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**Ahonen**

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(54) **VIRTUAL PRIVATE NETWORKS**

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(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)

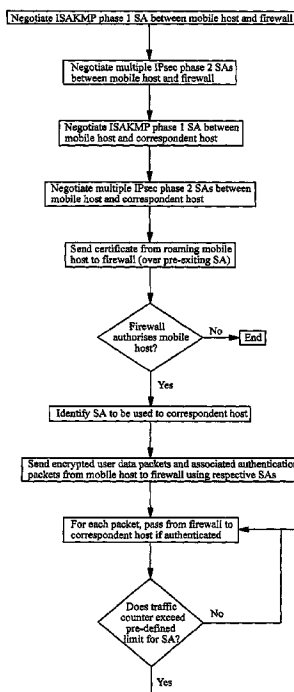
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(57) **ABSTRACT**

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

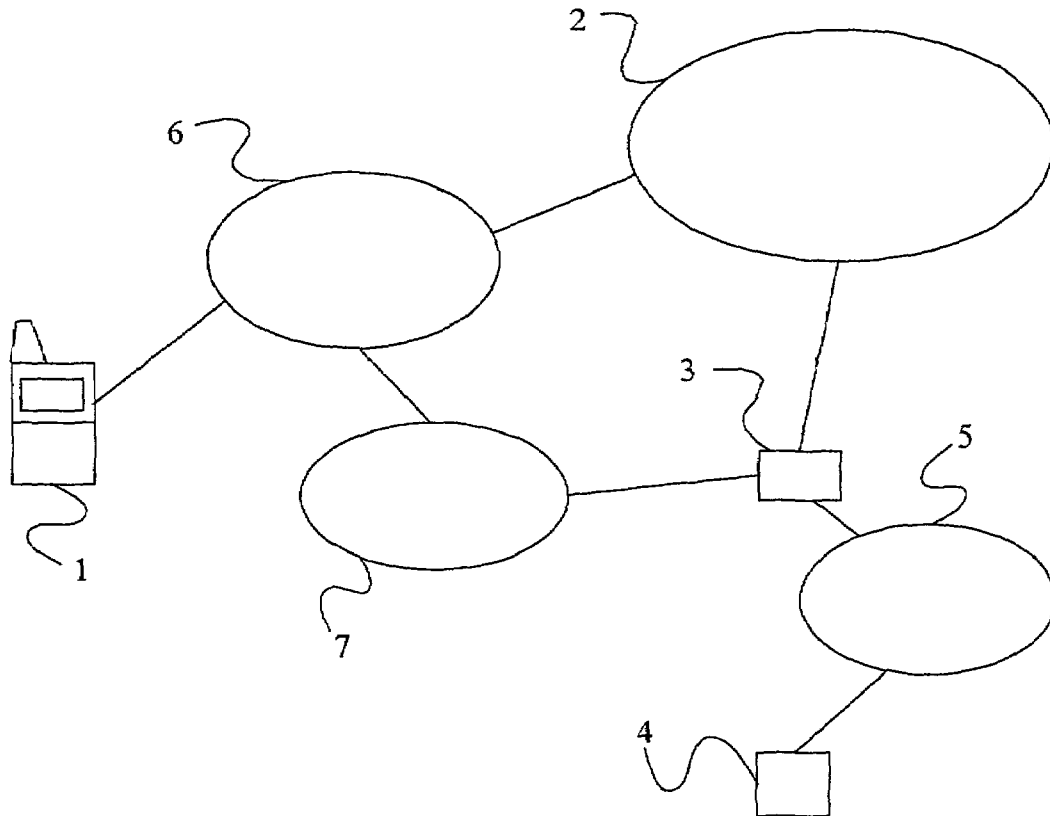


Figure 1

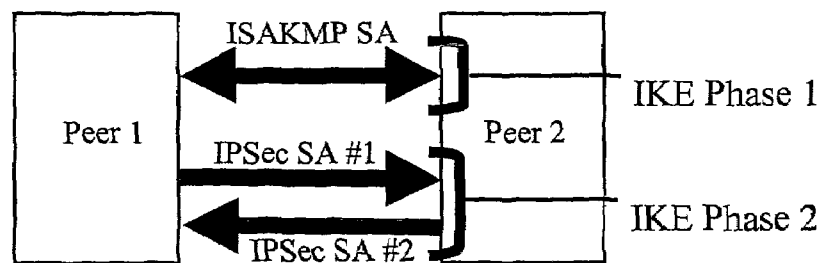


Figure 2

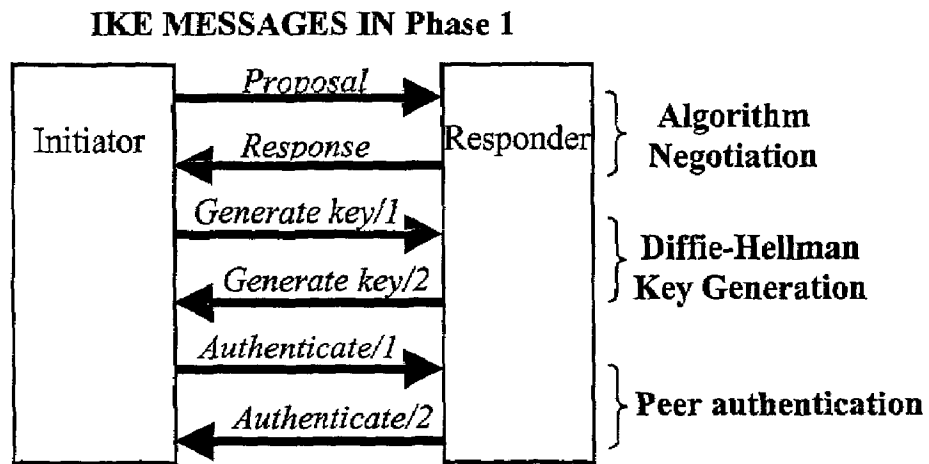


Figure 3

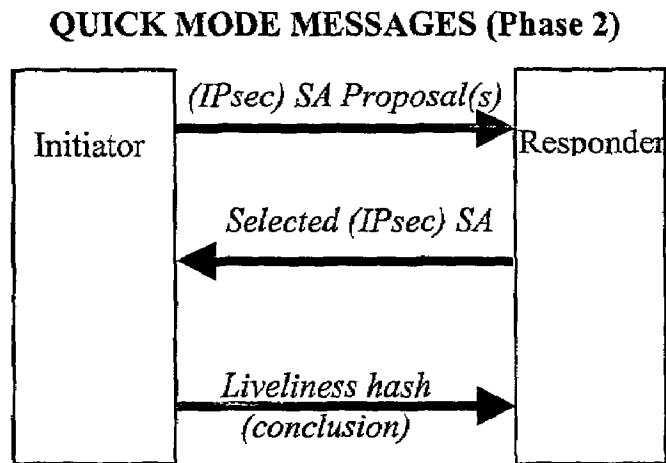


Figure 4

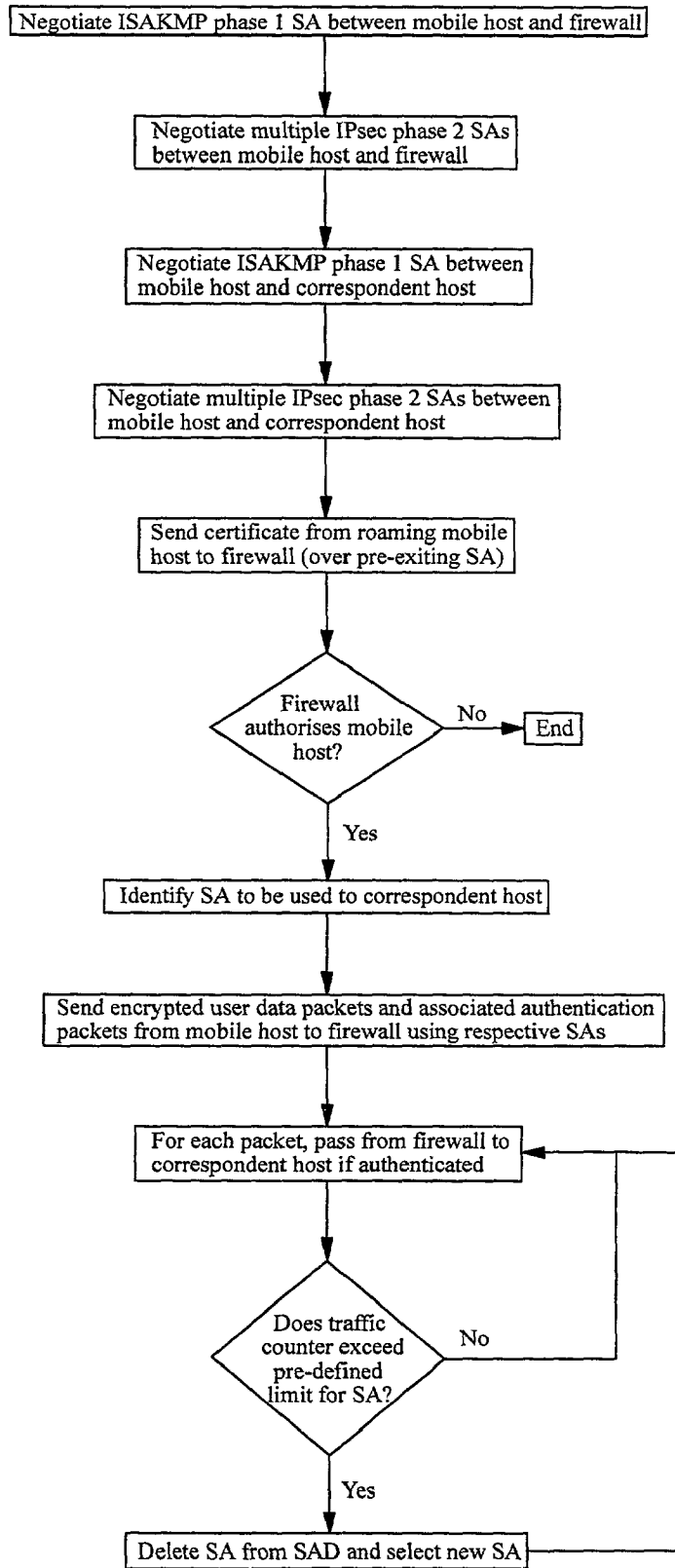


Figure 5

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