(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 December 2014 (18.12.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/199323 A2

(51) International Patent Classification:
H04B 10/11 (2013.01)

(21) International Application Number:
PCT/IB2014/062152

(22) International Filing Date:
12 June 2014 (12.06.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1998/MUM/2013 12 June 2013 (12.06.2013) IN

(72) Inventor; and
(71) Applicant : **AMIT KUMAR JAIN, Amit** [IN/IN]; W-104, Rear Lower Ground Floor, Grater Kailash, Part One, New Delhi 110048 (IN).

(74) Agent: **ARJUN KARTHIK BALA, Arjun**; Metayage IP Strategy Consulting LLP, Global Incubation Services, CA Site No.1, JSS Institution Campus, HAL 3rd stage, Behind Hotel Leela Place, Kodihally, Bangalore 560008 (IN).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) Title: METHOD OF ULTRA FAST WIRELESS COMMUNICATION

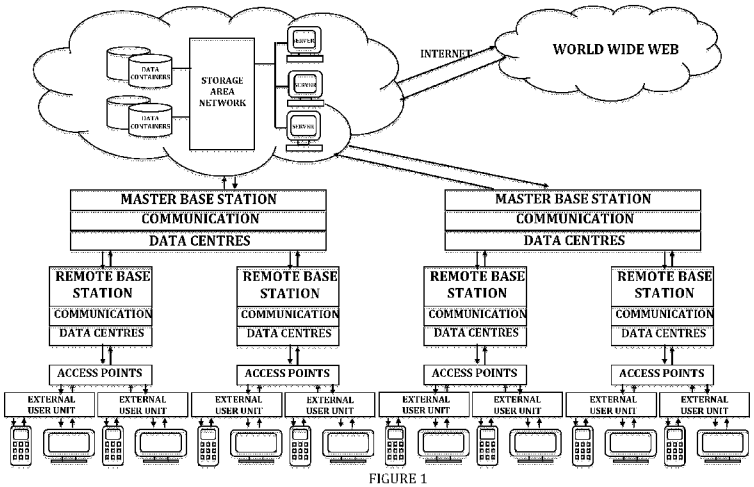

FIGURE 1

(57) Abstract: The present invention is a method to facilitate connections for data transmission at much greater speeds than what is presently available to the consumer, quintessentially speeds greater than 1Gbps at a constant rate, reducing the time required for downloading and uploading of huge data like 4k or 8k content. The present invention also facilitates providing a variety of cloud-based services apart from providing an Internet connection to enterprises and end consumers. The present invention is a method that utilizes a hybrid connection infrastructure that uses free space communication optical laser links and wireless ultra fast data links using standards like IEEE 802.11ad and IEEE 802.11ac. Combined together, these two media for data transmissions provide the fastest uplink and downlink data transmission that can be achieved using today's available technology and can be implemented on a large global scale

WO 2014/199323 A2

METHOD OF ULTRA FAST WIRELESS COMMUNICATION

BACKGROUND

Technical Field

[0001] The present invention is related to the field of wireless communication and more particularly to wireless communication using free space optical lasers and wireless radio frequency bands that combine together to achieve ultra fast communication.

Description of the Related Art

[0002] As of the filing date of this application, latest available statistics indicate that there are 2.4 billion Internet users, and the total continues to grow apace. Internet data use is increasing exponentially and expected to continue at a rapid speed with advent and growth of technologies like live steaming games, apps, media content and that too at 4k-8k resolution. Currently a full HD (1k) movie has an average size of 6-8GB of data to be downloaded or streamed and 4k would be about 100GB whereas 8k would be about 300-400GB. Using today's technology, it is not feasible (both in terms of cost as well as time required) to download or stream a 4k or 8k content at the best available broadband speeds of around 8mbps (India) to 16- 40mbps in US or with a upcoming 4G connection promising 18mbps (theoretical) data speed or at 3G with 7mbps(theoretical) speed.

[0003] For example, to download a 4k movie of about 100GB, at an average speed of 8 Mbps, it would take more than a day's time to download the movie.

[0004] If we consider a 4k movie, that typically has a size of 100GB +, at an average speed of 50Mbps (which is the highest available connection speed), it takes approximately over 5.5 hours to download the movie completely, which is highly inconvenient for a user.

[0005] Hence what is required is an improved method to facilitate connections for data transmission at much greater speeds, quintessentially speeds greater than 1Gbps at a constant rate, reducing the time required for downloading and uploading of huge data like 4k or 8k content, and also, the method should be feasible and sustainable, making the cost of the connection and the associated data transfers economic and effective

SUMMARY

[0006] The present invention is a method to facilitate connections for data transmission at much greater speeds than what is presently available to the consumer, quintessentially speeds greater than 1Gbps at a constant rate, reducing the time required for downloading and uploading of huge data like 4k or 8k content.

[0007] The present invention implements a feasible and sustainable method that makes the cost of internet connection and the associated data transfers economic and effective for the enterprises and end consumer.

[0008] The present invention also facilitates providing a variety of cloud-based services apart from providing an Internet connection to enterprises and end consumers.

[0009] The present invention is a method that utilizes a hybrid connection that involves free space communication optical laser link and wireless ultra fast data link. Combined together, these two media for data transmissions provide the fastest uplink and downlink data transmission that can be achieved using today's available technology and can be implemented on a large global scale.

[0010] The present invention is a method of wireless communication to facilitate uplink and downlink communication and services between a user and a service provider. The method comprises: establishing an uplink and a downlink free space optical laser link

between a primary transceiver level comprising at least one master base station and a secondary transceiver level comprising at least one remote base station; establishing an uplink and a downlink free space communication optical laser link between said secondary transceiver level and a tertiary transceiver level wherein said tertiary transceiver level comprises at least one access point unit; establishing an uplink and downlink free space communication optical laser link between said tertiary transceiver level and an internal user unit wherein said internal user unit is located indoors; establishing an uplink and downlink wireless ultra fast data transmission link between said internal user unit and a user communication device, wherein said user communication device is located indoors; establishing an uplink and downlink free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors; establishing an uplink and a downlink free space communication optical laser link between an external user unit and said user communication device wherein said user communication device and said external user unit are located outdoors; establishing an uplink and downlink wireless ultra fast data transmission link between said external user unit and said user communication device wherein said user communication device and said external user unit are located outdoors; establishing a computing cloud and integrating said primary transceiver level with said computing cloud for providing enterprise and consumer end services.

[0011] The method further comprises: receiving in a service server integrated to said computing cloud, an uplink data generated in said user communication device, comprising: transmitting said uplink data from said user's communication device to said internal user unit using said wireless ultra fast data transmission link between said internal user unit and said user's communication device wherein said user communication

device is located indoors, transmitting said uplink data from said user's communication device to said internal user unit using said free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors, transmitting said uplink data from said user's communication device to said external user unit using said free space communication optical laser link between said external user unit and said user communication device wherein said user communication device is located outdoors, transmitting said uplink data from said user's communication device to said external user unit using said wireless ultra fast data transmission link between said external user unit and said user communication device wherein said user communication device is located outdoors, transmitting said uplink data from said internal user unit to said access point unit using said free space communication optical laser link between said access point unit and said internal user unit wherein said internal user unit is located indoors, transmitting said uplink data from said external user unit to said tertiary transceiver level said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said external user unit is located outdoors, transmitting said first data from said tertiary transceiver level to said secondary transceiver level using said free space communication optical laser link between said secondary transceiver level and said tertiary transceiver level, transmitting said uplink data from said secondary transceiver level to said primary transceiver level using said free space communication optical laser link between said secondary transceiver level and said primary transceiver level, transmitting said uplink data from said primary transceiver level to said service server integrated to said computing cloud.

[0012] The method further comprises: sending a downlink data from said computing cloud to said user communication device, comprising: transmitting said

downlink data from said service server to said primary transceiver level, transmitting said downlink data from said primary transceiver level to said secondary transceiver level using said free space communication optical laser link between said secondary transceiver level and said primary transceiver level, transmitting said downlink data from said secondary transceiver level to said tertiary transceiver level using said free space communication optical laser link between said secondary transceiver level and tertiary transceiver level, transmitting said downlink data from said tertiary transceiver level to said external user unit using said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said external user unit is located outdoors, transmitting said downlink data from said tertiary transceiver level to said internal user unit using said free space communication optical laser link between said tertiary transceiver level and said internal user unit wherein said internal user unit is located indoors, transmitting said downlink data from said internal user unit to said user's communication device using said free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors, transmitting said downlink data from said internal user unit to said user's communication device using said wireless ultra fast data link between said internal user unit and said user's communication device wherein said user communication device is located indoors, transmitting said downlink data from said tertiary transceiver level to said external user unit using said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said internal user unit is located indoors, transmitting said downlink data from said external user unit to said user's communication device using said free space communication optical laser link between said external user unit and said user communication device wherein said user communication device is located outdoors,

transmitting said downlink data from said external user unit to said user's communication device using said wireless ultra fast data transceiver link between said external user unit and said user communication device wherein said user communication device is located outdoors.

[0013] The method further involves connecting, configuring and synchronizing data centers at said primary transceiver level and at said at least one secondary transceiver level, wherein data being transmitted through every primary transceiver level and every secondary transceiver level is processed and sent to said data centers wherein they are encrypted, logged and archived.

[0014] In the method, encryption and decryption of the uplink data and the downlink data are performed at each and every step to and fro between a user unit and a service server. This comprises: transmitting said uplink data from said internal user unit to said tertiary transceiver level further comprises encrypting said uplink data at said internal user unit and decrypting said uplink data at said tertiary transceiver level; transmitting said uplink data from said external user unit to said tertiary transceiver further comprises encrypting said uplink data at said external user unit and decrypting said uplink data at said tertiary transceiver level; transmitting said first data from said tertiary transceiver level to said secondary transceiver level further comprises encrypting said uplink data at said tertiary transceiver level and decrypting said uplink data at said secondary transceiver level; transmitting said uplink data from said at least one secondary transceiver level and said primary transceiver level further comprises encrypting said uplink data at said secondary transceiver level and decrypting said uplink data at said primary transceiver level; transmitting said uplink data from said primary transceiver level to said service server integrated to said computing cloud further comprises encrypting said data at said master base station and decrypting said uplink

data at said service server; transmitting said downlink data from said service server to said primary transceiver level further comprises encrypting said downlink data at said service server and decrypting said downlink data at said primary transceiver level; transmitting said downlink data from said primary transceiver level to said secondary transceiver level further comprises encrypting said downlink data at said primary transceiver level and decrypting said downlink data at said remote base station; transmitting said downlink data from said secondary transceiver level to said tertiary transceiver level further comprises encrypting said downlink data at said secondary transceiver level and decrypting said downlink data at said tertiary transceiver level; transmitting said downlink data from said tertiary transceiver level to said external user unit further comprises encrypting said downlink data at said tertiary transceiver level and decrypting said downlink data at said external user unit; transmitting said downlink data from said tertiary transceiver level to said internal user unit further comprises encrypting said downlink data at said tertiary transceiver level and decrypting said downlink data at said internal user unit.

[0015] In the method, establishing an uplink and a downlink free space optical laser link comprises establishing a line-of-sight propagation of an optical laser signal among the entities between whom an uplink and a downlink free space optical laser link is established. This comprises: establishing an uplink and a downlink free space optical laser link between said primary transceiver level and said secondary transceiver level comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one master base station and said at least one remote base station; establishing a line-of-sight propagation of at least one optical laser signal beam between multiple master base stations wherein said primary transceiver level comprises a plurality of master base stations; establishing an uplink and a downlink free space

communication optical laser link between said secondary transceiver level and said tertiary comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one remote base station and said at least one access point unit; establishing an uplink and downlink free space communication optical laser link between said tertiary transceiver level and said internal user unit further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one access point unit and said internal user unit; establishing an uplink and downlink free space communication optical laser link between said internal user unit and said user communication device further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said internal user unit and said user communication device; and establishing an uplink and a downlink free space communication optical laser link between said external user unit and said user communication device further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said external user unit and said user communication device

[0016] These and other aspects of the embodiments herein will be better appreciated and understood when considered in conjunction with the following description and the accompanying drawings. It should be understood, however, that the following descriptions, while indicating preferred embodiments and numerous specific details thereof, are given by way of illustration and not of limitation. Many changes and modifications may be made within the scope of the embodiments herein without departing from the spirit thereof, and the embodiments herein include all such modifications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The embodiments herein will be better understood from the following detailed description with reference to the drawings, in which:

[0018] Fig 1. illustrates a flow diagram of the flow of uplink and downlink communication and a high level architecture of a system wherein the present invention may be implemented.

[0019] Fig 2. illustrates a line-of-sight optical laser transmission between the laser communication device of a sender free space optical transceiver unit and the laser communication device of a receiver free space optical transceiver unit .

[0020] Fig 3. illustrates the computing cloud that maybe used to provide communication and various services. .

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0021] The embodiments herein and the various features and advantageous details thereof are explained more fully with reference to the non-limiting embodiments that are illustrated in the accompanying drawings and detailed in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[0022] The following detailed description contains specific details that are set forth to provide a comprehensive understanding of the present invention. Although the

following detailed description contains many specifics for the purposes of illustration, anyone of ordinary skill in the art will appreciate that many variations and alterations to the following details are within the scope of the invention.

[0023] Examples described herein refer specific standards, protocols, specifications etc., such as the application of the invention based on WirelessHD specifications and/or IEEE 802.11 specifications. However, the invention is not limited to the particular designations noted herein.

[0024] The present invention may be implemented to set up an infrastructure for providing Internet connections and optionally, various enterprise and end- consumer services. Uplink and downlink data transfers can be achieved using the various embodiments of the present invention.

[0025] The present invention has the capability to provide high – speed, stable and large scale commercially deployable internet connection providing service that implements a unique hybrid of combination of free space optical laser data transmissions and wireless ultra fast data transmissions.

[0026] The present invention is a method of wireless communication to facilitate uplink and downlink communication and services between a user and a service provider.

[0027] Said communication comprises all modern forms of electronic communication such as (but not limited to) Internet connections and associated communications, telecommunication, cable connections via IP and content delivery. Said services comprises services like (but not limited to) e-commerce services, social computing and social networking services, entertainment and media services media services, information services, hosting services, infrastructure providing services and application based services.

[0028] The present invention is a method of wireless communication to facilitate

uplink and downlink communication and services between a user and a service provider.

[0029] The method comprises: establishing an uplink and a downlink free space optical laser link between a primary transceiver level comprising at least one master base station and a secondary transceiver level comprising at least one remote base station; establishing an uplink and a downlink free space communication optical laser link between said secondary transceiver level and a tertiary transceiver level wherein said tertiary transceiver level comprises at least one access point unit; establishing an uplink and downlink free space communication optical laser link between said tertiary transceiver level and an internal user unit wherein said internal user unit is located indoors; establishing an uplink and downlink wireless ultra fast data transmission link between said internal user unit and a user communication device, wherein said user communication device is located indoors; establishing an uplink and downlink free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors; establishing an uplink and a downlink free space communication optical laser link between an external user unit and said user communication device wherein said user communication device and said external user unit are located outdoors; establishing an uplink and downlink wireless ultra fast data transmission link between said external user unit and said user communication device wherein said user communication device and said external user unit are located outdoors; establishing a computing cloud and integrating said primary transceiver level with said computing cloud for providing enterprise and consumer end services.

[0030] The method, further comprises: receiving in a service server integrated to said computing cloud, an uplink data generated in said user communication device, comprising: transmitting said uplink data from said user's communication device to said

internal user unit using said wireless ultra fast data transmission link between said internal user unit and said user's communication device wherein said user communication device is located indoors, transmitting said uplink data from said user's communication device to said internal user unit using said free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors, transmitting said uplink data from said user's communication device to said external user unit using said free space communication optical laser link between said external user unit and said user communication device wherein said user communication device is located outdoors, transmitting said uplink data from said user's communication device to said external user unit using said wireless ultra fast data transmission link between said external user unit and said user communication device wherein said user communication device is located outdoors, transmitting said uplink data from said internal user unit to said access point unit using said free space communication optical laser link between said access point unit and said internal user unit wherein said internal user unit is located indoors, transmitting said uplink data from said external user unit to said tertiary transceiver level said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said external user unit is located outdoors, transmitting said first data from said tertiary transceiver level to said secondary transceiver level using said free space communication optical laser link between said secondary transceiver level and said tertiary transceiver level, transmitting said uplink data from said secondary transceiver level to said primary transceiver level using said free space communication optical laser link between said secondary transceiver level and said primary transceiver level, transmitting said uplink data from said primary transceiver level to said service server integrated to said computing cloud.

[0031] The method further comprises: sending a downlink data from said computing cloud to said user communication device, comprising: transmitting said downlink data from said service server to said primary transceiver level, transmitting said downlink data from said primary transceiver level to said secondary transceiver level using said free space communication optical laser link between said secondary transceiver level and said primary transceiver level, transmitting said downlink data from said secondary transceiver level to said tertiary transceiver level using said free space communication optical laser link between said secondary transceiver level and tertiary transceiver level, transmitting said downlink data from said tertiary transceiver level to said external user unit using said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said external user unit is located outdoors, transmitting said downlink data from said tertiary transceiver level to said internal user unit using said free space communication optical laser link between said tertiary transceiver level and said internal user unit wherein said internal user unit is located indoors, transmitting said downlink data from said internal user unit to said user's communication device using said free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors, transmitting said downlink data from said internal user unit to said user's communication device using said wireless ultra fast data link between said internal user unit and said user's communication device wherein said user communication device is located indoors, transmitting said downlink data from said tertiary transceiver level to said external user unit using said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said internal user unit is located indoors, transmitting said downlink data from said external user unit to said user's communication device using said free space

communication optical laser link between said external user unit and said user communication device wherein said user communication device is located outdoors, transmitting said downlink data from said external user unit to said user's communication device using said wireless ultra fast data transceiver link between said external user unit and said user communication device wherein said user communication device is located outdoors.

[0032] Said user communication device maybe any electronic device that can be used for communication, sending and receiving any kind of data, such as (but not limited to) computers, televisions, mobile phones, video gaming consoles, tablets, home audio and video entertainment systems, portable audio and video players, hand held gaming devices, etc.

[0033] Said primary transceiver level comprises at least one master base station, and a master base station may further comprise (but not limited to) associated server, a free space optical transceiver unit and a mounting tower.

[0034] Said secondary transceiver level comprises at least one remote base station, and a remote base station may further comprise associated server, a free space optical transceiver unit and a mounting tower, as per requirement.

[0035] Said tertiary transceiver level comprises at least one access point unit, and an access point unit comprises a free space optical transceiver unit and a mounting tower.

[0036] Said external user unit and internal user unit also comprise a free space optical transceiver unit and a radio transceiver unit.

[0037] The free space optical transceiver unit in the master base stations, remote base stations, access point routers may comprise a laser communication device. The laser communication device may modulate communication signals into optical laser signals and transmits such signals, through a light transmitter, based on line-of-sight propagation

of the optical laser signal, to a receiver laser communication device at the receiver. The receiver laser communication device, receives the transmitted laser signal at a light receiver wherein demodulation of such signals is performed and laser signal is converted to communication signal.

[0038] Said radio transceiver unit at said external user unit and said internal user unit converts optical laser signal converted into communication signal by the free space optical transceiver unit into radio signals, and these radio signals can be sent to user a communication device. Said radio transceiver unit also converts radio signals received from a user communication device to communication signals so that they can further be converted to optical laser signals by said free space optical user unit present in the internal user unit or the external user unit, which can then be sent to an access point unit.

[0039] The servers associated with a master base station may be used to (but not limited to): connect and synchronize (process and data synchronization) a master base station with a plurality of other master base stations, connect and synchronize (process and data synchronization) a master base station to a plurality of remote base stations, connect and synchronize (process and data synchronization) a master base station to said computing cloud.

[0040] The servers associated with a remote base station may be used to (but not limited to): connect and synchronize (process and data synchronization) a remote base station to an access point unit, connect and synchronize (process and data synchronization) a remote base station to a master base station.

[0041] In the method, establishing an uplink and a downlink free space optical laser link comprises establishing a line-of-sight propagation of an optical laser signal among the entities between whom an uplink and a downlink free space optical laser link is established. This comprises: establishing an uplink and a downlink free space optical

laser link between said primary transceiver level and said secondary transceiver level comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one master base station and said at least one remote base station; establishing a line-of-sight propagation of at least one optical laser signal beam between multiple master base stations wherein said primary transceiver level comprises a plurality of master base stations; establishing an uplink and a downlink free space communication optical laser link between said secondary transceiver level and said tertiary comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one remote base station and said at least one access point unit; establishing an uplink and downlink free space communication optical laser link between said tertiary transceiver level and said internal user unit further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one access point unit and said internal user unit; establishing an uplink and downlink free space communication optical laser link between said internal user unit and said user communication device further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said internal user unit and said user communication device; and establishing an uplink and a downlink free space communication optical laser link between said external user unit and said user communication device further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said external user unit and said user communication device.

[0042] Laser signals are severely attenuated when they pass through the atmosphere containing fogs. Due to such attenuation, effective coverage of laser communication devices is limited and, in severe cases, communication stoppage may occur.

[0043] To over come this problem, the free space optical transceiver unit may use a laser beam guiding technology based on real time automated steering of optical laser beams. This technology enables real time optical link alignment and compensates for plus or minus 3 degrees of tower twist and sway caused by conditions such as heavy wind, sun, and ice and snow build up.

[0044] Real time guiding means that free space optical transceiver unit can be deployed on any type of tower or other structures without the stringent structural stability requirements that are typical of other wireless solutions.

[0045] This opens up more deployment opportunities and enables the shortest link paths possible—particularly relevant for ultra-low latency applications.

[0046] The free space optical transceiver may further comprise an adjustable slot means that allows said free space optical transceiver unit to install it on towers as per requirement.

[0047] The further involves connecting, configuring and synchronizing data centers at said primary transceiver level and at said at least one secondary transceiver level, wherein data being transmitted through every primary transceiver level and every secondary transceiver level is processed and sent to said data centers wherein they are encrypted, logged and archived.

[0048] Said data centers may comprise a storage area network and a server. This server may acquire the data received at a particular master base station or remote base station and store it using said storage area network.

[0049] In the method, encryption and decryption of the uplink data and the downlink data are performed at each and every step to and fro between a user unit and a service server. This comprises: transmitting said uplink data from said internal user unit to said tertiary transceiver level further comprises encrypting said uplink data at said

internal user unit and decrypting said uplink data at said tertiary transceiver level; transmitting said uplink data from said external user unit to said tertiary transceiver further comprises encrypting said uplink data at said external user unit and decrypting said uplink data at said tertiary transceiver level; transmitting said first data from said tertiary transceiver level to said secondary transceiver level further comprises encrypting said uplink data at said tertiary transceiver level and decrypting said uplink data at said secondary transceiver level; transmitting said uplink data from said at least one secondary transceiver level and said primary transceiver level further comprises encrypting said uplink data at said secondary transceiver level and decrypting said uplink data at said primary transceiver level; transmitting said uplink data from said primary transceiver level to said service server integrated to said computing cloud further comprises encrypting said data at said master base station; and decrypting said uplink data at said service server; transmitting said downlink data from said service server to said primary transceiver level further comprises encrypting said downlink data at said service server and decrypting said downlink data at said primary transceiver level; transmitting said downlink data from said primary transceiver level to said secondary transceiver level further comprises encrypting said downlink data at said primary transceiver level and decrypting said downlink data at said remote base station; transmitting said downlink data from said secondary transceiver level to said tertiary transceiver level further comprises encrypting said downlink data at said secondary transceiver level and decrypting said downlink data at said tertiary transceiver level; transmitting said downlink data from said tertiary transceiver level to said external user unit further comprises encrypting said downlink data at said tertiary transceiver level and decrypting said downlink data at said external user unit; transmitting said downlink data from said tertiary transceiver level to said internal user unit further comprises encrypting said downlink data at said tertiary

transceiver level and decrypting said downlink data at said internal user unit.

[0050] Said encryption and decryption may be performed using various cryptographic algorithms wherein every instance of encryption at said primary transceiver level or secondary transceiver level or tertiary transceiver level is followed by a respective decryption performed at the corresponding destination.

[0051] In one aspect, the present invention involves using free space optical laser medium for outdoor data transmission using laser beams, that provide for the highest possible data transmissions available for outdoor data transmission. On an average, optical laser beams are capable of providing speeds around 2Gbps and up to a maximum 10Gbps as mentioned in IEEE publication "High Speed Full Duplex Optical Wireless Communication System For Indoor Applications" (ISBN: 978-1-4577-1223-4), " Wavelength Selection For High Speed Rate Free Space Optics In Next Generation Wireless Communication" (ISBN: 978-1-4673-0950-9), " Scattering Effect On Link Range For 10Gbps Free Space Optical Communication System" (ISBN: 978-1-4577-0757-5) and "Result Of An Optical Wireless Ground Link Experiment In Continental Fog And Dry Snow Conditions" (ISBN: 978-953-184-130-6 reference) .

[0052] In another aspect, the method involves using wireless ultra fast indoor data transmission that provides for the highest possible data transmissions available for indoor data transmission. Wireless ultra fast data transmission maybe implemented using the frequency spectrum around the 60 GHz extremely high frequency radio band. Here, about 7 GHz of un-channelized frequency spectrum is available for license – free wireless communication applications. It is ideal for applications that demand ultra high-speed data rates over short ranges, capable of providing data transmission speeds of at least one

[0053] Gigabit(s) of data transferred in one second as in publications "60GHz wireless communication system with radio over fiber links for indoor wireless LAN"

(ISSN: 0098-3063), "Research on wireless communication in the 60GHz frequency band" (E-ISBN: 978-1-4244-5143-2) and "60GHz radios: Enabling Next Generation Wireless Application" (E-ISBN: 0-7803-9311-2).

[0054] In another aspect, indoor wireless ultra fast data transmission maybe implemented using the WirelessHD standard, capable of providing speeds between 10 to 28 Gbps with a range up to 10 meters.

[0055] In another aspect, indoor wireless ultra fast data transmission maybe implemented using the IEEE 802.11ad standard, capable of providing speeds up to 7 Gbps with a range up to 10 meters as mentioned in "A system Design For IEEE 802.11ad" (E-ISBN: 978-1-4673-4727-3), "IEEE P802.11ad/D5.0: Wireless LAN medium access control and Physical layer specifications enhancements for very high throughput in 60GHz band" (ISSN: pending).

[0056] In another aspect, with respect to indoor wireless ultra fast data transmission, wireless ultra fast data transmission may be achieved implementing IEEE 802.11ac standard using the 5GHz band, capable of providing speeds up to 7 Gbps with a range up to 50 meters as mentioned in "On the performance of packet aggregation in IEEE 802.11ac in MU-MIMO WLANs" (ISSN: 1089-7798, Communication Letters, IEEE), "IEEE 802.11ac: Enhancements For very high throughput WLANs "(E-ISBN : 978-1-4577-1347-7).

[0057] In another aspect, outdoor ultra fast data transmission may be achieved implementing IEEE 802.11ad standard, capable of providing speeds up to 7 Gbps with a range up to 10 meters.

[0058] In another aspect, outdoor ultra data transmission may be achieved implementing IEEE 802.11ac standard, capable of providing speeds up to 7 Gbps with a range up to 50 meters.

[0059] In the method, said computing cloud may be an infrastructure cloud providing storage and compute resources as a service, and/or said computing cloud is a platform cloud providing development/operating environments as a service, and/or said computing cloud is an application cloud providing a single application through the browser to multiple users using a multitenant architecture, and/or said computing cloud is a network cloud providing and facilitating network/transport connectivity services and/or inter-cloud network connectivity services. Said infrastructure cloud is an Infrastructure as a service (IaaS) cloud model, wherein physical or (more often) virtual machines - and other resources are offered as a service. Said platform cloud is a Platform as a service (PaaS) cloud model, wherein a computing platform typically including operating system, programming language execution environment, database, and web server are offered as service. Said application cloud is Software as a service (SaaS) cloud model, wherein application software and databases are provided as a service. Said network cloud is a Network as a service (NaaS) cloud model, wherein network/transport connectivity services and/or inter-cloud network connectivity services are provided as a service and involves the optimization of resource allocations by considering network and computing resources as a unified whole. Said cloud may also comprise a cloud management system that may be used to monitor and control the entire cloud and every aspect of it.

[0060] The architecture, deployment (public model or community model or private model or hybrid model), resources and various implementations of the computing cloud may vary, depending on the services that are to be provided by it. Said computing cloud is connected to the World Wide Web for interaction and communication with other entities connected to the World Wide Web.

[0061] The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current

knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the appended claims.

CLAIMS

What is claimed is:

1. A method of wireless communication to facilitate uplink and downlink communication, and services, between a user and a service provider, the method comprising:

establishing an uplink and a downlink free space optical laser link between a primary transceiver level comprising at least one master base station and a secondary transceiver level comprising at least one remote base station ;

establishing an uplink and a downlink free space communication optical laser link between said secondary transceiver level and a tertiary transceiver level wherein said tertiary transceiver level comprises at least one access point unit;

establishing an uplink and downlink free space communication optical laser link between said tertiary transceiver level and an internal user unit wherein said internal user unit is located indoors;

establishing an uplink and downlink wireless ultra fast data transmission link between said internal user unit and a user communication device , wherein said user communication device is located indoors;

establishing an uplink and downlink free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors;

establishing an uplink and a downlink free space communication optical laser link between an external user unit and said user communication device wherein said user communication device and said external user unit are located outdoors;

establishing an uplink and downlink wireless ultra fast data transmission link between said external user unit and said user communication device wherein said user communication device and said external user unit are located outdoors;

establishing a computing cloud and integrating said primary transceiver level with said computing cloud for providing enterprise and consumer end services;

receiving in a service server integrated to said computing cloud, an uplink data generated in said user communication device, wherein said receiving comprises:

transmitting said uplink data from said user's communication device to said internal user unit using said wireless ultra fast data transmission link between said internal user unit and said user's communication device wherein said user communication device is located indoors, transmitting said uplink data from said user's communication device to said internal user unit using said free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors, transmitting said uplink data from said user's communication device to said external user unit using said free space communication optical laser link between said external user unit and said user communication device

wherein said user communication device is located outdoors,

transmitting said uplink data from said user's communication device to said external user unit using said wireless ultra fast data transmission link between said external user unit and said user communication device wherein said user communication device is located outdoors,

transmitting said uplink data from said internal user unit to said access point unit using said free space communication optical laser link between said access point unit and said internal user unit wherein said internal user unit is located indoors,

transmitting said uplink data from said external user unit to said tertiary transceiver level said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said external user unit is located outdoors,

transmitting said first data from said tertiary transceiver level to said secondary transceiver level using said free space communication optical laser link between said secondary transceiver level and said tertiary transceiver level,

transmitting said uplink data from said secondary transceiver level to said primary transceiver level using said free space communication optical laser link between said secondary transceiver level and said primary transceiver level,

transmitting said uplink data from said primary transceiver level to said service server integrated to said computing cloud;

sending a downlink data from said computing cloud to said user communication device, said sending comprises:

transmitting said downlink data from said service server to said primary transceiver level,

transmitting said downlink data from said primary transceiver level to said secondary transceiver level using said free space communication optical laser link between said secondary transceiver level and said primary transceiver level,

transmitting said downlink data from said secondary transceiver level to said tertiary transceiver level using said free space communication optical laser link between said secondary transceiver level and tertiary transceiver level,

transmitting said downlink data from said tertiary transceiver level to said external user unit using said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said external user unit is located outdoors,

transmitting said downlink data from said tertiary transceiver level to said internal user unit using said free space communication optical laser link between said tertiary transceiver level and said internal user unit wherein said internal user unit is located indoors,

transmitting said downlink data from said internal user unit to said user's communication device using said free space communication optical laser link between said internal user unit and said user communication device wherein said user communication device is located indoors,

transmitting said downlink data from said internal user unit to said user's communication device using said wireless ultra fast data link between said internal user unit and said user's communication device

wherein said user communication device is located indoors,

transmitting said downlink data from said tertiary transceiver level to said external user unit using said free space communication optical laser link between said tertiary transceiver level and said external user unit wherein said internal user unit is located indoors,

transmitting said downlink data from said external user unit to said user's communication device using said free space communication optical laser link between said external user unit and said user communication device wherein said user communication device is located outdoors ,

transmitting said downlink data from said external user unit to said user's communication device using said wireless ultra fast data transceiver link between said external user unit and

said user communication device wherein said user communication device is located outdoors ;and

connecting, configuring and synchronizing data centers at said primary transceiver level and at said secondary transceiver level, wherein data being transmitted through every primary transceiver level and every secondary transceiver level is processed and sent to said data centers wherein they are encrypted, logged and archived.

2. The method according to claim 1, wherein -

transmitting said uplink data from said internal user unit to said tertiary transceiver level further comprises encrypting said uplink data at said internal user unit and decrypting said uplink data at said tertiary transceiver level;

transmitting said uplink data from said external user unit to said tertiary transceiver further comprises encrypting said uplink data at said external user unit and decrypting said uplink data at said tertiary transceiver level;

transmitting said first data from said tertiary transceiver level to said secondary transceiver level further comprises encrypting said uplink data at said tertiary transceiver level and decrypting said uplink data at said secondary transceiver level;

transmitting said uplink data from said at least one secondary transceiver level and said primary transceiver level further comprises encrypting said uplink data at said secondary transceiver level and decrypting said uplink data at said primary transceiver level ;

transmitting said uplink data from said primary transceiver level to said service server integrated to said computing cloud further comprises encrypting said data at said master base station and decrypting said uplink data at said service server;

transmitting said downlink data from said service server to said primary transceiver level further comprises encrypting said downlink data at said service server and decrypting said downlink data at said primary transceiver level;

transmitting said downlink data from said primary transceiver level to said secondary transceiver level further comprises encrypting said downlink data at said primary transceiver level and decrypting said

downlink data at said remote base station;

transmitting said downlink data from said secondary transceiver level to said tertiary transceiver level further comprises encrypting said downlink data at said secondary transceiver level and decrypting said downlink data at said tertiary transceiver level ;

transmitting said downlink data from said tertiary transceiver level to said external user unit further comprises encrypting said downlink data at said tertiary transceiver level and decrypting said downlink data at said external user unit ;

transmitting said downlink data from said tertiary transceiver level to said internal user unit further comprises encrypting said downlink data at said tertiary transceiver level and decrypting said downlink data at said internal user unit.

3. The method according to claim 1, wherein said computing cloud comprises a storage area network.

4. The method according to claim 1, wherein said data centers comprise storage area networks.

5. The method according to claim 1,wherein establishing an uplink and a downlink free space optical laser link between said primary transceiver level and said secondary transceiver level comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one master base station and said at least one remote base station.

6. The method according to claim 1, wherein an uplink and downlink free space communication optical laser link is established using line-of-sight propagation of at least one optical laser signal beam between multiple master base stations wherein said primary transceiver level comprises a plurality of master base stations. .

7. The method according to claim 1, wherein establishing an uplink and a downlink free space communication optical laser link between said secondary transceiver level and said tertiary comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one remote base station and said at least one access point unit.

8. The method according to claim 1,wherein establishing an uplink and downlink free space communication optical laser link between said tertiary transceiver level and said internal user unit further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said at least one access point unit and said internal user unit.

9. The method according to claim 1, wherein establishing an uplink and downlink free space communication optical laser link between said internal user unit and said user

communication device further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said internal user unit and said user communication device.

10. The method according to claim 1, wherein establishing an uplink and a downlink free space communication optical laser link between said external user unit and said user communication device further comprises establishing a line-of-sight propagation of at least one optical laser signal beam between said external user unit and said user communication device.

11. The method according to claim 1, wherein said computing cloud is an infrastructure cloud providing storage and compute resources as a service, and/or said computing cloud is a platform cloud providing development/operating environments as a service, and/or said computing cloud is an application cloud providing applications through the browser to multiple users using a multitenant architecture, and/or said computing cloud is a network cloud providing and facilitating network/transport connectivity services and/or inter-cloud network connectivity services.

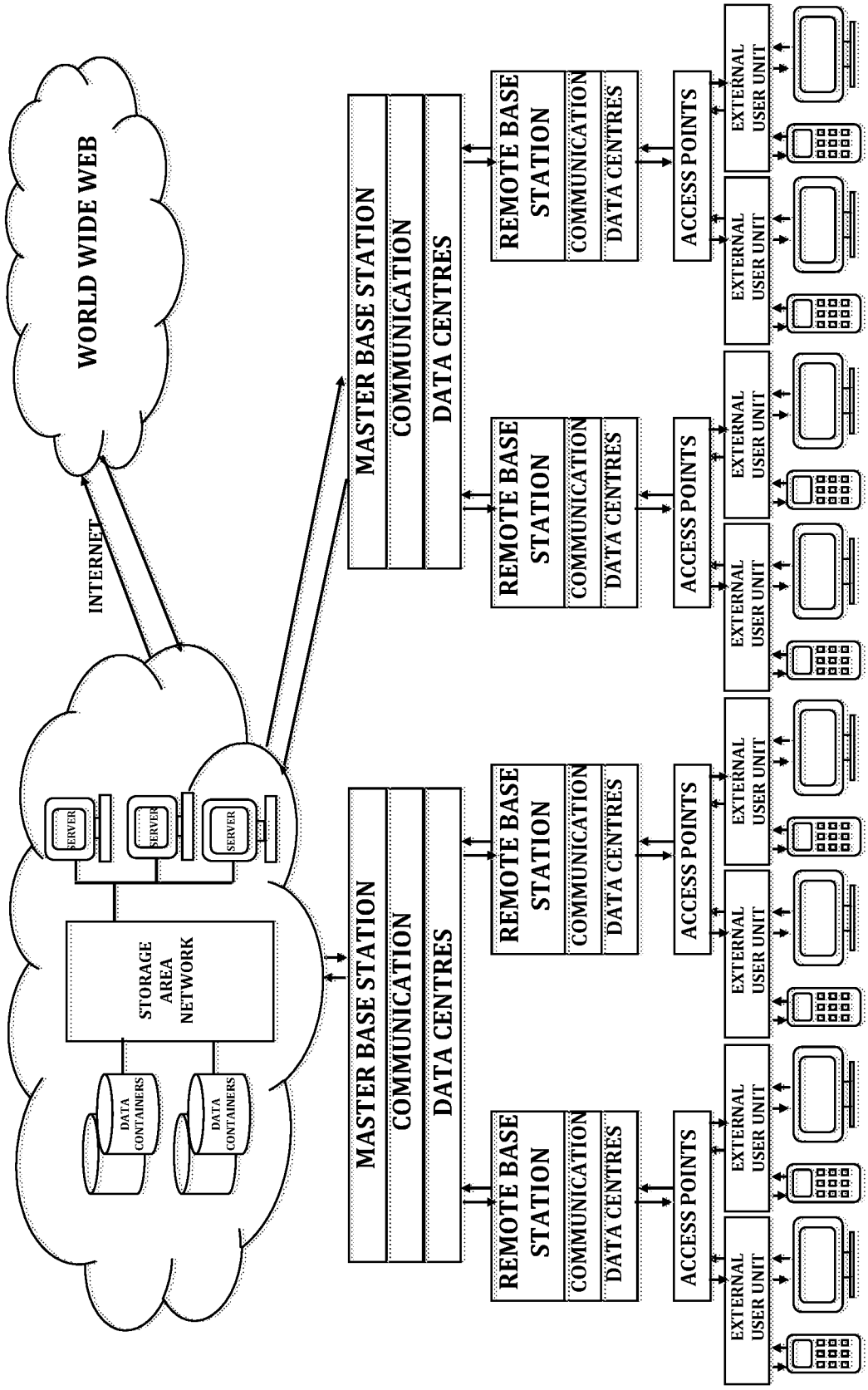
WORLD WIDE WEB
INTERNET
SERVER
SERVER
SERVER
STORAGE AREA NETWORK
DATA CONTAINERS
DATA CONTAINERS
MASTER BASE STATION
COMMUNICATION
DATA CENTRES
REMOTE BASE STATION
COMMUNICATION
DATA CENTRES
ACCESS POINTS
EXTERNAL USER UNIT

FIGURE 1

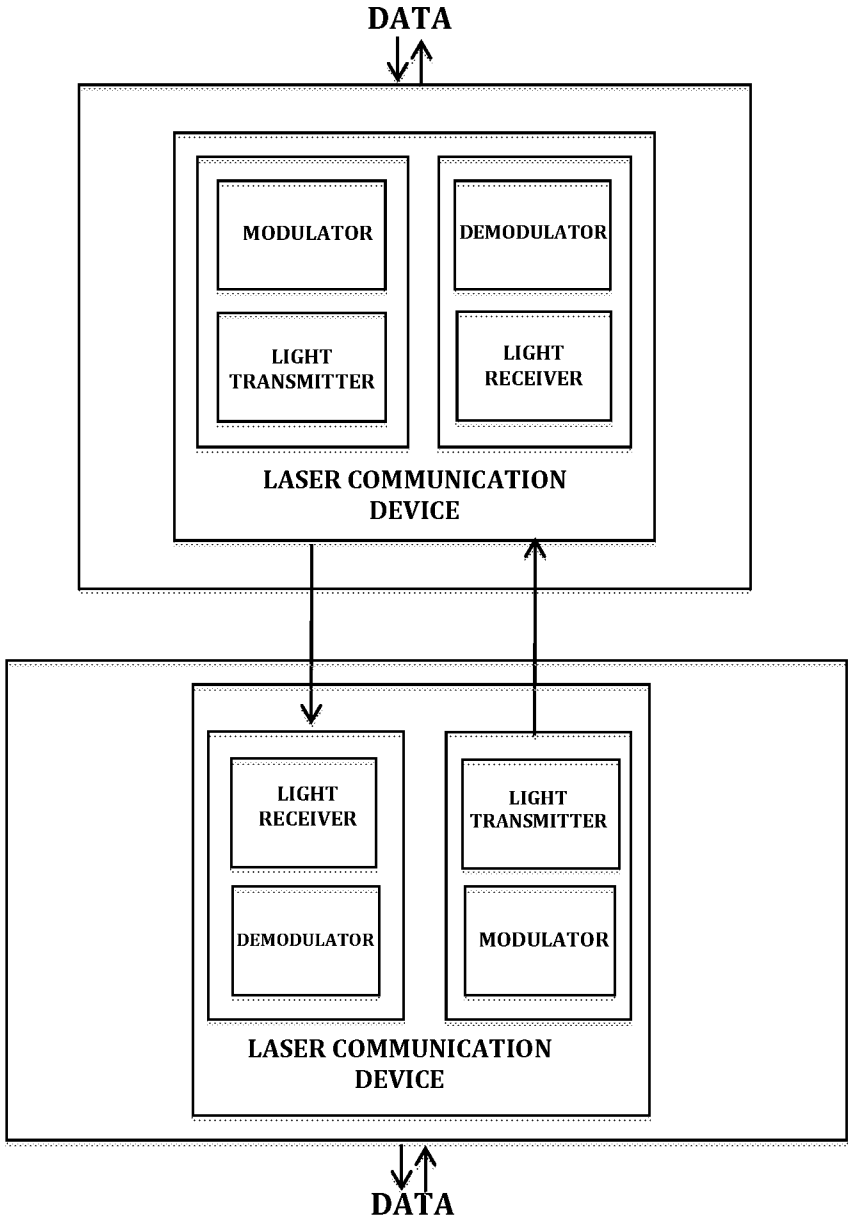
DATA
MODULATOR
DEMODULATOR
LIGHT TRANSMITTER
LIGHT RECEIVER
LASER COMMUNICATION DEVICE
LIGHT RECEIVER
LIGHT TRANSMITTER
DEMODULATOR
MODULATOR
LASER COMMUNICATION DEVICE
DATA

FIGURE 2

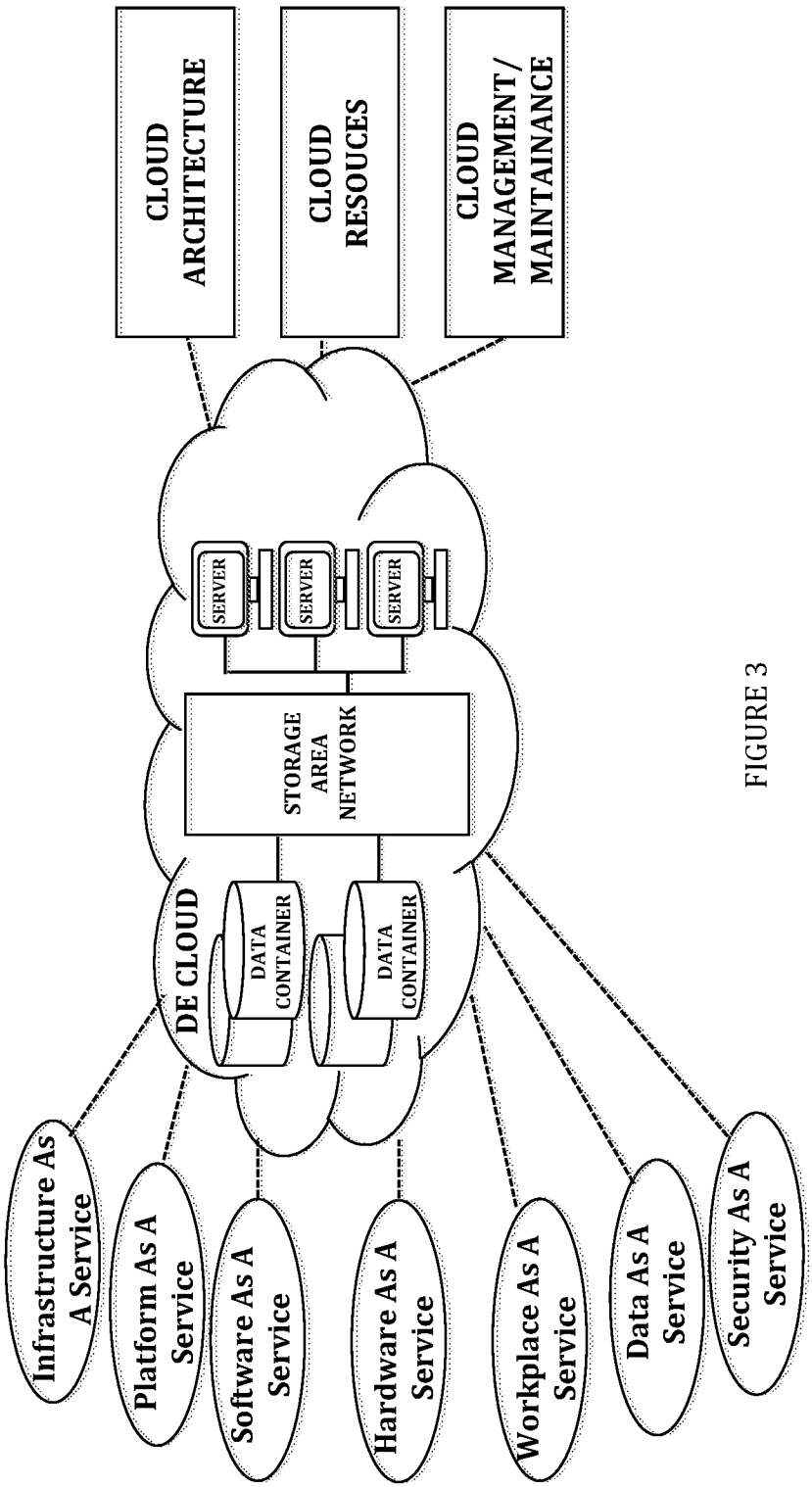
CLOUD ARCHITECTURE
CLOUD RESOUCES
CLOUD MANAGEMENT / MAINTAINANCE
SERVER
SERVER
SERVER
STORAGE AREA NETWORK
DE CLOUD
DATA CONTAINER
DATA CONTAINER
Infrastructure As A Service
Platform As A Service
Software As A Service
Hardware As A Service
Workplace As A Service
Data As A Service
Security As A Service

FIGURE 3