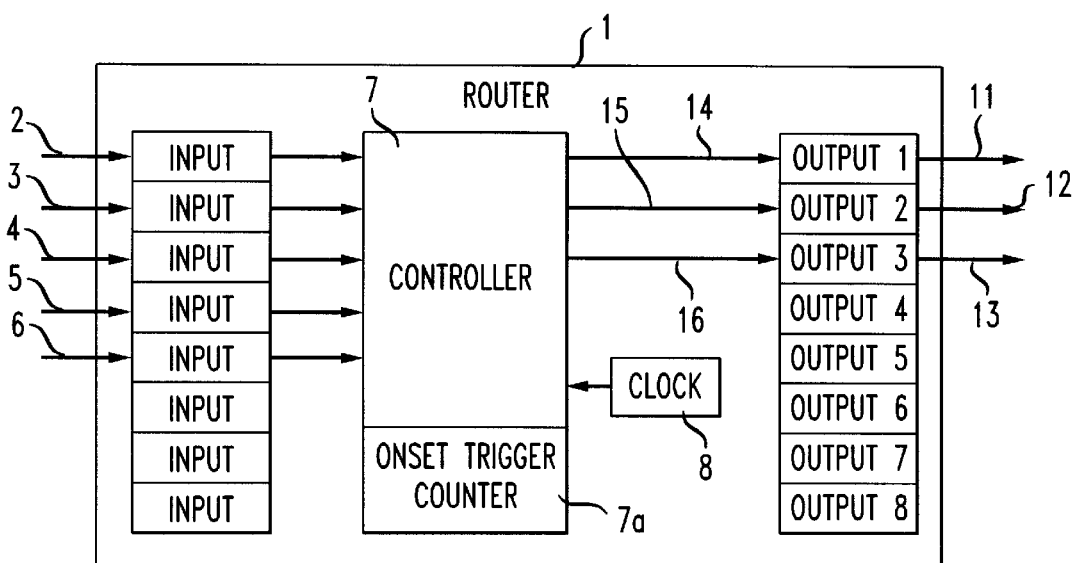
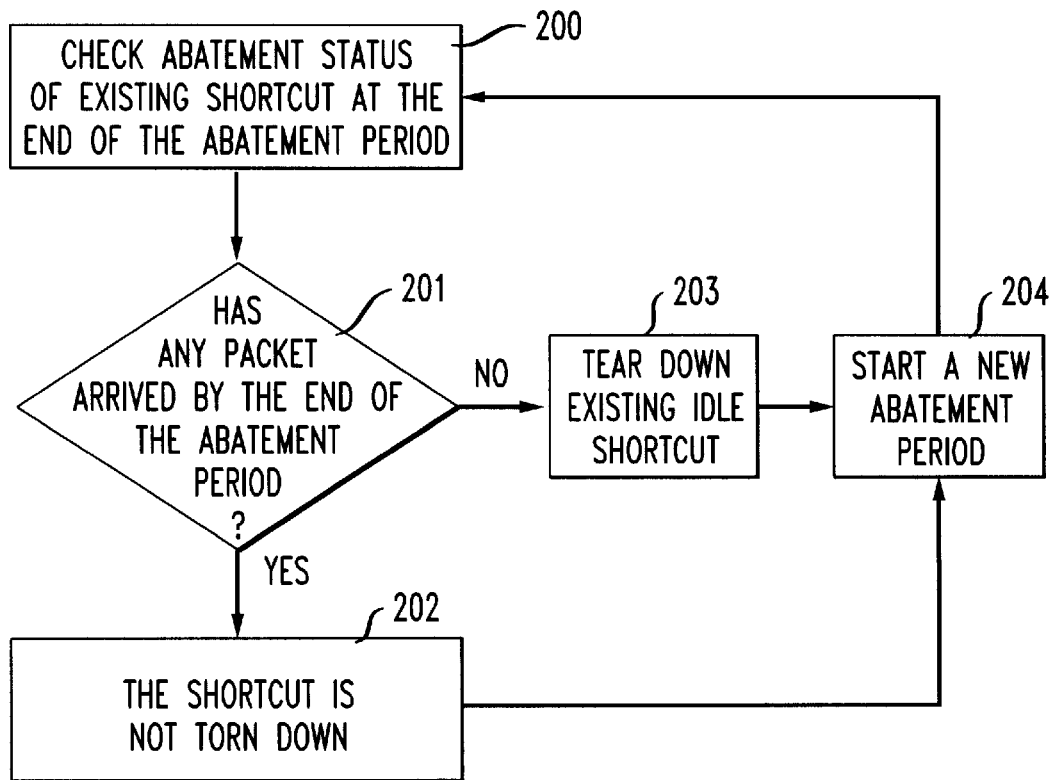
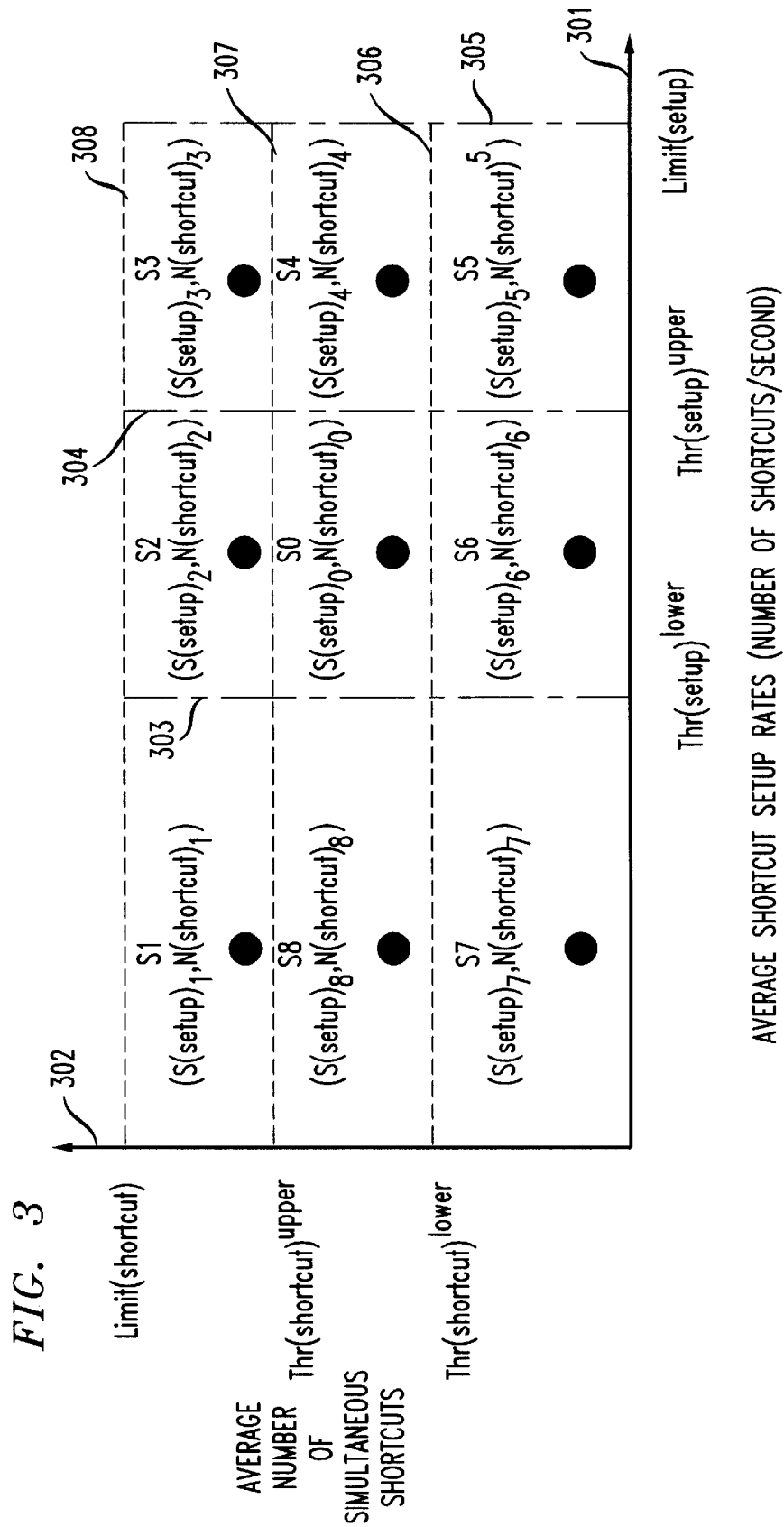


FIG. 2





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