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Wilson

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(54) **SATELLITE DISTRIBUTED HIGH SPEED INTERNET ACCESS**

6,414,635 B1 7/2002 Stewart et al.

6,522,865 B1 2/2003 Offen

6,556,828 B1 4/2003 Carlin et al.

(75) Inventor: **W. David Wilson**, Cincinnati, OH (US)

(73) Assignee: **System Services, Inc.**, Batavia, OH (US)

(Continued)

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FOREIGN PATENT DOCUMENTS

EP 1 024 610 A2 2/2000

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OTHER PUBLICATIONS

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Unknown, VP1200/VP1210 Vivato Indoor & Outdoor Wi-Fi Base Stations, copyright 2004, Vivato, Inc., San Francisco, CA U.S.A.

Related U.S. Application Data

Primary Examiner—CongVan Tran

(74) *Attorney, Agent, or Firm*—Taft Stettinius & Hollister LLP

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(57) **ABSTRACT**

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(58) **Field of Classification Search** 370/316, 370/474, 475, 352, 321, 390, 432, 351, 355, 370/356; 455/13.3, 12.1, 428, 445; 714/752, 714/791, 794, 800

See application file for complete search history.

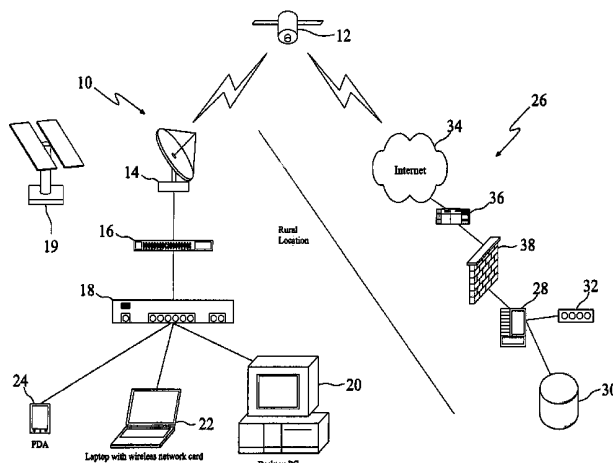
(56) **References Cited**

U.S. PATENT DOCUMENTS

5,081,703 A 1/1992 Lee
5,678,172 A 10/1997 Dinkins
6,035,178 A 3/2000 Chennakeshu et al.
6,072,768 A 6/2000 Wiedeman et al.
6,212,550 B1 4/2001 Segur
6,243,450 B1 6/2001 Jansen et al.

A satellite distributed high-speed Internet “Hotspot” enables wireless and hardwired, satellite distributed Internet access for anyone with a PC or other web-ready device (wireless ready or cabled) and a valid credit card or prepaid coupon. The Hotspots can be located anywhere there is 120 volt electricity available or access to the sun for a solar panel and enough space to house the transceiver and mount a satellite dish. Upon connecting to the Hotspot, the user is directed to a remote server for log-on and validation of the user’s account. During validation, the remote server verifies that prepaid access time remains in the user’s account. Upon validation, the user may browse the web until the prepaid access time runs out. Alternatively, an account may be set up on a “continue until canceled” basis, wherein the user’s credit card will be charged for the amount of time used during each session.

32 Claims, 4 Drawing Sheets



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U.S. PATENT DOCUMENTS

6,584,083 B1	6/2003	Toporek et al.	2002/0006116 A1	1/2002	Burkhart
6,591,084 B1	7/2003	Chuprun et al.	2003/0046242 A1	3/2003	Himmel et al.
6,611,821 B2	8/2003	Stahl et al.	2003/0149601 A1 *	8/2003	Cabral 705/5
6,894,990 B1 *	5/2005	Agarwal et al. 370/321	2003/0181162 A1 *	9/2003	Matula 455/13.3
7,216,283 B2 *	5/2007	Shen et al. 714/752	2004/0255221 A1 *	12/2004	Shen et al. 714/752
2001/0010047 A1	7/2001	Shen et al.	2005/0135422 A1 *	6/2005	Yeh 370/474
2001/0026537 A1	10/2001	Massey	2007/0115942 A1 *	5/2007	Money et al. 370/352

* cited by examiner

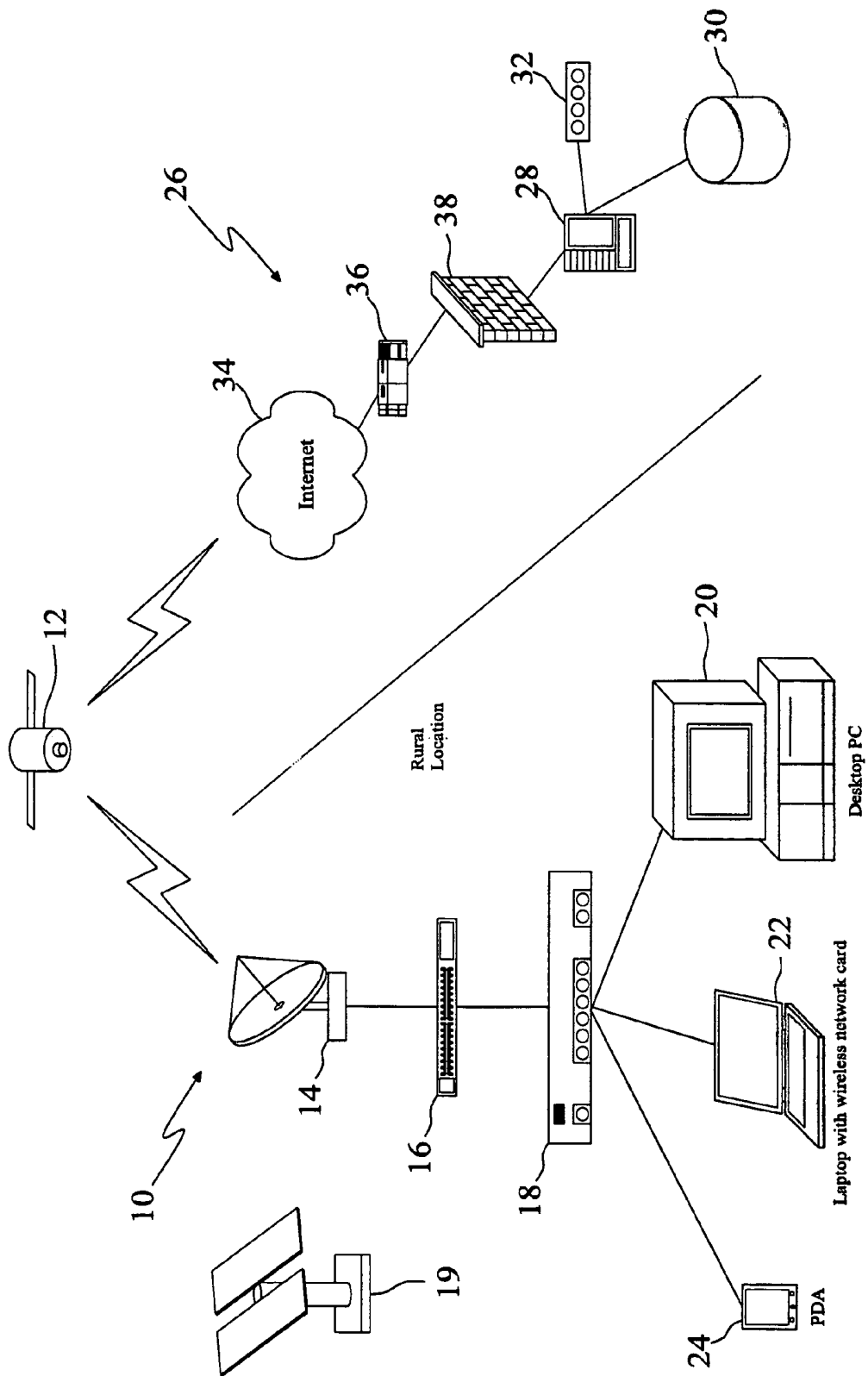


FIG.1

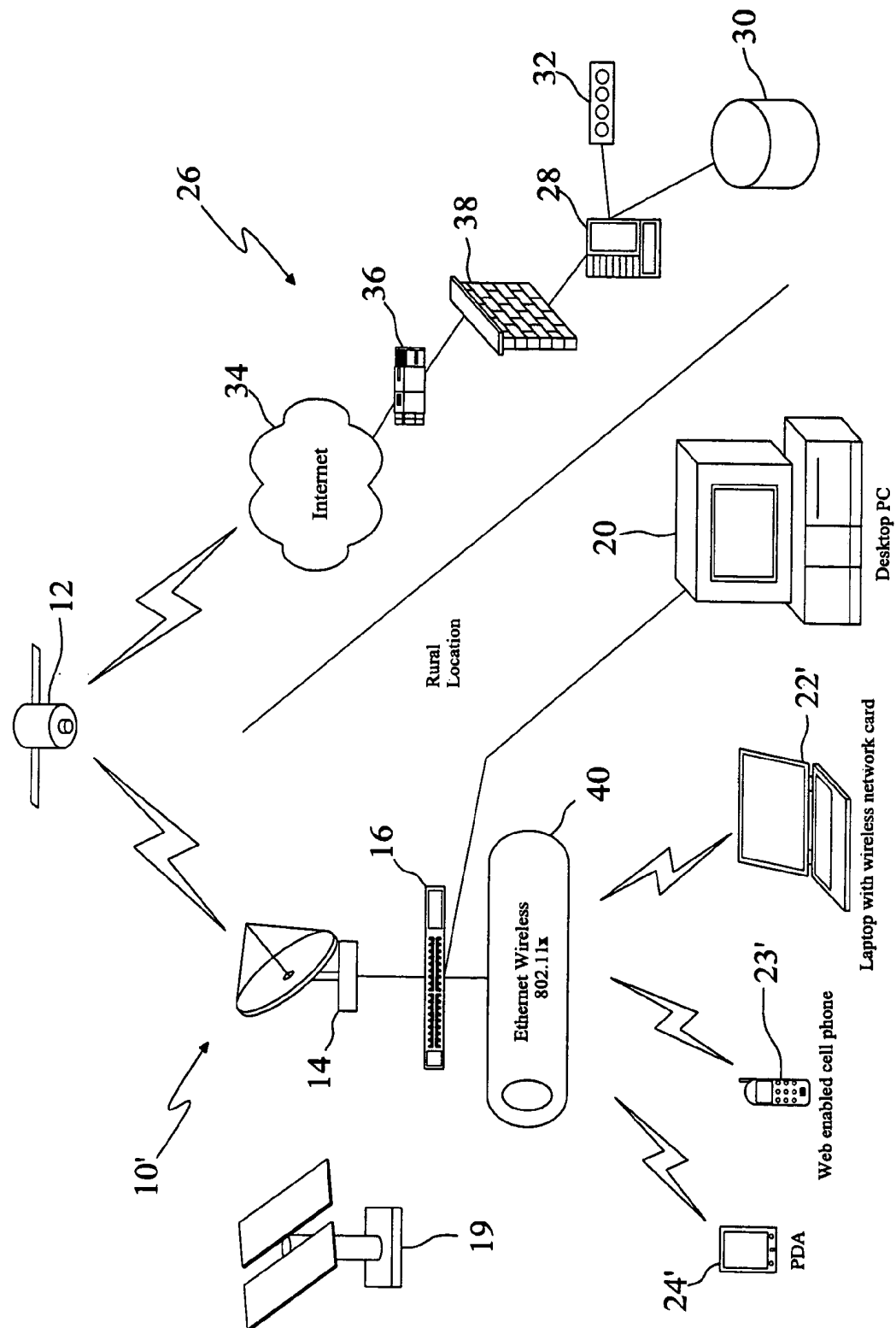


FIG. 2

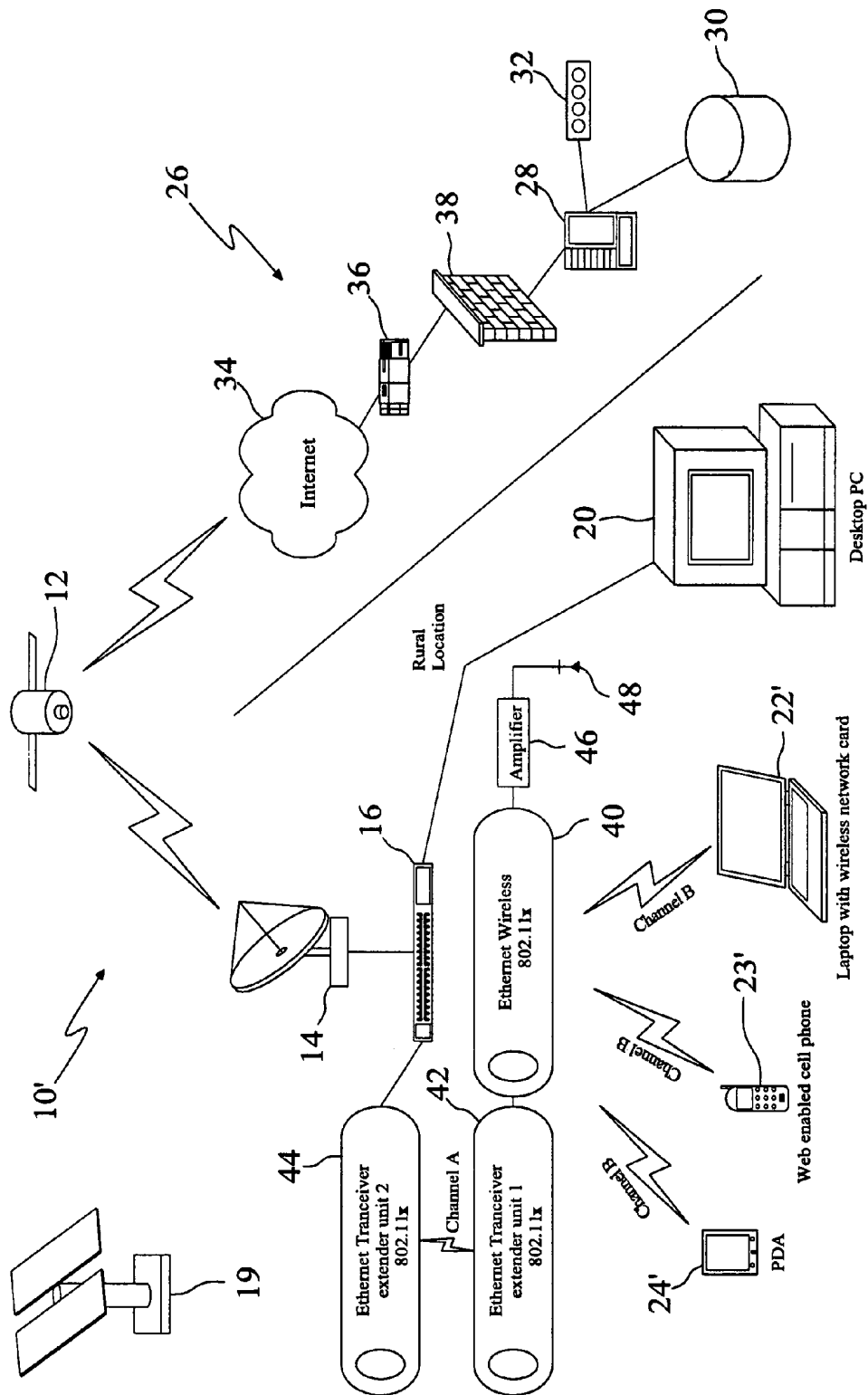
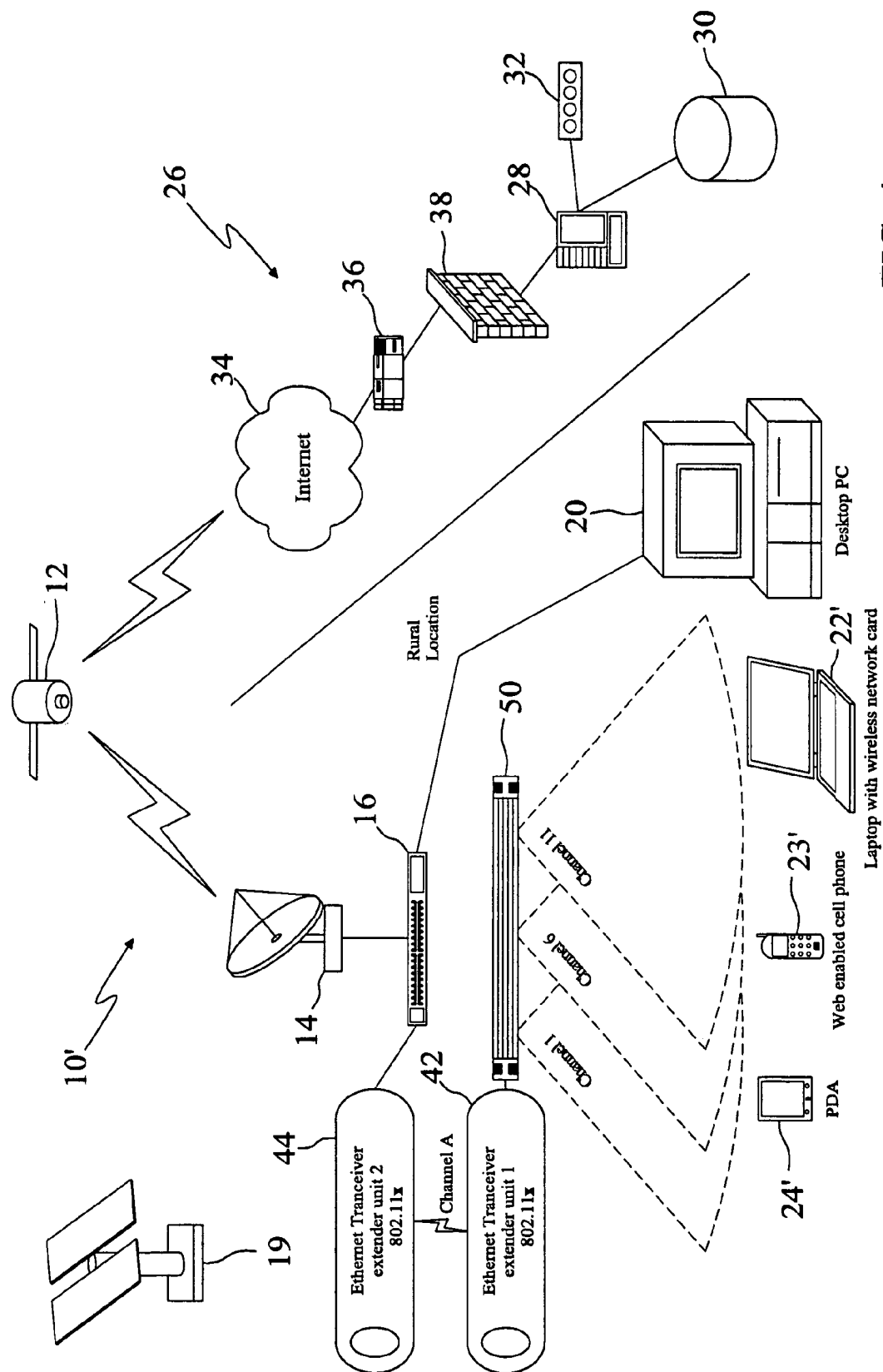


FIG. 3



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SATELLITE DISTRIBUTED HIGH SPEED INTERNET ACCESS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority of provisional application Ser. No. 60/507,022, filed Sep. 29, 2003, provisional application Ser. No. 60/517,044, filed Nov. 4, 2003, and provisional application Ser. No. 60/523,061, filed Nov. 18, 2003.

BACKGROUND

The continued development of high speed wireless Internet connections permitting the transceiving of real time information has greatly increased the volume and efficiency of work, both commercial and personal, that can be accomplished. This efficiency saves both time and money for its users and is quickly becoming a necessary part of our overall telecommunications infrastructure.

This efficiency however, is not easily accessible unless one has a wireless ready PC, and their own satellite dish and transceiver or is located in or near a city with providers who sell access subscriptions to their equipment. Anyone in transit, such as salesmen, executives, truckers and private individuals has virtually no access while traveling, especially in rural areas. Even in populated areas, one must find a hard-wired commercial access point to get to the Internet. This is time consuming, costly and severely limits the benefits of the Internet in most areas of the country.

SUMMARY

The present invention provides rural "Hotspots" (such as Wi-Fi access, for example) to enable wireless and hard-wired, satellite distributed Internet access for anyone with a PC or other web-ready device (wireless ready or cabled) and a valid credit card. The "Hotspots" can be located anywhere there is 120 volt electricity available or access to the sun for a solar panel and enough space to house the transceiver and mount a satellite dish. These "Hotspots" would best be located in areas that experience high volume transient traffic, such as rest areas, restaurants, truck stops, rural hotels, conference centers, motels and state park lodges. A Hotspot may allow access to users with cabled devices, wireless devices, or both.

Accordingly, it is a first aspect of the present invention to provide a method for establishing and operating an Internet Hotspot that includes the steps of: providing a satellite dish communicating with the Internet via data link with a satellite; providing at least one router operatively coupled to the satellite dish; installing the satellite dish and router in a rural location, which experiences a relatively high volume of transient traffic; and allowing a user to access the Internet at the rural location by connecting a user's web-ready device to the Internet via the router and satellite dish. In a more detailed embodiment, the router includes at least one jack to which a web-ready device may be connected via a cable. In a further detailed embodiment the method further includes a step of providing a subscriber access unit operatively coupled between the satellite dish and the router, where a user opens a subscription account via a remote server before the user is enabled to access other websites. Alternately, a user purchases a quantity of subscription-based access time using a credit card via the remote server before the user is enabled to access other websites. The subscription-based access time may be purchased in a definite quantity, or the

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subscription-based access time may be purchased on a "continued until canceled" basis. The credit card billing may be performed by an existing merchant service and the existing merchant service may be reciprocal with other Internet subscription providers nationwide. Optionally, a user's account status is first authenticated by the remote server each time the user establishes a connection with the Hotspot before the user is enabled to access other websites. This authentication of the user's account is performed by a subscriber merchant service.

In an alternate detailed embodiment of the first aspect of the present invention, the connecting step includes a step of communicating the user's web-ready device to the router via a wireless connection. Further, a plurality of users can simultaneously access the Internet by communicating wireless web-ready devices with the router. Further, the method may include a step of operatively coupling a subscriber access between the satellite dish and the router, where a user opens a subscription account via a remote server before the user is enabled to access other websites. With this, a user may purchase a quantity of subscription-based access time using a credit card via the remote server before the user is enabled to access other websites. The subscription-based access time may be purchased in a definite quantity, or the subscription-based access time may be purchased on a "continued until canceled" basis. The credit card billing may be performed by an existing merchant service and the existing merchant service may reciprocate with other Internet subscription providers nationwide. Optionally, a user's account status is first authenticated by the remote server each time the user establishes a connection with the Hotspot before the user is enabled to access other websites. With this the authentication of the user's account is performed by a subscriber merchant service. Alternatively, the method further includes the steps of operatively coupling at least one wireless transceiver extender unit between the satellite dish and the router to extend the range of Internet access at the rural location.

The method of the first aspect may further include the steps of operatively coupling at least one wireless transceiver extender unit between the satellite dish and the router to extend the range of Internet access at the rural location.

It is a second aspect of the present invention to provide a method for providing satellite-distributed high-speed Internet access that includes the steps of: providing a router to which a web-ready device may be connected via at least one of a cable and a wireless data link; assigning a dynamic IP address to the web-ready device that has been connected to the router; forwarding by the router of the user's connection to a subscriber access unit; retrieving from memory by the subscriber access unit of the static IP address of a remote server; forwarding the user's connection to a satellite dish; establishing communication by the satellite dish with a satellite, which is enabled to send and receive data over the Internet; establishing a connection over the Internet with the remote server, whose interface is viewed by the user as a webpage on the web-ready device; prompting by the remote server of the user for a username and password; accessing a database by the remote server to verify the username and password; prompting the user to create a new account, if the username and password are invalid or the user's account has zero time remaining; charging the user's credit card, if a new account is created; allowing the user to access other websites, until the user's account has zero time remaining or the user logs off the network; and updating the user's account in the database by the remote server to subtract the amount of time used during the just-completed session when the user

logs off the network. In a detailed embodiment the method further includes the step of installing the router and the satellite dish in a rural location experiencing a relatively high volume of transient traffic.

It is a third aspect of the present invention to provide an Internet Hotspot that includes: a satellite dish installed in a remote location experiencing a relatively high volume of transient traffic, and the satellite dish communicating with the Internet via data link with a satellite; at least one router operatively coupled to the satellite dish and installed in the remote location, where a user may access the Internet at the remote location by establishing a data connection with the router via a user's web-ready device. In a more detailed embodiment, the data connection is a wireless data connection. In another detailed embodiment, a plurality of users may access the Internet simultaneously at the remote location by respectively establishing data connections with the router via their web-ready devices. The data connections may be wired and/or wireless connections. The Hotspot may also include a subscriber access unit operatively coupled between the satellite dish and the router and/or at least one wireless extender transceiver wirelessly, operatively coupled between the router and the satellite dish.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows an exemplary embodiment of the invention with a cabled router providing access to the Hotspot for cabled users.

FIG. 2 shows an exemplary embodiment of the invention with an Ethernet wireless access point (wireless router) providing access to the Hotspot for wireless users.

FIG. 3 shows an exemplary embodiment of the invention with wireless transceiver extender units, allowing the access point (Ethernet wireless access point or router) to be located remotely from the remainder of the Hotspot apparatus.

FIG. 4 shows an exemplary embodiment of the invention with a Vivato outdoor switch used as the wireless access point, providing long range operation.

DETAILED DESCRIPTION

The present invention provides rural "Hotspots" (such as Wi-Fi access, for example) to enable wireless and hard-wired, satellite distributed Internet access for anyone with a PC or other web-ready device (wireless ready or cabled) and a valid credit card or prepaid coupon. The "Hotspots" can be located anywhere there is 120 volt electricity available, either from an electric utility service or from an on-site power source such as a solar panel with a bridged access point, and enough space to house the transceiver and mount a satellite dish. These "Hotspots" would best be located in areas that experience high volume transient traffic, such as rest area, restaurants, truck stops, rural hotels, conference centers, motels and state park lodges. Since the signal is always "live," all a potential wireless user would have to do is to move within the transceiver's field (an approximately radius of 0.2 to 0.4 miles when an amplifier used, in an exemplary embodiment) and turn on his/her wireless ready PC to know the service was available. Alternatively, for those with cabled web-ready devices, signage can announce the availability of access to internal network ports. Because these internal network ports, if available, would always be "live," all a potential user would have to do is to plug in a web-ready device and logon. Several transceivers/routers (providing cabled and/or wireless access) can be installed to provide coverage for large or multi-floor sites.

In the exemplary embodiment, when a client attempts to access the Internet, they are routed through the "Subscriber Access Unit." This unit, utilizing radius client, automatically forces the user to first logon via satellite through a third party commercial site that houses the radius server. Internet access is granted upon activation of a valid credit card, or existing valid account. Access time is sold by the hour, day, week, or month, or as a "continued until canceled" subscription, and the validation and billing are done by an existing merchant service. Time purchased is durable until used within the purchased time unit (or one day, if purchased by the hour or day—whichever is less) and credits and accounts are reciprocal with other subscription providers nation-wide. Invalid credit cards or expired accounts are not permitted beyond the logon screen. Detailed transaction records are provided by the existing telecommunications infrastructure.

An exemplary embodiment of the system providing access to cabled users is shown in FIG. 1. The Hotspot 10 comprises all the equipment installed at the rural location that is necessary to provide Internet access via satellite 12. The equipment installed at the rural location includes a satellite dish 14 for communicating with the satellite, a subscriber access unit 16 operatively coupled to the satellite dish 14 and a router 18 operatively coupled to the subscriber access unit 18. As used herein, the term "operatively coupled" refers to any configuration in which two or more devices interact in any way, by wired or wireless connections. Some or all of the components of the Hotspot 10 may be powered by a solar panel 19. User web-enabled devices, such as PC 20, laptop computer 22 and PDA 24 are directly coupled to the router via wired connections (i.e., cables). The user can access the Hotspot using his own web-ready device to acquire a dynamic IP address from one of many wired jacks located all over the router 18 using DHCP (Dynamic Host Configuration Protocol). The router 18 then forwards the user access to the subscriber access unit 16. Each router 18 can allow 254 concurrent users to gain access to the Internet.

At a central location 26, a radius server 28 includes a database 30 and modem 32 operatively coupled thereto. The radius server 28 is operatively coupled to the Internet 34 through an Internet server 36 and is protected by a firewall 38. The satellite 12 communicates to the radius server over the internet (via another satellite dish and associated computer—not shown).

The subscriber access unit 16 has the static IP address 36 of the Radius server 28 pre-programmed. It then uses Radius client software to send the user directly to the satellite dish 14. The user's connection then passes to the satellite 12 then through the Internet 34 where, using the Radius server's IP address 36, it finds the Radius server 28. The Static IP address 36 routes the traffic through the firewall 38.

Upon establishing a user connection to the Radius server 28, the Radius server is viewed as a webpage in SSL (Secure Socket Layer) by the user. The user is prompted for a username and password. The Radius server 28 uses the database 30 to validate username and password and check that the number of minutes left in the user's account is greater than 0. If the user cannot submit a valid username and password for an account that has more than zero minutes left, the user will be prompted to create a new account. Upon creating an account, the Radius server 28 will charge the credit card furnished by the user using the modem 32 or Internet 34.

Upon validation by database 30, the user can browse the Internet 34 until the minutes are used up or the user is logged

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off the network. When the user logs off, the database 30 will be updated, subtracting the minutes used during the just-completed session.

Another exemplary embodiment 10' of the system providing access to wireless users is shown in FIG. 2. The basic system architecture and operation are substantially the same as described above. The main difference in the wireless access Hotspot of FIG. 2 is that the cabled router 18 of FIG. 1 has been replaced by an Ethernet wireless access point or router 40. The user can access the Hotspot using his own wireless web-ready device, such as a personal digital assistant (PDA) 24', web-enabled cell phone 23', or laptop computer with wireless network card 22' to acquire a dynamic IP address from the Ethernet wireless access point 40 using DHCP (Dynamic Host Configuration Protocol). The Ethernet wireless access point 40 then forwards the user access to the subscriber access unit 16. Each Ethernet wireless access point 40 can allow 254 concurrent users to gain access to the Internet 34. The Ethernet wireless access point 40 can employ a security protocol of a type that is known to persons skilled in the art, such as the 802.11b security protocol, or any subsequent or future versions of the 802.11 standard. Such security protocols may be generally designated as 802.11x, where x can be any version or implementation of the 802.11 standard.

From the subscriber access unit 16, a connection is established with the Radius server 28 in the substantially same manner as described above. The Radius server prompts the user to log in and verifies the user's password and account status, including the amount of time remaining, in substantially the same manner as described above.

In another exemplary embodiment 10", as illustrated in FIG. 3, the Ethernet wireless access point 40 may be separated from, and communicate wirelessly with, the subscriber access unit 16. The Ethernet wireless access point 40 is connected by wire to wireless transceiver extender unit "1" (42). Utilizing a different channel from the Ethernet wireless access point 40, the wireless transceiver extender unit "1" (42) transmits and receives wirelessly to and from wireless transceiver extender unit "2" (44). Wireless transceiver extender unit "2" (44) will run directly by wire to the subscriber access unit 16. This use of wireless transceiver extender units 42, 44 allows the Ethernet wireless access point 40 to be placed further away, extending the effective range of the hotspot. The wireless transceiver extender units 42, 44 can employ a security protocol of the 802.11x form, as explained above, where x can be any version or implementation of the 802.11 standard. From the subscriber access unit 16, a connection is established with the Radius server 28 in substantially the same manner as described above. The Radius server 28 prompts the user to log in and verifies the user's password and account status, including the amount of time remaining, in substantially the same manner as described above.

This wireless extension embodiment may also be practiced with a cabled router connected to wireless transceiver extender unit "1" (42) in place of Ethernet wireless access point 40, thus allowing cabled access with the router located remotely from the subscriber access unit 16.

In the exemplary embodiments 10' and 10" of the system shown in FIGS. 2 and 3, respectively, the Ethernet wireless access point can be operatively coupled to an amplifier 46 and antenna 48. The antenna 48 can be an omni-directional antenna or a directional antenna such as a yagi antenna. The amplifier in conjunction with the antenna can increase the DBi gain to 28 to 35 based on the DBi gain for the antenna selected. The total output of the antenna will not exceed the

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36 DBi limited by current Federal Communications Commission regulations. Additional wireless access points or antennas can be added to widen the coverage area as needed, provided that the wireless beams of overlapping signal coverage will need to use different channels to prevent interference.

Alternatively, as shown in FIG. 4, the wireless Ethernet access point can be replaced with a Vivato® outdoor switch 50 (such as the VP1210 available from Vivato, Inc), which includes an amplifier and antenna. The Vivato® outdoor switch features an electronically controlled phased array antenna that can be used to create high gain beams of Wi-Fi on three channels simultaneously. In order to prevent interference, three nonadjacent channels (e.g., channels 1, 6, and 11, as shown in FIG. 4) can be selected from the eleven channels supported by the 802.11x communication protocol. This embodiment can provide Wi-Fi access for many kilometers along a line of sight from the antenna, providing three simultaneous beams of Wi-Fi throughout the coverage area with extended range.

Having described the invention with reference to exemplary embodiments, it is to be understood that the invention is defined by the claims and it not intended that any limitations or elements describing the exemplary embodiment set forth herein are to be incorporated into the meanings of the claims unless such limitations or elements are explicitly listed in the claims. Likewise, it is to be understood that it is not necessary to meet any or all of the identified advantages or objects of the invention disclosed herein in order to fall within the scope of any claims, since the invention is defined by the claims and since inherent and/or unforeseen advantages of the present invention may exist even though they may not have been explicitly discussed herein.

What is claimed is:

1. A method for establishing and operating an Internet Hotspot comprising the steps of:

- providing a satellite dish communicating with the Internet via data link with a satellite;
- providing at least one router operatively coupled to the satellite dish;
- providing a subscriber access unit operatively coupled between the satellite dish and the router;
- installing the satellite dish, router and subscriber access unit in a rural location, the rural location experiencing a relatively high volume of transient traffic;
- connecting a web-ready device to the router;
- creating by a user a subscription account, the subscription account being created on a remote server and enabling the user to access the Internet;
- navigating a browser operating on the web-ready device to a subscriber access website, the subscriber access website being capable of verifying that the subscription account is valid;
- verifying that the subscription account is valid via the subscriber access website to allow access to the Internet; and
- allowing a user to access the Internet at the rural location.

2. The method of claim 1, wherein the router includes at least one jack to which a web-ready device may be connected via a wired connection.

3. The method of claim 1, wherein the step of creating a subscription account includes creating the subscription account using a prepaid coupon via the remote server.

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4. The method of claim 1, wherein the step of creating a subscription account includes purchasing by the user a quantity of subscription-based access time using a credit card via the remote server.

5. The method of claim 4, wherein the subscription-based access time may be purchased in a definite quantity.

6. The method of claim 4, wherein the subscription-based access time may be purchased on a "continued until canceled" basis.

7. The method of claim 4, wherein the credit card billing is performed by an existing merchant service.

8. The method of claim 7, wherein the existing merchant service is reciprocal with other Internet subscription providers nationwide.

9. The method of claim 1, wherein the verifying step is performed by a subscriber merchant service.

10. The method of claim 1, wherein the connecting step includes connecting the web-ready device to the router via a wireless connection.

11. The method of claim 10, wherein a plurality of users can simultaneously connect web-ready devices to the router.

12. The method of claim 10, further comprising the steps of operatively coupling at least one wireless transceiver extender unit between the satellite dish and the router to extend the range of Internet access at the rural location.

13. The method of claim 1, further comprising an amplifier and antenna operatively coupled to the router.

14. The method of claim 10, wherein the wireless connection is one of an 802.11a wireless area network, an 802.11b wireless area network, an 802.11g wireless area network, and an 802.11n in wireless area network.

15. A method for providing satellite-distributed high-speed Internet access, comprising the steps of:

providing a router to which a web-ready device may be connected via at least one of a cable or a wireless data link;

assigning a dynamic IP address to the web-ready device that has been connected to the router;

forwarding by the router of the user's connection to a subscriber access unit;

retrieving from memory by the subscriber access unit of the static IP address of a remote server;

forwarding the user's connection to a satellite dish;

establishing communication by the satellite dish with a satellite, which is enabled to send and receive data over the Internet;

establishing a connection over the Internet with the remote server, whose interface is viewed by the user as a webpage on the web-ready device;

prompting by the remote server of the user for a username and password;

accessing a database by the remote server to verify the username and password;

prompting the user to create a new account, if the username and password are invalid or the user's account has zero time remaining;

allowing the user to access other websites, until the user's account has zero time remaining or the user logs off the network; and

updating the user's account in the database by the remote server to subtract the amount of time used during the just-completed session, when the user logs off the network.

16. The method of claim 15, wherein the interface of the remote server is viewed by the user as a webpage on the web-ready device using Secure Socket Layer encryption.

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17. The method of claim 15, wherein the user may create an account using a prepaid coupon.

18. The method of claim 15, further comprising, after the step of prompting the user to create a new account, if the username and password are invalid or the user's account has zero time remaining, the step of:

charging the user's credit card, if a new account is created.

19. The method of claim 18, wherein the user may purchase access time in a definite quantity when creating an account.

20. The method of claim 18, wherein the user may purchase access time on a "continue until canceled" basis when creating an account.

21. The method of claim 18, wherein the charging of the user's credit card is performed by an existing merchant service.

22. The method of claim 21, wherein the existing merchant service is reciprocal with other Internet subscription providers nationwide.

23. The method of claim 18, further comprising the step of installing the router and the satellite dish in a rural location experiencing a relatively high volume of transient traffic.

24. An Internet Hotspot comprising:

a satellite dish communicating with the Internet via one or more data links with a satellite;

at least one router operatively coupled to the satellite dish;

a subscriber access unit operatively coupled between the satellite dish and the at least one router, the subscriber access unit being capable of authenticating a subscription account associated with a user prior to allowing the user access to the Internet; and

a web-ready device operatively coupled to the at least one router, the web-ready device having a browser application operating thereon for accessing the Internet;

wherein the satellite dish, at least one router and the subscriber access unit are located in a remote location experiencing a relatively high volume of transient traffic;

wherein the user may authenticate the subscription account and access the Internet at the remote location by establishing a data connection between the web-ready device and the router.

25. The Internet Hotspot of claim 24, wherein the data connection is one of a wired data connection and a wireless data connection.

26. The Internet Hotspot of claim 24, wherein a plurality of users may access the Internet simultaneously at the remote location by respectively establishing data connections with the router via their web-ready devices.

27. The Internet Hotspot of claim 26, wherein the data connections include wired data connections.

28. The Internet Hotspot of claim 26, wherein the data connections include wireless data connections.

29. The Internet Hotspot of claim 28, further comprising an amplifier and antenna operatively coupled to the router.

30. The Internet Hotspot of claim 29, wherein the router is a Vivato outdoor switch.

31. The Internet Hotspot of claim 24, further comprising at least one wireless extender transceiver operatively coupled between the subscriber access unit and the router.

32. The Internet Hotspot of claim 25, wherein the wireless connection is one of an 802.11a wireless area network, an 802.11b wireless area network, an 802.11g wireless area network, and an 802.11n wireless area network.

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