

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

(10) **Patent No.:** **US 6,385,170 B1**  
(45) **Date of Patent:** **May 7, 2002**

- (54) **METHOD AND SYSTEM FOR DYNAMICALLY TRIGGERING FLOW-BASED QUALITY OF SERVICE SHORTCUTS THROUGH A ROUTER**
- (75) Inventors: **Angela L. Chiu**, Tinton Falls; **Xiaowen Mang**, Manalapan, both of NJ (US)
- (73) Assignee: **AT&T Corp.**, New York, NY (US)
- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

- (21) Appl. No.: **09/221,853**
- (22) Filed: **Dec. 29, 1998**
- (51) Int. Cl.<sup>7</sup> ..... **G01R 31/08; H04L 12/28**
- (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

*Primary Examiner*—Alpus H. Hsu  
*Assistant Examiner*—Duc Ho

(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**

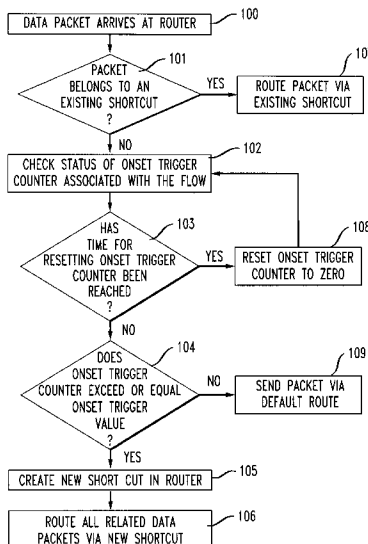


FIG. 1

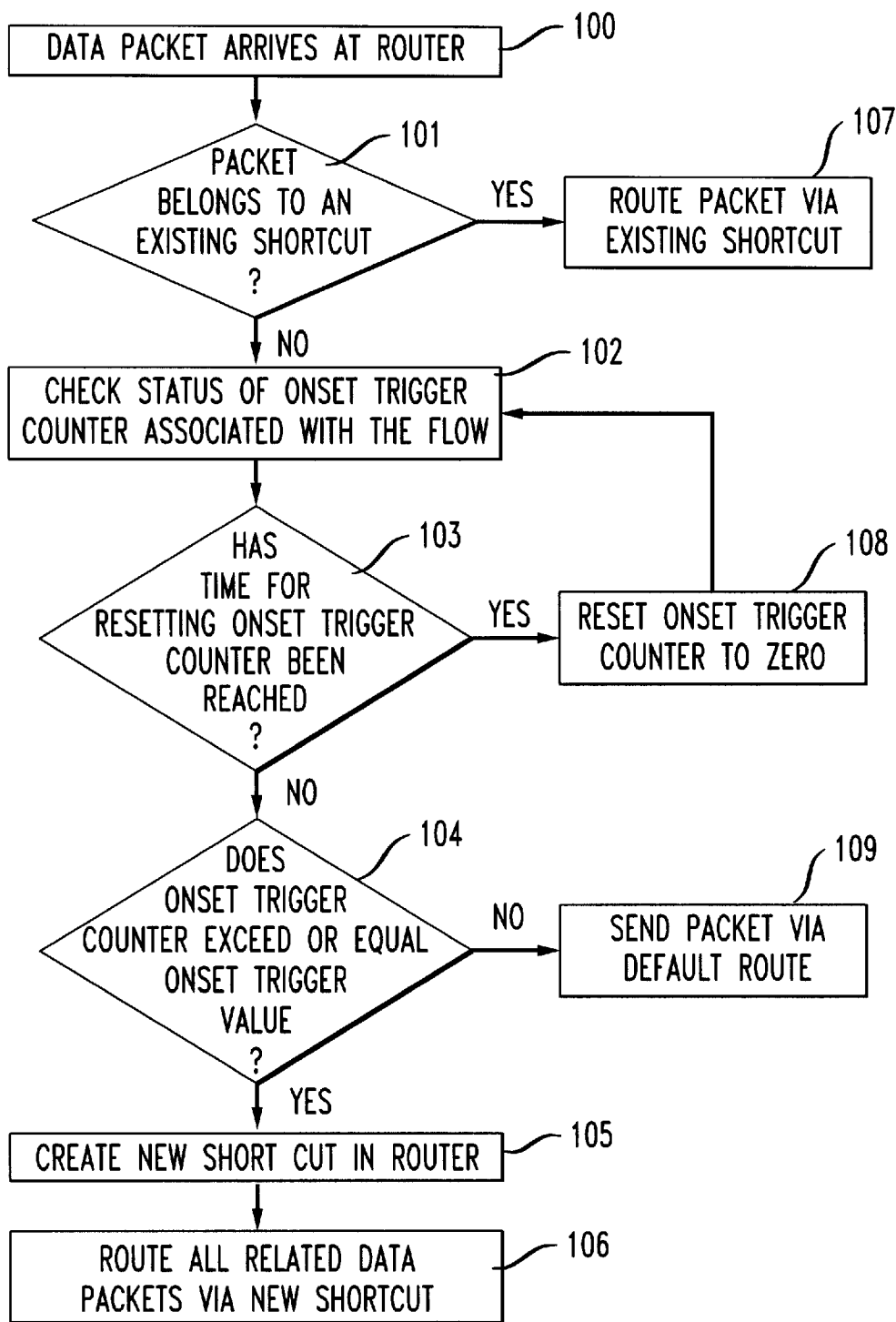


FIG. 1a

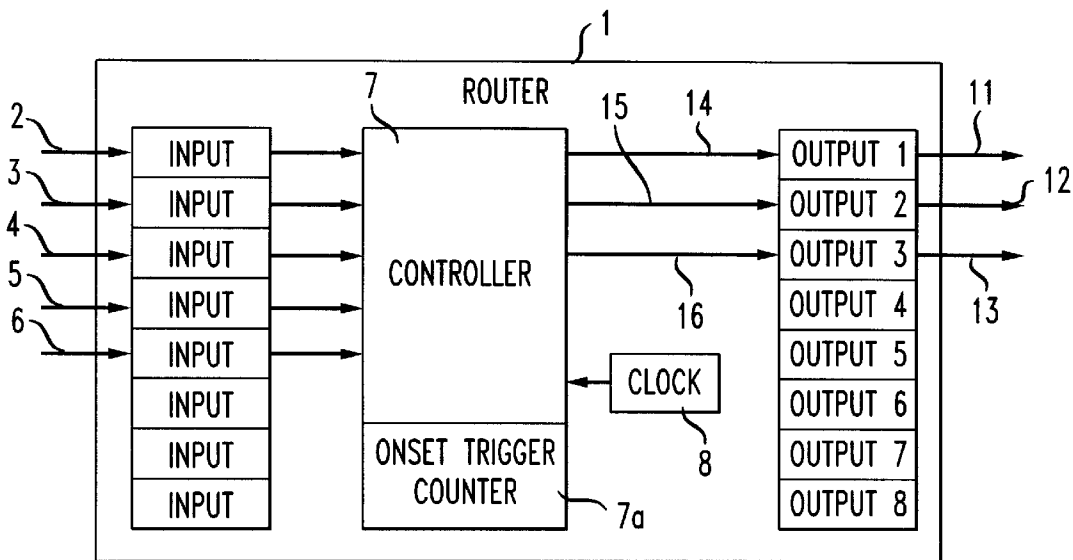


FIG. 2

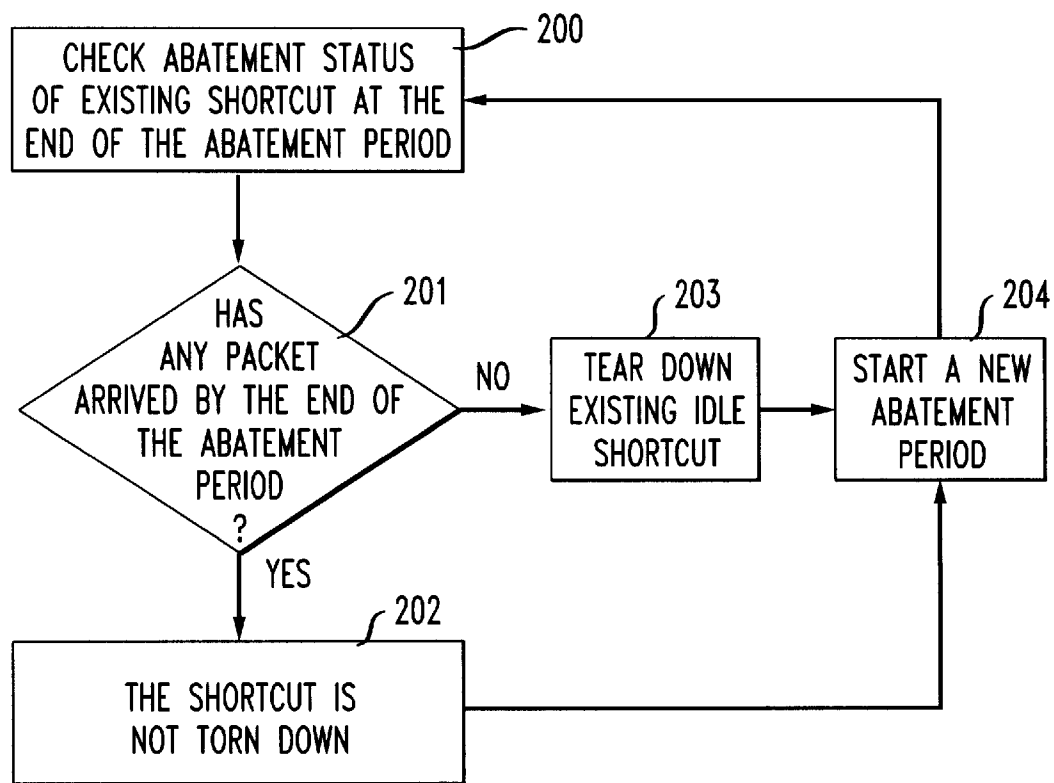
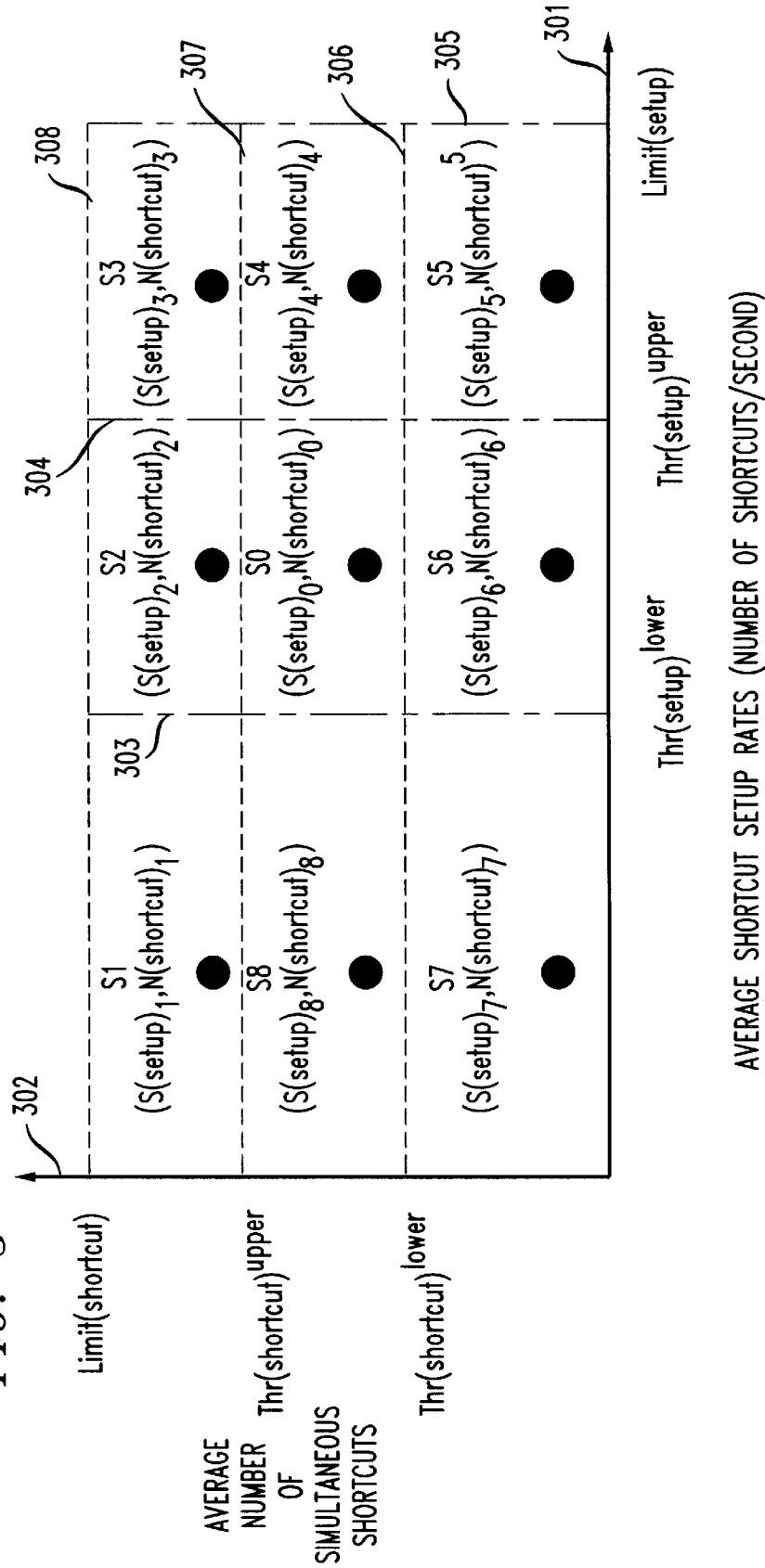


FIG. 3



# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.