



US006633571B1

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

(10) **Patent No.:** **US 6,633,571 B1**
(45) **Date of Patent:** **Oct. 14, 2003**

(54) **VPN COMPOSING METHOD, INTERWORK ROUTER, PACKET COMMUNICATION METHOD, DATA COMMUNICATION APPARATUS, AND PACKET RELAYING APPARATUS**

(75) Inventors: **Kenichi Sakamoto**, Tokyo (JP);
Kazuyoshi Hoshino, Fujisawa (JP);
Koji Wakayama, Kokubunji (JP);
Shiro Tanabe, Hidaka (JP); **Noboru Endo**, Kodaira (JP)

(73) Assignee: **Hitachi, Ltd.**, Tokyo (JP)

(*) 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.: **09/392,623**

(22) Filed: **Sep. 9, 1999**

(30) **Foreign Application Priority Data**

May 27, 1999 (JP) 11-147663

(51) **Int. Cl.**⁷ **H04L 12/46**

(52) **U.S. Cl.** **370/401; 709/249**

(58) **Field of Search** 370/356, 395.5,
370/401; 709/249

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,390,173 A	*	2/1995	Spinney et al.	370/393
5,394,402 A	*	2/1995	Ross	370/402
5,430,727 A	*	7/1995	Callon	370/401
5,450,407 A	*	9/1995	Perlman et al.	370/392
6,035,105 A	*	3/2000	McCloghrie et al.	709/236
6,219,699 B1	*	4/2001	McCloghrie et al.	709/221
6,304,901 B1	*	10/2001	McCloghrie et al.	709/221
6,392,997 B1	*	5/2002	Chen	370/252

* cited by examiner

Primary Examiner—Hassan Kizou

Assistant Examiner—Dmitry Levitan

(74) *Attorney, Agent, or Firm*—Antonelli, Terry, Stout & Kraus, LLP

(57) **ABSTRACT**

A method serves to compose a VPN (Virtual Private Network) over a plurality networks each of which is managed by different Internet Service Providers (ISP). When a packet with a first capsule header used for composing a VPN in a first ISP network is transmitted to a second ISP network, a route for outputting packet to the second ISP network is determined based on the information both in the capsule header and in the IP header. In addition, a second capsule header used for composing a VPN in the second ISP network is determined based on the above information.

5 Claims, 23 Drawing Sheets

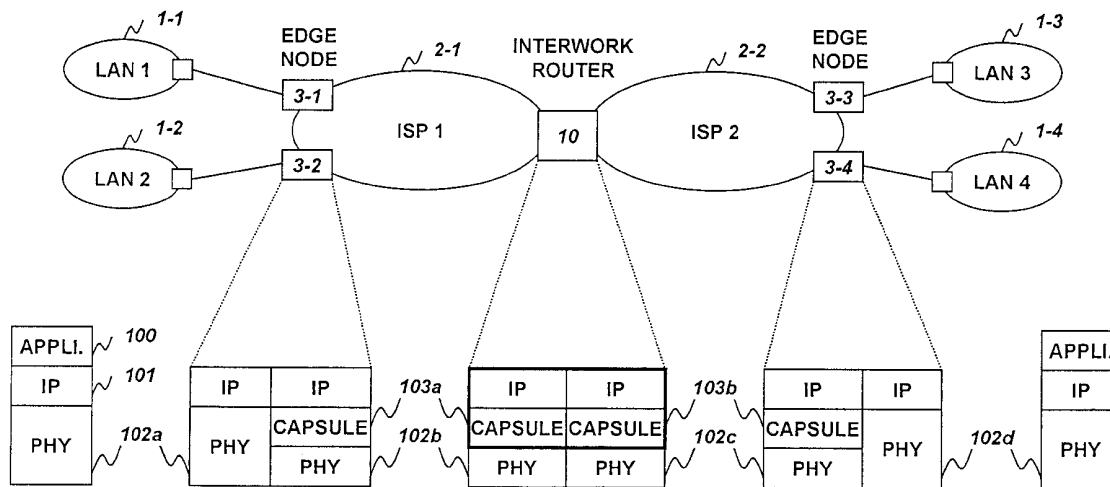


FIG. 1

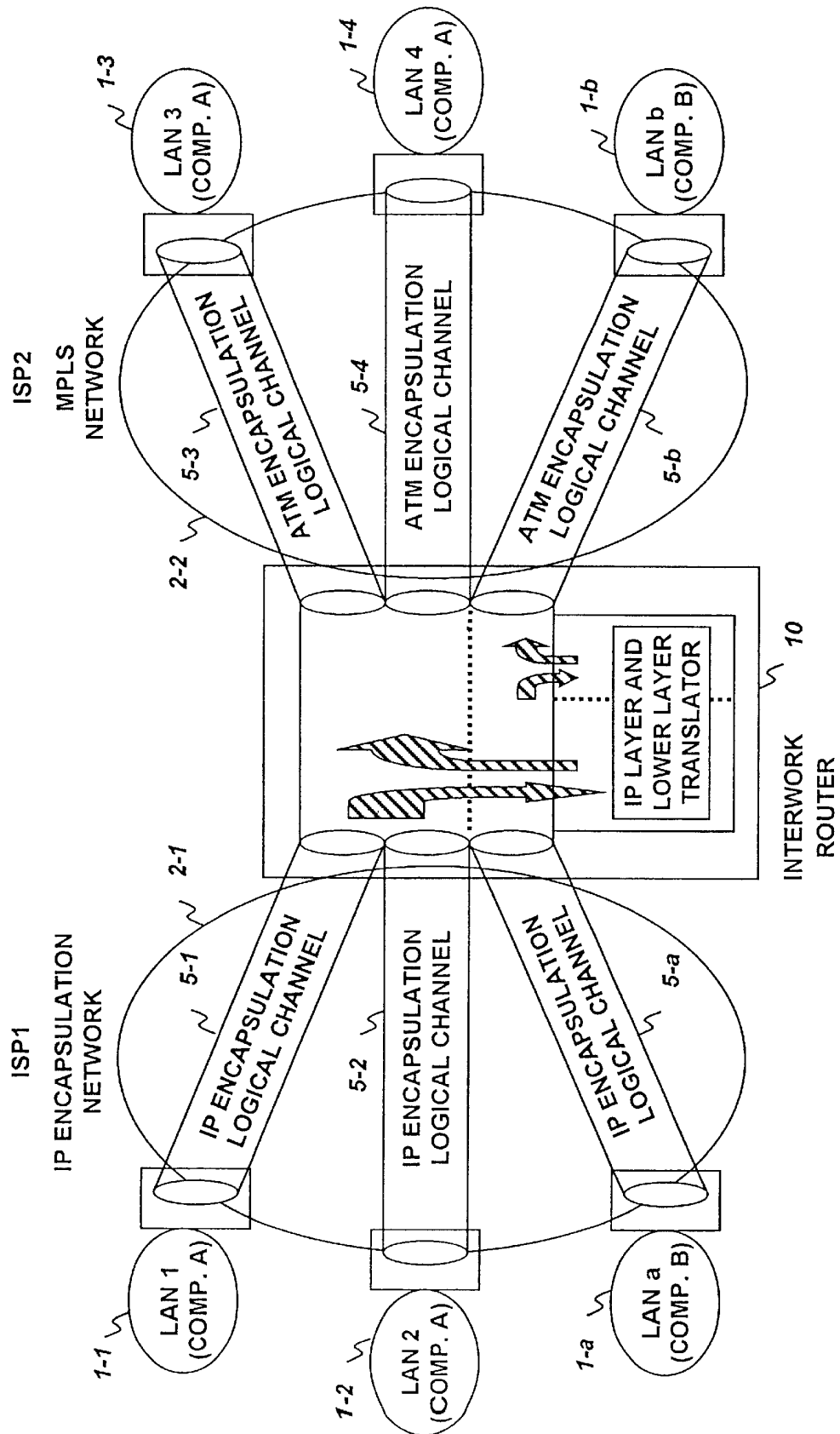


FIG. 2

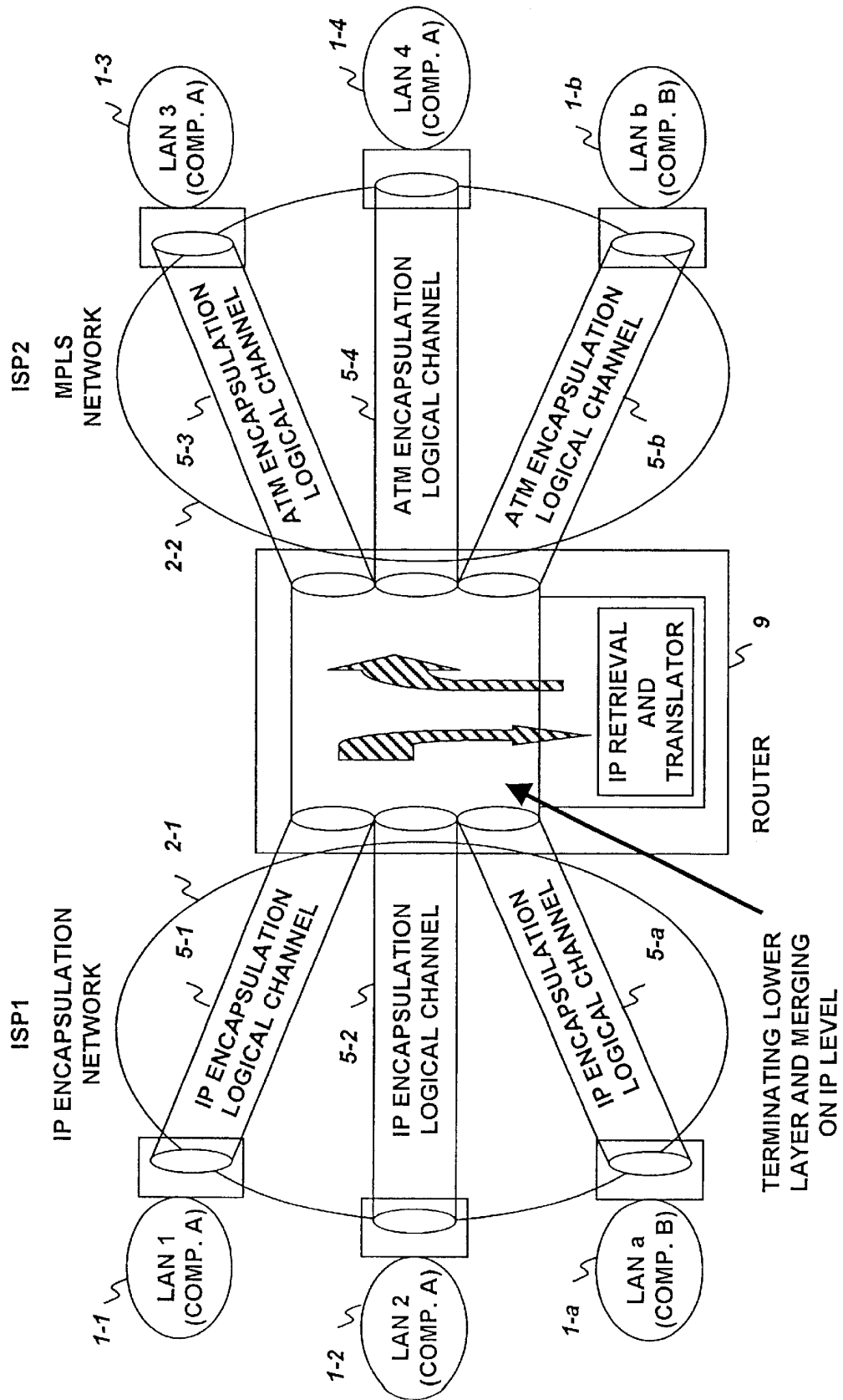


FIG. 3

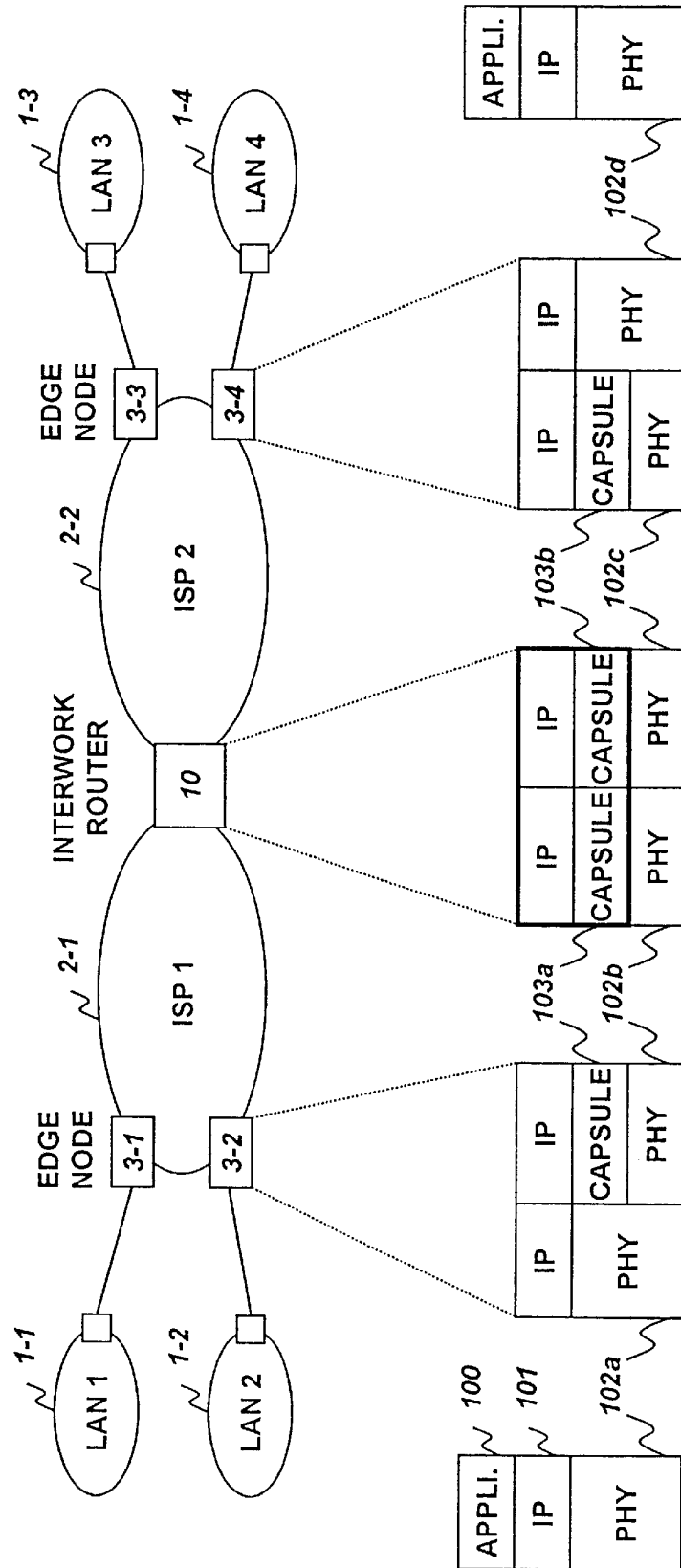
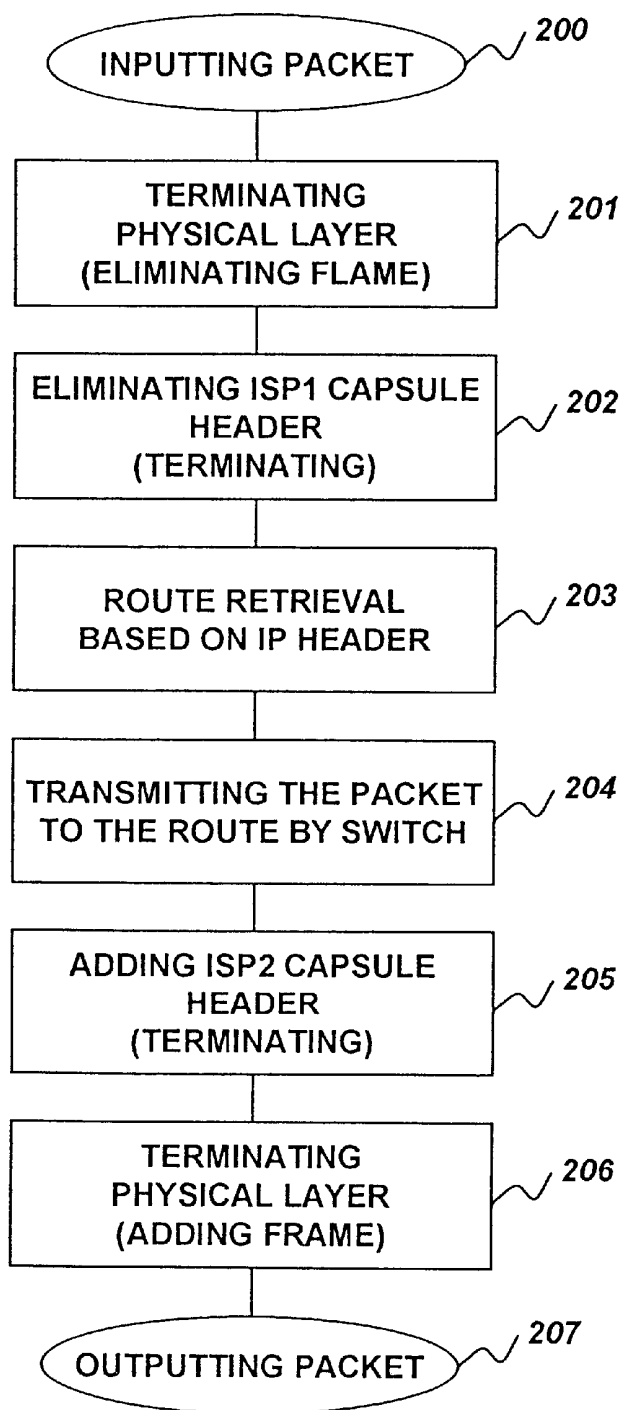


FIG.4



PROCESSING FLOW IN ROUTER

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.