



US006976177B2

(12) **United States Patent**
Ahonen

(10) **Patent No.:** **US 6,976,177 B2**
(45) **Date of Patent:** **Dec. 13, 2005**

(54) **VIRTUAL PRIVATE NETWORKS**

(75) Inventor: **Pasi Matti Kalevi Ahonen**, Oulu (FI)

(73) Assignee: **Telefonaktiebolaget LM Ericsson (publ)**, Stockholm (SE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 865 days.

(21) Appl. No.: **09/764,661**

(22) Filed: **Jan. 18, 2001**

(65) **Prior Publication Data**

US 2001/0009025 A1 Jul. 19, 2001

(30) **Foreign Application Priority Data**

Jan. 18, 2000 (GB) 00009613

(51) **Int. Cl.**⁷ **G06F 17/00**

(52) **U.S. Cl.** **713/201; 713/168; 713/175; 713/153**

(58) **Field of Search** **713/201, 168, 713/175, 153**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,940,591 A * 8/1999 Boyle et al. 713/201
6,330,562 B1 * 12/2001 Boden et al. 707/10

OTHER PUBLICATIONS

Zao et al., "A public-key based secure Mobile IP", J.C. Baltzer AG, Science Publishers, pp. 373-390.*

Reavis, Jim, "Is VPN the killer application for PKI?", Sep. 22, 1999, Network World Fusion.*

Zao et al., A public-key based secure mobile IP, Wireless Networks, vol. 5, Issue 5 (Oct. 1999) pp.: 373-390 Year of Publication: 1999.*

(Continued)

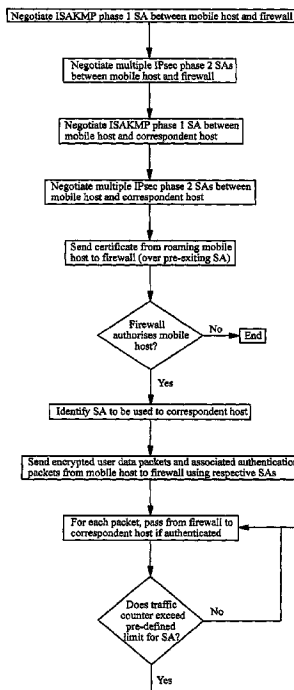
Primary Examiner—David Jung

(74) *Attorney, Agent, or Firm*—Roger Burleigh

(57) **ABSTRACT**

A secure communication method for allowing a mobile host to communicate with a correspondent host over a Virtual Private Network. The method comprises negotiating one or more Security Associations between the mobile host and a correspondent host of a Virtual Private Network. Subsequently, a communication is initiated between the mobile host and a Security Gateway and an authentication certificate sent to the Security Gateway, the certificate containing at least the identity of a Security Association which will be used for subsequent communication between the mobile host and the correspondent host. Data packets can then be sent from the mobile host to the correspondent host using the identified Security Association, via the Security Gateway. However, the data packets are forwarded by the Security Gateway to the correspondent host only if they are authenticated by the Security Gateway.

15 Claims, 3 Drawing Sheets



OTHER PUBLICATIONS

Dynamic network-based secure VPN deployment in GPRS Xenakis, C.; Merakos, L.; Personal, Indoor and Mobile Radio Communications, 2002. The 13th IEEE International Symposium on vol. 3, Sep. 15-18, 2002, Page(s):1260-1265 vol.3.*

An agent-based shopping system Benedicenti, L.; Xuguang Chen; Xiaoran Cao; Paranjape, R.; Electrical and Computer Engineering, 2004. Canadian Conference on vol. 2, May 2-5, 2004 Page(s):703-705, vol. 2.*

Simple mobility support for IPsec tunnel mode Byoung-Jo, K.; Srinivasan, S.; Vehicular Technology Conference, 2003. VTC 2003-Fall. 2003 IEEE 58th vol. 3, Oct. 6-9, 2003 Page(s):1999-2003 vol. 3 Digital Object Identifier 10.1109/VETEFC.2003.1285375.*

Jacobs, S., et al., "Security of Current Mobile IP Solutions", Proceedings of the Military Communications Conference, Nov. 3, 1997, pp. 1122-1128, XP 000792591.

Inoue, A., et al., "IP Layer Security and Mobility Support Design Policy and an Implementation", Proceedings of the ISS'97 International Switching Symposium, Toronto, Canada, Sep. 21-23, 1997, pp. 571-577, XP000720565.

Zao, J., et al., "A Public-Key Based Secure Mobile IP", Proceedings of the Mobicom'97 Third Annual ACM/IEEE International Conference on Mobile Computing and Networking, Budapest, Hungary, pp. 26-30, Sep. 1997, XP 000764777.

* cited by examiner

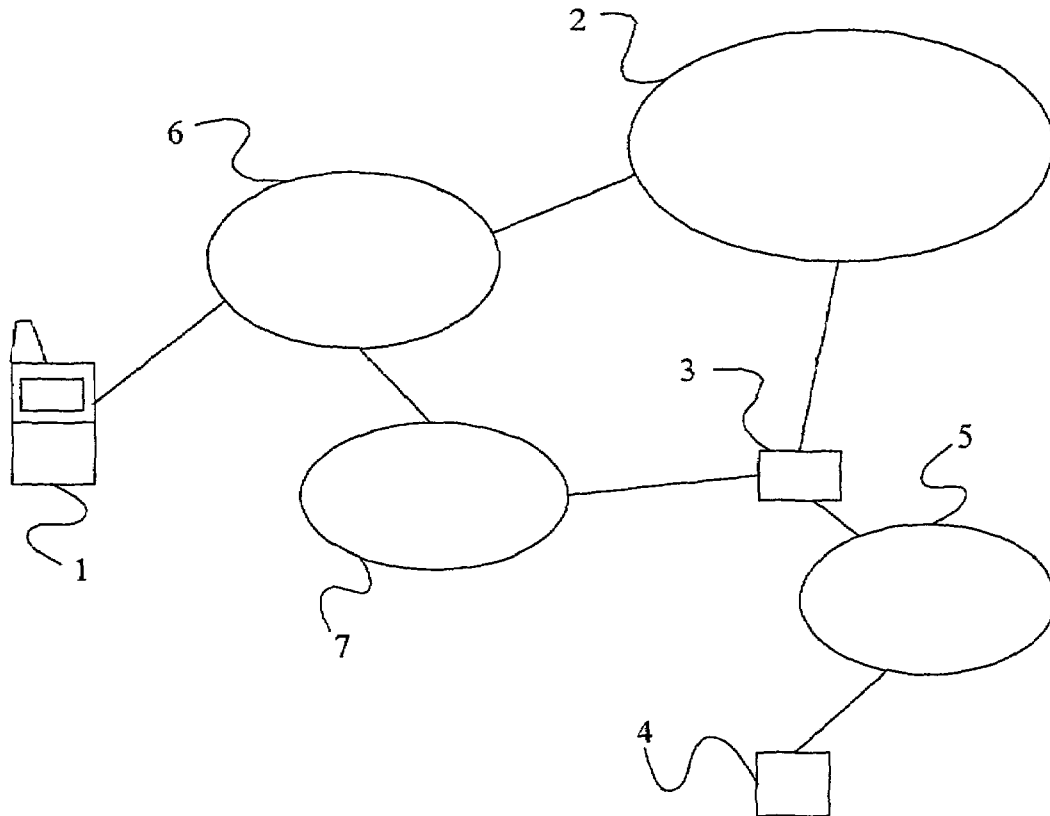


Figure 1

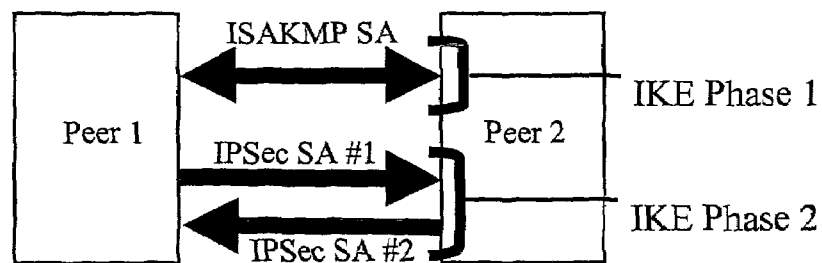


Figure 2

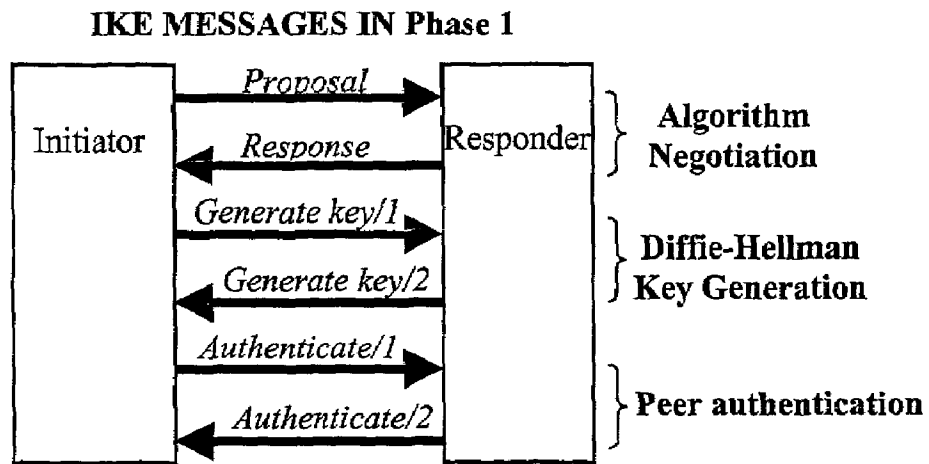


Figure 3

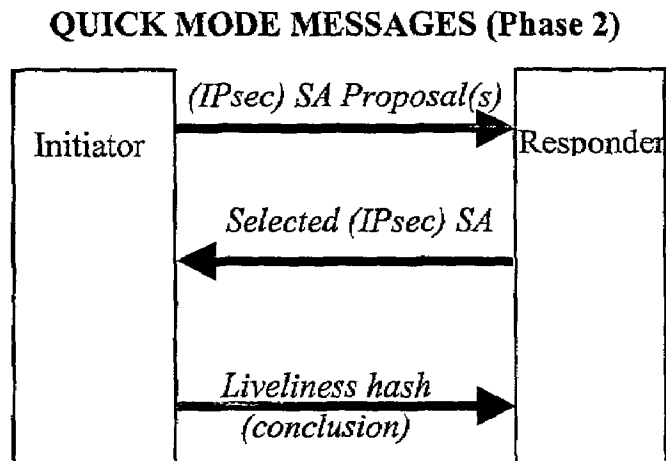


Figure 4

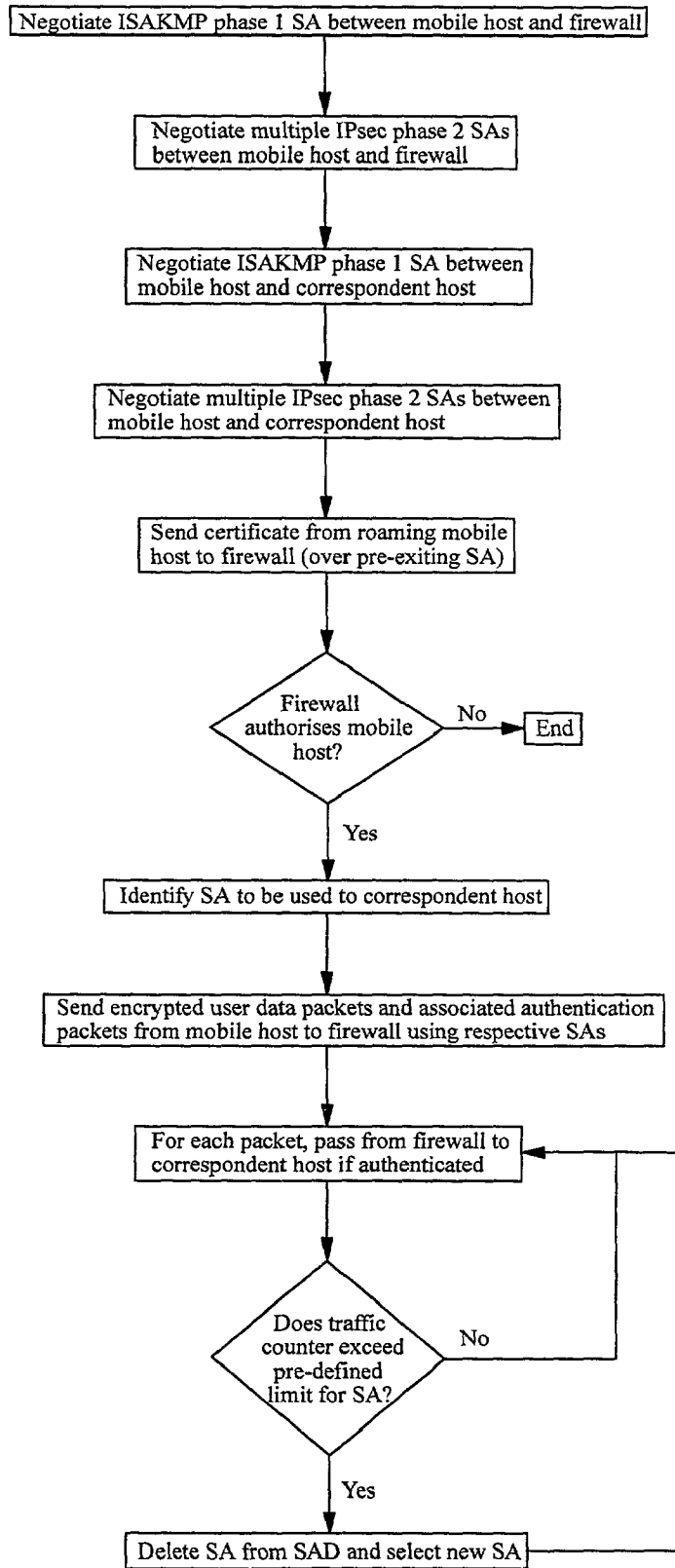


Figure 5

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.