US007028337B2

(12) **United States Patent**
Murakawa

(10) Patent No.: **US 7,028,337 B2**
(45) Date of Patent: **Apr. 11, 2006**

(54) **METHOD OF VIRTUAL PRIVATE NETWORK COMMUNICATION IN SECURITY GATEWAY APPARATUS AND SECURITY GATEWAY APPARATUS USING THE SAME**

(75) Inventor: **Yasushi Murakawa**, Fukuoka (JP)

(73) Assignee: **Matsushita Electric Industrial Co., Ltd.**, Osaka (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 866 days.

(21) Appl. No.: **09/729,262**

(22) Filed: **Dec. 1, 2000**

(65) **Prior Publication Data**

US 2001/0020273 A1 Sep. 6, 2001

(30) **Foreign Application Priority Data**

Dec. 3, 1999 (JP) 11-344500

(51) **Int. Cl.**
H04L 9/00 (2006.01)

(52) **U.S. Cl.** **726/15**

(58) **Field of Classification Search** 709/238; 713/153, 201; 707/227; 726/15
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,615,357 B1 * 9/2003 Boden et al. 713/201
6,751,729 B1 * 6/2004 Giniger et al. 713/153
6,779,004 B1 * 8/2004 Zintel 709/227

* cited by examiner

Primary Examiner—Gregory Morse
Assistant Examiner—Ellen C Tran
(74) *Attorney, Agent, or Firm*—RatnerPrestia

(57) **ABSTRACT**

A method of the Virtual Private Network (VPN) communication employed for a security gateway apparatus and the security gateway apparatus using the same, which allow a personal computer outside a local area network (LAN) to access, via a WAN, to a terminal on the LAN, virtually regarding the outside PC as a terminal on the LAN. The communication method is employed for a security gateway apparatus to connect, through concentration and conversion process, between a LAN and a WAN including a public network. Security Architecture for the Internet Protocol (IPsec) establishes VPN with an outside PC having a dialup connection to the WAN. During an Internet Key Exchange (IKE) communication that is performed prior to the IPsec communication, the security gateway apparatus integrates a Dynamic Host Configuration Protocol (DHCP) communication option into an IKE data, and designates the IP address of the outside PC from a tunneled IP packet.

24 Claims, 8 Drawing Sheets

FIG. 1

FIG. 2

```
         ┌─────────────┐
         │    Start     │
         └─────────────┘
                │
                ▼
    ┌───────────────────────┐
    │      Phase 1          │ ──── S1
    │   communication       │
    └───────────────────────┘
                │
                ▼
    ┌───────────────────────┐
    │   Establish IKE-SA    │ ──── S2
    └───────────────────────┘
                │
                ▼
    ┌───────────────────────┐
    │      Phase 2          │ ──── S3
    │   communication       │
    └───────────────────────┘
                │
                ▼
    ┌───────────────────────┐
    │  Establish IPsec-SA   │ ──── S4
    └───────────────────────┘
                │
                ▼
    ┌───────────────────────┐
    │  Distribute IP address │ ──── S5
    └───────────────────────┘
                │
                ▼
         ┌─────────────┐
         │     End      │
         └─────────────┘
```

FIG. 3

IKE data 300

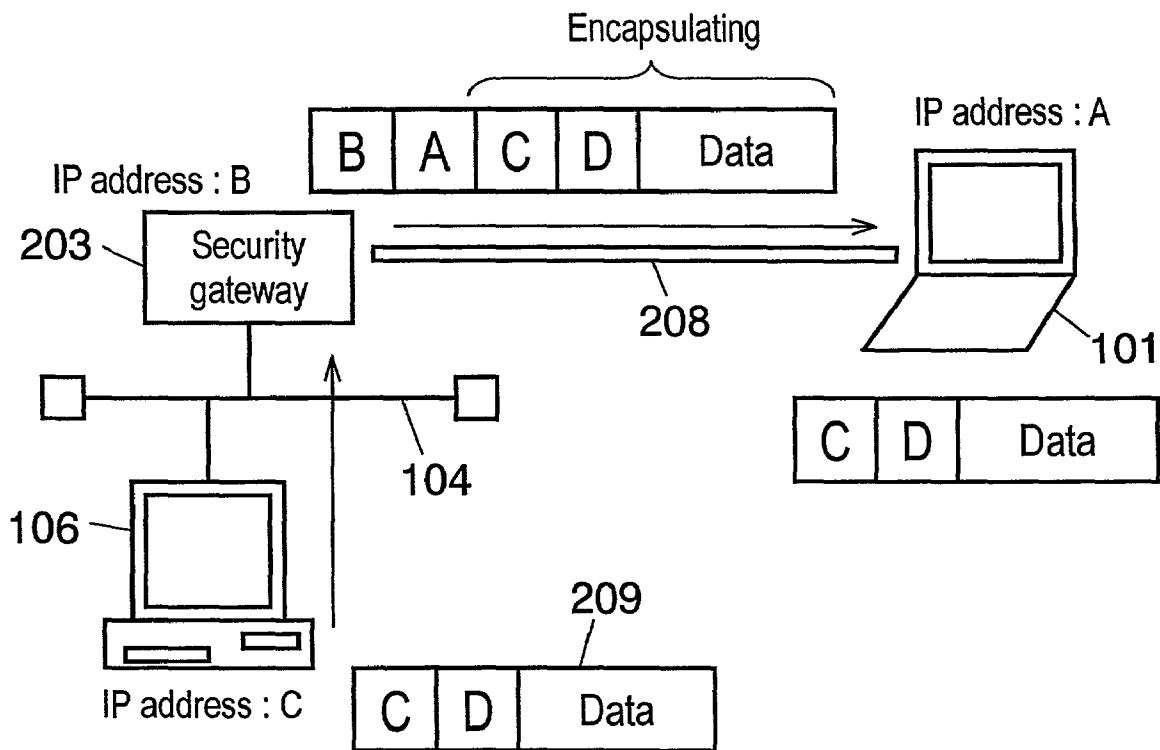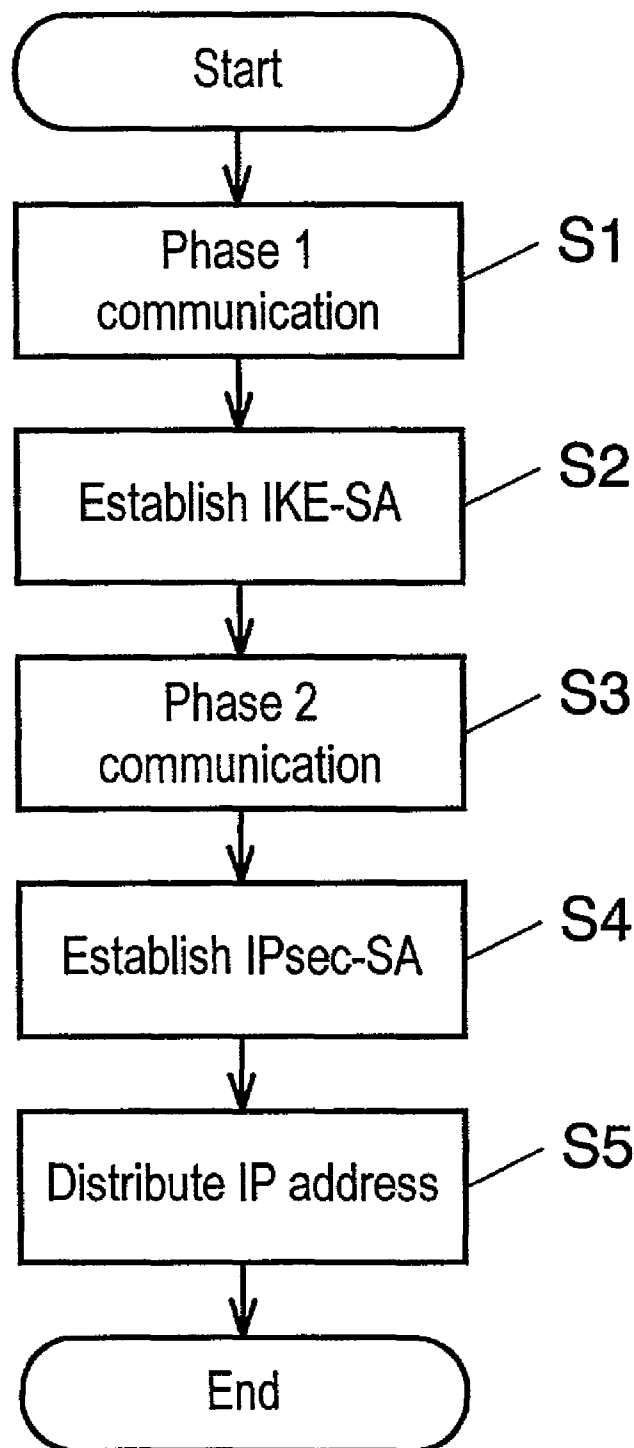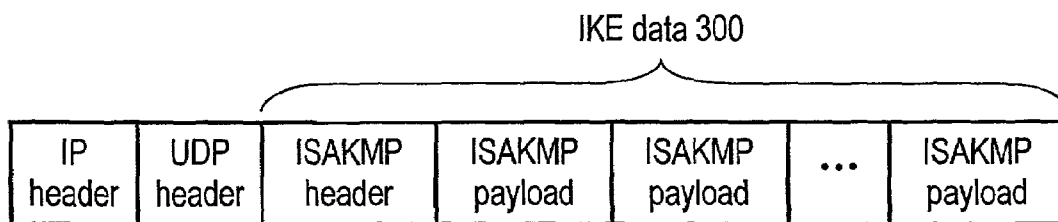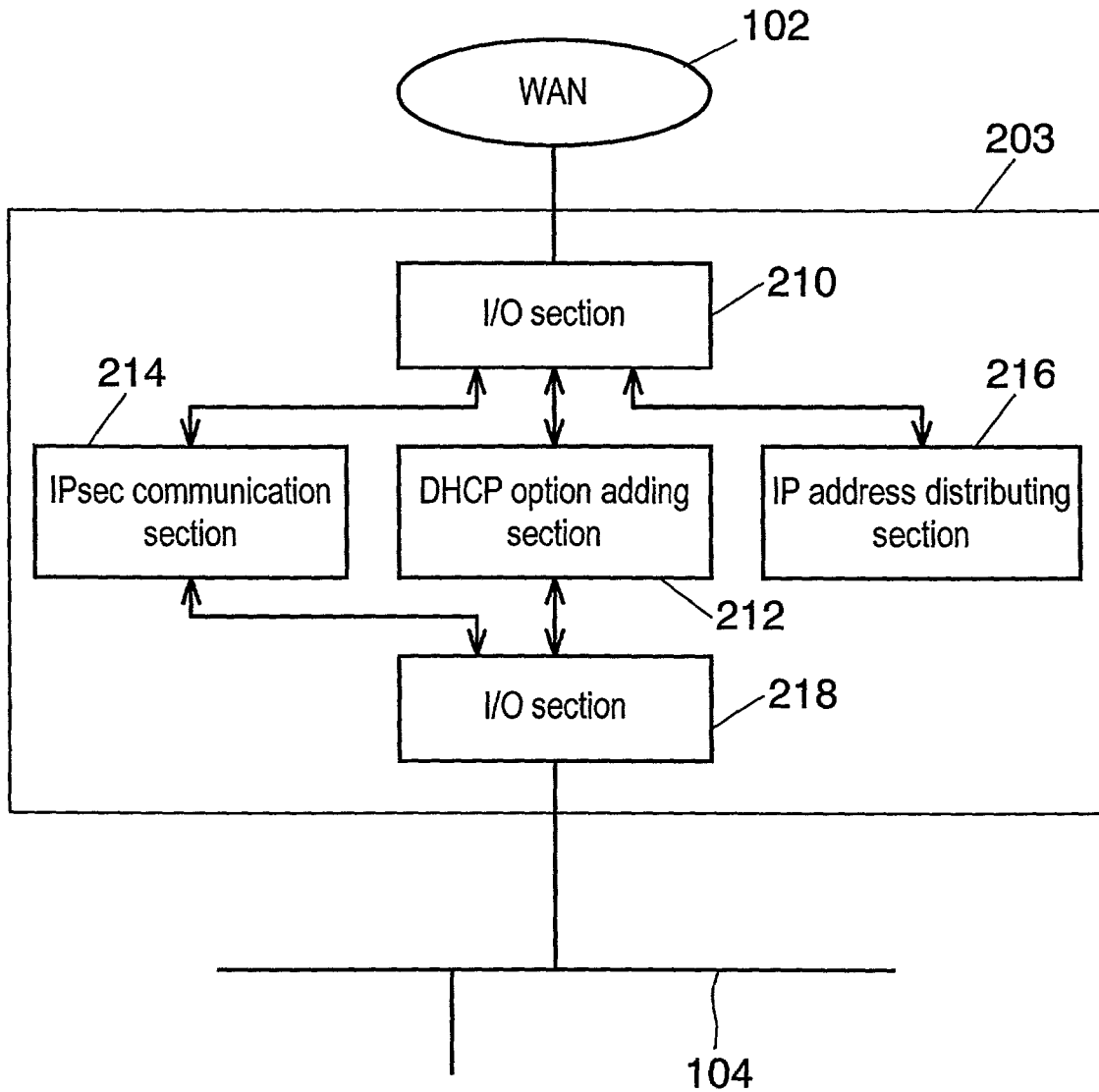| IP header | UDP header | ISAKMP header | ISAKMP payload | ISAKMP payload | ... | ISAKMP payload |
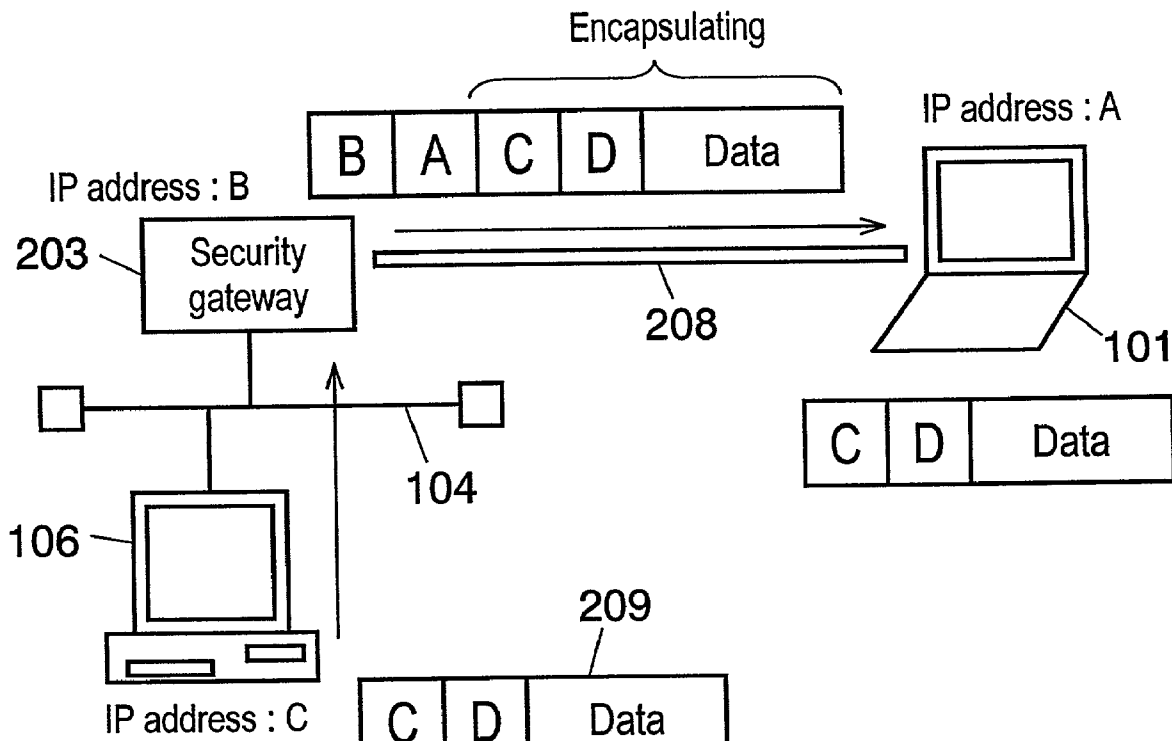
FIG. 4

DOCKET ALARM

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.

fastcase®
Smarter legal research.