



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

(10) **Patent No.:** **US 7,224,668 B1**
(45) **Date of Patent:** **May 29, 2007**

(54) **CONTROL PLANE SECURITY AND TRAFFIC FLOW MANAGEMENT**

(75) Inventors: **Adrian C. Smethurst**, Groton, MA (US); **Michael F. Keohane**, Shrewsbury, MA (US); **R. Wayne Ogozaly**, Hollis, NH (US)

(73) Assignee: **Cisco Technology, Inc.**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1000 days.

(21) Appl. No.: **10/307,154**

(22) Filed: **Nov. 27, 2002**

(51) **Int. Cl.**
G06F 11/00 (2006.01)
H04L 12/50 (2006.01)
H04L 12/28 (2006.01)

(52) **U.S. Cl.** **370/229**; 370/352; 370/360; 370/401; 370/402

(58) **Field of Classification Search** 370/229, 370/360, 387, 352, 357, 401, 402; 379/88.22, 379/207.02, 221.08; 709/224, 238
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,304,568 B1 10/2001 Kim
2001/0026612 A1 10/2001 Duspiva et al.
2002/0097672 A1 7/2002 Barbas et al.

OTHER PUBLICATIONS

Park, K. and Lee, H., "On the Effectiveness of Route-Based Packet Filtering for Distributed DoS Attack Prevention in Power-Law Internets," *SIGCOMM' 01*:1-12 (2001).

Re: [RPSEC] Draft Status, from a protocol developer's angle. [online], Jul. 26, 2002 [retrieved on Sep. 18, 2002]. Retrieved from the Internet <URL:https://www1.ietf.org/mailman-archive/work-ing-groups/rpsec/current/msg00167.html>.

Durham, D., et al., "Elimination of Distributed Denial of Service Attacks using Programmable Network Processors," *Intel Research and Development*:1-4 (2002).

Flexible Firewalls for Network Processors. [online] [retrieved on Sep. 18, 2002]. Retrieved from the Internet <URL:mhtml:file://C:\tibnet\dad\clients\cisco\utexas.mht>.

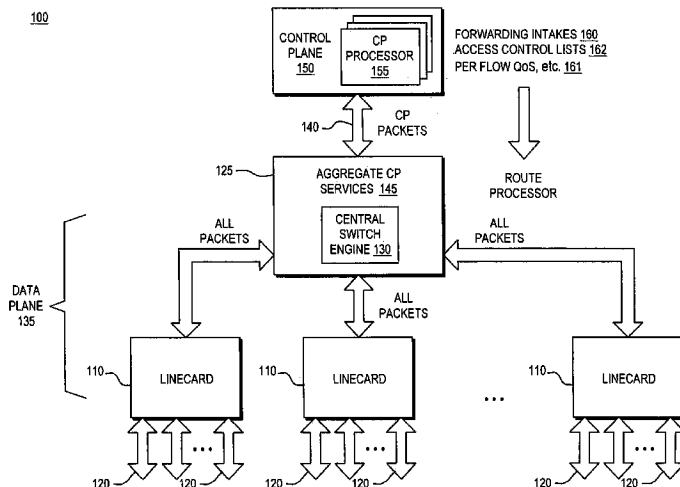
Primary Examiner—Afsar Qureshi

(74) *Attorney, Agent, or Firm*—Hamilton, Brook, Smith & Reynolds, P.C.

(57) **ABSTRACT**

An internetworking device that provides improved immunity to Denial of Service attacks, and in general, improved Quality of Service (QoS). An internetworking element or other route processor is composed of two main parts, including a data forwarding plane and a control plane; the control plane runs routing, signaling and control protocols that are responsible for determining the packet forwarding behavior by the data plane. Independent control plane processes may be provided; however, they are considered to be a single network entity that is a uniquely addressable port. Packets thus intended for the control plane always pass through a designated point. As a result, a set of port services unique to the control plane may be applied to the control plane port. These control plane port services thus can be utilized to control all packet traffic entering and exiting the control plane processes as a whole.

72 Claims, 6 Drawing Sheets



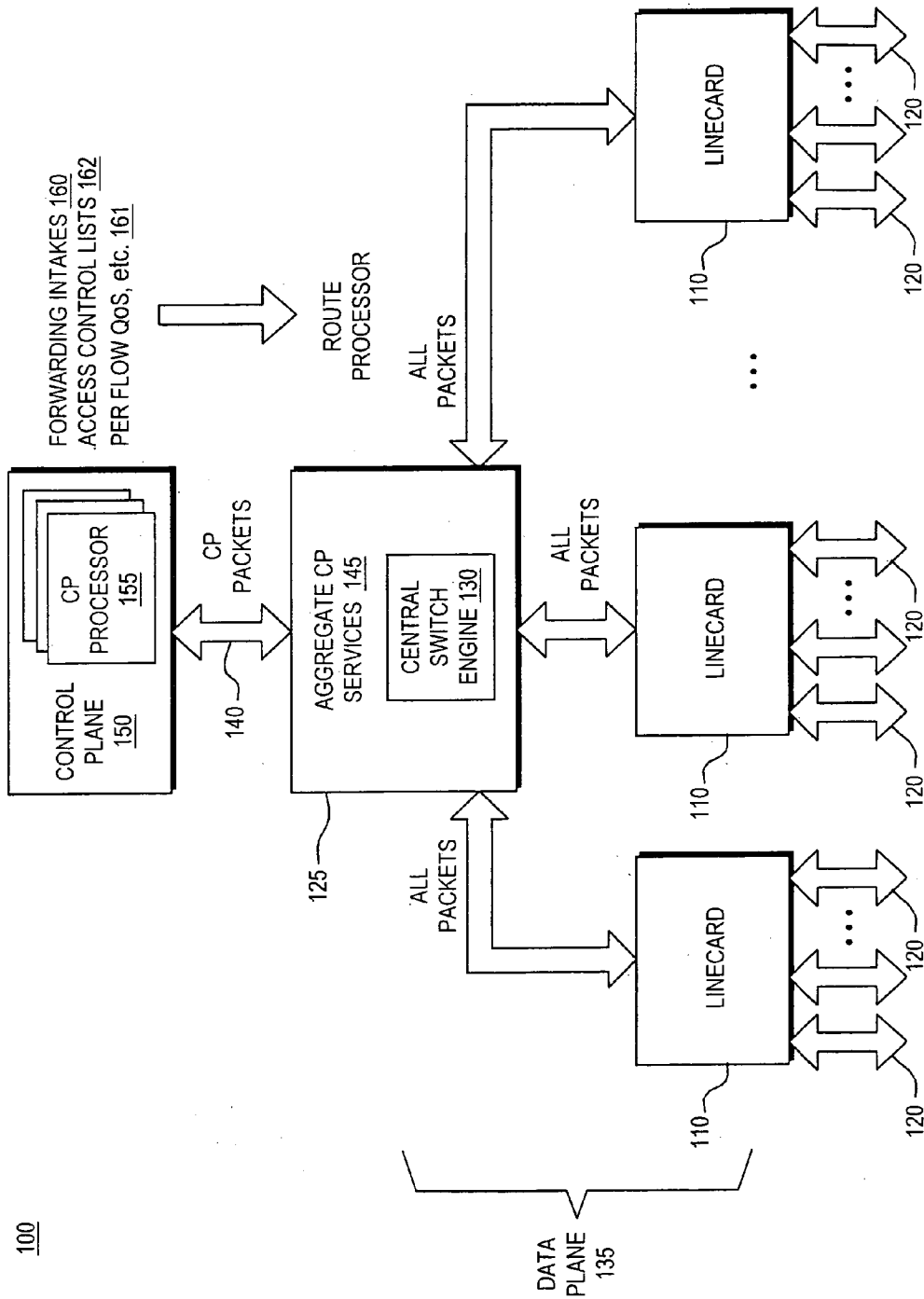


FIG. 1

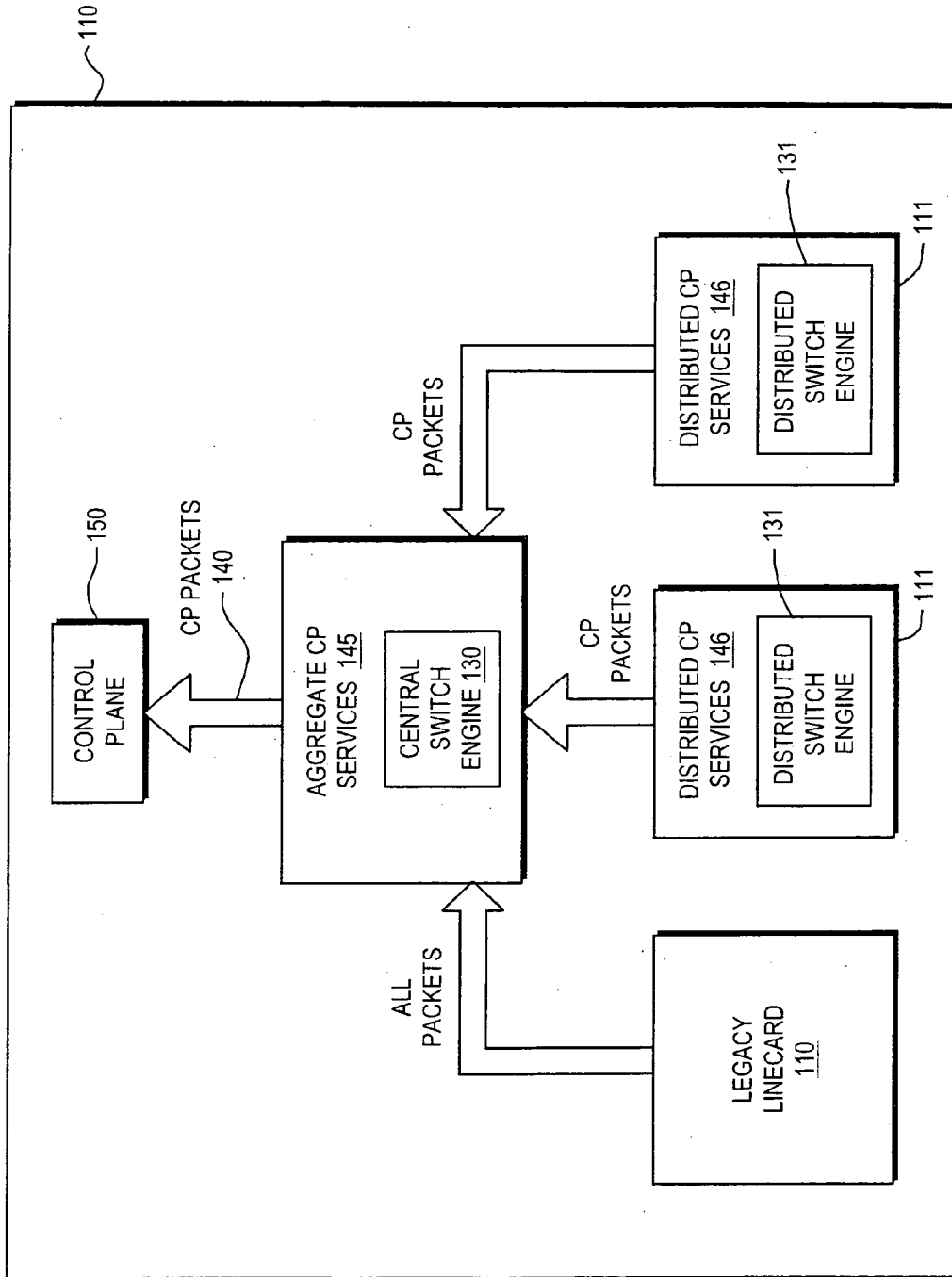


FIG. 2

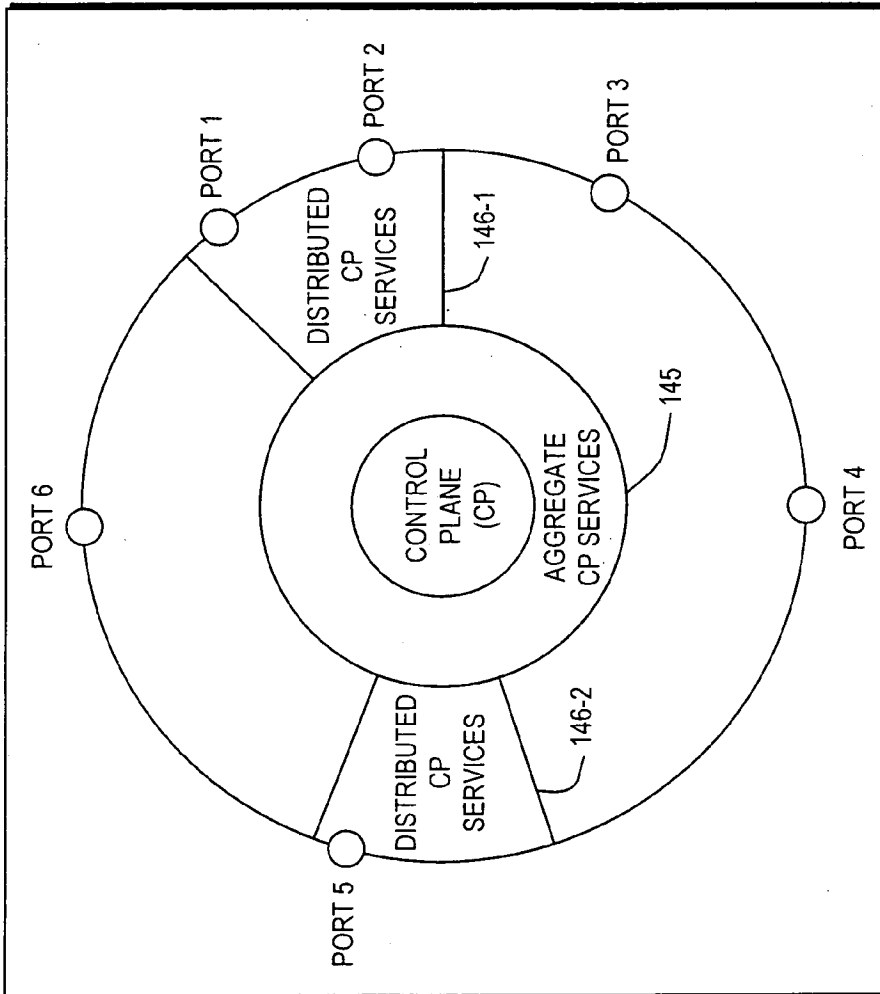


FIG. 3

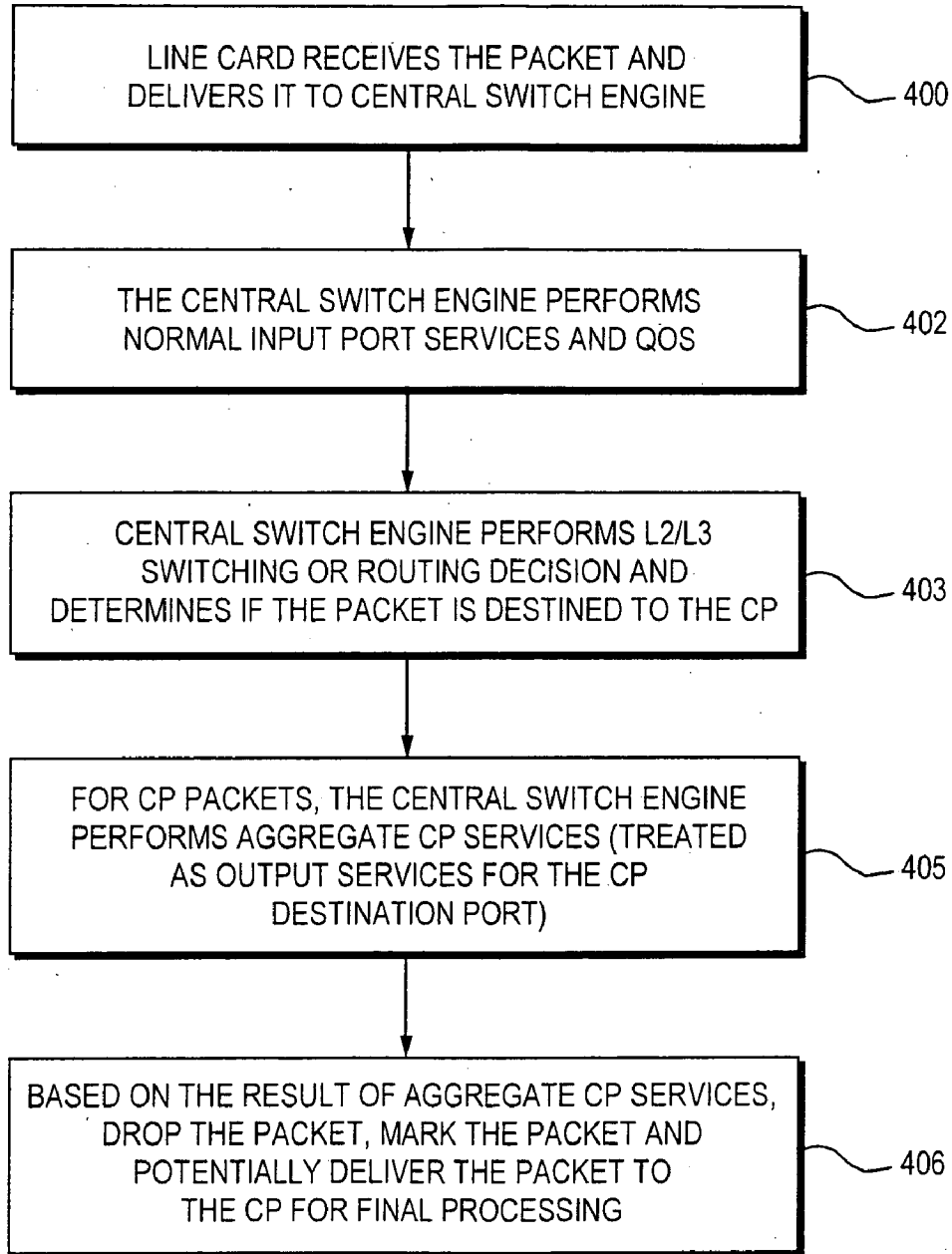


FIG. 4

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.