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PATENT

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TITLE OF THE INVENTION (280 characters maximum)

SYSTEMS AND METHODS FOR DYNAMICALLY CREATING SUBSCRIBER
TUNNELS BY A GATEWAY DEVICE IN A COMPUTER NETWORK

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ENCLOSED APPLICATION PARTS (check all that apply)

- Specification (Number of Pages 160, including Claims, Abstract and Attachments)
- Drawing(s) (Number of Sheets 6)
- Claims (Number of Claims 6)
(A complete provisional application does not require claims 37 C.F.R. § 1.51(a)(2).)
- Small Entity Statement
- Other (specify)

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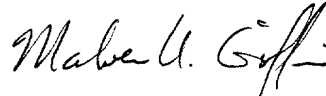
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- No.
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Respectfully submitted,



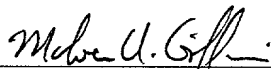
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**SYSTEMS AND METHODS FOR DYNAMICALLY CREATING SUBSCRIBER
TUNNELS BY A GATEWAY DEVICE IN A COMPUTER NETWORK**

FIELD OF THE INVENTION

5 The present invention relates generally to a universal subscriber gateway and, more particularly, a universal subscriber gateway that dynamically creates tunnels for subscribers.

BACKGROUND OF THE INVENTION

10 In order for a computer to function properly in a network environment, the computer must be appropriately configured. Among other things, this configuration process establishes the protocol and other parameters by which the computer transmits and receives data. In one common example, a plurality of computers are networked to create a local area network (LAN). In the LAN, each computer must be appropriately
15 configured in order to exchange data over the network. Since most networks are customized to meet a unique set of requirements, computers that are part of different networks are generally configured in different manners in order to appropriately communicate with their respective networks.

 While desktop computers generally remain a part of the same network for a
20 substantial period of time, laptops or other portable computers are specifically designed to be transportable. As such, portable computers are connected to different networks at different times depending upon the location of the computer. In a common example in which the portable computer serves as an employee's desktop computer, the portable computer is configured to communicate with their employer's network, i.e., the enterprise
25 network. When the employee travels, however, the portable computer may be connected to different networks that communicate in different manners. In this regard, the employee may connect the portable computer to the network maintained by an airport or by a hotel in order to access the enterprise network, the internet or some other on-line service. Since these other networks are configured somewhat differently, however, the
30 portable computer must also be reconfigured in order to properly communicate with these other networks. Typically, this configuration is performed by the user/subscriber each

time that the portable computer is connected to a different network. As will be apparent, this repeated reconfiguration of the portable computer is not only quite time consuming, but is also prone to errors. Further, the user/subscriber is often required to have specific software running on the portable computer in order to communicate with the enterprise network, though such communications may be in conflict with the network over which the portable computer must transfer data to reach the enterprise network.

As described by United States Patent Application No. 08/816,174 and United States Provisional Patent Application No. 60/111,497, a universal subscriber gateway device has been developed by Nomadix, Incorporated of Santa Monica, California. The contents of both of these applications are incorporated herein by reference. The gateway device serves as an interface connecting the user/subscriber to a number of networks or other online services. For example, the gateway device can serve as a gateway to the Internet, the enterprise network, or other networks and/or on-line services. In addition to serving as a gateway, the gateway device automatically configures a computer to communicate with the new network in a manner that is transparent to the user/subscriber. In this regard, the gateway device will download the necessary protocols and other configuration parameters to the computer without any intervention by the user/subscriber and without loading any additional software on the user/subscriber's computer. Once the gateway device has appropriately configured the user/subscriber's computer, the computer can appropriately communicate via the new network, such as the network at a hotel or at an airport, in order to access other networks, such as the enterprise network, or other online services, such as the internet.

The computer user/subscriber, and more specifically the remote or laptop user, benefits from being able to access a myriad of computer networks without having to undergo the time-consuming and all-too-often daunting task of reconfiguring their host in accordance with network specific configurations. In this fashion, the gateway device is capable of providing more efficient network access to the user/subscriber. A gateway device is also instrumental in providing the user/subscriber broadband network access that can be tailored to the user/subscriber's needs. In many instances the remote user/subscriber is concerned with being able to acquire network access to their home or enterprise network, which are most typically protected by a firewall. The firewall

prevents unauthorized access to the enterprise network through a general internet connection, such as through an internet service provider. While some access is possible from outside the firewall, such as inbound electronic mail, corporate resources such as network databases and application programs are generally not made accessible to computers located outside the firewall unless the user/subscriber has an active account with a valid username and password combination.

However, as appreciated by those of ordinary skill in the art, different network protocols may be used within the Internet infrastructure and within an enterprise networks. For example, an Internet Protocol (IP) is typically used at the network protocol level to send data through the Internet. An enterprise network, on the other hand, may use any one of a variety of network protocols including IP, IPX, Appletalk, etc. When a remote user attempts to access the enterprise network through the Internet, typically through an Internet service provider, the remote user is dynamically assigned an IP address. Thus, the remote user may be denied access by the firewall of the enterprise network because the IP address assigned by the Internet service provider is not one of the authorized addresses in the corporate network. In addition, the remote user may be forced by the Internet service provider to use an IP protocol incompatible with that of the enterprise network. If the IP protocol and the enterprise network protocol are incompatible, then the remote user may be prevented from accessing resources on the enterprise network.

In response to these and other problems associated with granting remote access to an enterprise network over the internet, several techniques have been developed for creating virtual private networks (VPN), wherein a remote node of a single network is interconnected using a publicly accessible communication medium. For example, there are a number of systems that enable user/subscribers to create virtual networks using the Internet as a medium for transporting data between the enterprise network and a remote user. These systems often times include encryption and other security mechanisms to ensure that only authorized users can access the virtual network, and that the data cannot be intercepted.

The common technique for constructing a VPN is by tunneling. Tunneling works by encapsulating or wrapping a packet or a message from one network protocol in the

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