



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

(10) **Patent No.:** **US 6,496,867 B1**  
(45) **Date of Patent:** **Dec. 17, 2002**

(54) **SYSTEM AND METHOD TO NEGOTIATE PRIVATE NETWORK ADDRESSES FOR INITIATING TUNNELING ASSOCIATIONS THROUGH PRIVATE AND/OR PUBLIC NETWORKS**

6,381,646 B2 \* 4/2002 Zhang et al. .... 709/227  
6,400,722 B1 \* 6/2002 Chuah et al. .... 370/401

**OTHER PUBLICATIONS**

Lee et al., "The Next Generation of the Internet: Aspects of the Internet Protocol Version 6", IEEE Network, Jan./Feb. 1988, pp. 28-33.\*  
"Internet Engineering Task Force", Request for Comments 791, Internet Protocol, Sep. 1981, pp. 1 to 45.  
"Internet Engineering Task Force", Request for Comments 1853, IP in IP Tunneling, Oct. 1995, pp. 1 to 8.  
"Internet Engineering Task Force", Request for Comments 1701, Generic Routing Encapsulation (GRE), Oct. 1994, pp. 1 to 8.  
"Internet Engineering Task Force", Request for Comments 1241, A Scheme for an Internet Encapsulation Protocol, Jul. 1991, pp. 1 to 17.

(List continued on next page.)

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(\*) 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.: **09/384,120**

(22) Filed: **Aug. 27, 1999**

(51) **Int. Cl.**<sup>7</sup> ..... **G06F 15/16**; G06F 15/173

(52) **U.S. Cl.** ..... **709/245**; 709/227; 709/225

(58) **Field of Search** ..... 709/220, 222, 709/225, 226, 227, 228, 229, 245, 218, 217; 370/401, 349; 713/201

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

5,159,592 A	10/1992	Perkins	
5,227,778 A	7/1993	Vacon et al.	
5,550,984 A	8/1996	Gelb	
5,636,216 A	6/1997	Fox et al.	
5,708,655 A	1/1998	Toth et al.	
5,793,763 A	8/1998	Mayes et al.	
5,812,819 A	9/1998	Rodwin et al.	
5,867,660 A	2/1999	Schmidt et al.	
5,872,847 A	2/1999	Boyle et al.	
6,018,767 A *	1/2000	Fijolek et al.	709/218
6,236,652 B1 *	5/2001	Preston et al.	370/349
6,253,327 B1 *	6/2001	Zhang et al.	713/201
6,377,982 B1 *	4/2002	Rai et al.	709/217

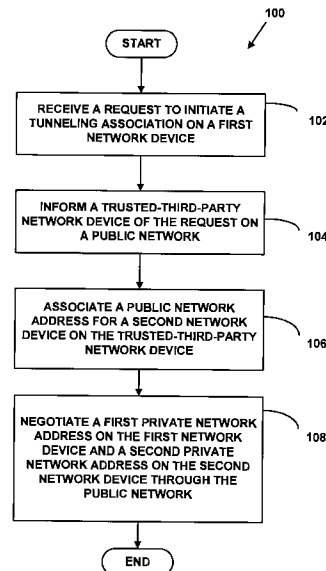
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(57) **ABSTRACT**

A method for initiating a tunneling association in a data network. The method includes negotiating private addresses, such as private Internet Protocol addresses, for the ends of the tunneling association. The negotiation is performed on a public network, such as the Internet, through a trusted-third-party without revealing the private addresses. The method provides for hiding the identity of the originating and terminating ends of the tunneling association from the other users of the public network. Hiding the identities may prevent interception of media flow between the ends of the tunneling association or eavesdropping on Voice-over-Internet-Protocol calls. The method increases the security of communication on the data network without imposing a computational burden on the devices in the data network.

**41 Claims, 17 Drawing Sheets**



## OTHER PUBLICATIONS

“ITU-T Recommendation H.323”, Series H: Audiovisual and Multimedia Systems (Systems and Terminal Equipment for audiovisual Services), Telecommunication Standardization Sector of ITU, International Telecommunication Union, Feb. 1998, 125 pages.

“ITU-T Recommendation H.255.0”, Series H: Audiovisual and Multimedia Systems (Transmission Multiplexing and Synchronization), Telecommunication Standardization Sector of ITU, International Telecommunication Union, Feb. 1998, 157 pages.

“Internet Engineering Task Force”, Request for Comments 2663, IP Network Address Translator (NAT) Terminology and Considerations, Aug. 1999, pp. 1 to 30.

“Internet Engineering Task Force”, Request for Comments 1631, The IP Network Address Translator (NAT), May 1994, pp. 1 to 10.

“Internet Engineering Task Force”, Internet Draft, Negotiated AddressReuse (NAR), May 1998, pp. 1 to 22.

“Internet Engineering Task Force”, Internet-Draft, NAT Bypass for End 2 End ‘Sensitive’ Applications, Jan. 1998, pp. 1 to 5.

“Internet Engineering Task Force”, Internet-Draft, Network Address Translation—Protocol Translation (NAT-PT), Jan. 1999, pp. 1 to 15.

“Internet Engineering Task Force”, Internet-Draft, IP Host Network Address (and Port) Translation, Nov. 1998, pp. 1 to 14.

“Internet Engineering Task Force”, Internet Draft, Distributed Network Address Translation, Oct. 1998, pp. 1 to 24.

“Internet Engineering Task Force”, Internet-Draft, DNS Extensions to Network Address Translators (DNS\_ALG), Oct. 1998, pp. 1 to 27.

“Internet Engineering Task Force”, Internet-Draft, Security for IP Network Address Translator (NAT) Domains, Nov. 1998, pp. 1 to 11.

“Internet Engineering Task Force”, Internet-Draft, The IP Network Address Translator (NAT), Feb. 1998, pp. 1 to 24.

“Internet Engineering Task Force”, Internet-Draft, Traditional IP Network Address Translator (Traditional NAT), Oct. 1998, pp. 1 to 17.

“Internet Engineering Task Force”, Internet-Draft, IP Network Address Translator (NAT) Terminology and Considerations, Oct. 1998, pp. 1 to 28.

“Internet Engineering Task Force”, Internet Draft, A Multihoming solution using NATs, Nov. 1998, pp. 1 to 32.

“Internet Engineering Task Force”, Internet Draft, Network Address Translation Issues with IPsec, Feb. 1998, pp. 1 to 12.

“Internet Engineering Task Force”, Internet Draft, IP Security, Nov. 1997, pp. 1 to 12.

“Internet Engineering Task Force”, Internet Draft, Architectural Implications of NAT, Oct. 1998, pp. 1 to 14.

“Internet Engineering Task Force”, Internet Draft, IP Relocation Through Twice Network Address Translators (RAT), Feb. 1999, pp. 1 to 20.

“Internet Engineering Task Force”, Internet Draft, Reverse Twice Network Address Translators (RAT), Dec. 1998, pp. 1 to 24.

“Internet Engineering Task Force”, Internet Draft, Implications of NATs on the TCP/IP Architecture, Feb. 1999, pp. 1 to 7.

“Internet Engineering Task Force”, Internet Draft, Mobile IP Extension for Private Internets Support, Feb. 1999, pp. 1 to 24.

\* cited by examiner

FIG. 1

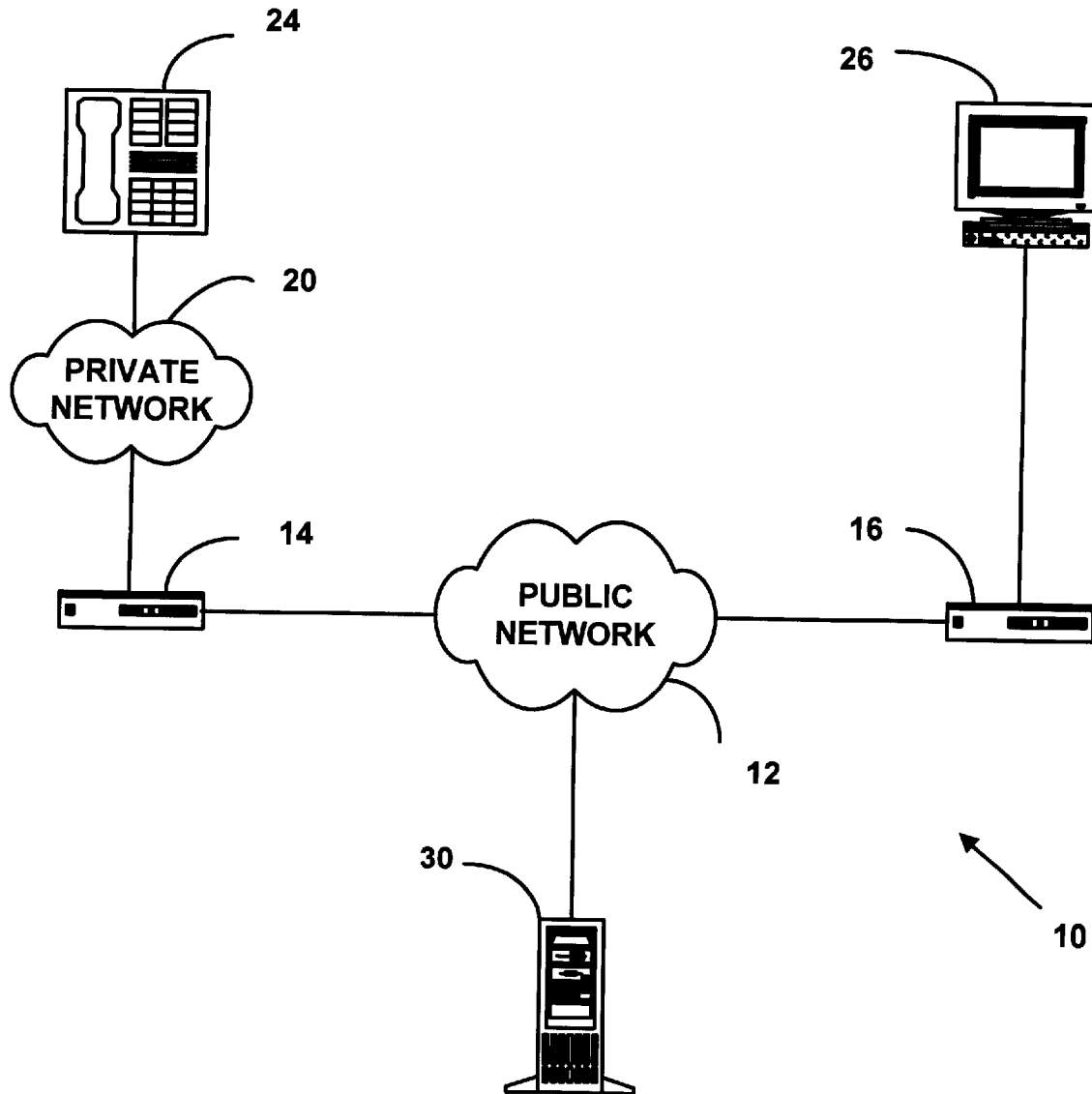
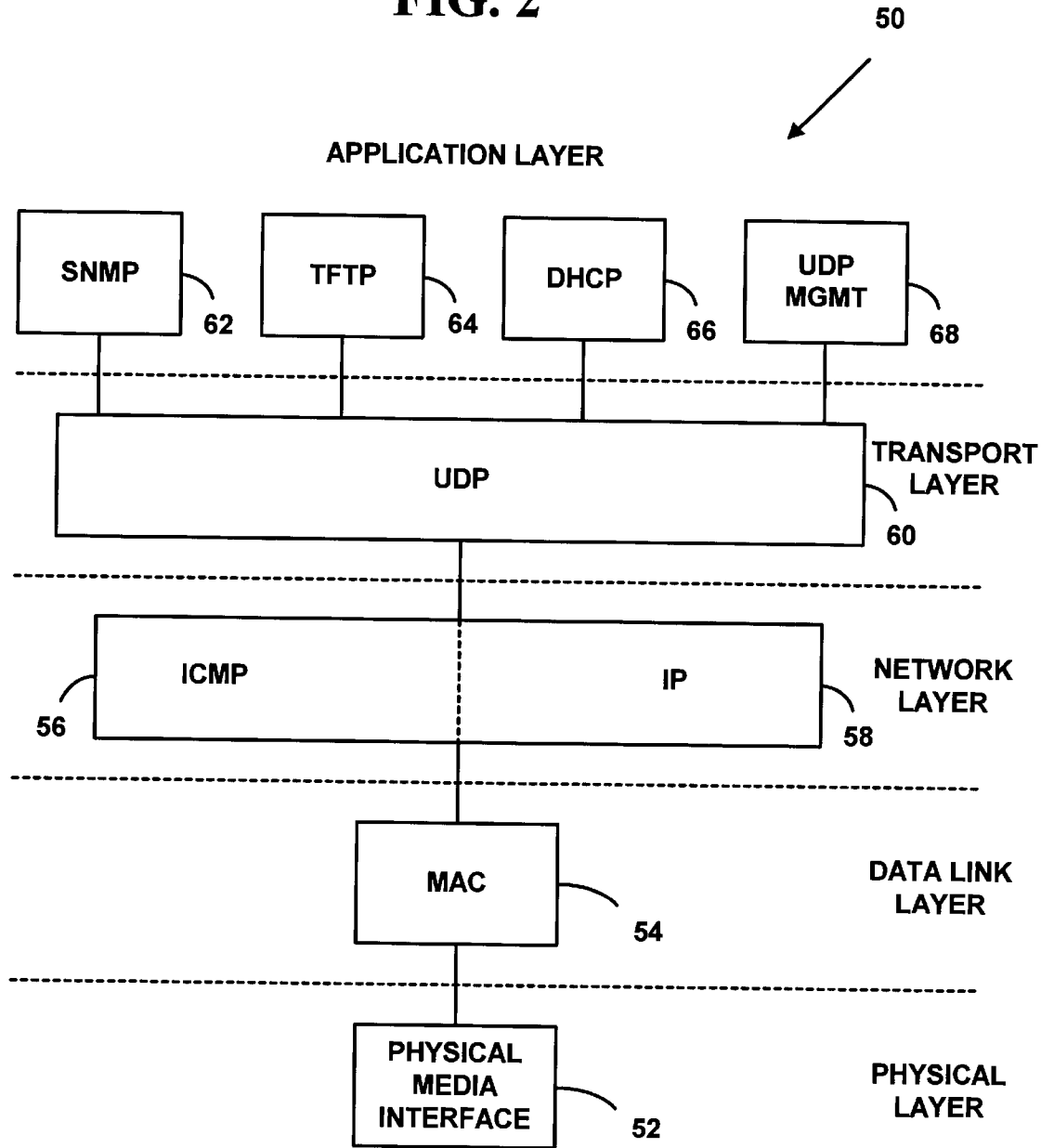
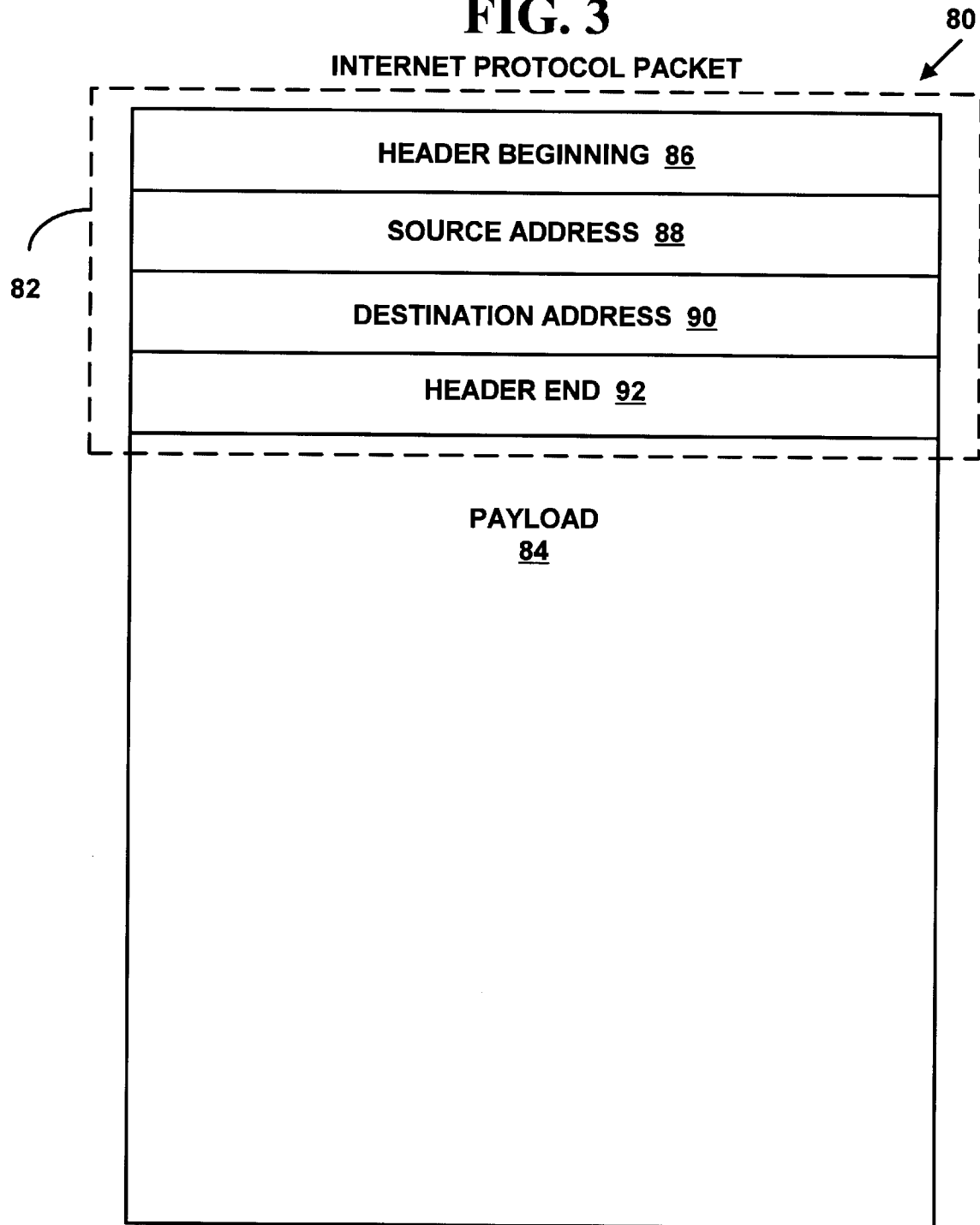


FIG. 2



**FIG. 3**



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