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**CONFIRMATION NO. 2494**

**FILING RECEIPT**

1444
Browdy and Neimark, PLLC
1625 K Street, N.W.
Suite 1100
Washington, DC 20006

Date Mailed: 01/19/2012

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**If Required, Foreign Filing License Granted:** 01/17/2012
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/584,500**
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**Non-Publication Request:** No
**Early Publication Request:** No
**** SMALL ENTITY ****
**Title**

SYSTEM AND METHOD FOR CLOUD SERVER AS A GATEWAY

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# U.S. PATENT AND TRADEMARK OFFICE
# PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT
under 37 C.F.R. §1.53(b)(2)

Atty. Docket: BINDER=40

| INVENTOR(S)/APPLICANT(S) | | |
|---|---|---|
| LAST NAME | GIVEN NAME | RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY) |
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| | | |
| | | |
| | | |

☐ Additional inventors are being named on separately numbered sheets attached hereto

**TITLE OF THE INVENTION (500 characters max)**

SYSTEM AND METHOD FOR CLOUD SERVER AS A GATEWAY

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**ENCLOSED APPLICATION PARTS (check all that apply)**

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|---|---|---|
| ☒ Specification | Number of Pages 29 | ☐ Other |
| ☒ Drawings | Number of Pages 9 | |

**FEES AND METHOD OF PAYMENT OF FILING FEES (check all that apply)**

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|---|---|---|---|---|
| ☒ Basic Filing fee | | | | $ **250. 00** |
| ☐ Additional Fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing or computer program listing filed in an electronic medium). The fee is $**310.00** for each additional 50 sheets of paper or fraction thereof. | | | | |
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| 38- 100 = | / 50 = | | × **310.00** | $ |
| | | | **SUB-TOTAL** | $250.00 |
| ☒ Applicant claims small entity status. See 37 CFR 1.27. | | | | <$125.00> |
| | | | **TOTAL FILING FEES** | **$125.00** |

☒ Credit Card Payment authorization submitted herewith to cover the total filing fees.

☒ The Commissioner is hereby authorized to charge any underpayment of filing fees and credit any overpayments to Deposit Account Number 02-4035.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No ☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,
BROWDY AND NEIMARK, P.L.L.C.

Date: January 9, 2012

By: /jmf/
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# System and Method for Cloud Server as a Gateway

## TECHNICAL FIELD

This disclosure relates generally to an apparatus and method for cloud server implementing gateway functionalities.

## BACKGROUND

The Internet is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP), including Transmission Control Protocol (TCP) and the Internet Protocol (IP), to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic and optical networking technologies. The Internet carries a vast range of information resources and services, such as the interlinked hypertext documents on the World Wide Web (WWW) and the infrastructure to support electronic mail. The Internet backbone refers to the principal data routes between large, strategically interconnected networks and core routers in the Internet. These data routes are hosted by commercial, government, academic and other high-capacity network centers, the Internet exchange points and network access points that interchange Internet traffic between the countries, continents and across the oceans of the world. Traffic interchange between Internet service providers (often Tier 1 networks) participating in the Internet backbone exchange traffic by privately negotiated interconnection agreements, primarily governed by the principle of settlement-free peering.

The Internet, and consequently its backbone networks, does not rely on central control or coordinating facilities, nor do they implement any global network policies. The resilience of the Internet results from its principal architectural features, most notably the idea of placing as few network states and control functions as possible in the network elements, but instead relying on the endpoints of communication to handle most of the processing to ensure data integrity, reliability and authentication. In addition, the high degree of redundancy of today's network links and sophisticated real-time routing protocols provides alternative paths of communications for load balancing and congestion avoidance.

The Internet Protocol (IP) is the principal communications protocol used for relaying datagrams (packets) across an internetwork using the Internet Protocol Suite. Responsible for

routing packets across network boundaries, it is the primary protocol that establishes the Internet. IP is the primary protocol in the Internet Layer of the Internet Protocol Suite and has the task of delivering datagrams from the source host to the destination host based on their addresses. For this purpose, IP defines addressing methods and structures for datagram encapsulation. Internet Protocol Version 4 (IPv4) is the dominant protocol of the Internet. IPv4 is described in Internet Engineering Task Force (IETF) Request for Comments (RFC) 791 and RFC 1349, and the successor, Internet Protocol Version 6 (IPv6), is in active and growing deployment worldwide. IPv4 uses 32-bit addresses (providing 4 billion, or $4.3\times10^{9}$ addresses), while IPv6 uses 128-bit addresses (providing 340 undecillion or $3.4\times10^{38}$ addresses), as described in RFC 2460.

The Internet Protocol is responsible for addressing hosts and routing datagrams (packets) from a source host to the destination host across one or more IP networks. For this purpose the Internet Protocol defines an addressing system that has two functions. Addresses identify hosts and provide a logical location service. Each packet is tagged with a header that contains the meta-data for the purpose of delivery. This process of tagging is also called encapsulation. IP is a connectionless protocol for use in a packet-switched Link Layer network, and does not need circuit setup prior to transmission. The aspects of delivery guaranteeing, proper sequencing, avoidance of duplicate delivery, and data integrity are addressed by an upper transport layer protocol (e.g., TCP - Transmission Control Protocol and UDP – User Datagram Protocol).

The main aspects of the IP technology are IP addressing and routing. Addressing refers to how end hosts become assigned IP addresses and how sub-networks of IP host addresses are divided and grouped together. IP routing is performed by all hosts, but most importantly by internetwork routers, which typically use either Interior Gateway Protocols (IGPs) or External Gateway Protocols (EGPs) to help make IP datagram forwarding decisions across IP connected networks. Core routers serving in the Internet backbone commonly use the Border Gateway Protocol (BGP) as per RFC 4098 or Multi-Protocol Label Switching (MPLS). Other prior art publications relating to Internet related protocols and routing include the following chapters of the publication number 1-587005-001-3 by Cisco Systems, Inc. (7/99) titled: "Internetworking Technologies Handbook", which are all incorporated in their entirety for all purposes as if fully set forth herein: Chapter 5: "Routing Basics" (pages 5-1 to 5-10), Chapter 30: "Internet Protocols" (pages 30-1 to 30-16), Chapter 32: "IPv6" (pages 32-1 to 32-6), Chapter 45: "OSI Routing" (pages 45-1 to 45-8) and Chapter 51: "Security" (pages 51-1 to 51-12), as well as IBM Corporation,

International Technical Support Organization Redbook Documents No. GG24-4756-00 titled: "Local area Network Concepts and Products: LAN Operation Systems and management", 1st Edition May 1996, Redbook Document No. GG24-4338-00 titled: "Introduction to Networking Technologies", 1st Edition April 1994, Redbook Document No. GG24-2580-01 "IP Network Design Guide", 2nd Edition June 1999, and Redbook Document No. GG24-3376-07 "TCP/IP Tutorial and Technical Overview", ISBN 0738494682 8th Edition Dec. 2006, which are incorporated in their entirety for all purposes as if fully set forth herein.

A Wireless Mesh Network (WMN) and Wireless Distribution Systems (WDS) are known in the art to be a communication network made up of clients, mesh routers and gateways organized in a mesh topology and connected using radio. Such wireless networks may be based on DSR as the routing protocol. WMNs are standardized in IEEE 802.11s and described in a slide-show by W. Steven Conner, Intel Corp. *et al.* titled: "IEEE 802.11s Tutorial" presented at the IEEE 802 Plenary, Dallas on Nov. 13, 2006, in a slide-show by Eugen Borcoci of University Politehnica Bucharest, titled: "Wireless Mesh Networks Technologies: Architectures, Protocols, Resource Management and Applications", presented in INFOWARE Conference on August 22-29th 2009 in Cannes, France, and in an IEEE Communication magazine paper by Joseph D. Camp and Edward W. Knightly of Electrical and Computer Engineering, Rice University, Houston, TX, USA, titled: "The IEEE 802.11s Extended Service Set Mesh Networking Standard", which are incorporated in their entirety for all purposes as if fully set forth herein. The arrangement described herein can be equally applied to such wireless networks, wherein two clients exchange information using different paths by using mesh routers as intermediate and relay servers. Commonly in wireless networks, the routing is based on MAC addresses. Hence, the above discussion relating to IP addresses applies in such networks to using the MAC addresses for identifying the client originating the message, the mesh routers (or gateways) serving as the relay servers, and the client serving as the ultimate destination computer.

The Internet structure is using a client-server model, among other models. The terms 'server' or 'server computer' relates herein to a device or computer (or a series of computers) connected to the Internet and is used for providing specific facilities or services to other computers or other devices (referred to in this context as 'clients') connected to the Internet. A server is commonly a host that has an IP address and executes a 'server program', and typically operating as a socket listener. Many servers have dedicated functionality such as web server, Domain Name System

(DNS) server (described in RFC 1034 and RFC 1035), Dynamic Host Configuration Protocol (DHCP) server (described in RFC 2131 and RFC 3315), mail server, File Transfer Protocol (FTP) server and database server. Similarly, the term 'client' herein refers to a program or to a device or a computer (or a series of computers) executing this program, which accesses a server over the Internet for a service or a resource. Clients commonly initiate connections that a server may accept. For example, web browsers are clients that connect to web servers for retrieving web pages, and email clients connect to mail storage servers for retrieving mails.

Transport Layer Security (TLS) and its predecessor Secure Sockets Layer (SSL) are non-limiting examples of end-to-end cryptographic protocols, providing secured communication above the OSI Transport Layer, using keyed message authentication code and symmetric cryptography. In client / server applications, the TLS client and server negotiate a stateful connection by using a handshake procedure, during which various parameters are agreed upon, allowing a communication in a way designed to prevent eavesdropping and tampering. The TLS 1.2 is defined in RFC 5246, and several versions of the protocol are in widespread use in applications such as web browsing, electronic mail, Internet faxing, instant messaging and Voice-over-IP (VoIP). In application design, TLS is usually implemented on top of any of the Transport Layer protocols, encapsulating the application-specific protocols such as HTTP, FTP, SMTP, NNTP, and XMPP. Historically, it has been used primarily with reliable transport protocols such as the Transmission Control Protocol (TCP). However, it has also been implemented with datagram-oriented transport protocols, such as the User Datagram Protocol (UDP) and the Datagram Congestion Control Protocol (DCCP), a usage which has been standardized independently using the term Datagram Transport Layer Security (DTLS). A prominent use of TLS is for securing World Wide Web traffic carried by HTTP to form HTTPS. Notable applications are electronic commerce and asset management. Increasingly, the Simple Mail Transfer Protocol (SMTP) is also protected by TLS (RFC 3207). These applications use public key certificates to verify the identity of endpoints. Another Layer 4 (Transport Layer) and upper layers encryption-based communication protocols include SSH (Secure Shell) and SSL (Secure Socket Layer).

There is a growing widespread use of the Internet for carrying multimedia, such as video and audio. Various audio services include Internet-radio stations and VoIP (Voice-over-IP). Video services over the Internet include video conferencing and IPTV (IP Television). In most cases, the multimedia service is a real-time (or near real-time) application, and thus sensitive to delays over

the Internet. In particular, two-way services such a VoIP or other telephony services and video-conferencing are delay sensitive. In some cases, the delays induced by the encryption process, as well as the hardware / software costs associated with the encryption, render encryption as non-practical. Therefore, it is not easy to secure enough capacity of the Internet accessible by users to endure real-time communication applications such as Internet games, chatting, VoIP, MoIP (Multimedia-over-IP), etc. In this case, there may be a data loss, delay or severe jitter in the course of communication due to the property of an Internet protocol, thereby causing inappropriate real-time video communication. The following chapters of the publication number 1-587005-001-3 by Cisco Systems, Inc. (7/99) titled: "Internetworking Technologies Handbook", relate to multimedia carried over the Internet, and are all incorporated in their entirety for all purposes as if fully set forth herein: Chapter 18: "Multiservice Access Technologies" (pages 18-1 to 18-10), and Chapter 19: "Voice / Data Integration Technologies" (pages 19-1 to 19-30).

VoIP systems in widespread use today fall into three groups: systems using the ITU-T H.323 protocol, systems using the SIP protocol, and systems that use proprietary protocols. H.323 is a standard for teleconferencing that was developed by the International Telecommunications Union (ITU). It supports full multimedia audio, video and data transmission between groups of two or more participants, and it is designed to support large networks. H.323 is network-independent: it can be used over networks using transport protocols other than TCP/IP. H.323 is still a very important protocol, but it has fallen out of use for consumer VoIP products due to the fact that it is difficult to make it work through firewalls that are designed to protect computers running many different applications. It is a system best suited to large organizations that possess the technical skills to overcome these problems.

SIP (for Session Initiation Protocol) is an Internet Engineering Task Force (IETF) standard signaling protocol for teleconferencing, telephony, presence and event notification and instant messaging. It provides a mechanism for setting up and managing connections, but not for transporting the audio or video data. It is probably now the most widely used protocol for managing Internet telephony. Like the IETF protocols, SIP is defined in a number of RFCs, principally RFC 3261. A SIP-based VoIP implementation may send the encoded voice data over the network in a number of ways. Most implementations use Real-time Transport Protocol (RTP), which is defined in RFC 3550. Both SIP and RTP are implemented on UDP, which, as a connectionless protocol, can cause difficulties with certain types of routers and firewalls. Usable SIP phones therefore also need

to use STUN (for Simple Traversal of UDP over NAT), a protocol defined in RFC 3489 that allows a client behind a NAT router to find out its external IP address and the type of NAT device.

The connection of peripherals and memories to a processor may be via a bus. A communication link (such as Ethernet, or any other LAN, PAN or WAN communication link) may also be regarded as bus herein. A bus may be an internal bus (a.k.a. local bus), primarily designed to connect a processor or CPU to peripherals inside a computer system enclosure, such as connecting components over the motherboard or backplane. Alternatively, a bus may be an external bus, primarily intended for connecting the processor or the motherboard to devices and peripherals external to the computer system enclosure. Some buses may be doubly used as internal or as external buses. A bus may be of parallel type, where each word (address or data) is carried in parallel over multiple electrical conductors or wires; or alternatively, may be bit-serial, where bits are carried sequentially, such as one bit at a time. A bus may support multiple serial links or lanes, aggregated or bonded for higher bit-rate transport. Non-limiting examples of internal parallel buses include ISA (Industry Standard architecture); EISA (Extended ISA); NuBus (IEEE 1196); PATA - Parallel ATA (Advanced Technology Attachment) variants such as IDE, EIDE, ATAPI, SBus (IEEE 1496), VESA Local Bus (VLB), PCI and PC/104 variants (PC/104, PC/104 Plus, PC/104 Express). Non-limiting examples of internal serial buses include PCIe (PCI Express), Serial ATA (SATA), SMBus, and Serial Peripheral Bus (SPI) bus. Non-limiting examples of external parallel buses include HIPPI (HIgh Performance Parallel Interface), IEEE-1284 ('Centronix'), IEEE-488 (a.k.a. GPIB – General Purpose Interface Bus) and PC Card / PCMCIA. Non-limiting examples of external serial buses include USB (Universal Serial Bus), eSATA and IEEE 1394 (a.k.a. FireWire). Non-limiting examples of buses that can be internal or external are Futurebus, InfiniBand, SCSI (Small Computer System Interface), and SAS (Serial Attached SCSI). The bus medium may be based on electrical conductors, commonly copper wires based cable (may be arranged as twisted-pairs) or a fiber-optic cable. The bus topology may use point-to-point, multi-drop (electrical parallel) and daisy-chain, and may further be based on hubs or switches. A point-to-point bus may be full-duplex, providing simultaneous, two-way transmission (and sometimes independent) in both directions, or alternatively a bus may be half-duplex, where the transmission can be in either direction, but only in one direction at a time. Buses are further commonly characterized by their throughput (data bit-rate), signaling rate, medium length, connectors and medium types, latency, scalability, quality-of-service, devices per connection or channel, and supported bus-width. A

configuration of a bus for a specific environment may be automatic (hardware or software based, or both), or may involve user or installer activities such as software settings or jumpers. Recent buses are self-repairable, where spare connection (net) is provided which is used in the event of malfunction in a connection. Some buses support hot-plugging (sometimes known as hot swapping), where a connection or a replacement can be made, without significant interruption to the system or without the need to shut-off any power. A well-known example of this functionality is the Universal Serial Bus (USB) that allows users to add or remove peripheral components such as a mouse, keyboard, or printer. A bus may be defined to carry a power signal, either in separate dedicated cable (using separate and dedicated connectors), or commonly over the same cable carrying the digital data (using the same connector). Typically dedicated wires in the cable are used for carrying a low-level DC power levels, such as 3.3VDC, 5VDC, 12VDC and any combination thereof. A bus may support master / slave configuration, where one connected node is typically a bus master (e.g., the processor or the processor-side), and other nodes (or node) are bus slaves. A slave may not connect or transmit to the bus until given permission by the bus master. A bus timing, strobing, synchronization, or clocking information may be carried as a separate signal (e.g. clock signal) over a dedicated channel, such as separate and dedicated wired in a cable, or alternatively may use embedded clocking (a.k.a. self-clocking), where the timing information is encoded with the data signal, commonly used in line codes such as Manchester code, where the clock information occurs at the transition points. Any bus or connection herein may use proprietary specifications, or preferably be similar to, based on, substantially or fully compliant with an industry standard (or any variant thereof) such as those referred to as PCI Express, SAS, SATA, SCSI, PATA, InfiniBand, USB, PCI, PCI-X, AGP, Thunderbolt, IEEE 1394, FireWire and Fibre Channel.

In consideration of the foregoing, it would be an advancement in the art to provide an improved networking or gateway functionality method and system that is simple, secured, cost-effective, faithful, reliable, easy to use or sanitize, has a minimum part count, minimum hardware, and / or uses existing and available components, protocols, programs and applications for providing better security and additional functionalities, and provides a better user experience.

**SUMMARY**

Environment control networks are networks of sensors and controller which provide an optimized solution for an environment control. The environment can be a house, agricultural farm,

city traffic systems etc. The sensors will provide information on the environment conditions and events. The controller will allow automatic control or control by the user via internet. Presently, a dedicated hardware gateway is required to control the wireless network in each environment. The disclosure describes how the dedicated gateway can be replaced by a cloud server, offering much better cost, reliability and level of service.

Any connection herein, such as the connection of peripherals in general, and memories in particular to a processor, may use a bus. A communication link (such as Ethernet, or any other LAN, PAN or WAN communication links may also be regarded as buses herein. A bus may be an internal bus, an external bus or both. A bus may be a parallel or a bit-serial bus. A bus may be based on a single or on multiple serial links or lanes. The bus medium may electrical conductors based such as wires or cables, or may be based on a fiber-optic cable. The bus topology may use point-to-point, multi-drop (electrical parallel) and daisy-chain, and may further be based on hubs or switches. A point-to-point bus may be full-duplex, or half-duplex. Further, a bus may use proprietary specifications, or may be based on, similar to, substantially or fully compliant to an industry standard (or any variant thereof), and may further be hot-pluggable. A bus may be defined to carry only digital data signals, or may also defined to carry a power signal (commonly DC voltages), either in separated and dedicated cables and connectors, or may carry the power and digital data together over the same cable. A bus may support master / slave configuration. A bus may carry a separated and dedicated timing signal or may use self-clocking line-code.

The memory may be a random-accessed or a sequential-accessed memory, and may be location-based, randomly-accessed, and can be written multiple times. The memory may be volatile and based on semiconductor storage medium, such as: RAM, SRAM, DRAM, TTRAM and Z-RAM. The memory may be non-volatile and based on semiconductor storage medium, such as ROM, PROM, EPROM or EEROM, and may be Flash-based, such as SSD drive or USB 'Thumb' drive. The memory may be based on non-volatile magnetic storage medium, such as HDD. The memory may be based on an optical storage medium that is recordable and removable, and may include an optical disk drive. The storage medium may be: CD-RW, DVD-RW, DVD+RW, DVD-RAM BD-RE, CD-ROM, BD-ROM or DVD-ROM. The adapter or the memory (or both) form factor may be an IC, a PCB on which one or more ICs are mounted, or a box-shaped enclosure.

The communication may be based on a PAN, a LAN or a WAN communication link. The first bus or the second bus (or both) may each be based on Ethernet and may be substantially compliant with IEEE 802.3 standard, and be based on one out of: 100BaseT/TX, 1000BaseT/TX, 10 gigabit Ethernet substantially (or in full) according to IEEE Std 802.3ae-2002as standard, 40 Gigabit Ethernet, and 100 Gigabit Ethernet substantially according to IEEE P802.3ba standard. The first bus or the second bus (or both) may each be based on a multi-drop, a daisy-chain topology, or a point-to-point connection, use half-duplex or full-duplex, and may employs a master / slave scheme. The first bus or the second bus (or both) may each be a wired-based, point-to-point, and bit-serial bus, wherein a timing, clocking or strobing signal is carried over dedicated wires, or using a self-clocking scheme. Each of the buses (or both) may use a fiber-optic cable as the bus medium, and the adapter may further comprise a fiber-optics connector for connecting to the fiber-optic cable.

The above summary is not an exhaustive list of all aspects of the present invention. Indeed, the inventor contemplates that his invention includes all systems and methods that can be practiced from all suitable combinations and derivatives of the various aspects summarized above, as well as those disclosed in the detailed description below and particularly pointed out in the claims filed with the application. Such combinations have particular advantages not specifically recited in the above summary.

## BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of non-limiting examples only, with reference to the accompanying drawings, wherein like designations denote like elements. Understanding that these drawings only provide information concerning typical embodiments of the invention and are not therefore to be considered limiting in scope:

Fig. 1 illustrates a schematic electrical diagram of a home network system with a dedicated gateway,

Fig 2 illustrates a schematic electrical diagram of a system where a cloud server is serving as a gateway for several home networks and other environment networks,

Fig 3 illustrates a schematic electrical diagram of a description of a home network system using the a cloud server as a gateway,

Fig 4 illustrates a schematic electrical diagram of a home router serving several types of networks,

Fig 5 illustrates a schematic electrical diagram of a home network sensor,

Fig 6 illustrates a schematic electrical diagram of a home network controller,

Fig 7 illustrates a schematic electrical diagram of a home network camera, and

Fig 8 illustrates a schematic electrical diagram of a cloud server serving as a home network gateway.

## DETAILED DESCRIPTION

The principles and operation of an apparatus according to the present invention may be understood with reference to the figures and the accompanying description wherein similar components appearing in different figures are denoted by identical reference numerals. The drawings and descriptions are conceptual only. In actual practice, a single component can implement one or more functions; alternatively, each function can be implemented by a plurality of components and devices. In the figures and descriptions, identical reference numerals indicate those components that are common to different embodiments or configurations. Identical numerical references (even in the case of using different suffix, such as **5**, **5a**, **5b** and **5c**) refer to functions or actual devices that are either identical, substantially similar, or having similar functionality. It will be readily understood that the components of the present invention, as generally described and illustrated in the figures herein, could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of the embodiments of the apparatus, system, and method of the present invention, as represented in the figures herein, is not intended to limit the scope of the invention, as claimed, but is merely representative of embodiments of the invention.

Environment control networks are networks of sensors and controller which provide an optimized solution for an environment control. The environment can be a house, agricultural farm, city traffic systems etc. The sensors will provide information on the environment conditions and events. The controller will allow automatic control or control by the user via internet.

The gateway function of the network may be provided by a cloud server. This will reduce the cost, increase reliability and will allow new types of services due to the vast information and networking of the cloud server. For the home, the condition sensors can be temperature, humidity and light sensor. Event sensors can be motion, smoke, flood, gas, door or window open sensors.

The system can allow automatic control upon detection of certain conditions or events. The lights can be turned on when a motion is detected in a room. The electricity may be turned off upon a fire and the water off upon a flood. The heating may be adjusted based on internet information on the weather or information on neighbor behavior. Users may be warned on problems in neighboring homes. The motion sensors can be adjusted to be more sensitive upon a detection of a security problem in a near home.

For an agricultural farm there can be a field network and cattle handling network. For the field, there can be a temperature sensor, ground humidity sensor. The irrigation system may be adjusted accordingly. It can also be impacted by cloud server information of last week rain fall and weather forecast. The cattle feeding system can use measurements of the cow weight, food left and cloud server information on weather forecast and cattle diseases. For the system, a network can be used for the transportation system of traffic lights and road sign.

Fig 1 shows a wireless sensor network on the home network. Hardware gateway **10** is connected most likely through a low power Wi-fi network such as Zigbee to sensor **16** which is connected through a mesh network to other sensors. Appliance controller **17** and camera **18** are most likely connected through a PLC connection over the power lines. The gateway is connected to the internet via the house router and via the internet the house computing devices such as Smart Phone **11**, Tablet **12** or PC are connected to it and can receive sensor information from it and control the home appliances via controllers **17** and get home video via camera **18**. A sensor can count cars which together with information on other city roads can impact the behavior of the traffic light.

FIG. 2 shows a description of a system where the cloud server **20** is serving as a gateway for multiple environment networks. These can be multiple homes **21** agricultural farm **22** of city systems **23**. This disclosure will focus on home network, but methods and apparatus described are also good for other types of environments.

FIG. 3 describes a home network system controlled by a cloud server. Home mesh sensor **36** network is connected to router **35** via a low power Wi-Fi such as Zigbee. So does home controllers **37** and home cameras **38** which are connected most likely over a PLC connection. The router is connected via the home broad band modem **34** to the internet and to the cloud server **20** serving as the gateway. It is connected via internet to the home resident smart phones **11**, tablets **12** or PCs **13**. The home device will have a TCP/IP stack which will allow them direct interface with the server. The sensors are connected through a mesh network as it is not guaranteed that a high frequency

(2.4Ghz) wi-fi signal from a device will reach the router from anywhere in the house, but it will reach the neighboring device which will pass it on.

FIG. 8 describes the server gateway structure. The server is connected to the house computing devices **11**, **12** and **13**. One of them will serve as the programming device. A house registration and control unit **81** will handle the subscription of the house hold and will provide a password to the household. There can be a special password for the system manager. For better security, the house computing devices (their ID, MAC address) will be registers .It will also handle the login sequence and authentication of the house computing devices trying to get the service. Device ID **82** will handle the device introduction sequence, to be explained later, and then the house device addressing control. Monitoring device **83** will collect information from the house sensors. Based on the house information from **83** and addressing from **82** device control unit **84** will provide automatic control the house controllers. User communication device **85** will handle the communication with the user computing device and will get and execute the user instructions.

FIG. 4 describes a house router adapted to communicate with the house devices. A standard house router has a Wi-fi and LAN connections. This is not sufficient for the house network devices which may have other forms of communication. Router **35** is a standard home router. It will be connected via its LAN connections to adapters **42** and **43**. Adapter **42** will be a low power Wi-fi connection, for example Zigbee. There are several types of low power wifi standards, so there may be several such adapters. Adapter **43** will be a PLC, a power line communication adapter. For best reliability two routers need to be placed in every house.

FIG. 5 describes a home network sensor unit. It will have a sensor device 51 connected to a microcontroller 52, which is connected to a low power communication device 53. They are all feeding from battery 55. Presently, there is a sensor chip per purpose – temperature, light, motion etc. It is of course better to allow a single chip implementation of the sensors. This will require implementing the sensors in CMOS. For the temperature, the sensor can be a bi-metal sensor or a CMOS sensor where the behavior of an amplifier is temperature dependent. Light sensors can be implements in CMOS like all camera chips. Smoke sensor can use a light transmission and a CMOS light sensor. Motion detectors are traditionally heat sensors (emitted by a live body entering the room) or IR sensors built using GAAS technologies. Motion sensing can also be achieved using the camera and detecting a significant change in the picture over time.

Another alternative is to use RF signature – have multiple directional antennas and transmit a high frequency (e.g. 5Ghz) signal. If an object is entering the room it will change the RF signature received by the device. For best user convenience instead of battery 55 a solar cell connected to a rechargeable battery will be used. The solar cell is very thin and this will allow having the device as a sticker, instead of the present boxes with 2 AAA batteries. A solar cell is not a must, a regular coin battery offering about 200mah or a thin battery offering 20mha can be used if the communication power is reduced. The solar cell however, with a 2*2 cm size, can provide an energy of only 5uw.

Therefore, special handling of the communication, which wastes most of the energy needs to take place. A network device is transmitting only in a very small fraction of the time – the trouble is that most of the energy is spent on the device actively listening. The mesh network is posing a special problem. This means that every device on the network must be listening all the time for a potential communicated over the mesh. Low power communication devices such as Zigbee or Ant offer a very short transmission time – few usec, but when they are on they still consume more than 20ma.

To avoid that, it is recommended to have all the devices synchronized. This can be done by the server instructing one of the devices to transmit a synchronization message. All the communication can then be sent every second. The listening time will be few microsec every second. For the lowest possible communication power consumption new special communication component need to be built. For such a new device it is recommended to have a special "wake up" circuit in the communication devices used. A listening device will just have this circuit active. It will detect energy sent at the specific frequency. Once such an energy is detected. The device will enter to a digital communication mode with a high power consumption. As an alternative, communication using 37Mhz instead of the 900Mhz and 2.4Ghz traditionally used is recommended. It consumes much lower energy and also due to the low frequency can easily pass through walls, with no mesh required.

FIG. 6 describes an appliance network control unit, which is aimed to control appliance **66**. Microcontroller **52** will control switch **61** which can pass the power from power jack **65** to the appliance **66**. It will also have a PLC communication device **64** which will be connected to the power line through jack **65**. Device **62** will measure the current consumption passing through switch **61**. For ease of implementation, Switch **61** will be built using a high voltage interface which will reduce the voltage to be below **70**, which will allow device **62** to be built using CMOS technology

with high voltage capability. Device **63** will be an IR remote control device which can control appliance **66** in addition to the on/off control offered by switch **61**. It will receive the right sequence from the server.

FIG. 7 describes a network camera. Camera deice **52** is controlled by microcontroller **52**. To allow using the camera as a motion detector flash memory **72** will store old pictures which microcontroller **52** will compare with the present picture to detect a significant change, which would indicate that a new object entered the room. It will be connected to PLC communication unit **64**, which will be connected to power jack **65**, which will also feed all the devices.

For all three types of units, the microcontroller **52** will implement the required control and data transfer operations required. It will also have a TCPIP stack. Small, low power stacks are available in the market. It will also have in it's flash a unique ID for the device which will also tell it's type. Also, in the flash the IP address of the server will be programmed in.

The operation of the whole system will be performed in several steps:

1. Subscription
2. Device introduction
3. System programming
4. Automatic control
5. User control

The first 3 operations will be performed by a programming device, which is one of the house hold computing devices. The user will subscribe to the service by entering the appropriate web site. It will communicate with the server gateway unit **81**. It will get a password for all household devices and a password for himself. He will order the appropriate sensors, controllers and cameras.

Upon reception of the units, a unit introduction session will take place. The programming device will login. It will connect with the serer gateway unit **82**. It will also connect to the house network. First, all the house hold computing devices will be introduced – the deice ID, user name. Phone number will be registered. This will guarantee that only the household residents can control the home environment. The network devices will be placed correctly. The programming person will press on the introduction bottom in each unit.

Under one alternative, the unit will establish communication with the server using the programmed IP address, under another alternative it will broadcast a message over the house

network, the programmer computing device will get it and will transmit to it the server IP address. It will transmit it's ID and type to the server and a name will be given to it. The programming person will than program the system – indicate what automatic operation he wants and based on what conditions. The above process will be repeated for every house hold subscribing to the service. The server will control all subscribed households or all other subscribed environments.

Device **83** in the server will monitor the house sensors according to the programmed conditions. Once an action is required, it will activate unit **84**. Unit **84** will translate the required actions to command to specific control units in the house. The house residents may connect to the server, get an update on the house status. Potentially, the server may notify them on certain conditions or events in the house (e.g. a motion detected). They will be offered a menu of action with a list of the potential control devices and can activate the controller they wish. They can of course get video from the camera in the home they want. The user actions will be recorded and his profile of preferences prepared. His profile can travel with him – the user can enter his hotel room and by activating an application it will be set for his preferences.

While some arrangements are exampled above regarding the Internet, it is apparent that this disclosure equally applies to any network such as a LAN (Local Area Network), a WAN (Wide Area Network), or a MAN (Metropolitan Area Network). Further, the arrangement equally applies to any digital data network connecting multiple devices, wherein multiple distinct communication paths may be formed between a sender and a receiver of the message. Further, non-packet based networks and networks which use protocols other than IP (e.g., cell-based networks such as ATM) may equally use the arrangement. In addition, while IP addresses have been exampled herein for identification of the entities involved in the communication (such as the source and ultimate destination computers and the intermediate servers), any other type of addresses or identifiers (involving any of the OSI layers) may be equally used. For example, MAC (Medium Access Control) address may be used as an alternative or in addition to the IP address.

The applications that can use the arrangement include Electronic Mail (E-Mail) and electronic commerce such as banking, shopping, products, or services purchase. Further, the arrangement may be used for carrying sensitive information such as passwords and public (or private) encryption keys. Messages carried according to the arrangement may include voice, text, images, video, facsimile, characters, numbers or any other digitally represented information. In one

aspect, the messages are carrying multimedia information, such as audio or video. The multimedia is carried as part of a one-way or interactive audio or video service. The arrangement may be equally used for carrying any real-time or near-real-time information. The carried audio may be speech or music, and may serve telephony such as VoIP or an Internet radio service. Similarly, the carried video may be part of video services over the Internet such as video conferencing and IPTV (IP Television).

There is a growing widespread use of the Internet for carrying multimedia, such as video and audio. Various audio services include Internet-radio stations and VoIP (Voice-over-IP). Video services over the Internet include video conferencing and IPTV (IP Television). In most cases, the multimedia service is a real-time (or near real-time) application, and thus sensitive to delays over the Internet. In particular, two-way services such a VoIP or other telephony services and video-conferencing are delay sensitive.

In addition to the equipment cost, the costs associated with the operation of the information device are as follows: a. Communication service. The costs associated with the communication sessions. b. ISP, in the case of using the Internet. c. Information service. The costs associated with operating the relay servers. In general, billing the user for communication services by the provider may be: based on a. One -time fee; b. Flat fee for a period (e.g. monthly); c. per communication session; d. per lengths of communication sessions or messages; or any combination of the above.

A Next Generation Network (NGN) is a packet based network which can provide services including telecommunication services and able to make use of multiple broadband, Quality of Service (QoS) – enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. The NGN offers unrestricted access by users to different service providers. The NGN operator or any service provider using the NGN may offer gateway services based on the method described herein.

In one aspect the arrangement is used for security as part of cloud computing deployment. For example, messages exchanged between a cloud services provider and a user or as part of the cloud computing infrastructure. The cloud services may include Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS) and Cloud Infrastructure as a Service (IaaS), and the method described herein may be used as part of the implementing security measures such as described in the publication "Security Guidance for Critical Areas of Focus in Cloud Computing

V2.1", Prepared by the Cloud Security Alliance, December 2009, which is incorporated in its entirety for all purposes as if fully set forth herein.

FIG. 13 is a block diagram that illustrates a system **130** including a computer system **140** and the associated Internet **11** connection upon which an embodiment may be implemented. Such configuration is typically used for computers (hosts) connected to the Internet **11** and executing a server or a client (or a combination) software. A source computer such as laptop **12a**, an ultimate destination computer **13c** and relay servers **14a**-**14d** above, as well as any computer or processor described herein, may use the computer system configuration and the Internet connection shown in FIG. 13. The system **140** may be used as a portable electronic device such as a notebook / laptop computer, a media player (e.g., MP3 based or video player), a cellular phone, a Personal Digital Assistant (PDA), an image processing device (e.g., a digital camera or video recorder), and / or any other handheld computing devices, or a combination of any of these devices. Note that while FIG. 13 illustrates various components of a computer system, it is not intended to represent any particular architecture or manner of interconnecting the components; as such details are not germane to the present invention. It will also be appreciated that network computers, handheld computers, cell phones and other data processing systems which have fewer components or perhaps more components may also be used. The computer system of FIG. 13 may, for example, be an Apple Macintosh computer or Power Book, or an IBM compatible PC. Computer system **140** includes a bus **137**, an interconnect, or other communication mechanism for communicating information, and a processor **138**, commonly in the form of an integrated circuit, coupled with bus **137** for processing information and for executing the computer executable instructions. Computer system **140** also includes a main memory **134**, such as a Random Access Memory (RAM) or other dynamic storage device, coupled to bus **137** for storing information and instructions to be executed by processor **138**. Main memory **134** also may be used for storing temporary variables or other intermediate information during execution of instructions to be executed by processor **138**. Computer system **140** further includes a Read Only Memory (ROM) **136** (or other non-volatile memory) or other static storage device coupled to bus **137** for storing static information and instructions for processor **138**. A storage device **135**, such as a magnetic disk or optical disk, a hard disk drive for reading from and writing to a hard disk, a magnetic disk drive for reading from and writing to a magnetic disk, and/or an optical disk drive (such as DVD) for reading from and writing to a removable optical disk, is coupled to bus **137** for storing information and instructions. The hard disk drive, magnetic disk

drive, and optical disk drive may be connected to the system bus by a hard disk drive interface, a magnetic disk drive interface, and an optical disk drive interface, respectively. The drives and their associated computer-readable media provide non-volatile storage of computer readable instructions, data structures, program modules and other data for the general purpose computing devices. Typically computer system **140** includes an Operating System (OS) stored in a non-volatile storage for managing the computer resources and provides the applications and programs with an access to the computer resources and interfaces. An operating system commonly processes system data and user input, and responds by allocating and managing tasks and internal system resources, such as controlling and allocating memory, prioritizing system requests, controlling input and output devices, facilitating networking and managing files. Non-limiting examples of operating systems are Microsoft Windows, Mac OS X, and Linux.

The term "processor" is meant to include any integrated circuit or other electronic device (or collection of devices) capable of performing an operation on at least one instruction including, without limitation, Reduced Instruction Set Core (RISC) processors, CISC microprocessors, Microcontroller Units (MCUs), CISC-based Central Processing Units (CPUs), and Digital Signal Processors (DSPs). The hardware of such devices may be integrated onto a single substrate (e.g., silicon "die"), or distributed among two or more substrates. Furthermore, various functional aspects of the processor may be implemented solely as software or firmware associated with the processor.

Computer system **140** may be coupled via bus **137** to a display **131**, such as a Cathode Ray Tube (CRT), a Liquid Crystal Display (LCD), a flat screen monitor, a touch screen monitor or similar means for displaying text and graphical data to a user. The display may be connected via a video adapter for supporting the display. The display allows a user to view, enter, and/or edit information that is relevant to the operation of the system. An input device **132**, including alphanumeric and other keys, is coupled to bus **137** for communicating information and command selections to processor **138**. Another type of user input device is cursor control **133**, such as a mouse, a trackball, or cursor direction keys for communicating direction information and command selections to processor **138** and for controlling cursor movement on display **131**. This input device typically has two degrees of freedom in two axes, a first axis (e.g., x) and a second axis (e.g., y), that allows the device to specify positions in a plane.

The computer system **140** may be used for implementing the methods and techniques described herein. According to one embodiment, those methods and techniques are performed by

computer system **140** in response to processor **138** executing one or more sequences of one or more instructions contained in main memory **134**. Such instructions may be read into main memory **134** from another computer-readable medium, such as storage device **135**. Execution of the sequences of instructions contained in main memory **134** causes processor **138** to perform the process steps described herein. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions to implement the arrangement. Thus, embodiments of the invention are not limited to any specific combination of hardware circuitry and software.

The term "computer-readable medium" (or "machine-readable medium") as used herein is an extensible term that refers to any medium or any memory, that participates in providing instructions to a processor, (such as processor **138**) for execution, or any mechanism for storing or transmitting information in a form readable by a machine (e.g., a computer). Such a medium may store computer-executable instructions to be executed by a processing element and/or control logic, and data which is manipulated by a processing element and/or control logic, and may take many forms, including but not limited to, non-volatile medium, volatile medium, and transmission medium. Transmission media includes coaxial cables, copper wire and fiber optics, including the wires that comprise bus **137**. Transmission media can also take the form of acoustic or light waves, such as those generated during radio-wave and infrared data communications, or other form of propagated signals (e.g., carrier waves, infrared signals, digital signals, etc.). Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, or any other magnetic medium, a CD-ROM, any other optical medium, punch-cards, paper-tape, any other physical medium with patterns of holes, a RAM, a PROM, and EPROM, a FLASH-EPROM, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read.

Various forms of computer-readable media may be involved in carrying one or more sequences of one or more instructions to processor **138** for execution. For example, the instructions may initially be carried on a magnetic disk of a remote computer. The remote computer can load the instructions into its dynamic memory and send the instructions over a telephone line using a modem. A modem local to computer system **140** can receive the data on the telephone line and use an infra-red transmitter to convert the data to an infra-red signal. An infra-red detector can receive the data carried in the infra-red signal and appropriate circuitry can place the data on bus **137**. Bus **137** carries the data to main memory **134**, from which processor **138** retrieves and executes the

instructions. The instructions received by main memory **134** may optionally be stored on storage device **135** either before or after execution by processor **138**.

Computer system **140** also includes a communication interface **141** coupled to bus **137**. Communication interface **141** provides a two-way data communication coupling to a network link **139** that is connected to a local network **111**. For example, communication interface **141** may be an Integrated Services Digital Network (ISDN) card or a modem to provide a data communication connection to a corresponding type of telephone line. As another non-limiting example, communication interface **141** may be a local area network (LAN) card to provide a data communication connection to a compatible LAN. For example, Ethernet based connection based on IEEE802.3 standard may be used such as 10/100BaseT, 1000BaseT (gigabit Ethernet), 10 gigabit Ethernet (10GE or 10GbE or 10 GigE per IEEE Std 802.3ae-2002as standard), 40 Gigabit Ethernet (40GbE), or 100 Gigabit Ethernet (100GbE as per Ethernet standard IEEE P802.3ba), as described in Cisco Systems, Inc. Publication number 1-587005-001-3 (6/99), "Internetworking Technologies Handbook", Chapter 7: "Ethernet Technologies", pages 7-1 to 7-38, which is incorporated in its entirety for all purposes as if fully set forth herein. In such a case, the communication interface **141** typically include a LAN transceiver or a modem, such as Standard Microsystems Corporation (SMSC) LAN91C111 10/100 Ethernet transceiver described in the Standard Microsystems Corporation (SMSC) data-sheet "LAN91C111 10/100 Non-PCI Ethernet Single Chip MAC + PHY" Data-Sheet, Rev. 15 (02-20-04), which is incorporated in its entirety for all purposes as if fully set forth herein.

In one non-limiting example, the communication is based on a LAN communication, such as Ethernet, and may be partly or in full in accordance with the IEEE802.3 standard. For example, Gigabit Ethernet (GbE or 1 GigE) may be used, describing various technologies for transmitting Ethernet frames at a rate of a gigabit per second (1,000,000,000 bits per second), as defined by the IEEE 802.3-2008 standard. There are five physical layer standards for gigabit Ethernet using optical fiber (1000BASE-X), twisted pair cable (1000BASE-T), or balanced copper cable (1000BASE-CX). The IEEE 802.3z standard includes 1000BASE-SX for transmission over multi-mode fiber, 1000BASE-LX for transmission over single-mode fiber, and the nearly obsolete 1000BASE-CX for transmission over balanced copper cabling. These standards use 8b/10b encoding, which inflates the

line rate by 25%, from 1000 Mbit/s to 1250 Mbit/s, to ensure a DC balanced signal. The symbols are then sent using NRZ. The IEEE 802.3ab, which defines the widely used 1000BASE-T interface type, uses a different encoding scheme in order to keep the symbol rate as low as possible, allowing transmission over twisted pair. Similarly, The 10 gigabit Ethernet (10GE or 10GbE or 10 GigE may be used, which is a version of Ethernet with a nominal data rate of 10 Gbit/s (billion bits per second), ten times faster than gigabit Ethernet. The 10 gigabit Ethernet standard defines only full duplex point to point links which are generally connected by network switches. The 10 gigabit Ethernet standard encompasses a number of different physical layers (PHY) standards. A networking device may support different PHY types through pluggable PHY modules, such as those based on SFP+.

The powering scheme may be based on Power over Ethernet or PoE, which describes a system to pass electrical power safely, along with data, on Ethernet cabling, and may use phantom configuration for carrying the power. The PoE technology and applications are described in the White Paper "All You Need To Know About Power over Ethernet (PoE) and the IEEE 802.3af Standard", by PowerDsine Ltd., 06-0002-082 20-May-04, and in U.S. Pat. No. 6,473,609 to Lehr et al. titled: "Structure Cabling System", which are all incorporated in their entirety for all purposes as if fully set forth herein. The IEEE standard for PoE requires category 5 cable or higher for high power levels, but can operate with category 3 cable for low power levels. The power is supplied in common mode over two or more of the differential pairs of wires found in the Ethernet cables, and comes from a power supply within a PoE-enabled networking device such as an Ethernet switch or can be injected into a cable run with a midspan power supply. The IEEE 802.3af-2003 PoE standard, which is incorporated in its entirety for all purposes as if fully set forth herein, provides up to 15.4 Watts of DC power (minimum 44 V DC and 350 mA) to each device. Only 12.95 Watts is assured to be available at the powered device as some power is dissipated in the cable. The updated IEEE 802.3at-2009 PoE standard, also known as PoE+ or PoE plus, and which is incorporated in its entirety for all purposes as if fully set forth herein, provides up to 25.5 Watts of power. In PoE environment, a device may serve as a Power Sourcing Equipment (PSE) that provides ("sources") power on the Ethernet cable. A device consuming power from the LAN is referred to as a Powered Device (PD).

In the case of a dedicated or separated PCB or enclosure, the PCB or enclosure may be designed to be easily removable, for example by an end user. Such plug-in module is commonly

designed to be installed and removed typically by respectively connecting or disconnecting the module connectors (pins, plugs, jacks, sockets, receptacles or any other types) to or from the mating connectors, commonly using human hand force and without any tool. The connection mechanical support may be based only on the connectors, or supplemented by guides, rails, or any other mechanical support. Such a plug-in module may be pluggable into a computer system, motherboard, an intermediary device, or a memory.

All publications, standards, patents, and patent applications cited in this specification are herein incorporated by reference as if each individual publication, patent, or patent application were specifically and individually indicated to be incorporated by reference and set forth in its entirety herein.

Discussions herein utilizing terms such as, for example, "processing," "computing," "calculating," "determining," "establishing", "analyzing", "checking", or the like, may refer to operation(s) and/or process(es) of a computer, a computing platform, a computing system, or other electronic computing device, that manipulate and/or transform data represented as physical (e.g., electronic) quantities within the computer's registers and/or memories into other data similarly represented as physical quantities within the computer's registers and/or memories or other information storage medium that may store instructions to perform operations and/or processes.

Throughout the description and claims of this specification, the word “comprise" and variations of that word such as “comprises” and “comprising”, means "including, but not limited to …", and is not intended to exclude other additives, components, integers or steps. Throughout the description and claims of this specification, the word “couple’ and variations of that word such as “coupling”, "coupled" and “couplable” refers to an electrical connection (such as a copper wire or soldered connection), a logical connection (such as through logical devices of a semiconductor device), a virtual connection (such as through randomly assigned memory locations of a memory device) or any other suitable direct or indirect connections, for example for allowing for the transfer of power, signal or data. The terms "plurality" and "a plurality" as used herein includes, for example, "multiple" or "two or more". For example, "a plurality of items" includes two or more items.

The arrangements and methods described herein may be implemented using hardware, software or a combination of both. The term "software integration" or any other reference to the integration of two programs or processes herein refers to software components (e.g. programs,

modules, functions, processes etc.) that are (directly or via another component) combined, working or functioning together or form a whole, commonly for sharing a common purpose or set of objectives. Such software integration can take the form of sharing the same program code, exchanging data, being managed by the same manager program, executed by the same processor, stored on the same medium, sharing the same GUI or other user interface, sharing peripheral hardware (such as a monitor, printer, keyboard and memory), sharing data or a database, or being part of a single package. The term "hardware integration" or integration of hardware components herein refers to hardware components that are (directly or via another component) combined, working or functioning together or form a whole, commonly for sharing a common purpose or set of objectives. Such hardware integration can take the form of sharing the same power source (or power supply) or sharing other resources, exchanging data or control (e.g. by communicating), being managed by the same manager, physically connected or attached, sharing peripheral hardware connection (such as a monitor, printer, keyboard and memory), being part of a single package or mounted in a single enclosure (or any other physical collocating), sharing a communication port, or used or controlled with the same software or hardware. The term "integration" herein refers (as applicable) to a software integration, a hardware integration or a combination.

The term "message" is used generically herein to describe at least an ordered series of characters or bits intended to convey a package of information (or a portion thereof), which may be transferred from one point to another, such as by using communication via one or more communication mechanisms or by transferring among processes. The term "port" refers to a place of access to a device, electrical circuit or network, where energy or signal may be supplied or withdrawn. The term "interface" of a networked device refers to a physical interface, a logical interface (e.g., a portion of a physical interface or sometimes referred to in industry as a sub-interface - for example, such as, but not limited to a particular VLAN associated with a network interface), and/or a virtual interface (e.g., traffic grouped together based on some characteristic - for example, such as, but not limited to, a tunnel interface).

As used herein, the term "Integrated Circuit" (IC) shall include any type of integrated device of any function where the electronic circuit is manufactured by the patterned diffusion of trace elements into the surface of a thin substrate of semiconductor material (e.g., silicon), whether single or multiple die, or small or large scale of integration, and irrespective of process or base materials (including, without limitation Si, SiGe, CMOS and GAs) including without limitation applications

specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), digital processors (e.g., DSPs, CISC microprocessors, or RISC processors), so-called "system-on-a-chip" (SoC) devices, memory (e.g., DRAM, SRAM, flash memory, ROM), mixed-signal devices, and analog ICs. The circuits in an IC are typically contained in a silicon piece or in a semiconductor wafer, and commonly packaged as a unit. The solid-state circuits commonly include interconnected active and passive devices, diffused into a single silicon chip. Integrated circuits can be classified into analog, digital and mixed signal (both analog and digital on the same chip). Digital integrated circuits commonly contain many of logic gates, flip-flops, multiplexers, and other circuits in a few square millimeters. The small size of these circuits allows high speed, low power dissipation, and reduced manufacturing cost compared with board-level integration. Further, a multi-chip module (MCM) may be used, where multiple integrated circuits (ICs), semiconductor dies or other discrete components are packaged onto a unifying substrate, facilitating their use as a single component (as though a larger IC).

The term "computer" is used generically herein to describe any number of computers, including, but not limited to personal computers, embedded processing elements and systems, control logic, ASICs, chips, workstations, mainframes, etc. Any computer herein may consist of, or be part of, a handheld computer, including any portable computer which is small enough to be held and operated while holding in one hand or fit into a pocket. Such a device, also referred to as a mobile device, typically has a display screen with touch input and / or miniature keyboard. Non-limiting examples of such devices include Digital Still Camera (DSC), Digital video Camera (DVC or digital camcorder), Personal Digital Assistant (PDA), and mobile phones and smartphones. The mobile devices may combine video, audio and advanced communication capabilities, such as PAN and WLAN. A mobile phone (also known as a cellular phone, cell phone and a hand phone) is a device which can make and receive telephone calls over a radio link whilst moving around a wide geographic area, by connecting to a cellular network provided by a mobile network operator. The calls are to and from the public telephone network which includes other mobiles and fixed-line phones across the world. The smartphones may combine the functions of a personal digital assistant (PDA), and may serve as portable media players and camera phones with high-resolution touch-screens, web browsers that can access, and properly display, standard web pages rather than just mobile-optimized sites, GPS navigation, Wi-Fi and mobile broadband access. In addition to telephony, the smartphones may support a wide variety of other services such as text messaging,

MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography.

Some embodiments may be used in conjunction with various devices and systems, for example, a Personal Computer (PC), a desktop computer, a mobile computer, a laptop computer, a notebook computer, a tablet computer, a server computer, a handheld computer, a handheld device, a Personal Digital Assistant (PDA) device, a cellular handset, a handheld PDA device, an on-board device, an off-board device, a hybrid device, a vehicular device, a non-vehicular device, a mobile or portable device, a non-mobile or non-portable device, a wireless communication station, a wireless communication device, a wireless Access Point (AP), a wired or wireless router, a wired or wireless modem, a wired or wireless network, a Local Area Network (LAN), a Wireless LAN (WLAN), a Metropolitan Area Network (MAN), a Wireless MAN (WMAN), a Wide Area Network (WAN), a Wireless WAN (WWAN), a Personal Area Network (PAN), a Wireless PAN (WPAN), devices and/or networks operating substantially in accordance with existing IEEE 802.11, 802.11a, 802.11b, 802.11g, 802.11k, 802.11n, 802.11r, 802.16, 802.16d, 802.16e, 802.20, 802.21 standards and/or future versions and/or derivatives of the above standards, units and/or devices which are part of the above networks, one way and/or two-way radio communication systems, cellular radio-telephone communication systems, a cellular telephone, a wireless telephone, a Personal Communication Systems (PCS) device, a PDA device which incorporates a wireless communication device, a mobile or portable Global Positioning System (GPS) device, a device which incorporates a GPS receiver or transceiver or chip, a device which incorporates an RFID element or chip, a Multiple Input Multiple Output (MIMO) transceiver or device, a Single Input Multiple Output (SIMO) transceiver or device, a Multiple Input Single Output (MISO) transceiver or device, a device having one or more internal antennas and/or external antennas, Digital Video Broadcast (DVB) devices or systems, multi-standard radio devices or systems, a wired or wireless handheld device (e.g., BlackBerry, Palm Treo), a Wireless Application Protocol (WAP) device, or the like.

As used herein, the terms "program", "programmable", and "computer program" are meant to include any sequence or human or machine cognizable steps which perform a function. Such programs are not inherently related to any particular computer or other apparatus, and may be rendered in virtually any programming language or environment including, for example, C/C++, Fortran, COBOL, PASCAL, assembly language, markup languages (e.g., HTML, SGML, XML, VoXML), and the likes, as well as object-oriented environments such as the Common Object

Request Broker Architecture (CORBA), Java™ (including J2ME, Java Beans, etc.) and the like, as well as in firmware or other implementations. Generally, program modules include routines, programs, objects, components, data structures, etc., that performs particular tasks or implement particular abstract data types.

The terms "task" and "process" are used generically herein to describe any type of running programs, including, but not limited to a computer process, task, thread, executing application, operating system, user process, device driver, native code, machine or other language, etc., and can be interactive and/or non-interactive, executing locally and/or remotely, executing in foreground and/or background, executing in the user and/or operating system address spaces, a routine of a library and/or standalone application, and is not limited to any particular memory partitioning technique. The steps, connections, and processing of signals and information illustrated in the figures, including, but not limited to any block and flow diagrams and message sequence charts, may typically be performed in the same or in a different serial or parallel ordering and/or by different components and/or processes, threads, etc., and/or over different connections and be combined with other functions in other embodiments, unless this disables the embodiment or a sequence is explicitly or implicitly required (e.g., for a sequence of read the value, process the value--the value must be obtained prior to processing it, although some of the associated processing may be performed prior to, concurrently with, and/or after the read operation). Where certain process steps are described in a particular order or where alphabetic and / or alphanumeric labels are used to identify certain steps, the embodiments of the invention are not limited to any particular order of carrying out such steps. In particular, the labels are used merely for convenient identification of steps, and are not intended to imply, specify or require a particular order for carrying out such steps. Furthermore, other embodiments may use more or less steps than those discussed herein. The invention may also be practiced in distributed computing environments where tasks are performed by remote processing devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

As used herein, the terms "network", "communication link" and "communications mechanism" are used generically herein to describe one or more networks, communications media or communications systems, including, but not limited to, the Internet, private or public telephone, cellular, wireless, satellite, cable, data networks. Data networks include, but not limited to,

Metropolitan Area Networks (MANs), Wide Area Networks (WANs), Local Area Networks (LANs), Personal Area networks (PANs), WLANs (Wireless LANs), Internet, internets, NGN, intranets, Hybrid Fiber Coax (HFC) networks, satellite networks, and telco networks. Communication media include, but not limited to, a cable, an electrical connection, a bus, and internal communications mechanisms such as message passing, interprocess communications, and shared memory. Such networks or portions thereof may utilize any one or more different topologies (e.g., ring, bus, star, loop, etc.), transmission media (e.g., wired/RF cable, RF wireless, millimeter wave, optical, etc.) and/or communications or networking protocols (e.g., SONET, DOCSIS, IEEE Std. 802.3, ATM, X.25, Frame Relay, 3GPP, 3GPP2, WAP, SIP, UDP, FTP, RTP/RTCP, H.323, etc.). While exampled herein with regard to secured communication between a pair of network endpoint devices (host-to-host), the described method can equally be used to protect the data flow between a pair of gateways or any other networking-associated devices (network-to-network), or between a network device (e.g., security gateway) and a host (network-to-host).

Some embodiments may be used in conjunction with one or more types of wireless communication signals and/or systems, for example, Radio Frequency (RF), Infra Red (IR), Frequency-Division Multiplexing (FDM), Orthogonal FDM (OFDM), Time-Division Multiplexing (TDM), Time-Division Multiple Access (TDMA), Extended TDMA (E-TDMA), General Packet Radio Service (GPRS), extended GPRS, Code-Division Multiple Access (CDMA), Wideband CDMA (WCDMA), CDMA 2000, single-carrier CDMA, multi-carrier CDMA, Multi-Carrier Modulation (MDM), Discrete Multi-Tone (DMT), Bluetooth (RTM), Global Positioning System (GPS), Wi-Fi, Wi-Max, ZigBee (TM), Ultra-Wideband (UWB), Global System for Mobile communication (GSM), 2G, 2.5G, 3G, 3.5G, Enhanced Data rates for GSM Evolution (EDGE), or the like. Further, a wireless communication may be based on wireless technologies that are described in Chapter 20: "Wireless Technologies" of the publication number 1-587005-001-3 by Cisco Systems, Inc. (7/99) titled: "Internetworking Technologies Handbook", which is incorporated in its entirety for all purposes as if fully set forth herein.

To allow communications between the general purpose computing devices, a computing or networking device preferably includes a network interface or an adapter, such as communication interface **141**. While the preferred embodiment contemplates that communications will be exchanged primarily via Ethernet, Internet or a broadband network, other means of exchanging communications are also contemplated. For example, a wireless access interface that receives and

processes information exchanged via a wireless communications medium, such as, cellular communication technology, satellite communication technology, Bluetooth technology, WAP (Wireless Access Point) technology, or similar means of wireless communication can be utilized by the general purpose computing devices. Such an interface commonly includes a connector for wired or conductive medium, an antenna for over-the-air radio-frequency based communication and fiber-optic connector for fiber-optic cable based medium. A transceiver (transmitter / receiver set) is coupled to the connector or antenna, for transmitting to, and receiving from, the communication medium. A transmitter may be capable of operating at serial bit rates above 1 Gigabit/second, and a wired transmitter commonly use differential signaling and low voltages for faster switching, such as MOS Current Mode Logic (MCML) based technology. The transmitter may use pre-emphasis or de-emphasis to shape the transmitted signal to compensate for expected losses and distortion. The line-code may employ self-clocking and other encoding schemes, and control information is transmitted along with the data for error detection, alignment, clock correction, and channel bonding. Some popular encoding schemes are 8B/10B, 64B/66B, and 64B/67B. A receiver is commonly designed to mate with the corresponding transmitter and to recover the data and clock from the received signals, and commonly use equalization, and may further include impedance matching termination. PLLs (Phase Locked Loops) are commonly used for clock reconstruction and for achieving a serial clock that is an exact multiple of the parallel data. The receiver commonly decodes the received signal, and detects encoding-based errors. The byte boundaries and other alignment schemes may also be performed by the receivers. A transceiver may include a modem (MOdulator – DEModulator).

Any networking protocol may be utilized for exchanging information between the partners (e.g., the source computer, the ultimate destination computer and the relay servers) within the network (such as the Internet). For example, it is contemplated that communications can be performed using TCP/IP. Generally, HTTP and HTTPS are utilized on top of TCP/IP as the message transport envelope. These two protocols are able to deal with firewall technology better than other message management techniques. However, partners may choose to use a message-queuing system instead of HTTP and HTTPS if greater communications reliability is needed. A non-limiting example of a message queuing system is IBM's MQ-Series or the Microsoft Message Queue (MSMQ). The system described hereinafter is suited for both HTTP/HTTPS, message-queuing systems, and other communications transport protocol technologies. Furthermore,

depending on the differing business and technical requirements of the various partners within the network, the physical network may embrace and utilize multiple communication protocol technologies.

The corresponding structures, materials, acts, and equivalents of all means plus function elements in the claims below are intended to include any structure, or material, for performing the function in combination with other claimed elements as specifically claimed. The description of the present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the invention in the form disclosed. The present invention should not be considered limited to the particular embodiments described above, but rather should be understood to cover all aspects of the invention as fairly set out in the attached claims. Various modifications, equivalent processes, as well as numerous structures to which the present invention may be applicable, will be readily apparent to those skilled in the art to which the present invention is directed upon review of the present disclosure.

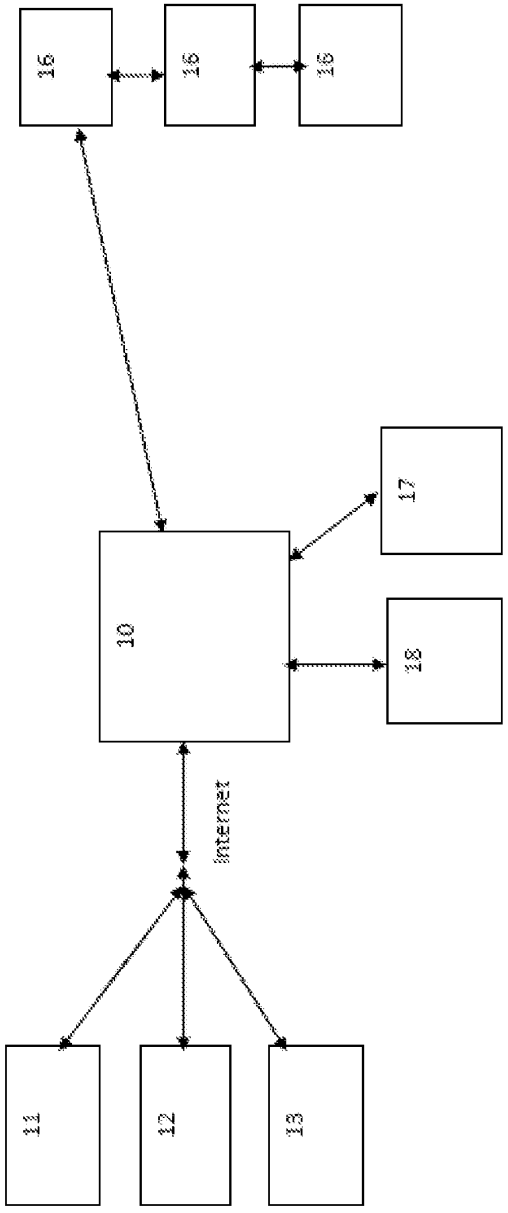


FIG. 1

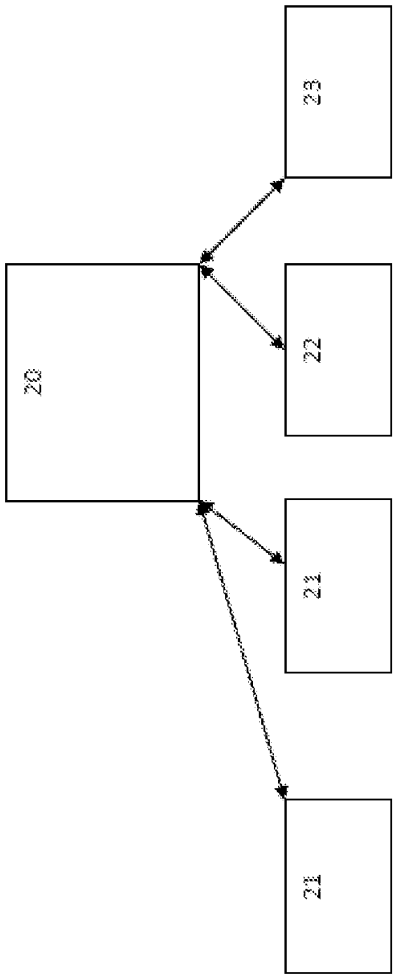


FIG. 2

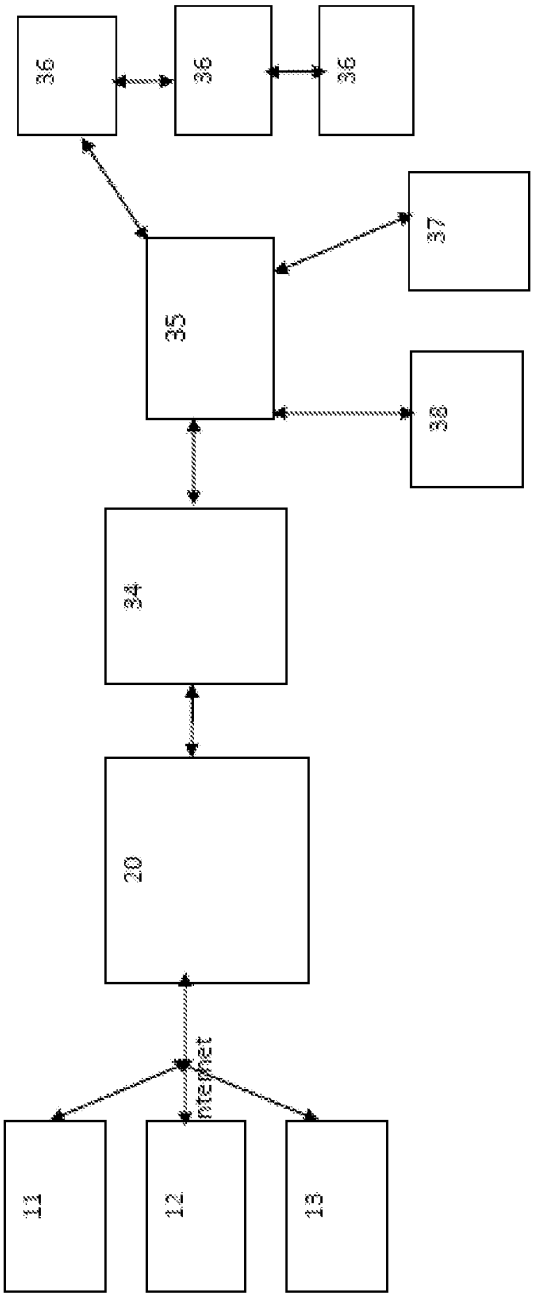


FIG. 3

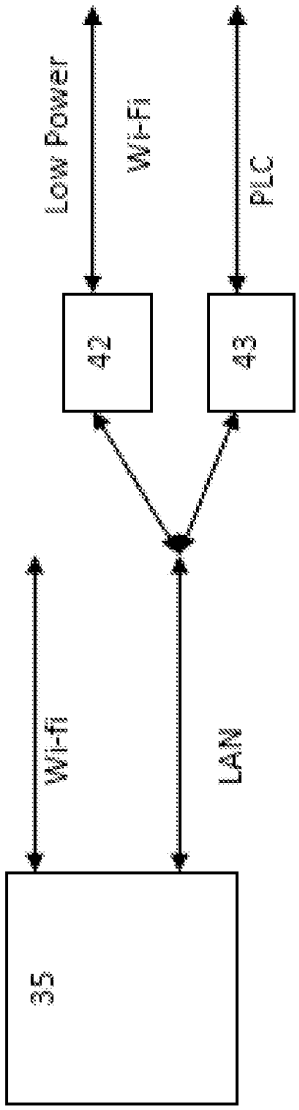


FIG. 4

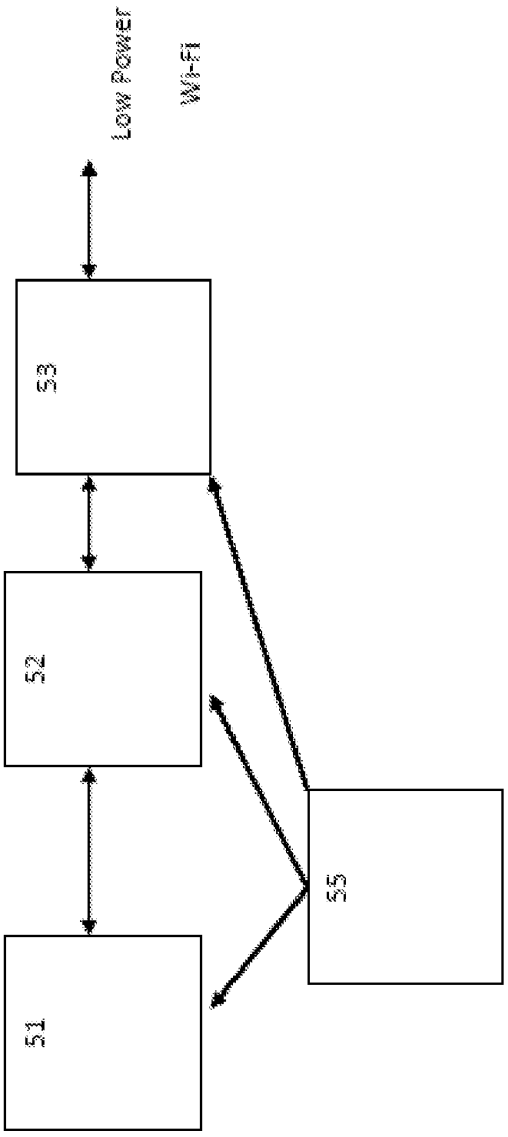


FIG. 5

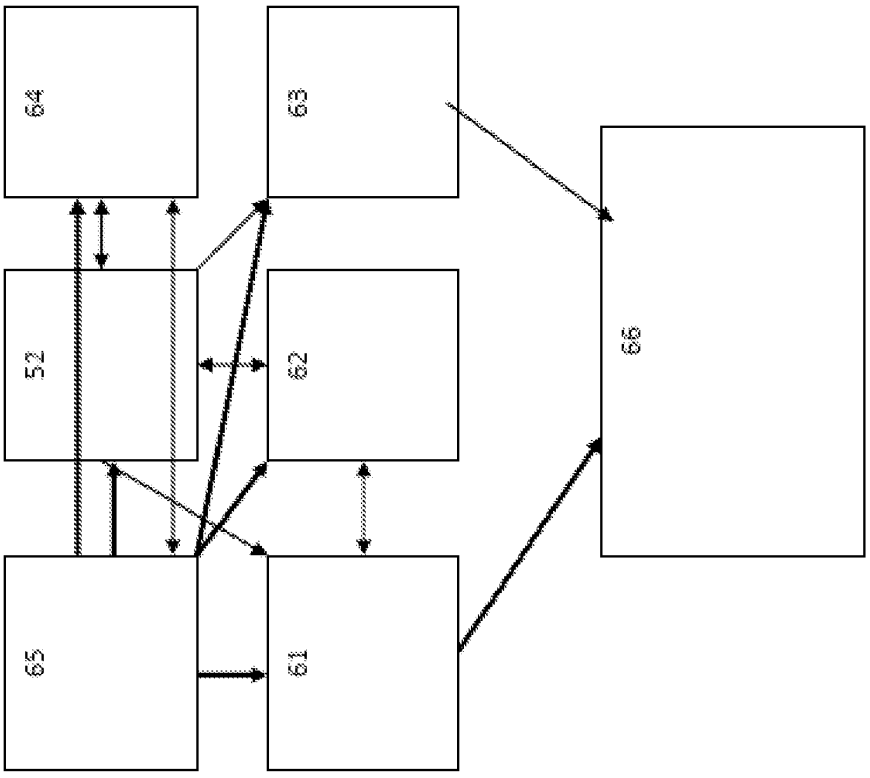


FIG. 6

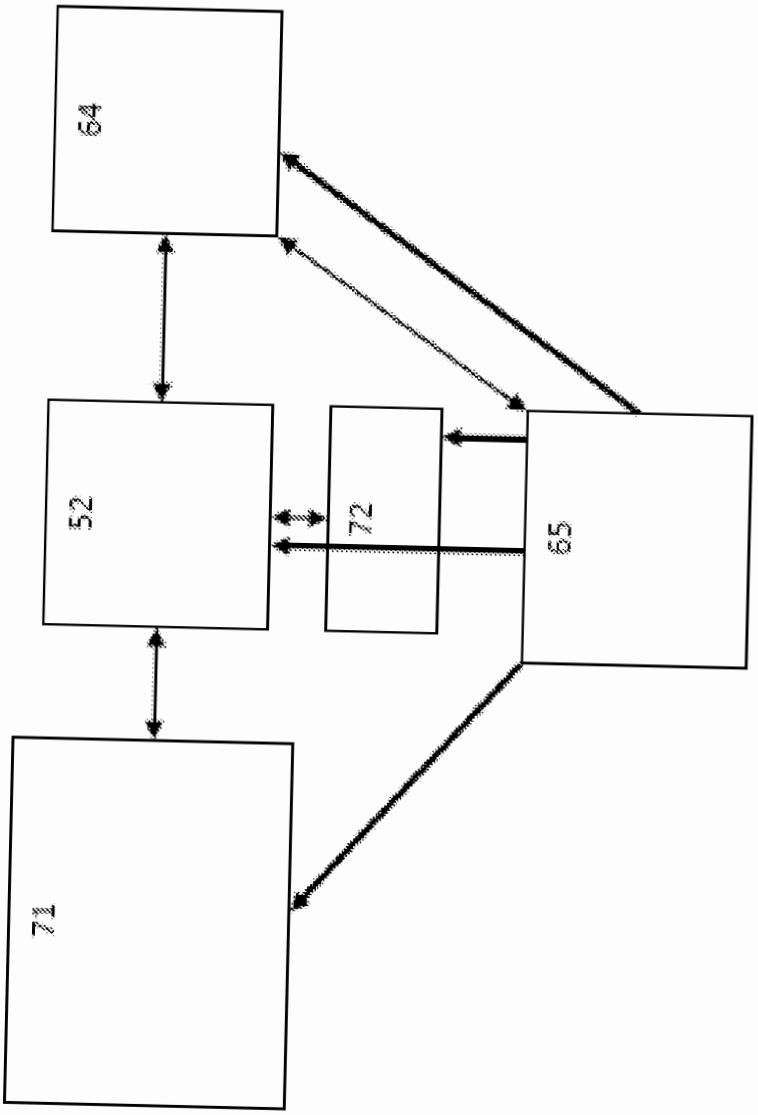


FIG. 7

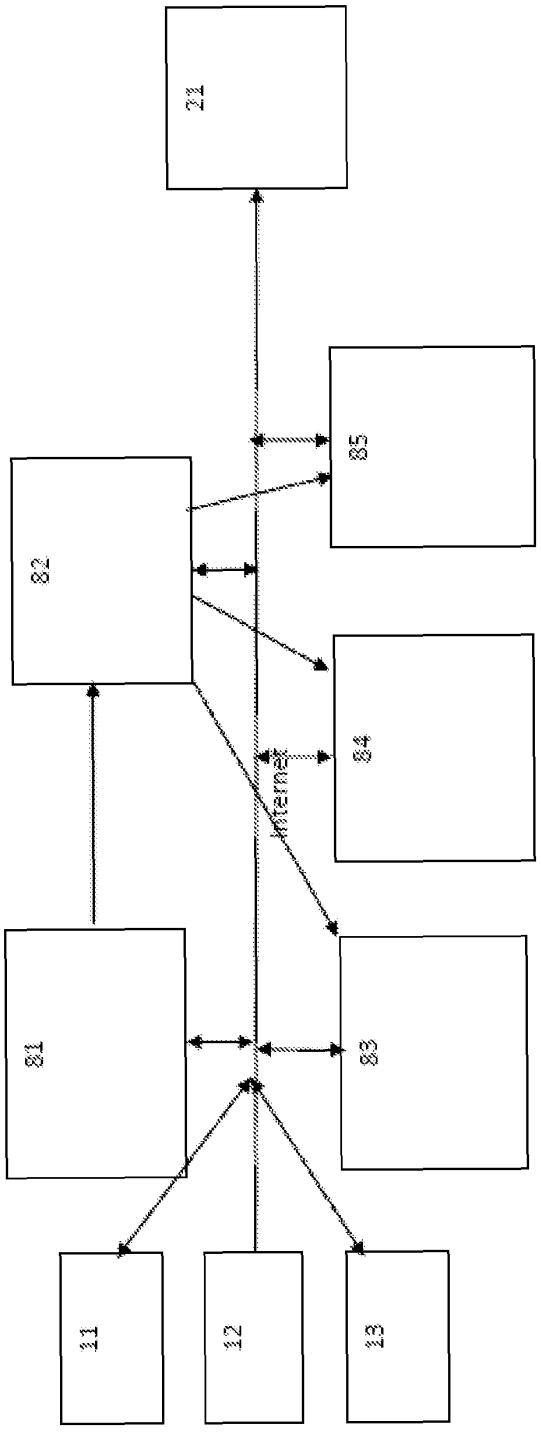


FIG. 8

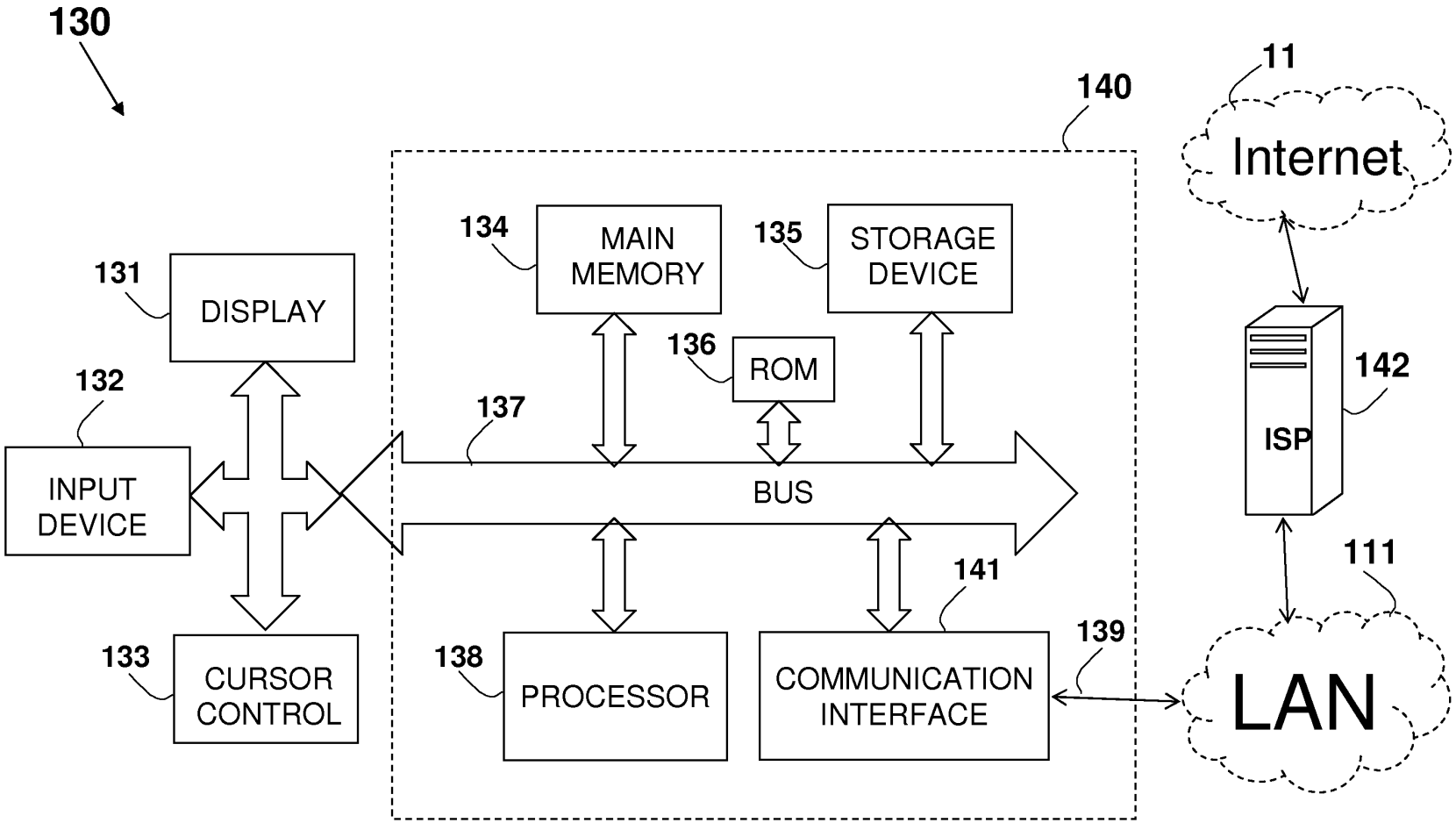


FIG. 13

Amazon EX1051 Page 42
Amazon v. Smart Speaker IPR2026-00145

| Electronic Patent Application Fee Transmittal | |
|---|---|
| **Application Number:** | |
| **Filing Date:** | |
| **Title of Invention:** | SYSTEM AND METHOD FOR CLOUD SERVER AS A GATEWAY |
| **First Named Inventor/Applicant Name:** | Yehuda BINDER |
| **Filer:** | Roger Lowen Browdy/Elizabeth Jerman |
| **Attorney Docket Number:** | BINDER=40 |
| Filed as Small Entity | |

**Provisional Filing Fees**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| Provisional Application filing fee | 2005 | 1 | 125 | 125 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
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| | | **Total in USD ($)** | | **125** |

| Electronic Acknowledgement Receipt | |
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| **EFS ID:** | 11791004 |
| **Application Number:** | 61584500 |
| **International Application Number:** | |
| **Confirmation Number:** | 2494 |
| **Title of Invention:** | SYSTEM AND METHOD FOR CLOUD SERVER AS A GATEWAY |
| **First Named Inventor/Applicant Name:** | Yehuda BINDER |
| **Customer Number:** | 1444 |
| **Filer:** | Roger Lowen Browdy/Elizabeth Jerman |
| **Filer Authorized By:** | Roger Lowen Browdy |
| **Attorney Docket Number:** | BINDER=40 |
| **Receipt Date:** | 09-JAN-2012 |
| **Filing Date:** | |
| **Time Stamp:** | 15:55:39 |
| **Application Type:** | Provisional |

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| Submitted with Payment | yes |
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| Deposit Account | |
| Authorized User | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
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| 2 | | 2012-01-09Application.pdf | 195207<br>9626c2bc0c31ba8bfe49e4a2b790f373e67c1dce | yes | 38 |
| | **Multipart Description/PDF files in .zip description** | | | | |
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| | Specification | | 1 | 29 | |
| | Drawings-only black and white line drawings | | 30 | 38 | |
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| 3 | Fee Worksheet (SB06) | fee-info.pdf | 29964<br>8c5c5bcc8b4ac9596a4379863c3a1eae3a5123ce | no | 2 |
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| | | **Total Files Size (in bytes):** | 244091 | | |

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**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**<u>National Stage of an International Application under 35 U.S.C. 371</u>**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**<u>New International Application Filed with the USPTO as a Receiving Office</u>**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**