



US007313100B1

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

(10) **Patent No.:** **US 7,313,100 B1**
(45) **Date of Patent:** **Dec. 25, 2007**

(54) **NETWORK DEVICE HAVING ACCOUNTING SERVICE CARD**

6,182,146 B1 1/2001 Graham-Cumming, Jr.
6,321,338 B1 * 11/2001 Porras et al. 726/25

(75) Inventors: **Stephen W Turner**, Menlo Park, CA (US); **Hsien-Chung Woo**, Fremont, CA (US); **Sanjay Kalra**, San Jose, CA (US); **Truman Joe**, Mountain View, CA (US); **Wendy R Cartee**, Los Altos, CA (US)

(Continued)

FOREIGN PATENT DOCUMENTS

WO WO 9836532 A1 * 8/1998
WO WO 2084920 A2 * 10/2002

(73) Assignee: **Juniper Networks, Inc.**, Sunnyvale, CA (US)

OTHER PUBLICATIONS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1034 days.

Weaver, A.C. et al., "A Real-Time Monitor for Token Ring Networks," Military Communications Conference, 1989. MILCOM '89. Oct. 1989. vol. 3. pp. 794-798.*

(Continued)

(21) Appl. No.: **10/228,150**

Primary Examiner—Chi Pham
Assistant Examiner—Donald L Mills
(74) *Attorney, Agent, or Firm*—Shumaker & Sieffert P.A.

(22) Filed: **Aug. 26, 2002**

(51) **Int. Cl.**
H04L 12/26 (2006.01)

(57) **ABSTRACT**

(52) **U.S. Cl.** **370/253; 370/244; 370/252; 370/392**

A network device integrates accounting functionality for generation of flow statistics with packet intercept functionality to provide a comprehensive traffic analysis environment. The device comprises a set of network interface cards to receive packets from a network, and a set of accounting service cards to calculate flow statistics for the packets. The device further comprises a control unit to receive the network packets from the interface cards and distribute the packets to the set of accounting service cards. The accounting service card comprises an interface for insertion within a slot of a network device. Accounting service cards may be added to easily scale the network device to support higher bandwidth communication links, such as OC-3, OC-12, OC48 and higher rate links. Additional accounting service cards may be used for purposes of redundancy to support continuous, uninterrupted packet processing and accounting in the event of a card failure.

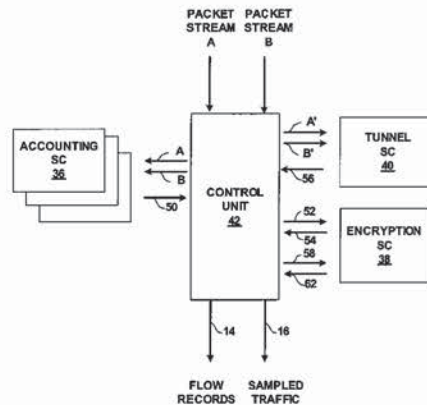
(58) **Field of Classification Search** 370/235, 370/242-244, 250, 252, 253, 389, 392, 396, 370/469, 471; 709/223, 224, 229
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,962,681 A	6/1976	Requa et al.	
4,032,899 A	6/1977	Jenny et al.	
4,600,319 A	7/1986	Everett, Jr.	
5,408,539 A	4/1995	Finlay et al.	
5,490,252 A *	2/1996	Macera et al.	709/249
5,509,123 A	4/1996	Dobbins et al.	
5,568,471 A *	10/1996	Hershey et al.	370/245
6,011,795 A	1/2000	Varghese et al.	
6,018,765 A	1/2000	Durana et al.	
6,148,335 A *	11/2000	Haggard et al.	709/224

24 Claims, 9 Drawing Sheets



U.S. PATENT DOCUMENTS

6,392,996 B1 5/2002 Hjalmtysson
 6,499,088 B1 12/2002 Wexler et al.
 6,563,796 B1* 5/2003 Saito 370/252
 6,590,898 B1 7/2003 Uzun
 6,594,268 B1 7/2003 Aukia et al.
 6,598,034 B1 7/2003 Kloth
 6,735,201 B1 5/2004 Mahajan et al.
 6,751,663 B1 6/2004 Farrell et al.
 6,826,713 B1 11/2004 Beesley et al.
 6,983,294 B2* 1/2006 Jones et al. 707/202
 6,985,956 B2* 1/2006 Luke et al. 709/229
 7,114,008 B2 9/2006 Jungck et al.
 2002/0141343 A1 10/2002 Bays
 2003/0005145 A1 1/2003 Bullard
 2003/0120769 A1 6/2003 McCollom et al.
 2003/0214913 A1 11/2003 Kan et al.

OTHER PUBLICATIONS

Dini, P. et al., "Performance Evaluation for Distributed System Components," Proceedings of IEEE Second International Workshop on Systems Management, Jun. 1996. pp. 20-29.*
 Integrated Services Adapter, 2000, Cisco Systems, Data Sheet, pp. 1-6, http://www.cisco.com/warp/public/cc/pd/ifaa/svaa/iasvaa/prodlit/ism2_ds.pdf.
 "The CAIDA Web Site," www.caida.org/, 2000.
 "About Endace," www.endace.com/, 2000.
 "Cisco IOS NetFlow," www.cisco.com/warp/public/732/Tech/nmp/netflow/index.shtml, 2002.
 U.S. Appl. No. 10/188,567, entitled "Adaptive Network Flow Analysis", filed Jul. 2, 2002, Scott Mackie.
 U.S. Appl. No. 10/228,132, entitled "Adaptive Network Router", filed Aug. 26, 2002, Woo et al.
 U.S. Appl. No. 10/228,114, entitled "Network Router Having Integrated Flow Accounting and Packet Interception", filed Aug. 26, 2002, Woo et al.
 U.S. Appl. No. 10/241,785, entitled "Rate-Controlled Transmission of Traffic Flow Information", filed Sep. 10, 2002, Sandeep Jain.
 * cited by examiner

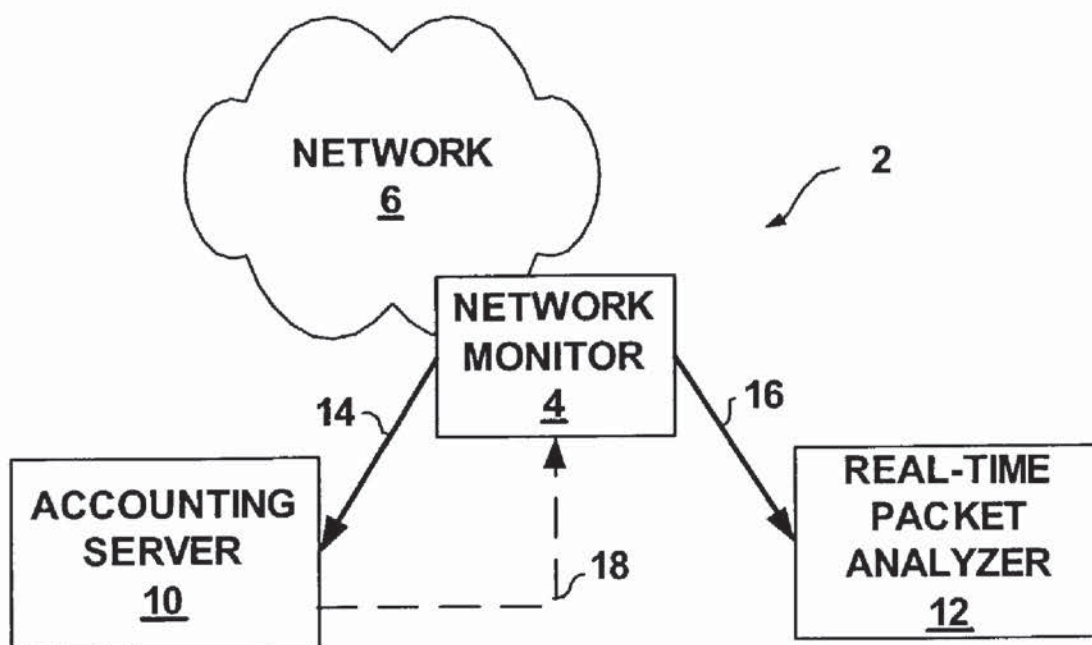


FIG. 1

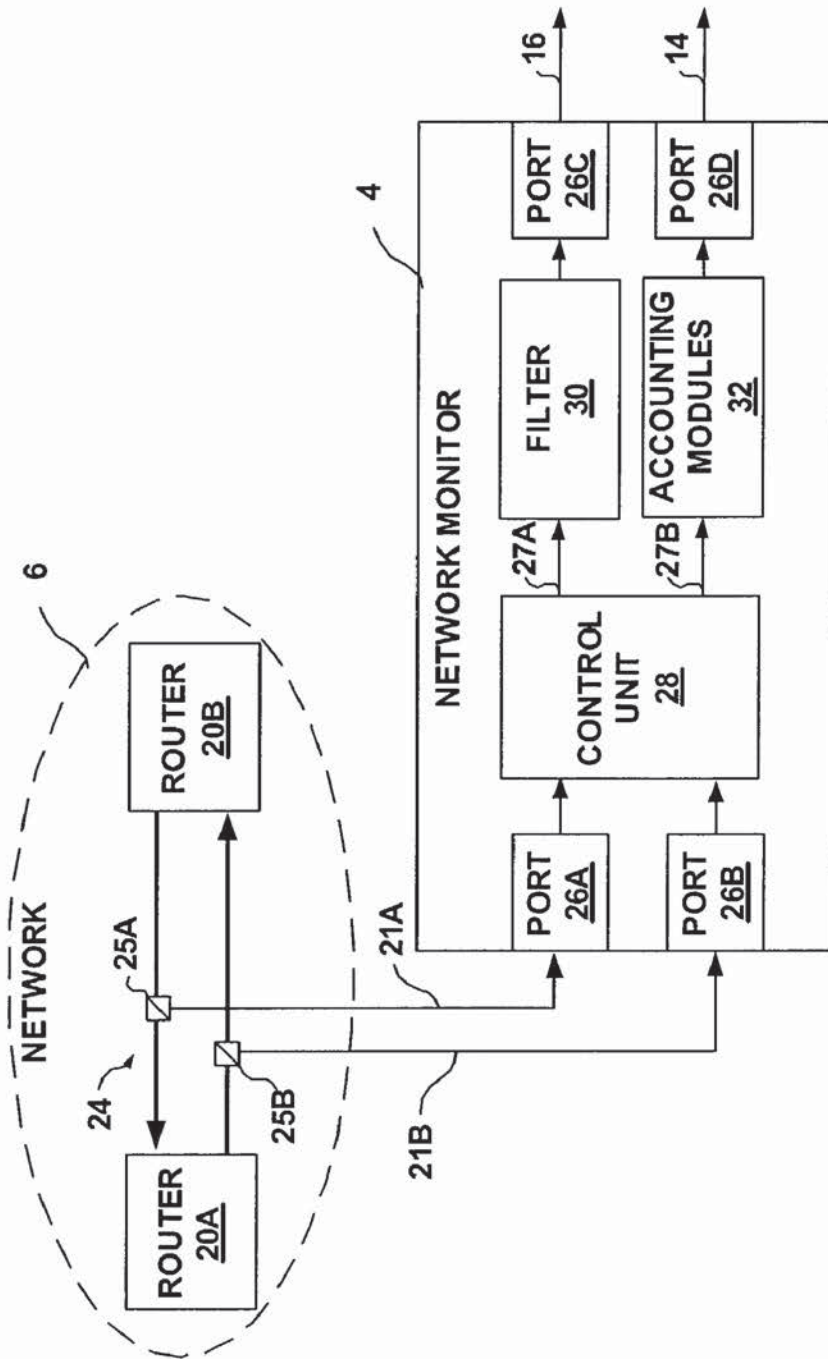


FIG. 2

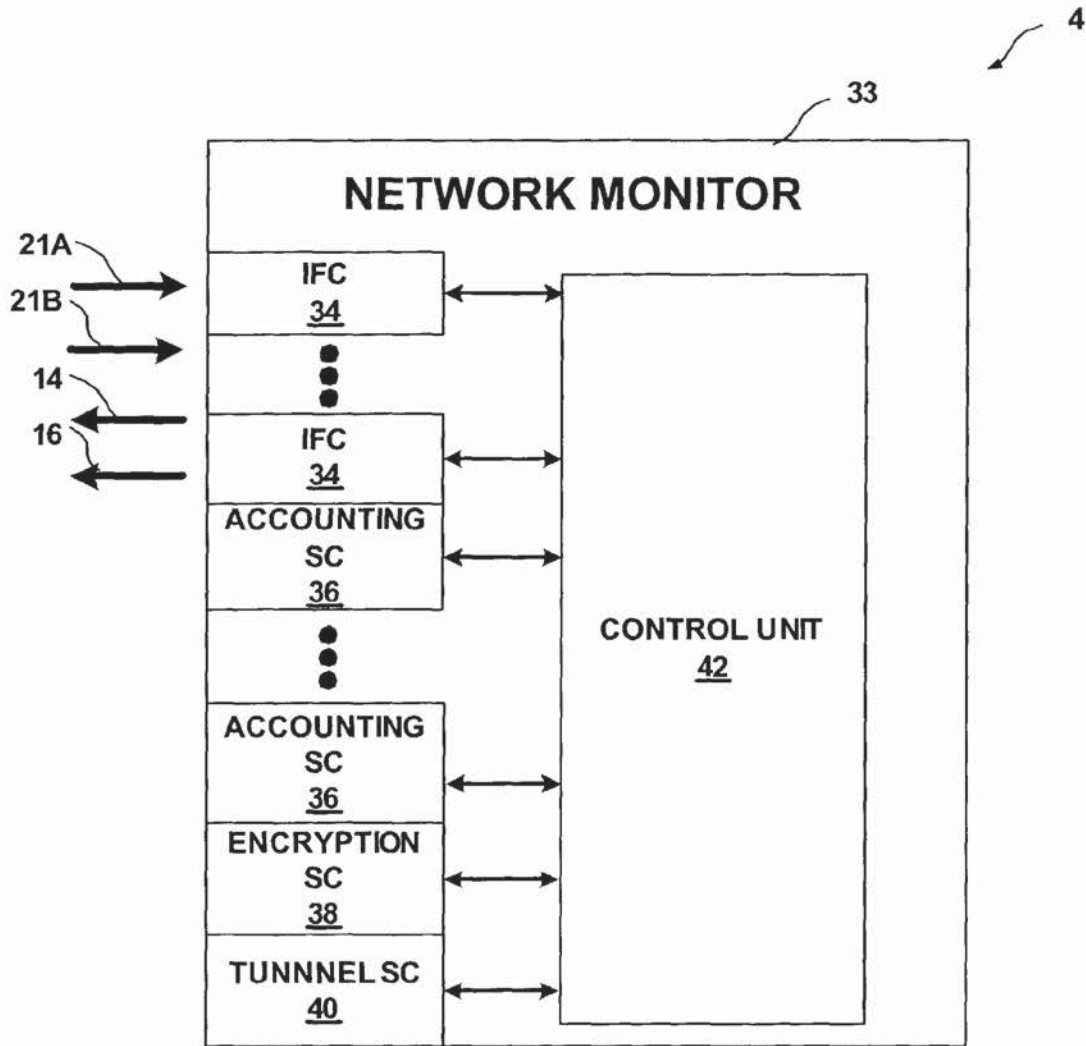


FIG. 3

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.