(54) Title: A SYSTEM AND METHOD FOR ENABLING, MANAGING, AND PROCESSING COMMUNICATIONS BETWEEN HETEROGENEOUS WIRELESS NETWORKS AND EXTERNAL VOICE AND DATA COMMUNICATIONS NETWORKS
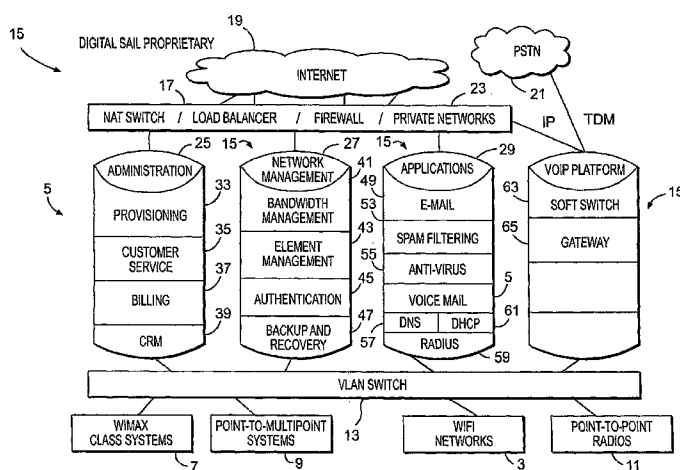
(57) Abstract: A system and method for converging multiple heterogeneous broadband wireless access networks into a packet-switched network access point is disclosed. The resulting system and method enable voice and data communication between at least one least one wireless network and at least one non-wireless network, such as the Public Switched Telephone Network. The network access point may include an input switch, a modular core, and an output switch. The modular core may be comprised of commercially available hardware and software, integrates network administration, applications, services, and end user traffic while allowing for connections to multiple external voice and data networks. The method may include the steps of receiving a communication from at least one wireless network, forwarding the communication to a network access point, analyzing the communication, and routing the communication to at least one non-wireless network or a wireless network.

A SYSTEM AND METHOD FOR ENABLING, MANAGING, AND PROCESSING COMMUNICATIONS BETWEEN HETEROGENEOUS WIRELESS NETWORKS AND EXTERNAL VOICE AND DATA COMMUNICATIONS NETWORKS

CROSS REFERENCE TO RELATED APPLICATIONS

[001]   This application claims the benefit of U.S. Provisional Application Serial No. 60/731675, filed October 31, 2005 in the U.S. Patent and Trademark Office, the contents of which are hereby incorporated in their entirety by reference.

BACKGROUND OF THE INVENTION

[002]   With the advent of new wireless communication technologies, service providers face numerous challenges which directly affect their ability to provide and maintain advanced communication services. For example, in order to compete, some service providers must be able to employ multiple broadband wireless such as, WiMax-class systems, WiFinetworks, point-to-multipoint systems, and point-to-point radios. Although all of these are wireless systems, they often are technically heterogeneous and, therefore, not compatible with one another. As a result, there are problems that occur when trying to manage networks comprising more than one of these heterogeneous wireless technologies. For example, each manufacturer's wireless platform may employ. a unique element management system which results in increased complexity of administering each platform's hardware and software. Moreover, difficulties arise with the ability to selectively manage the customer traffic to technically and geographically diverse networks. These problems are further exacerbated by the fact that service providers must be able to identify, monitor, and manage diverse customer traffic types such as HTML, peer-to-peer, STMP, and Voice over Internet Protocol (VoIP) and route customer traffic from these heterogeneous wireless networks to traditional external non-wireless networks such as the Internet, the public switched telephone network (PSTN), and various private networks.

[003]   In addition to connecting multiple heterogeneous wireless technologies into functioning non-wireless networks, communication service providers must also be able to deliver a variety of services over the wireless and non-wireless networks. These services generally include, but are not limited to, high speed Internet access, VoIP, private networking, remote network access, as well as back up and recovery functions for subscribers. Broadband wireless service providers also routinely offer messaging services such as voicemail, email, sms messaging, and video mail as well as facsimile and conferencing capabilities over these networks. In connection with these services, providers must also be able to establish, manage, and maintain

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customer histories, service customer accounts, and monitor and manage traffic over the networks. Current standard routed network architectures require the construction of multiple physical and logical levels for applications, firewalls, and root data which results in reduced network efficiency, decreased reliability, and increased asset investment and operating costs. Furthermore, as technology rapidly evolves, modern wireless service providers require the ability to quickly and easily deploy new equipment and services. Traditional routed networks generally require extensive reconfiguration when new subscriber services or system functionalities are added.

[004]   Accordingly, there is need for new and improved systems and methods for efficiently, easily, and inexpensively: (1) converging heterogeneous wireless technologies into functioning networks; (2) connecting these wireless networks to multiple external networks; (3) providing a variety of subscriber services and network administration functions over the wireless and external networks; and (4) providing a network architecture which allows subscriber services and functionalities to be added without the need for extensive reconfiguration of the network.

SUMMARY OF THE INVENTION

[005]   In accordance with one aspect of the present invention, a network access point
is may be provided for enabling voice and data communications between at least one
wireless network and at least one non-wireless network. The network access point
may include an input switch adapted to communicate with a wireless network. The
network access point may further include. at least one module. The module may be
configured as a Virtual Local Area Network or VLAN and may be operatively
connected to an output switch which, in turn, is capable of communicating with at
least one non-wireless network.

[006]   In accordance with another aspect of the present invention, a communications
system may be provided for enabling communications between wireless and non-
wireless networks. The communications system may include. at least one network
access point operatively connected to at least one wireless network, and at least one
non-wireless network. The network access point may further include a VLAN switch
operatively connected to at least one module, and an output switch operatively
connected to said module.

[007]   In accordance with yet another aspect of the present invention, a method may
be provided for routing voice and data communications between at least one wireless
network and at least one non-wireless network. The method may include the steps of
receiving a communication from a wireless network and forwarding the
communication to a network access point. The network access point may comprise a
VLAN switch, an output switch, and at least one module operatively connected to the
input switch. The method may further include analyzing the communication to
determine an intended recipient, and routing the converted communication to the
intended recipient over at least one non-wireless network.

BRIEF DESCRIPTION OF THE DRAWINGS

[008]   While the specification concludes with claims particularly pointing out and

distinctly claiming the present invention, it is believed the same will be better

understood from the following description taken in conjunction with the

accompanying drawings, which illustrate, in a non-limiting fashion, the best mode

presently contemplated for carrying out the present invention, and in which like

reference numerals designate like parts throughout the Figures, wherein:

[009]   FIG. 1 is a diagram of an exemplary embodiment of the present invention.`

DETAILED DESCRIPTION OF THE INVENTION

[0010]   The present invention is directed to a system and method for enabling communication between heterogeneous wireless networks and the Internet, the PSTN, and various data networks. The systems and methods disclosed and claimed herein may also provide for the application of various administrative functions and services. The present invention will now be described more fully with reference to FIG. 1 in which an exemplary embodiment of the present invention is shown. The subject matter of this disclosure may, however, be embodied in many different forms and should not be construed as being limited to the exemplary embodiment set forth herein.

[0011]   In general, the network access point (NAP) 1 of the present invention may comprise at least one wireless network, such as WiFi networks 3, WiMax-class systems 7, point-to-multipoint systems 9, and/or point-to-point radios 11, operatively connected to an input switch 13. The input switch 13, in turn, may operatively be connected to at least one NAP module 15. The NAP module may be connected operatively to an output switch 17 which, in turn, may be connected to the Internet 19, the PSTN 21, a private network 23, another network, or a combination thereof. As discussed in more detail below, all of the NAP modules may comprise some or all of commercially available hardware and software which support multiple languages and protocols. As a result, the NAP may be configured to reduce or eliminate proprietary computer code or programming.

[0012]   The NAP may be configured such that each NAP module is a VLAN. This configuration provides for two types of modularity, NAP Component modularity and Subscriber modularity. Because some or all of the NAP modules may be assembled from commercially available components, the NAP is very flexible and its modification may be simplified. For example, a service provider utilizing the NAP may initially provide voicemail and email services. Other services such as web hosting and telephone conferencing may be further added by installing and configuring any number of application servers or appliances. Similarly, services may be removed from the NAP or modified without having to take the NAP offline and interrupt subscriber service.

[0013]   The NAP may further allow for Subscriber modularity. For example, each
time a subscriber accesses the NAP, the subscriber may initiate a unique
communications session containing a unique request. Each unique request may be
treated separately allowing the subscriber access to only those modules and
components of the NAP which are necessary to complete the request. As a result,
subscriber requests may utilize fewer system resources and requests are handled more
efficiently. This type of Subscriber Modularity further allows service providers to
provide highly individualized services without affecting overall operability of the
NAP.

[0014]   As previously discussed, the NAP may include at least one input switch 13
which may be connected to a plurality of wireless networks 3, 5, 7, 9, and 11 and at
least NAP Module 15. The input switch 13 may be a standard VLAN switch or other
switch known by those of ordinary skill in the art. Examples of suitable VLAN
switches include, but are not limited to, the Ethernet Switch 450 (formerly the
Baystack 450 Switch), the Black Diamond, and the SuperStack which are
commercially available from Nortel Networks (www.nortel.com), Extreme Networks
(www.extremenetworks.com), and 3COM Corporation (www.3com.com),
respectively.

[0015]   For ease of explanation, the NAP modules 15 may be organized into four
categories: Administration 25, Network Management 27, Applications 29, and VoIP
31. Referring now to FIG.1, in one exemplary embodiment, the NAP may include an
Administration Module 25 which may include components for Provisioning 33,
Customer Service 35, Billing 37, and Customer Relationship Management (CRM) 39.
In order to carry out administration functions for a wide variety of platforms, the
Administration Module 25 may support at least the following language interfaces and
standard protocols: open database connectivity (ODBC), extensible markup language
(XML), lightweight directory access protocol (LDAP), common object request broker
architecture (CORBA), structured query language (SQL), hypertext transfer protocol
(HTTP), file transfer protocol (FTP), simple mail transfer protocol (SMTP), and open
application programming interfaces (APIs).

[0016]   The Provisioning component 33 of the Administration Module may be
responsible for activating network services and activating and controlling subscribers'
services. For example, the Provisioning component may assign subscribers'

telephone numbers and IP addresses, activate the services subscribers have requested, such as voicemail, email, conferencing, and/or Internet access, and allow subscribers access to the network. Suitable software for carrying out these provisioning functions may include, but is not limited to, NetProvision, InteractivatE, and ClarifyCRM commercially available from Syndesis Limited (www.syndesis.com), Intec Telecom Systems PLC (www.intec-telecom-systems.com), and Amdocs (www.amdocs.com), respectively.

[0017]   The Customer Service component 35 of the Administration Module may contain each individual subscriber's unique identifying information, including name, address, telephone numbers, and email address(es). In addition, the Customer Service component 35 may be responsible for maintaining individual histories for each subscriber. Subscriber histories may include information relating to the number of times a subscriber has had technical problems, the nature of the problems, and problem resolution. The Customer Service component 35 also may track and manage products and services requested by individual subscribers. Furthermore, the Customer Service component 35 may allow subscribers to engage in online question and answer sessions with support representatives and may provide a central location for subscribers to view and download product and service descriptions, frequently asked questions (FAQs), and technical help documents. Suitable subscriber service software to carry out these functions may include Convergys Infinys, Amdocs CRM, and Siebel 7.8 commercially available from Convergys Corporation, (www.convergys.com), Amdocs Limited (www.amdocs.com), and Siebel Systems, Inc. (www.siebel.com), respectively.

[0018]   The Billing component 37 of the Administration Module may comprise software that performs automated billing services for the network. The Billing component 37 allows for an infinite number of pricing structures for invoicing subscribers having unlimited service plans and options. Furthermore, the Billing component37 may maintain a record of the subscribers' usage of the system and determine if chargeable activity has occurred. Such usage records may include caps which prevent subscriber abuse of network services. In addition, the Billing component 37 may generate subscriber bills for a variety of billing periods such as weekly, monthly, quarterly or annually. These bills may then be sent to the subscriber electronically by the Billing component 37 or via regular mail. Furthermore, the

Billing component 37 processes subscriber payments, whether made by credit card, check, a prep-paid card, top-off cards, and the like. In some instances it may also be beneficial for the Billing component to handle subscriber billing and payment processing for multiple currencies. In one embodiment, the Billing component 37 may also monitor whether subscribers have paid their bills and suspend the service of subscribers who have not. When the subscriber pays his or her bill in full, the Billing component 37 may reactivate the subscriber's service. Suitable Billing component software includes, but is not limited to Rodopi 6.0, Logisense EngageIP, and SysMaster VoiceMaster commercially available from Rodopi Software, Inc. (www.rodopi.com), Logisense Corporation (www.logisense.com), and SysMaster Corporation (www.sysmaster.com), respectively.

[0019]   In general, the CRM component 39 of the Administration Module 25 may monitor the activities of subscribers. For example, the CRM component 39 may create subscriber profiles based on a subscriber's demographics, preferences, history, web site usage, revenue generation, and other service usage. These subscriber profiles then can be used to assign values to subscribers and rank or group subscribers into market segments, which in turn makes it easier and more efficient to market, sell, and provide services to subscribers. Suitable software for the CRM component 39, includes but is not limited to, KANA Resolution, Astute PowerCenter, and ATG Adaptive Scenario Engine commercially available from KANA, Incorporated (www.kana.com), Astute, Incorporated. (www.astutesolutions.com), and Art Technology Group, Incorporated (www.atg.com), respectively.

[0020]   The Network Management (NM) Module 27 may include, but is not limited to, components for Bandwidth Management 41, Element Management 43, Authentication 45, and Business Continuity/Disaster Recovery 47. The Bandwidth Management component 41 of the NM Module allows the NAP service provider to monitor, classify, and control traffic through the NAP. For example, different subscribers, such as businesses and individuals, may have service level agreements which specify minimum or maximum levels of bandwidth delivery. As a result, different customers or traffic types may need to be prioritized relative to others. The Bandwidth Management component 41 allocates the appropriate amount of bandwidth to each subscriber based on the subscriber's service agreement and prioritizes communications. In addition, the Bandwidth Management component 41 may

monitor and manage traffic based upon protocol, destination, or port number and prioritize traffic types. For example, Internet peer-to-peer (P2P) file sharing applications allow computer users to directly access files from one another's hard drives. Common P2P connections such as BitTorrent (www.bittorrent.com) generally consume large amounts of bandwidth if unmonitored. Suitable hardware for the Bandwidth Management component 41 includes, but is not limited to, Emerging Technologies 1800G, NetIntact Packet Logic, PowerNOC Packeteer, and Radware SynApps, and NetEnforcer which are commercially available from Emerging Technologies, Incorporated (www.etinc.om), Netintact (www.netintact.net), PowerNoc (www.powernoc.com), Radware Limited (www.radware.com), and Allot Communications (www.allot.com), respectively.

[0021]   The Element Management System (EMS) component 43 may comprise software that controls the wireless system hardware, including base stations and transceivers, as well as individual subscribers' devices. For example, the EMS component 43 may communicate directly with the Provisioning and Billing components which, in turn, may instruct the EMS component 43 to turn a subscriber's modem or radio on or off. In order to carry out element management with a wide variety of platforms, the EMS component 43 may support open APIs and command line interfaces (CLIs). Examples of suitable element management system software include, but are not limited to, Sonus Insight, MetaSwitch, and Openwave which are commercially available from Sonus Networks Incorporated. (www.sonusnet.com), MetaSwitch, a division of Data Connection (www.metaswitch.com), and Openwave Systems, Incorporated (www.openwave.com), respectively.

[0022]   The Authentication component 45 may control subscriber access to the various features of the NAP. For example, a user may be required to "log in" or "sign on" to a network by entering a user name and password with a computer keyboard or touch-tone telephone key pad, by speaking a user name and password, or by using a voiceprint. It is the Authentication component 45 which controls whether the subscriber gains access. In order to carry out authentication functions for a wide variety of platforms, the Authentication component 45 should support at least the following language interfaces and standard protocols: Active Directory, e directory, LDAP, secureID, and RSA SecureID. Suitable software for the Authentication component 45 includes, but is not limited to, Infoblox RADIUSone, and Trusted

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Networks Identity commercially available from Infoblox Incorporated
(www.infoblox.com) and Network Technologies, Incorporated
(www.trustednetworktech.com), respectively.

[0023]   The Business Continuity/Disaster Recovery component 47 may be used to
build redundancy into the databases and servers comprising the NAP in order to
protect the NAP and its services during sudden disasters such as fires, floods,
earthquakes and tornadoes and rolling disasters such as viruses, file corruptions, and
accidental deletions. By providing redundancy, the NAP may be able to continue
processing phone calls, emails, text messages, faxes, data, and other information even
if critical components in the NAP fail due to a disaster. Suitable disaster recovery
hardware and software includes, but is not limited to, LaCie, StorServer, and MaXXan
SA100 commercially available from LaCie USA (www.lacie.com), MaXXan
Systems, Inc. (www.maxxan.com), and STORSserver, Inc. (www.storserver.com),
respectively.

[0024]   The Applications Module 29 may include components to provide
communication services, including but not limited to, email 49, SMS messaging,
voicemail 51, conferencing, facsimile services, and spam filtering. The Applications
module 29 may include one, some, or all of these services. For example, the
Applications module 29 may initially include software for email and voicemail only.
However, because of the flexibility and modularity of the system of the present
invention, facsimile and conferencing services easily can be added. In one
embodiment, the Applications module 29 includes a unified communications
component. Unified communications generally refers to one system and number for
email, voicemail, facsimile, telephone and web conferencing, find me, and follow me
services. The unified communications component further may include the ability to
retrieve facsimiles and emails via the telephone using text-to-speech to listen to
telephone voice messages via a computer, and to respond to email via the telephone.
The unified communications also may provide an IVR or natural language speech
recognition auto-attendant to assist subscribers with locating phone numbers and
address, dialing phone numbers, adding telephone numbers and address to an
electronic address book, and the like. In one embodiment, the unified
communications also includes bulk and junk email and spam filtering 53 and antivirus
55 capabilities.

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[0025]   Suitable software to provide the Application module 29 services may include, but is not limited to, Vircom ModusMail, Rockliffe Mailsite, and Stalker Communigate available from Vircom, Inc. (www.vircom.com), Rockliffe, Inc. (wwwlrockliffe.com), and Stalker Software, Inc. (www.stalker.com), respectively. Additional suitable software includes, Audiostream Messaging, Telesoft ACM, and Unitel VM commercially available from StreamWide Technology (www.streamwide.com), Telesoft Corp. (www.telesoft.com), and Unitel, Inc. (www.unitelcom.com), respectively.

[0026]   The Applications module 29 also may include the Domain Name Server (DNS) software and server 57, Remote Authentication Dial-In User Service (RADIUS) server 59, and the Dynamic Host Configuration Protocol (DHCP) software and server 61. These servers and associated software may be standard in the industry and are known by those skilled in the art. Therefore, they will not be discussed in detail in the present application.

[0027]   Briefly, the DNS server 57 translates alphanumeric domain names into numbers used to locate the specific web servers storing a particular web site. For instance, the web site www.digitalsail.com would be translated by the DNS server into the number series 204.69.234.1 or 204.74.101.1, which identifies two particular web servers connected to the internet where the Digital Sail web site may be found. Suitable DNS servers include Nominum Foundation and Incognito Name Commander, which are commercially available from Nominum Incorporated (www.nominum.com) and Incognito Software, Incorporated (www.incognito.com).

[0028]   The DHCP server 61 may be used to dynamically assign IP address to subscribers' computing devices. Suitable DHCP software and servers include IP Commander, Meta SAFE, and BlueCat Adonis which are commercially available from Incognito Software Incorporated (www.incognito.com), Metainfo (www.metainfo.com), and BlueCat Networks, Inc. (www.bluecatnetworks.com), respectively.

[0029]   Finally, the RADIUS server 59 may provide remote user authentication and accounting. Suitable RADIUS servers include Infoblox RADIUSOne, Celestix RADIUS, and Funk SBR which are commercially available from Infoblox Incorporated (www.infoblox.com), Celestix Networks, Incorporated (www.celestix.com), and Funk Software Incorporated (www.funk.com), respectively.

[0030]   As further shown in FIG. 1, the NAP may include a VoIP Module 31. This
module may be a standard VoIP platform know in the art and, as a result, is not
discussed in detail. Components of the VoIP Module 31 include at least one soft
switch 63 and a gateway 65. Soft switch processing involves the conversion of calls
from the PSTN into an internet protocol (IP) packet, which is then transferred to
another network over the internet. Gateway processing involves the routing of calls
through the PSTN.

[0031]   Suitable soft switches include Nortel CS2000, Sonus Insignus, Copper Com
CSX, and MetaSwitch VP3500, commercially available from Nortel Networks
Incorporated (www.nortel.com), Sonus Networks Incorporated (www.sonus.com),
CopperCom™, a division of Heico Companies LLC (www.coppercom.com), and
MetaSwitch™ a division of Data Connection Limited (www.metaswitch.com),
respectively. Suitable Gateways include, but are not limited to, Logitel VXT1000,
Excel IMG1010, and SysMaster SM 7000 commercially available from Logitel
Corporation (www.logitel.com), Excel Switching Corporation
(www.excelswitching.com), and SysMaster Corporation (www.sysmaster.com),
respectively. Each of these gateways supports H.323 and Session Initiation Protocol
(SIP) protocols.

[0032]   It will be appreciated by those skilled in the art that any number of modules
may be used in the present invention in order to meet each individual service
provider's needs. For example, a service provider may choose to have a NAP with
one module, three modules, or ten modules. Furthermore, those skilled in the art will
understand that the application and management capabilities of the modules may vary.
For example, a service provider may combine all or some of applications and
management capabilities of the administration and network management modules into
one module or leave out some of the applications and management capabilities
altogether.

[0033]   The NAP further may comprise at least one output switch 17 positioned
between the NAP Modules and the plurality of non-wireless networks. The NAT
switch may be used to perform static and dynamic NATting. Suitable NAT switches
include, but are not limited to, F5 V9, ES10170, and the HSX6000 which are
commercially available from F5 Networks, Inc. (www.f5.com), Riverstone Networks,

Inc. (www.riverstone.com), and Hammerhead Systems, Inc. (www.hammerheadsystems.com), respectively.

[0034]   In operation, a service provider will configure the NAP so that it is in communication with at least one wireless network 3, 5, 7, 9, and/or 11 and at least one non-wireless network such as the Internet 19, a private network 23, and/or the PSTN 21. A communication originating from a wireless network is received by the input switch 13, which will either accept the communication as one from a subscriber or reject the communication. An accepted communication then is either routed through the NAP and out to the Internet 19, the PSTN 21, and/or a private network 23.

[0035]   Alternatively, a wireless voice or data communication may be processed solely within the NAP. For instance, a unique communications sessions may be initiated by a subscriber requesting to listen to his or her voicemail. After the subscriber is identified and authenticated, the NAP provides the subscriber with access to his or her stored voicemails. The subscriber then may listen to his or her voicemails. If the subscriber chooses not to respond to any of the voicemails, the unique communication session is ended without any communication being routed to a non-wireless network. Those skilled in the art will appreciate that if the subscriber chooses to respond to a voicemail by placing a return telephone call that the return call will then be routed through the NAP and to the Internet 19, the PSTN 21, or private network 23.

[0036]   The NAP may be designated to a particular service area, such as all of the users in a city or other geographic area. Alternatively, the NAP may be designated to a particular building or property, such as an office, residence hall, apartment or condo building, or other multiple dwelling unit (MDU).

[0037]   Additionally, two or more NAPs may be operatively connected together to serve a larger number of end users. When connecting two or more NAPs, it may be desirable to designate one NAP as the primary NAP and subsequent NAPs as secondary NAPs. Two or more NAPs are connected via standard Ethernet via either NAT or VLAN side of the NAP.

[0038]   Many changes and modifications will occur to those skilled in the art upon studying this description. All such changes and modifications which are within the spirit of the invention are intended to be included within the scope of the claims.

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CLAIMS

What is claimed is:

1.   A network access point comprising:

an input switch, the input switch adapted to receive voice and data communications

from a wireless network;

a plurality of modules including at least one module configured as a VLAN

operatively connected to the input switch; and

an output switch operatively connected to the at least one module, the output switch

adapted to route the voice and data communications to a non-wireless network.

2.   The network access point of Claim 1, wherein the plurality of modules are

operatively connected to one another, the input switch, and the output switch.

3.   The network access point of Claim 1 wherein the wireless network is selected

from the group consisting of wide area broadband, medium area broadband, WiMax-class

systems, WiFi networks, point-to-point radios, and point-to-multipoint systems.

4.   The network access point of Claim 1 wherein the non-wireless network is

selected from the group consisting of the Internet, a private network, and a public switched

telephone network.

5.   The network access point of Claim 1 wherein the output switch is a NAT

switch.

6.   The network access point of Claim 1 wherein the output switch has load

balancing capabilities.

7.   The network access point of Claim 2 wherein the plurality of modules is

selected from the group consisting of administration, network management, applications, and

VoIP modules.

8.   The network access point of Claim 1, wherein a first module of the plurality

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of modules comprises a VoIP platform having a softswitch and a gateway.

9.   The network access point of Claim 8, wherein a second module of the plurality

of modules is selected from the group consisting of administration, network management, and

applications modules.

10.   The network access point of Claim 9 wherein the second module includes

network administration software.

11.   The network access point of Claim 9, wherein a third module of the plurality

of modules comprises one of a network management module or an applications module.

12.   The network access point of Claim 11, wherein the third module includes

application software.

13.   The network access point of Claim 11, wherein a fourth module of the

plurality of modules comprises a network management module having network management

software.

14.   A communications system for enabling voice and data communications

between wireless and non-wireless networks comprising:

         at least one wireless network;

         at least one network access point connected to the at least one wireless network, the

network access point comprising,

                  a VLAN switch operatively connected to the wireless network,

                  at least one module operatively connected to the input switch; and

                  an output switch operatively connected to the module and

         at least one non-wireless network.

15.   The communications system of Clam 14, further comprising a second network

access point operatively connected to the at least one network access point via an Ethernet

connection.

16.   A network access point comprising:

a VLAN input switch configured to receive communications from a wireless network;

a first module operatively connected to the first input switch, the first module

comprising a VoIP soft switch and a gateway;

a second module operatively connected to the first module and the input switch, the

second module comprising network management software;

a third module operatively connected to the first and second modules, and the input

switch, the third module comprising applications software;

a fourth module operatively connected to the first, second, and third modules, and the

input switch, said fourth module comprising administration software; and

an output switch operatively connected to the first, second, third, and fourth modules.

17.   The network access point of Claim 16 wherein the output switch is operatively

connected to at least one of the Internet, a private network, and a public switched telephone

network.

18.   The network access point of Claim 16 wherein the network management

software comprises software selected from the group consisting of bandwidth management,

element management, authentication, and business continuity/disaster recovery software.

19.   The network access point of Claim 16 wherein said applications software

further comprises software selected from the group consisting of email, voicemail, facsimile,

conferencing, and unified communications software.

20.   The network access point of Claim 16 wherein the third module further

comprises domain name server, a RADIUS server, and a dynamic host configuration protocol

server.

21.   The network access point of Claim 16, wherein the administration software

further comprises software selected from the group consisting of provisioning, customer

service, customer billing, and customer relationship management software.

22. The network access point of Claim 16 wherein the first, second, third, and fourth modules, are configured operatively as VLANs.

23. A method of routing voice and data communications between at least one wireless network and at least one non-wireless network, the method comprising:

receiving a communication from a wireless network;

forwarding the communication to a network access point, the network access point comprising a VLAN switch operatively connected to the wireless network, at least one module operatively connected to the VLAN switch, and an output switch operatively connected to the at least one module;

analyzing the communication to determine an intended recipient; and

routing the communication to the intended recipient over a non-wireless network.

24. The method of Claim 23 further comprising a plurality of modules, the plurality of modules comprising an administration module, a network management module, an applications module, and a VoIP module.

25. A network access point for receiving and routing voice and data communications comprising:

an input switch operatively connected to at least one wireless network;

at least one module configured as a VLAN operatively connected to said input switch; and an output switch operatively connected to at least one non-wireless network,

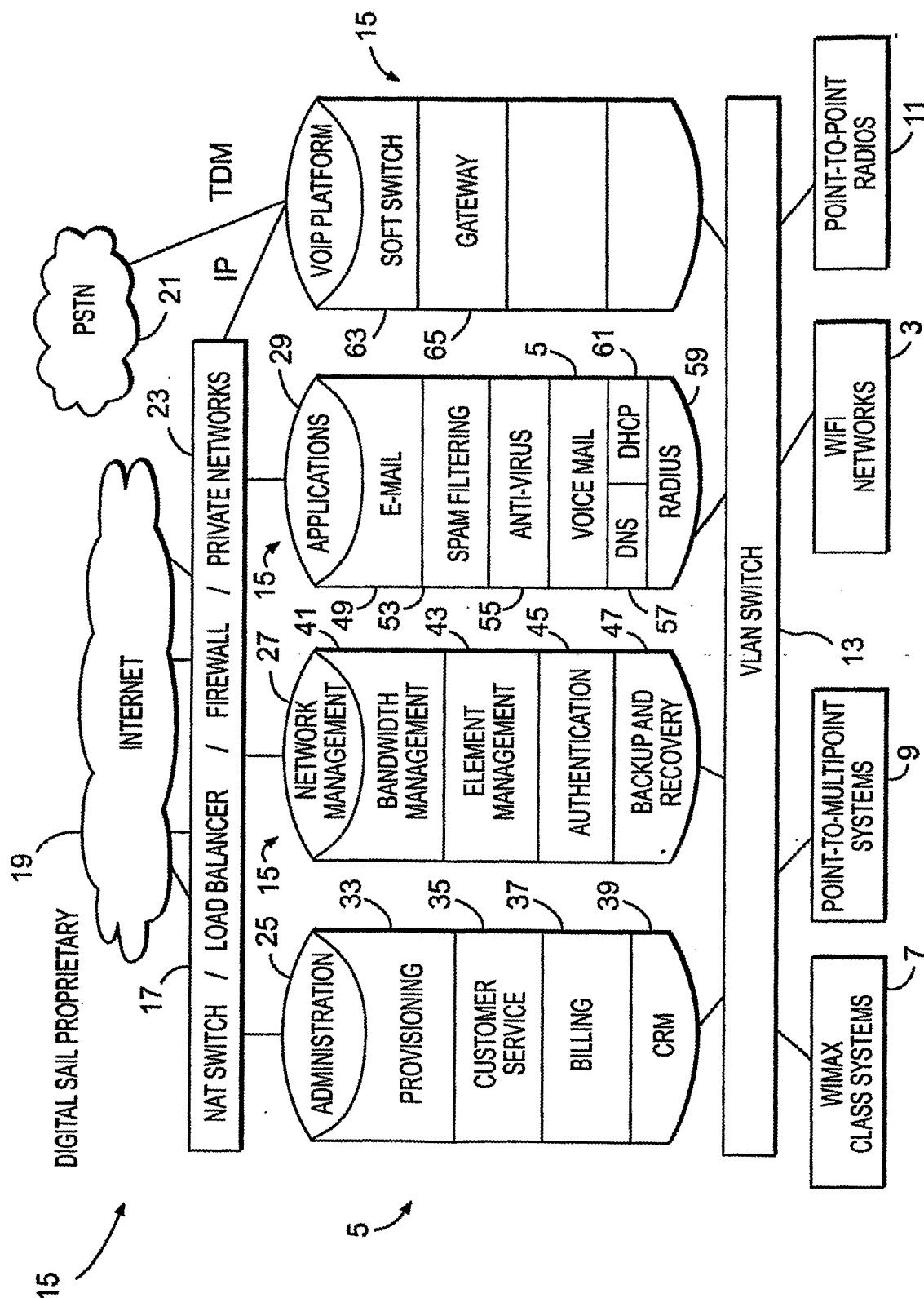wherein said input switch is a VLAN switch.

FIG. 1