CONTENT DELIVERY NETWORK

BACKGROUND OF THE INVENTION

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RELATED APPLICATIONS

[0002] This application is related to and claims priority from the following co-owned and co-pending U.S. provisional patent applications, the entire contents of each of which are fully incorporated herein by reference for all purposes: (1) U.S. Application No. 61/570,448, titled "Content Delivery Network," filed December 14, 2011, and (2) U.S. Application No. 61/570,486, titled "Content Delivery Network," filed December 14, 2011.

[0003] This application is related to the following co-owned U.S. Patents and co-pending patent applications, the entire contents of each of which are fully incorporated herein by reference for all purposes:

1. U.S. Patent No. 7,822,871 titled "Configurable Adaptive Global Traffic Control And Management," filed 09/30/2002, issued 10/26/2010
2. U.S. Patent No. 7,860,964 titled "Policy-Based Content Delivery Network Selection," filed 10/ 26/2007, issued 12/28/2010
3. U.S. Patent No. 6,185,598 titled "Optimized Network Resource Location," filed 02/10/1998, issued 02/06/ 2001
4. U.S. Patent No. 6,654,807 titled "Internet Content Delivery Network," filed 12/06/2001, issued 11/25/2003

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MICROSOFT-1002
Microsoft Corp. v. Sandpiper CDN, LLC
IPR2026-00190

5. U.S. Patent No. 7,949,779 titled "Controlling Subscriber Information Rates In A Content Delivery Network," filed 10/31/2007, issued 05/24/2011
6. U.S. Patent No. 7,945,693 titled "Controlling Subscriber Information Rates In A Content Delivery Network," filed 10/31/2007, issued 05/17/2011
7. U.S. Patent No. 7,054,935 titled "Internet Content Delivery Network," filed 03/13/2002, issued 05/30/2006
8. U.S. Published Patent Application No. 2009-0254661 titled "Handling Long-Tail Content In A Content Delivery Network (CDN)," filed 03/21/2009
9. U.S. Published Patent Application No. 2010-0332595 titled "Handling Long-Tail Content In A Content Delivery Network (CDN)," filed 09/13/2010
10. U.S. Patent No. 8,015,298 titled "Load-Balancing Cluster," filed 02/23/2009, issued 09/06/2011
11. U.S. Published Patent Application No. 2010-0332664 titled "Load-Balancing Cluster," filed 09/13/2010.

FIELD OF THE INVENTION

[0004] This invention relates to content delivery and content delivery networks. More specifically, to content delivery networks and systems, frameworks, devices and methods supporting content delivery and content delivery networks.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Other objects, features, and characteristics of the present invention as well as the methods of operation and functions of the related elements of structure, and the combination of parts and economies of manufacture, will

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become more apparent upon consideration of the following description and the appended claims with reference to the accompanying drawings, all of which form a part of this specification.

[0006] **FIG. 1**. shows exemplary content delivery network (CDN);

[0007] **FIGS. 2** and **3** depict cache cluster sites in a CDN;

[0008] **FIGS. 4** and **5** depict cache clusters in the cache cluster sites of **FIGS. 2** and **3**;

[0009] **FIG. 6** depicts an exemplary cache cluster site;

[0010] **FIG. 7** depicts a control core cluster of a CDN;

[0011] **FIGS. 8** and **9** depict the hierarchical organization of a content delivery network and the logical organization of caches in a CDN;

[0012] **FIG. 10** shows a typical interaction between a client and a CDN;

[0013] **FIG. 11** shows request-response processing in a CDN;

[0014] **FIGS. 12A-12C** show various data structures;

[0015] **FIG. 13A** is a logical depiction of a sequence control object;

[0016] **FIGS 13B-13D** show examples of sequences and sequence processing;

[0017] **FIG. 14A-14D** show examples of sequencers and handlers;

[0018] **FIG. 15A** is a flow chart showing a process of adding a cache server to a CDN;

[0019] **FIG. 15B** is a flow chart showing exemplary request-response processing in a CDN;

[0020] **FIG. 15C** shows operation of various caches in a CDN;

[0021] **FIG. 16** shows an exemplary cache server operating within a CDN;

[0022] **FIG. 17** is a block diagram showing the major functional modules for request-response processing in an exemplary cache server;

[0023] **FIGS. 18** and **19** depict various tables and databases used by the CDN;

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[0024] **FIGS. 20A-20C** is a flow chart describing an exemplary request-response processing flow;

[0025] **FIGS. 21A-21H** show an exemplary CDN and aspects of its operation;

[0026] **FIG. 22** show interaction between components of the CDN; and

[0027] **FIG. 23** shows a typical computer system; and

[0028] **FIGS. 24A** to **24E**, and **25A** to **25B** and **26** describe aspects of the Executive system.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EXEMPLARY EMBODIMENTS

GLOSSARY

[0029] As used herein, unless used otherwise, the following terms or abbreviations have the following meanings:

[0030] CCS means Customer Configuration Script

[0031] CDN means Content Delivery Network;

[0032] CNAME means Canonical Name;

[0033] DNS means Domain Name System;

[0034] FQDN means Fully Qualified Domain Name;

[0035] FTP means File Transfer Protocol;

[0036] GCO means Global Configuration Object;

[0037] HTTP means Hyper Text Transfer Protocol;

[0038] HTTPS means HTTP Secure;

[0039] IP means Internet Protocol;

[0040] IPv4 means Internet Protocol Version 4;

[0041] IPv6 means Internet Protocol Version 6;

[0042] IP address means an address used in the Internet Protocol, including both IPv4 and IPv6, to identify electronic devices such as servers and the like;

[0043] MX means Mail Exchange;

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[0044] NDC means Network Data Collector;

[0045] NS means Name Server;

[0046] QoS means quality of service;

[0047] TCP means Transmission Control Protocol;

[0048] URI means Uniform Resource Identifier;

[0049] URL means Uniform Resource Locator; and

[0050] VIP address means a virtual IP address.

BACKGROUND AND OVERVIEW

[0051] The primary purpose of a content delivery network – a CDN – is to distribute resources efficiently to client machines on behalf of one or more content providers, preferably via a public Internet. A CDN can also provide an over-the-top transport mechanism for efficiently sending content in the reverse direction – from the client to the origin server. Both end-users (clients) and content providers benefit from using a CDN. By using a CDN, a content provider is able to take pressure off its own servers. Clients benefit by being able to obtain content with fewer delays.

Overview – structure

[0052] **FIG. 1** shows an exemplary CDN **100**, which includes multiple caches **102-1**, **102-2** … **102-*m*** (collectively caches **102**, individually cache **102-*i***), rendezvous mechanisms / systems **104-1** … **104-*k***, (collectively rendezvous mechanism(s) / system(s) **104**, made up of one or more rendezvous mechanisms **104-*j***), collector mechanism /system **106** (made up of one or more collector mechanisms **106-1 … 106-*n***), and a control core **108**. The CDN **100** also includes various operational and/or administrative mechanisms **109**.

[0053] As shown in **FIG. 2**, each CDN cache **102** may be a cache cluster site **202** comprising one or more cache clusters **204**. The cache cluster site **202** may include a routing mechanism **206** acting, *inter alia*, to provide data to / from the

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cache clusters **202**. The routing mechanism **206** may perform various functions such as, *e.g.*, load balancing, or it may just pass data to/from the cache cluster(s) **204**. Depending on its configuration, the routing mechanism **206** may pass incoming data to more than one cache cluster **204**. **FIG. 3** shows an exemplary cache cluster site **202** with ***p*** cache clusters (denoted **204-1**, **204-2** … **204-*p***).

[0054] As shown in **FIG. 4**, a cache cluster **204** comprises one or more servers **208**. The cache cluster preferably includes a routing mechanism **210**, *e.g.*, a switch, acting, *inter alia*, to provide data to / from the servers **208**. The servers **208** in any particular cache cluster **204** may include caching servers **212** and/or streaming servers **214**. The routing mechanism **210** provides data (preferably packet data) to the server(s) **208**. Preferably the routing mechanism **210** is an Ethernet switch.

[0055] The routing mechanism **210** may perform various functions such as, *e.g.*, load balancing, or it may just pass data to/from the server(s) **208**. Depending on its configuration, the routing mechanism **210** may pass incoming data to more than one server **208**. **FIG. 5** shows an exemplary cache cluster **204'** comprising *k* servers (denoted **208-1**, **208-2** … **208-*k***) and a switch **210'**.

[0056] The cache cluster site routing mechanism **206** may be integrated with and/or co-located with the cache cluster routing mechanism **210**.

[0057] **FIG. 6** shows an exemplary cache cluster site **202"** with a single cache cluster **204"** comprising one or more servers **208"**. The server(s) **208"** may be caching servers **212"** and/or streaming servers **214"**. As shown in the example in **FIG. 6**, the cache cluster routing mechanism **210"** and the cache cluster site's routing mechanism **206"** are logically/functionally (and possibly physically) combined into a single mechanism (as shown by the dotted line in the drawing).

[0058] A cache server site may be a load-balancing cluster, *e.g.*, as described in U.S. published Patent Application No. 2010-0332664, filed February 28, 2009, titled "Load-Balancing Cluster," and U.S. Patent No. 8,015,298, titled "Load-Balancing Cluster," filed 02/23/2009, issued 09/06/2011, the entire

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contents of each of which are fully incorporated herein by reference for all purposes.

[0059] In presently preferred implementations, some of the cache cluster servers **208** that are connected to a particular switch **210** will share the same virtual IP (VIP) addresses. (Each cache cluster server **208** will also preferably have a different and unique IP address.) In these presently preferred implementations, for the purposes of CDN control, the cache cluster routing mechanism **210** and the cache cluster site's routing mechanism **206** are logically/functionally (and preferably physically) combined into a single mechanism – a switch. In these implementations the cache cluster site refers to all of the machines that are connected to (*e.g.*, plugged in to) the switch. Within that cache cluster site, a cache cluster consists of all machines that share the same set of VIPs.

[0060] An exemplary cache cluster **204** is described in U.S. published Patent Application No. 2010-0332664, titled "Load-Balancing Cluster," filed 09/13/2010, and U.S. Patent No. 8,015,298, titled "Load-Balancing Cluster," filed 02/23/2009, issued 09/06/2011, the entire contents of each of which are fully incorporated herein for all purposes.

[0061] With reference again to **Fig. 1**, as explained in greater detail below, the rendezvous system **104** is used to direct client resource requests. The rendezvous system **104** is preferably implemented using the DNS and comprises one or more DNS name servers. The rendezvous mechanisms **104-*j*** are preferably domain name servers implementing policy-based domain name resolution. An exemplary rendezvous system **104** is described in U.S. Patent No. 7,822,871, titled "Configurable Adaptive Global Traffic Control And Management," filed 09/30/2002, issued 10/26/2010, and U.S. Patent No. 7,860,964 "Policy-Based Content Delivery Network Selection," filed 10/26/2007, issued 12/28/2010, the entire contents of each of which are fully incorporated herein for all purposes.

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[0062] The control core mechanism **108** controls operation of the CDN and is described in greater detail below. Physically, the control core preferably consists of a set of geographically distributed machines, preferably connected via high-speed communication links. *E.g.,* five machines located in New York, San Francisco, Chicago, London, and Frankfurt. Logically, the control core acts like a single, robust data base/web server combination, containing configuration data. **FIG. 7** shows an exemplary control core mechanism **108** made up of five distinct components or machines (denoted *CC1, CC2, CC3, CC4, CC5* in the drawing). While shown with five components or machines, those of skill in the art will realize and understand, upon reading this description, that the control core could be formed of any number of components or machines comprising the control core. Odd numbers are preferable because of the use of voting by the components or machines. Larger numbers will make the control core more available but respond slower. Having only one machine is a degenerate case possibly useful in non-production situations. The components or machines forming the control core are operated together as a single high-availability cluster, and are shown as a single entity in most drawings. It should be understood that any particular interaction with the control core mechanism **108** will likely take place with only one of its component machines. The control core mechanism **108** is also referred to herein as the control core cluster **108** or the control core **108**.

[0063] Although only one control core **108** is shown in **Fig. 1**, it should be appreciated that a CDN may have more than one control core, with different control cores controlling different aspects or parts of the CDN.

[0064] The control core **108** is addressable by one or more domain names. For the sake of this description, the domain name *control.fp.net* will be used for the control core **108**. In a preferred implementation the control core cluster consists of five (5) distinct and geographically distributed control core mechanisms and is operated as a multihomed location with five (5) IP addresses. Thus, when a client asks a DNS server to resolve the control core's domain name

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(*e.g.*, *control.fp.net*) the DNS server will return one or more of the five IP addresses associated with that name. That client may then access the control core at one of those addresses. It should be appreciated that the DNS server(s) will provide the client with a rendezvous to a "nearby" control core server or servers (*i.e.*, to "best" or "optimal" control core server(s) for that client), similar to the manner in which clients rendezvous with CDN servers. In other words, internal components of the CDN (cache servers, control cores, etc.) may use the same rendezvous mechanisms as are used by entities outside the CDN to rendezvous with CDN components. In some cases the various control core mechanisms may have the same IP address, in which cases routing tables may direct a client to a "best" or "optimal" control core mechanism. This may also be achieved using an anycast IP address.

Tiers and Groups

[0065] A CDN may have one or more tiers of caches, organized hierarchically. **FIG. 8** depicts a content delivery network **100** that includes multiple tiers of caches. Specifically, the CDN **100** of **FIG. 8** shows *j* tiers of caches (denoted Tier 1, Tier 2, Tier 3, … Tier *j* in the drawing). Each tier of caches may comprise a number of caches organized into cache groups. A cache group may correspond to a cache cluster site or a cache cluster (**202, 204** in **FIGS. 2-5**). The Tier 1 caches are also referred to as edge caches, and Tier 1 is sometimes also referred to as the "edge" or the "edge of the CDN." The Tier 2 caches (when present in a CDN) are also referred to as parent caches.

[0066] For example, in the CDN **100** of **FIG. 8**, Tier 1 has *n* groups of caches (denoted "Edge Cache Group 1", "Edge Cache Group 2", … "Edge Cache Group *n*"); tier 2 (the parent caches' tier) has *m* cache groups (the *i*-th group being denoted "Parent Caches Group *i*"); and tier 3 has *k* cache groups, and so on. Preferably each tier has the same number of cache groups, although this is not required.

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[0067] **FIG. 9** shows the logical organization / grouping of caches in a CDN of **FIG. 8**. In the exemplary CDN **100** of **FIG. 9**, each tier of caches has the same number (*n*) of cache groups. Those of skill in the art will know and understand, upon reading this description, that each cache group may have the same or a different number of caches. Additionally, the number of caches in a cache group may vary dynamically. For example, additional caches may be added to a cache group to deal with increased load on the group.

[0068] The caches in a cache group may be homogeneous or heterogeneous, and each cache in a cache group may comprise a cluster of physical caches sharing the same name and/or network address. An example of such a cache is described in co-pending and co-owned U.S. published Patent Application No. 2010-0332664, titled "Load-Balancing Cluster," filed 09/13/2010, and U.S. Patent No. 8,015,298, titled "Load-Balancing Cluster," filed 02/23/2009, issued 09/06/2001, the entire contents of which are fully incorporated herein by reference for all purposes.

[0069] Caches in the same tier and the same group may be referred to as peers or peer caches. In general, for each Tier *j*, the caches in Tier *j* may be peers of each other, and the caches in Tier *j+1* may be referred to as parent caches. In some cases, caches in different groups and/or different tiers may also be considered peer caches. It should be appreciated that the notion of peers is flexible and that multiple peering arrangements are possible and contemplated herein.

[0070] A typical CDN has only one or two tiers of caches. A CDN with only one tier will have only edge caches, whereas a CDN with two tiers will have edge caches and parent caches. (At a minimum, a CDN should have at least one tier of caches – the edge caches.)

[0071] The grouping of caches in a tier may be based, *e.g.*, on one or more of their physical or geographical location, network proximity, the type of content being served, the characteristics of the machines within the group, etc. For

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example, a particular CDN may have six groups – four groups of caches in the United States, group 1 for the West Coast, group 2 for the mid-west, Group 3 for the northeast and Group 4 for the south east; and one group each for Europe and Asia.

[0072] Those of skill in the art will realize and understand, upon reading this description, that cache groups may correspond to cache clusters or cache cluster sites.

[0073] A particular CDN cache is preferably in only one cache group.

[0074] In general, some or all of the caches in each tier can exchange data with some or all of the caches in each other tier. Thus, some or all of the parent caches can exchange information with some or all of the edge caches, and so on. For the sake of simplicity, in the drawing (**FIG. 8**), each tier of caches is shown as being operationally connectable to each tier above and below it, and Tier 3 is shown as operationally connected to Tier 1 (the Edge Tier). In some CDNs, however, it may be preferable that the caches in a particular tier can only exchange information with other caches in the same group (*i.e.*, with peer caches) and/or with other caches in the same group in a different tier. For example, in some CDNs, the edge caches in edge cache group *k*, can exchange information with each other and with all caches in parent cache group *k*, and so on.

[0075] A content provider's / customer's server (or servers) are also referred to as origin servers. A content provider's origin servers may be owned and/or operated by that content provider or they may be servers provided and/or operated by a third party such as a hosting provider. The hosting provider for a particular content provider may also provide CDN services to that content provider. With respect to a particular subscriber / customer resource, a subscriber / customer origin server is the authoritative source of the particular resource. More generally, in some embodiments, with respect to any particular resource (including those from elements/machines within the CDN), the authoritative source of that particular resource is sometimes referred to as a co-server.

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[0076] A CDN may also include a CDN origin/content cache tier which may be used to cache content from the CDN's subscribers (*i.e.,* from the CDN subscribers' respective origin servers). Those of skill in the art will know and understand, upon reading this description, that a CDN can support one or more content providers or subscribers, *i.e.*, that a CDN can function as a shared infrastructure supporting numerous content providers or subscribers. The CDN origin tier may also consist of a number of caches, and these caches may also be organized (physically and logically) into a number of regions and/or groups. The cache(s) in the CDN origin tier obtain content from the content providers' / subscribers' origin servers, either on an as needed basis or in advance or an explicit pre-fill.

Overview – operation

[0077] **FIG. 10** shows a typical interaction between a client **110** and a CDN **100**. In this case the CDN **100** serves content (resources) on behalf of the content provider **112**. As described above, the CDN includes multiple locations (*e.g.*, cache sites not shown in the drawing) from which content may be provided/served to clients. The process of associating a particular client (or client request) with a particular location in the CDN is referred to as a *rendezvous* process. When a particular client (*e.g.*, client **110**) wants to obtain some content (*e.g.*, a particular resource), that client is typically directed to a "best" (or "optimal") location (via some rendezvous mechanism **104**). As used here, a location may be, *e.g.*, a server, a server site, a region of servers, a cache cluster, a cache cluster site, etc. The location may even be another CDN or network or a server outside the CDN **100**. With reference to **FIGS. 1-7**, the "best" or "optimal" location may be, without limitation, a cache cluster site, a cache cluster, a group, a tier, or some combination thereof.

[0078] Those of skill in the art will realize and understand, upon reading this description, that the notion of a "best" or "optimal" location is dependent on

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multiple factors, including, without limitation, some or all of the following: network load, load on the CDN servers and other components, location of the client computer, etc. The notion of a "best" or "optimal" location may vary by time of day, type of content, content provider policies, CDN policies, etc. The invention is not to be limited in any way by the manner in which a "best" or "optimal" location in the CDN is determined.

[0079] A "best" or "optimal" server may be selected by a server selection mechanism such as described in U.S. Patents Nos. 6,185,598; 6,654,807; 7,949,779; 7,945,693; and 7,054,935, the entire contents of each of which are fully incorporated herein for all purposes. In a presently preferred implementation, the server selection mechanism is part of and/or uses the DNS system.

[0080] In a presently preferred implementation, the rendezvous system **104** uses and is integrated into the DNS system, as described in U.S. Patent No. 7,822,871, filed 09/30/2002, issued 10/26/2010, and U.S. Patent No. 7,860,964, filed 10/26/2007, issued 12/28/2010, the entire contents of each of which are fully incorporated herein for all purposes. The client **110**'s DNS system **114** interacts with the CDN's rendezvous mechanism **104** in order to associate a particular client request for a resource with a particular location, preferably in the CDN **100**, from which that requested resource will be served to the client. The "best" or "optimal" location may be provided by the rendezvous mechanism **104** as one or more IP addresses or a CNAME (domain name) corresponding to one or more locations in the CDN or to a different CDN or network.

[0081] With reference to **FIG. 10**, an exemplary use of the CDN **100** (in which the client **110** wants to obtain a particular resource) is as follows:

[0082] The client computer **110** interacts with the rendezvous mechanism **104** in order to determine the "best" location from which to obtain the particular resource (at ***S1***). When the rendezvous mechanism **104** is integrated into the DNS system, the client's DNS system **114** interacts with the CDN's rendezvous mechanism **104** to direct the client to a location, preferably in the CDN **100**, from

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which the client can obtain (or try to obtain) the resource. When the rendezvous mechanism **104** is integrated into the DNS system, this request (at ***S1***) may be part of a request to resolve a domain name associated with the particular resource, and the rendezvous mechanism may provide the client with one or more IP addresses or CNAME of one or more locations in the CDN (at ***S2***). If the rendezvous mechanism provides more than one IP address (corresponding to more than one "best" location), the client may select which of those addresses to use.

[0083] Having obtained a "best" location from which to obtain the particular resource, the client computer **110** then requests the particular resource from the location in the CDN **100** (at ***S3a***). The CDN **100** may already have a copy of that particular resource at that location, in which case it provides (serves) the resource to the client computer **110** (at ***S3b***). If the CDN did not already have a copy of that particular resource at that location, then it tries to obtain a copy at that location (either from another location in the CDN or from the content provider **112** (at ***S4a, S4b***)). Having obtained the resource (either from another location in the CDN or from a the content provider **112**), the CDN **100** provides (serves) the resource to the client computer **110** (at ***S3b***). It should be appreciated that in some cases the response could be generated within the CDN as opposed to fetched. This may occur, *e.g.*, in the case of a conversion from an existing resource (such as a compression/transcoding) or completely generated by a script/process (either previously pulled from the content providers origin server, or provided from the control core as part of the property configuration.

[0084] The CDN may also provide information (*e.g.*, logs and performance data) to content providers regarding resources delivered on their behalf. Thus, as shown in **FIG. 10**, the CDN **100** may provide information to the content provider **112** (at ***S5***).

[0085] To simplify the above explanation, **FIG. 10** shows only one client computer **110**, one content provider **110** and one CDN **100**. Those of skill in the art will realize and understand, upon reading this description, that a typical CDN

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may provide content on behalf of multiple content providers to multiple client computers. Those of skill in the art will also realize and understand, upon reading this description, that the system may include multiple CDNs, and that the rendezvous mechanism **104** may cause client requests to be directed to different ones of the CDNs. An exemplary rendezvous mechanism **104** is described, *e.g.*, in U.S. Patents Nos. 7,822,871 and 7,860,964, the entire contents of each of which are fully incorporated herein by reference for all purposes.

[0086] As used herein, the terms "resource" and "content" refer, without any limitations, to any and all kinds of resources and/or content that may be provided to client computers via CDNs. Resources and/or content may be any static or dynamic data item comprising an arbitrary sequence of bits, regardless of how those bits are stored or transmitted, and regardless of what those bits represent. A resource provided by a CDN may comprise data representing some or all of another resource, including some or all of: a file, a portion of a file, a digital message, a portion of a digital message, a digital image, a portion of a digital image, a video signal, a portion of a video signal, an audio signal, a portion of an audio signal, a software product, a portion of a software product, a page in memory, a web page; a movie, and a portion of a movie. This list is given by way of example, and is not intended to be in any way limiting.

[0087] **FIG. 10** shows the client **110** as separate from the CDN. As will be explained in detail below, the inventors realized that the various components of the CDN could themselves act as clients with respect to the CDN in order to obtain CDN related resources. Therefore the client may be a CDN element or component, *e.g.*, a cache. Similarly, **FIG. 10** shows the content provider **112** as separate from the CDN. As will be explained in detail below, the inventors realized that the various components of the CDN could themselves act as content providers with respect to the CDN in order to provide CDN related resources to other CDN components. Thus, *e.g.*, as will be explained further below, with reference to **FIG. 1**, when a collector mechanism **106** obtains information from a

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cache **102**, that collector mechanism **106** is acting as a client, while the cache **102** is a content provider.

[0088] The CDN has been described thus far in terms of its separate and distinct components. It should be understood, however, that within the CDN each object (*e.g.*, all data that is to be moved between CDN components) is treated as a web object or resource, with, *e.g.* the control core acting as the "origin tier" for such objects. That is, each CDN object has a URL (or whatever address is used by the CDN), and each CDN object can be requested, filled, invalidated, refreshed, etc. Each cache has the knowledge (information) it needs to obtain and provide CDN objects. This approach allows all data transfers within the CDN to use the CDN itself. The CDN can thus use its own mechanisms to deal with CDN control and/or management-related information (*e.g.*, control core data). Thus, *e.g.*, any CDN component can obtain CDN data using the CDN.

REQUEST-RESPONSE PROCESSING

[0089] In operation, the various CDN components (*e.g.*, caches) receive requests for resources, processes those requests, and provide responses (which may include, *e.g.*, the requested resources, error messages, or directions to find the resources elsewhere).

[0090] **Fig. 11** shows the request-response operation of an exemplary CDN component **1102**. Although component **1102** is denoted "Server" in the drawing, it should be appreciated that component **1102** may be a cache server or any other component of the CDN that performs request-response processing. As shown in the drawing, client **1103** makes a request for a resource of server **1102**, and receives a response to that request. In processing that request, as explained below, the server **1102** may obtain information from one or more other data sources **1110**. Some of these data sources **1110** may be other CDN components (*e.g.*, caches **1112** or control core(s) **1116**). The data sources **1110** may also include origin server(s) **1114** that may or may not be part of the CDN. It should be appreciated

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that the client **1103** may be another CDN component (*e.g.*, a cache) or it may be a client entity that is external to the CDN.

[0091] The server **1102** preferably supports HTTP/1.0, and HTTP/1.1, and HTTPS requests, although it is not limited to those protocols or to any particular version of any protocol. HTTP/1.1 is defined in Network Working Group, Request for Comments: 2616, June 1999, "Hypertext Transfer Protocol -- HTTP/1.1," the entire contents of which are fully incorporated herein by reference for all purposes. HTTPS is described in Network Working Group, Request for Comments: 2818, May 2000, "HTTP Over TLS," the entire contents of each of which are fully incorporated herein by reference for all purposes. Unless specifically stated otherwise, "HTTP" is used in this description to refer to any version or form of HTTP request, including HTTP and HTTPS requests. Those of skill in the art will realize and understand, upon reading this description, that HTTPS may be preferred in situations where additional security may be required. It should also be appreciated that when an HTTP request is referred to herein, some other protocols, including possibly proprietary protocols, may be used while still leveraging the CDN and using URLs to name the objects.

[0092] The server **1102** includes a request / response mechanism **1104** (preferably implemented by software in combination with hardware on the server **1102**). The request / response mechanism **1104** listens for requests on multiple configured addresses/ports, including port **1106**.

[0093] When a request is made, the request / response mechanism **1104** tries to identify a customer associated with that request. As used here, a "customer" is an entity that is authorized to have its content served by the server **1102**. The customer may be an external entity such as, *e.g.*, a subscriber to the CDN, or the customer may be another CDN component. In order to determine whether or not the request is associated with a customer of the CDN (or the CDN itself), the server **1102** needs at least some information about the CDN's customers. This information may be stored as global data **1108** in a database **1106**

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on the server **1102**. The global data **1108** should include sufficient data to allow the server **1102** to either reject the request (in the case of a request for a resource that is not associated with a customer), or to serve the requested resource to the client **1103**, or to direct the client to another source from which the requested resource can be served. If the server **1102** does not have the required global data **1108** at the time of the client request, it may obtain the needed global data **1108** from a data source **1110**, preferably from a control core **1116** or from another cache. In effect, for internal CDN data, the control core is considered an origin server or coserver.

[0094] As explained below, the request / response mechanism **1104** may perform customer-specific processing as part of the request/response processing. In order to perform customer-specific processing, the request / response mechanism needs certain customer-specific data **1110**. If current customer-specific data **1110** are not available in the request / response mechanism's database **1106**, the server **1102** may obtain the needed customer-specific data from a data source **1110**, preferably from a control core **1116** (although customer-specific data may also be obtained from another cache **1112** in the CDN).

Objects, Sequencers and Handlers

[0095] The processing performed by request / response mechanism **1104** uses various kinds of objects, including a Notes Object, a Session Object (**sxn**), and a Transaction Object (**txn**). With reference to **Fig. 12A**, a Notes Object **1204** is a generalized string key / value table. **Figs. 12B-12C** show a Session Object (**sxn 1206**) and a Transaction Object **(txn 1208**), respectively. A session object **1206** contains information about a particular client session, *e.g.*, a client connection or an internally launched (or spawned) session. A Session Object **1206** may contain allocation context information for a session. A Transaction Object (**txn 1208**) is usually associated with a session and contains information about an individual request. During a session, multiple transactions may be performed, and

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information about each transaction is carried in a transaction object. E.g., a transaction object carries the request to be satisfied, room for the response, information about where the response body is coming from (e.g., response channel id), etc.

[0096] A sequencer is essentially a task. A sequencer uses a sequence control object made up of an ordered list of one or more handlers and handler argument(s). **Fig. 13A** shows an exemplary sequence control object **1301** comprising handler(s) **1302** and handler argument(s) **1304**. The handler(s) **1302** comprise the ordered lists of handlers **1302-1, 1302-2** … **1302-*n***. It should be appreciated that not all handlers require arguments, and that some handlers may obtain some or all of their arguments from other locations. It should also be appreciated that a sequence control object may have only a single handler and/or no arguments.

[0097] When running, a sequencer invokes its *handlers* (essentially, processing modules) in order. By default, sequencers are bidirectional, so that the sequencer's handlers are called (invoked) in order on the way "in" and in reverse order on the way "out". Handlers can modify the sequence, thereby providing flexibility. **Fig. 13B** shows the execution of the sequence of handlers **1302** from sequence control object **1301** (of **Fig. 13D**). As shown in **Fig. 13B**, the sequencer invokes the handlers in the order "Handler #1," "Handler #2," … "Handler #*n*" into the sequence and then in the reverse order out of the sequence. So "Handler #1" makes a request of "Handler #2", and so on, until "Handler #*n*", and then results are passed back, eventually from "Handler #2" to "Handler #1".

[0098] Handlers may be synchronous or blocking. Handlers may inspect and modify the sequence to which they belong, and handlers may launch their own sequencers. There are two forms of this process: one is where a handler launches a "subsequence". That subsequence runs in the same sequencer as the handler and the sequence the handler is in is suspended until the subsequence is complete. Another example is where a handler launches a complete sequencer. In that case,

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the sequencer is a separate, independent task. A powerful aspect of that model is that a handler could launch such a sequence on the way in to the sequence, allow processing to continue, and then pick up the result (waiting if necessary) on the way out of the sequence. **Fig. 13C** shows an example of a first sequence ("Sequence 1") in which a handler (Handler #2, **1302-2**) launches (or spawns) another sequence ("Sequence 2", consisting of Handler #2,1 **1302-2.1** … Handler #2,k **1302-2.k**). If Sequence 2 runs in the same sequence as the handler #2, then handler #3 (of sequence 1) will not begin until sequence 2 is complete (*i.e.*, until handler #2,k is done). If, on the other hand, sequence 2 is launched as an independent and separate task, sequence 1 can continue with handler #3, etc. without waiting for sequence 2 to complete.

[0099] **Fig. 13D** shows an example of a first sequence ("Sequence 1") in which a handler (#2) launches two other sequences (Sequence #2,1, and Sequence #2,2). The Sequence #2,2 launches a subsequence #2,2.1.

[00100] A handler's behavior may be classified into three broad groups (or types):

- One-shot: The handler is removed from sequence when done.
- Intelligent: The handler may manipulate sequence.
- Persistent: The handler is called on the way "in" and "out".

[00101] These labels are used as descriptive shorthand for basic types of handler behavior, and it should be appreciated that this type is not used by the sequencer, and nothing needs to enforce a handler's "type," and a handler may act differently depending on circumstances.

[00102] Handlers may be named (*e.g.*: "ssl", "http-conn", "http-session", "strip-query", "proxy-auth", etc.) to correspond to the functions that they are to perform.

[00103] A sequence control object may be stored in compiled form for re-use, so there is no need to constantly look up handler names.

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[00104] The following is an example of a sequence specification for an HTTP listener:

```
listener = {
address = "*.80",
sequence = "http-conn, http-session"
}
```

[00105] In this example, the handlers are "http-conn" and "http-session", and the parameters are "address = '*.80'". This listener task provides a bare TCP or cleartext connection. The first handler ("http-conn") is a one-shot handler which creates an HTTP connection from a cleartext connection. The second handler ("http-session") is an intelligent handler that takes the HTTP connection (as already created by the "http-conn" handler), creates a session object and handles the entire session. It should be appreciated that the listener is just providing the communication channel to the client, and the same basic listener code could be used with different handlers to implement protocols other than HTTP (e.g., FTP).

[00106] As another example, the following sequence specifies a general SSL listener:

```
listener = {
address = "*.443",
sequence = "ssl, http-conn, http-session"
}
```

[00107] In this example, the handlers are "ssl", "http-conn" and "http-session", and the parameters are "address = '*.443'". This sequence is similar to the HTTP listener (above), except that the SSL handler first creates an SSL channel on the bare (encrypted) connection, suitable for the *http-conn* handler. Although the SSL handler is a "one-shot" handler, it needs to block since it must perform the SSL negotiation. That is, the "ssl" handler must complete before the next handler can begin. The SSL handler is responsible for instantiating an SSL channel. It should be appreciated that although the ssl channel is persistent, the handler which sets it up does not need to be persistent. The "ssl" handler

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instantiates an SSL channel on top of the cleartext channel...Once that is done, the SSL channel (which does the decryption and encryption) persists until the connection is finished, even though the "ssl" handler itself is gone from the sequence. So the "ssl" handler is not performing the SSL operations itself, it is just enabling them by instantiating the necessary channel.

[00108] **FIGS. 14A-14D** show examples of sequencers and handlers.

[00109] As shown above, a sequence may be is used to interpret a request and get to the point that a response is available to be pumped. Te same basic sequencing mechanism can be used to implement a programmable pump/filter, although of course the handlers themselves are now performing a different task. **FIG. 14A** shows a bidirectional sequence that is part of a pump/filter. The pump task uses "direct delivery" requests, *e.g.*, *sendfile()*, because it does not need to see the data itself. It should be appreciated that *sendfile()* is not the request, it is just one way a direct delivery request may be implemented by the channel involved. The delivery sequence consists of two handlers:

- **delivery-monitor** (account bytes, monitors performance); and
- **chan-submit** (submits request to a channel, waits for response). The channel may be, *e.g.*, an object channel, downstream channel, etc.

[00110] If the process requires, *e.g.*, computation of an MD5 of the pumped data, the sequencer can be set up with an MD5 handler in the path (*e.g.*, as shown in **FIG. 14B**). The MD5 handler can snoop the data as it passes.

[00111] An example of a self-modifying sequence is shown in **FIG. 14C**. The pump task is using direct delivery requests, so the data is not available in user space. The MD5 handler sees the request on the way "in" to the sequence and inserts a new handler ("direct-to-buffered") handler to the "left" of the MD5 handler so that it runs before the MD5 handler. The "direct-to-buffered" handler translates direct delivery to buffered read/write.

[00112] A sequence can be modified to change direction of the order of operations. For example, in a case where direct delivery requests can be too large

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for a single buffered read/write, the "direct-to-buffered" handler can change the sequence direction to perform multiple operations on one side of the sequence (*e.g.*, as shown in **FIG. 14D**). Handlers to the left of the "direct-to-buffered" handler still see what they expect to see, while handlers to the right of the "direct-to-buffered" handler perform multiple operations.

Scripts and Customer-Specific Control

[00113] As noted, the request / response mechanism **1104** (**Fig. 11**) may perform customer-specific processing as part of the request/response processing. The request / response mechanism needs certain customer-specific data **1110** in order to perform the customer-specific processing.

[00114] The request / response mechanism **1104** may allow customer-specific handlers (or sequences) to be included at various locations (or hooks) during request / response processing. These customer-specific handlers may perform operations on the request and/or response paths. The customer-specific scripts that are to be used to process a customer's requests are referred to as Customer Configuration Scripts (CCSs), and are associated with the customers, *e.g.*, via customer ids. Preferably the system has a default mode in which it will perform request/response processing without any customer-specific handlers. That is, preferably customer-specific handlers are optional.

[0001] It should be appreciated that scripts are not the same as sequences. A script is used to specify the sequences to be used to handle requests for a particular customer. The script may perform whatever operations it needs (including making its own HTTP requests, etc.) to determine what the sequences should be. For example, a script may also use a different sequence depending on the local environment. However, once the script has done that job, the resulting sequences are used (without rerunning the script) until something happens (e.g., the script is invalidated and reloaded) which indicates different sequences are now needed. Note, however, that a given handler may be implemented as a

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request/response script in the same language as the configuration script, but performing a different job.

[00115] Customers may provide handlers, parameters for existing handlers, or routines to be invoked by handlers at certain stages of the processing.

[00116] It should be appreciated that since, as noted, the client **1103** may itself be another component of the CDN (*e.g.*, a cache or a control core, etc.), the CDN itself may have CCSs associated therewith. That is, from the point of view of request / response processing, the CDN may be considered to be a customer of itself.

[00117] With reference again to **Fig. 11**, the server **1102** will need the CCS for the customer associated with the request from the client **1103**. The CCS is stored in the database **1106**, in the customer-specific data **1110**. If the server does not have that customer's CCS stored locally at the time it is processing the client's request, the server **1102** will attempt to obtain the CCS from another data source **1110**, typically from a control core **1116**. If a CCS is found, any customer-specific handlers (or sequences) specified in the CCS will be included in the appropriate locations (hooks) during request/response processing. In summary, the CCS generally is run once. It sets up the customer-specific sequences, which are then cached in their compiled form. If those sequences are present and valid, they are used without re-running the CCS (see the "Valid sequences?" decision in the flow chart in Fig. 20A).

Adding a new cache to the CDN

[00118] When a new cache machine is to be added to the CDN, the control core needs to get information about that new cache (*e.g.*, what group/region it is in, its IP address, its VIP, some capacity information, etc.). Similarly, in order to operate within the CDN, the new cache machine needs to get the current customer configuration data and other configuration data from the control core. A new cache can be pre-configured so that when it connects to the network (*e.g.*, to the

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Internet) it sends a request to the control core for the resources that it needs. These requests can be made of the control core using standard HTTP requests. The new cache may, *e.g.*, request a single configuration object from the control core, and that configuration object may, itself, include the URLs of other configuration objects needed by the cache. The control core may be configured to similarly request configuration data from the new cache, also in the form of one or more HTTP requests, although preferably the new cache provides needed information to the control core as part of one of its requests. It should be understood that appropriate security and encryption may be used to prevent unauthorized connection to the CDN. Once it has sufficient customer data (global data **1108**), the new cache machine can then begin to function as a CDN cache machine. In some cases the new cache machine may go through a warming phase in which it may query its neighbors and preemptively pull the GCO and some CCS data (*e.g.*, of popular customers at the neighbor) before accepting any incoming client connections. The cache may, in some cases, pre-fetch popular content. In some cases the new cache machine may also influence local load balancing, so that for a period of time it gets less traffic than other members of the cluster (*e.g.*, until its cache miss rate is substantially the same as the rest of the cluster of which it is a member).

[00119] The addition of a cache to a CDN is summarized with reference to the flow charts in **Fig. 15A**. With reference to **Fig. 15A**, a cache newly added to the CDN preferably first registers with the control core (at **1502**). The cache is preferably configured with a hostname of the control core (*e.g. control.fp.net*), and upon being connected to a network (*e.g.*, the Internet), the cache contacts the control core and performs some initial registration. This process allows the control core to determine whether the cache is authorized to participate in and be a part of the CDN. The registration process is preferably automated and performed by programs running on the cache and on the control core. Those of skill in the art will realize and understand, upon reading this description, that a new cache may

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be one that has never been connected to the CDN before or one that has been disconnected for some reason.

[00120] Once registered, the cache obtains configuration data from the control core (at **1504**). The cache may request the configuration data using one or more HTTP requests. In some cases, *e.g.*, as noted above, the new cache may request a single configuration object from the control core, and that configuration object may, itself, include the URLs of other configuration objects needed by the cache.

[00121] It should be appreciated that the registration (at **1502**) may be combined with the process of obtaining the configuration data (at **1504**).

[00122] Some of the configuration data obtained during this process may correspond to the global data **1108** in **Fig. 11**, and preferably include the GCO. Since the CDN components essentially serve content to each other (*e.g.*, the control core serves CDN configuration content to the new cache (and vice versa)), from the point of view of the CDN components, as noted, the CDN may sometimes be considered a customer. As such, the CDN may itself have one or more CCSs associated therewith. Preferably the configuration data obtained from the control core by the cache (at **1504**) includes one or more CCSs associated with the CDN. These CDN CCSs will allow the cache to perform the appropriate processing when serving CDN content to other CDN components.

[00123] The control core may obtain data from the new cache (at **1506**). While the cache may provide some information to the control core during the initial registration process, the control core may also obtain additional information from the new cache after registration. This information may include information, *e.g.*, relating to the capacity and type of the new cache.

[00124] The new cache will also preferably verify that it is up to date as far as system/application software. This may require a bootstrap process to pull new software packages, e.g., in the form of RPMs from caches/control core, verifying

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them, installing them and restarting (up to and including rebooting the server to pick up new operating system components for instance).

[00125] At this time the new cache is ready to begin serving content on behalf of the CDN. However, it may be desirable in some cases for the new cache to "warm up" by obtaining information from other caches (at **1508**). In particular, the new cache may obtain customer data (*e.g.*, CCSs) from nearby caches in anticipation of serving content on behalf of those customers. Preferably the new cache will query members of the cluster to obtain the popular CCSs and popular content.

[00126] It should be appreciated that since the cache is using a hostname to connect to the control core, the CDN rendezvous mechanism can rendezvous the cache to a control core machine that is "best" or "optimal" for that cache. In some cases, once the cache has discovered (or been told) which other caches are members of its cluster and its peers, it may issue requests destined for the control core to them instead. This will reduce direct load on the control core and accelerate retrieval of such data.

[00127] A CDN component's handling of a resource request is described with reference to the flowchart in **Fig. 15B**. It should be appreciated that the CDN component may be a cache (*e.g.*, an edge cache, a parent cache, an origin cache, a control core, etc.), and the requested resource may be any resource, including resources requested by clients external to the CDN on behalf of customers or subscribers to the CDN and those resources that are requested by other CDN components and comprise CDN data (*e.g.*, log files and the like).

[00128] First, the cache obtains a resource request (at **1510**). The request may be using an HTTP request, and include information in an HTTP header. The cache needs the GCO in order to determine whether the requested resource can be served. The GCO includes information that will allow the cache to determine whether the requested resource corresponds to a resource of a customer of the CDN (or to a CDN resource). The cache therefore obtains a current version of the

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GCO (at **1512**) and determines (at **1514**) whether or not the resource can be served. If the cache needs the GCO or other information from the control core, the cache can request that information using appropriate HTTP (or FTP) requests, and the cache may obtain the GCO and/or other needed information from other caches or other locations in the CDN. For example, **FIG. 15C** shows various caches (**102**) pulling data from the control core **108** using an HTTPS pull. In order to initiate such a pull, a cache would make an HTTPS request for the data (using a URL of that data) and identifying the control core **108** as the source of the data.

[00129] The cache server should serve a particular customer's resource to a client in accordance with the processing requirements (*e.g.*, scripts, etc.) set by that particular customer, the cache therefore needs the CCS (if any) associated with that customer. Accordingly, at **1516**, the cache server obtains the CCS (if any) associated with the requested resource (*i.e.*, with the customer on behalf of whom the requested resource is being served). It should be appreciated that the CCS should be pulled prior to obtaining the resource (since the CCS may influence where/how to retrieve the resource).

[00130] If the cache determines (at **1514**) that the requested resource can be served (*i.e.*, that the cache is authorized to serve the resource), the cache may need to obtain a copy of the resource (at **1518**). The CCS (and possibly information associated with the request, *e.g.*, HTTP header information) provides the cache with sufficient information for it to locate a copy of the resource, if needed. The cache server may obtain the requested resource from another cache or from an origin server. In some embodiments the cache server may redirect the client to another location from which to obtain the content.

[00131] Having obtained the appropriate CCS (if one exists), the cache server then serves the resource (at **1520**) using information in the CCS. As explained, the CCS runs before the cache even obtains the resource to serve, since the CCS may program handlers at hook points which affect the request itself, and therefore which affect which resource is going to be served.

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Example

[00132] **FIG. 16** shows an exemplary cache (or streaming) server **1608** operating within a CDN **100**. In operation, the server **1608** may obtain resources from one or more origin servers, using, *e.g.*, the HTTP, FTP, or HTTPS protocols. These origin servers in **Fig. 16** correspond to the origin server(s) **1114** in **Fig. 11**. These resources may be resources to be served to clients (not shown). In addition, the server **1608** may obtain resources from other caches (corresponding to the cache(s) **1112** in **Fig. 11**), *e.g.*, from peer caches (*e.g.*, using the HTTP protocol). The server **1608** may generate log information, and the collector may obtain that log information and other information from the server **1608**. The collector may obtain the log information using, *e.g.*, HTTP, and request that log information using an appropriate URL that identifies the log information on the server **1608**. Essentially the server **1608** serves the log information as a resource to the collector.

[00133] The server **1608** needs certain information in order to function properly within the CDN. In particular, the server **1608** may need information about other servers (*e.g.*, its peers, parents, etc.); it needs information about content providers (*e.g.*, subscribers or CDN customers) on behalf of whom it may serve content; it needs information about invalid (*e.g.*, stale) content, load information, etc. As to the load information, it should be appreciated that a regular cache does not need load info from the control core – it would send it to a control core (NDC). A cache could, however, make use of load info from the other machines in the cluster. The server **1608** obtains the required information using one or more HTTP requests from the control core **108** or other locations in the CDN (*e.g.*, peer caches). This information corresponds, at least in part, to the global data **1108** and / or the customer-specific data **1110** shown in **Fig. 11** and described above.

[00134] Since the control core has at least one domain name associated therewith (*e.g. control.fp.net*), each object/resource that the server **1608** needs

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from the control core **108** can be named with a URL and can be requested from the control core **108** using that URL and an appropriate protocol (*e.g.*, HTTP). As the control core **108** is preferably a distributed system consisting of more than one machine, the server **1608** will be directed (*e.g.*, by the DNS system) to one of the machines that comprise the control core **108**, preferably to a "best" or "optimal" control core machine for the cache server **1608**. The server **1608** can then request the control information it needs from the control core **108** using an HTTP request. As is well known, and as shown in the drawing, HTTP, HTTPS, and FTP use the following well-known port numbers: 80 for HTTP; 443 for HTTPS; and 21 for FTP. Those of skill in the art will realize and understand, upon reading this description, that different and/or additional ports may be used. It should be appreciated that the selection of the "best" or "optimal" control core component to serve the cache server **1608** may be made with the same rendezvous and selection mechanism(s) used to direct client requests to servers in the CDN.

[00135] As shown in **FIG. 1**, a CDN **100** includes operation / measurement / administration mechanisms **109**. These include mechanisms to obtain and measure load on the caches **102** and other system components and to measure and maintain information about the state of the network. Some of this information is used, *e.g.*, to generate tables and other data that are used to determine a "best" or "optimal" location for resource requests. A measurement mechanism **1610** measures and collects load and other information from the cache **1608** and provides that information to a table generation mechanism. Measurement mechanism **1610** may use dynamic and static measurement tests, including *ping*, *traceroute*, and the like. An exemplary table generation mechanism is described in U.S. Patent No. 6,185,598, the entire contents of which have been fully incorporated herein for all purposes.

[00136] As noted above, from the point of view of a client (any entity that wishes to access the control core cluster **108** or information in the control core cluster), the control core **108** is considered a single entity accessible, *e.g.*, by its

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domain name (*e.g.*, *control.fp.net*). While a particular client is likely to always get content from the same control core cluster component, there is no requirement for that to occur. For example, if there are five control core cluster components and one of the five control core cluster components fails or is otherwise unavailable, a client will access the control core transparently at one of the other control core components. Those of skill in the art will realize and understand, upon reading this description, that, as used herein, the term "client" refers to any entity trying to obtain a resource from the control core **108**, and, as such, a client may be a cache **102** or some other component of the CDN **100**. Additionally, as with content from content-providers' origin servers, resources that originate at the control core may be served to a cache by a peer or parent rather than requiring that each cache pulls directly from the control core **108**. (The control core may be considered to be an "origin server" for the content for which it is authoritative, *e.g.*, for CDN control and configuration data.)

Control Core

[00137] The control core **108** (**Fig. 1**) keeps the authoritative database of the current CDN configuration. Data are replicated across all machines in the cluster, and the cluster uses a method such as voting to ensure updates and queries are consistent. In the presently preferred implementation (with a cluster of five machines), the commits only occur if three of the five cluster machines agree to commit, and queries only return an answer if three of the five cluster machines agree on the answer. The use of voting is given as an exemplary implementation, and those of skill in the art will realize and understand, upon reading this description, that different techniques may be used in conjunction with or instead of voting on queries. For example, techniques such as using signed objects to detect corruption/tampering may be adequate. In some cases, *e.g.*, the system may determine that it can trust the answer from a single server without the overhead of voting.

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[00138] The control core **108** comprises multiple databases that are used and needed to control and operate various aspects of the CDN **100**. These databases include databases relating to: (i) system configuration; and (ii) the CDN's customer/subscribers. The control core data are described in greater detail below.

[00139] Information in these databases is used/needed by the caches in order to serve resources on behalf of content providers. *E.g.,* each cache needs to know when content is still valid and where to go to get requested content that it does not have, and the rendezvous mechanism needs data about the state of the CDN (*e.g.*, cluster loads, network load, etc.) in order to know where to direct client requests for resources.

[00140] In some embodiments the control core **108** uses a distributed consensus algorithm – an approach for achieving consensus in a network of essentially unreliable processors.

[00141] As described in U.S. Patent No. 7,921,169 to Jacobs et al.:

> In a Paxos algorithm, one example of a distributed consensus algorithm, a server can be selected to act as a host or lead server by a network server, the network server leading a series of "consensus rounds." In each of these consensus rounds, a new host or lead server is proposed. Rounds continue until one of the proposed servers is accepted by a majority or quorum of the servers. Any server can propose a host or lead server by initiating a round, although a system can be configured such that a lead server always initiates a round for a host server selection. Rounds for different selections can be carried out at the same time. Therefore, a round selection can be identified by a round number or pair of values, such as a pair with one value referring to the round and one value referring to the server leading the round. The steps for one such round are as follows, although other steps and/or approaches may be appropriate for certain situations or applications. First, a round can be initiated by a leader

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sending a "collect" message to other servers in the cluster. A collect message collects information from servers in the cluster regarding previously conducted rounds in which those servers participated. If there have been previous consensus rounds for this particular selection process, the collect message also informs the servers not to commit selections from previous rounds. Once the leader has gathered responses from at least half of the cluster servers, for example, the leader can decide the value to propose for the next round and send this proposal to the cluster servers as a "begin" message. In order for the leader to choose a value to propose in this approach, it is necessary to receive the initial value information from the servers. Once a server receives a begin message from the leader, it can respond by sending an "accept" message, stating that the server accepts the proposed host/lead server. If the leader receives accept messages from a majority or quorum of servers, the leader sets its output value to the value proposed in the round. If the leader does not receive majority or quorum acceptance ("consensus") within a specified period of time, the leader can begin a new round. If the leader receives consensus, the leader can notify the cluster or network servers that the servers should commit to the chosen server. This notification can be broadcast to the network servers by any appropriate broadcasting technology, such as through point-to-point connections or multicasting. The agreement condition of the consensus approach can be guaranteed by proposing selections that utilize information about previous rounds. This information can be required to come from at least a majority of the network servers, so that for any two rounds there is at least one server that participated in both rounds. The leader can choose a value for the new round by asking each server for the number of the latest round in which the

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server accepted a value, possibly also asking for the accepted value. Once the leader gets this information from a majority or quorum of the servers, it can choose a value for the new round that is equal to the value of the latest round among the responses. The leader can also choose an initial value if none of the servers were involved in a previous round. If the leader receives a response that the last accepted round is x, for example, and the current round is y, the server can imply that no round between x and y would be accepted, in order to maintain consistency.

[00142] In presently preferred implementations, the core control cluster uses the Paxos algorithm of Lamport and Gray as its distributed consensus algorithm. Implementations of this distributed consensus algorithm are described, *e.g.*, in one or more of: U.S. Patent No. 7,856,502, titled "Cheap Paxos," U.S. Patent No. 7,797,457, titled "Leaderless Byzantine Consensus," U.S. Patent No. 7,711,825, titled "Simplified Paxos," U.S. Patent No. 7,698,465, titled "Generalized Paxos," U.S. Patent No. 7,620,680, titled "Fast Byzantine Paxos," U.S. Patent No. 7,565,433, titled "Byzantine Paxos," U.S. Patent No. 7,558,883, titled "Fast Transaction Commit," U.S. Patent No. 7,555,516, titled "Fast Paxos Recovery," U.S. Patent No. 7,249,280, titled "Cheap Paxos," U.S. Patent No. 6,463,532, titled "System And Method For Effectuating Distributed Consensus Among Members Of A Processor Set In A Multiprocessor Computing System Through The Use Of Shared Storage Resources," the entire contents of each of which are hereby incorporated herein for the purpose of describing the Paxos algorithm.

[00143] Various commercial implementations of the Paxos algorithm exist and are available. For example, Google uses the Paxos algorithm in their Chubby distributed lock service (see, *e.g.*, The Chubby lock service for loosely-coupled distributed systems, Burrows, M., OSDI'06: Seventh Symposium on Operating System Design and Implementation, Seattle, WA, November, 2006) in order to keep replicas consistent in case of failure. Chubby is used by Google's Bigtable

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(Bigtable: A Distributed Storage System for Structured Data, Chang, F. et al, in OSDI'06: Seventh Symposium on Operating System Design and Implementation, Seattle, WA, November, 2006) and other products. Microsoft Corporation uses Paxos in the Autopilot cluster management service from its Bing product. Keyspace, an open-source, consistently replicated key-value store uses Paxos as its basic replication primitive.

[00144] Those skilled in the art will realize and understand, upon reading this description, that other approaches and algorithms may be used instead of or in conjunction with the Paxos algorithm.

Logging

[00145] Caches may write their logs to files on their machines. Logs may also be streamed from the caches in addition to or instead of being kept as journal-style resources. The inventors realized that logs can be treated as ordinary cache resources, retrievable via HTTP or HTTPS using a standard URL. Thus caches may save logs using the same mechanisms they would use to save any cached resource, with the difference being that the source of the data is internal rather than external.

[00146] The logging system uses the hierarchical network data collector to gather, sort and efficiently merge logs.

[00147] Logs are internally generated resources that are cached and pinned until released. Logs are preferably stored in a format that is space-efficient and easy to parse and interpret. They are also preferably stored in a way or on a device that is suitably fault tolerant. Log access is by normal HTTP requests to the caches, so that the CDN can be used to collect logs from the caches.

[00148] Different views and subsets of the same log data are possible, based on the request. For efficiency, generated responses can be cached for a short time.

[00149] Logs are collected as necessary by the network data collector (NDC). In case of crashes, logs are accessible using a general offline cache

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content access mechanism. It should be appreciated that this may lead to a QoS issue, in that some data are more valuable than others and may require different retention mechanisms. For instance, data that are sourced locally may not be re-constructible in case of loss (as opposed to a publisher's resource, which may be able to be reloaded). So log data may be considered more valuable than a publisher's resource. Billing data (a specialized version of a log file) is likely most valuable. In some cases, log data may be sacrificed for space reasons, but billing data should persist until pulled.

Network Data Collector (NDC)

[00150] The network data collector (NDC) is essentially a reverse CDN. It preferably uses the normal HTTP or HTTPS channels, with one key extension: a single request may result in multiple fills that get merged. Flexible fan-in and merge options are supported. The fan-in and merge operations are defined by a script. The script is itself a resource. The script is an example of the Executable Resource mechanism described below. The root of each collection operation in the NDC is a single "origin client," analogous to an origin server in the CDN.

Component Roles

[00151] Certain components of the CDN system may act as clients of the CDN and/or as content providers to the CDN. For example, as noted above, the core control cluster maintains information used/needed by the caches in order for them to deliver content to clients. When caches obtain control-related content (resources) from the control core cluster, the control core cluster is acting as a content provider and the caches are acting as clients. Similarly, when a collector mechanism obtains log and other information from a cache cluster, the collector mechanism is acting as a client and the cache cluster is acting as a content provider. And when the control core cluster obtains information from a collector mechanism, the control core cluster is acting as a client and the collector

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mechanism is acting as a content provider. When content is being delivered by the CDN to clients on behalf of a content provider, the caches obtain that content from origin server sites associated with the content provider. In some cases, as noted above, a cache server site may try to obtain requested content from another cache server site (*e.g.*, from a peer cache server site or from a parent cache server site). In those cases the peer (or parent) cache server sites are acting as content providers.

Hierarchy

[00152] The CDN preferably uses tree-like hierarchical communication structures to pull data from the control core and origin servers to the edge, and to pull data from the edge to specialized gatherers and monitors. These tree-like structures are preferably dynamic, *i.e.*, they can change with time, requirements and circumstances. These structures are preferably also customized, *i.e.*, different communication operations can use different hierarchies, and different instances of a communication operation may use a different hierarchy (*e.g.*, different parents for different origin servers).

[00153] For pulling data to the edge, each node needs to know its parent or parents. For pulling data to the root, each node needs to know its children. Lists of parents or children can themselves be resources. Using domain names instead of IP addresses for parents and children allows the rendezvous system to be leveraged.

Executable Resources, Customization Hooks and scripts

[00154] Caches **102** in the CDN **100** are able to process and deliver (serve) executable resources, and CDN users (*e.g.*, content providers, the CDN itself) are able to provide extensions to resources via these executable resources. Executable resources provide a general and useful extension that may replace and/or enhance several *ad hoc* mechanisms and HTTP extensions in a CDN. Executable resources

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allow suitably authenticated HTTP servers to respond to an HTTP request with a new type of reply (possibly identified by an extension status code such as "600 Exec" or a new Content-Type, *e.g.*, say "application/x-fp-exec"). The contents of such a reply are a script to be executed by an interpreter in the response path of the cache, in order to generate the actual reply. Examples of things the interpreter may do are:

- Fill the request from an alternate location.
- Fill the request from multiple locations and merge the results.
- Perform authentication.
- Pre-fill one or more other resources.
- Perform manipulations on the body of a resource (*e.g.*, compression, transcoding, segmentation, etc.)

[00155] If the reply is cacheable, it may be retained by the cache, and executed each time the resource is requested.

[00156] The NDC may use this feature to gather logs.

[00157] The system provides a way to distinguish between requesting the script itself, and requesting the result of executing the script. Scripts are subject to pinning, expiration, invalidation and revalidation just like any other resources.

[00158] Customer-specific code can be added at numerous hook points in the processing. Such customer-specific code may be used, *e.g.*, for:

- request manipulation after parsing;
- calculation of cache key for index lookup;
- coarse and fine details of authentication;
- content negotiation choices, variants, and encodings;
- policies for range handling;
- deciding which peers to contact or migrate to;
- which host(s) to contact for fills;
- contents of fill request;

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- manipulation of fill response;
- handling of origin server errors;
- caching policy;
- manipulation of response to client;
- logging effects.

[00159] A wide variety of hook points enable CDN users (customers) to modify existing algorithms; pre- or post-process algorithms; and/or completely replace algorithms. In a presently preferred embodiment, these are the customer-specific sequences which are set at various hook points by the CCS.

[00160] In a present implementation, scripts can be used for:

- Configuration
- Customer-specific event handling and HTTP rewriting
- Network Data Collection operations
- Rapid prototyping of new features

[00161] Scripts are preferably cached objects (like other objects in the CDN). They are preferably compiled into byte code and executed in a sandbox by a virtual machine. Scripts are preferably measured for CPU usage and are effectively preemptible.

[00162] In a presently preferred implementation scripts are implemented using the Lua scripting language. Lua compiles into bytecodes for a small register virtual machine. Lua's primary data type is a table (which is implemented as a hybrid between a hash table and an array), but it also has other types (string, number, Boolean, etc.). Lua's interface to the rest of the system is via various function bindings which are a means for a Lua function call to cause a system function (instead of another Lua function) to be called. The details of a particular binding, including the data it operates on and the results it returns to the Lua script, are specific to the binding in question and may involve tables (*e.g.*, hash table objects) or other types of objects.

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[00163] Those of skill in the art will realize and understand, upon reading this description, that a different scripting language could be used. However, it should be appreciated that any scripting language should run (*e.g.*, be interpreted) quickly with a small interpreter, have a relatively small implementation, (be lightweight – have a small memory footprint and be easily sandboxed for secure execution) and provide sufficient control to allow customer-derived scripts to be used. It should be noted that "script" does not necessarily imply interpreted at run time, but rather it is used in a broader sense to mean loadable code.

[00164] It should be appreciated that basic cache functionality requires no scripts, and the CDN will operate without them to serve content. Hooks allow script execution at various points in the cache's processing path and may be used (if permitted) to enhance and modify content delivery.

[00165] Hooks may be either:

- Customer-visible. Monitored, accounted, billable.
- Ops-visible. Monitored.
- Development-visible. Minimally restricted.

[00166] At hook points, one can specify either:

- A canned (predefined) algorithm name; or
- An expression (*e.g.*, an in-line script or an expression in the script language); or
- A handler or series of handlers; or
- The name of a script

[00167] In some implementations, scripts used in request processing may:

- Inspect the request
- Modify the request
- Generate a response (including replacing an already generated response)
- Provide a short static body

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- Provide a function to incrementally generate longer response body
- Provide a function to filter a response body
- Inspect an already generated response
- Modify an already generated response
- Launch any number of helper requests
    - Synchronously – wait for and inspect response
    - Asynchronously – "fire and forget"
    - Cacheable or non-cacheable

[00168] Configuration variables similarly support script execution, *e.g.*, a variable can have an immediate value, be a parameter reference, or determined by an inline expression. For example, the variable *fill_host* is shown here with different types of values:

- **fill_host = "origin.customer.com"-- immediate value**
- **fill_host = $host1-- parameter reference**
- **fill_host = "origin".domain($request_host)-- inline expression**
- **fill_host = http://origin.customer.com/scripts/pick_origin.lua - reference to a script**

[00169] It should be appreciated that these values are given only by way of example of the type of values. These expressions will preferably be in the script language (e.g., Lua).

Cache Organization

[00170] **FIG. 17** is a block diagram showing the major functional modules (collectively **1700**) in an exemplary cache. These modules include Executive **1704**, manifest channel **1706**, global strategizer **1708**, outgoing connection manager **1710**, fill manager **1712**, HTTP parsers **1714**, **1715**, HTTP formatters **1716, 1717**, incoming connection manager **1718**, rewriter **1720**, index **1722**, store manager **1724**, peer manager **1726**, IO **1728**, intercache transport protocol **1730**,

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and rulebase **1732**. These modules and their operational connectivity are shown by way of example, and it should be appreciated that a cache may include different and/or additional modules, and that the modules in a cache may have different operational connectivity.

[00171] The Executive **1704** is the basic executive controlling all activities within the cache. The Executive's responsibility is to maintain a prioritized list of runnable tasks, and execute them in a priority order. A high-priority "system" task repeatedly checks for ready file descriptors, and moves their waiting "user" tasks onto the run list. The Executive may also support abstracting a task or group of tasks as an asynchronous service called a channel, and may provide a clean way for tasks and channels to communicate. Cache subsystems discussed below are implemented as tasks and channels.

[00172] When a new client connection is detected on one of the listener file descriptors, the Incoming Connection Manager **1718** assigns a client task to handle it, and coordinates the process of accepting the connection, completing any TLS (Transport Layer Security) handshake, and assigning a priority and connection-level policy. The Incoming Connection Manager **1718** continues to monitor and manage the connection throughout its lifetime.

[00173] Although the Incoming Connection Manager **1718** is described here as a single component, it should be appreciated that this is merely one logical depiction of functionality in the cache. *E.g.,* in a present implementation there is a listener task which, after receiving a new connection, runs a sequence of handlers which are configured for that particular listener. Those handlers may apply policies, perform a TLS upgrade if appropriate, etc.

[00174] The client task invokes the HTTP Parser **1715** to read data from the connection, locate the message boundaries, and parse the HTTP into a request object with a convenient internal format. Messages remain in this internal format as long as they are within the cache system (the CDN), even if they are migrated to another cache. It should be appreciated that cache-to-cache messages may be in

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other formats, *e.g.*, in some cases, messages may be sent from cache-to-cache in their standard text format.

[00175] The request object may next be processed by the rulebase **1732**, to assign customer-specific handling policies and normalize the URL associated with the request. The policy might indicate, *e.g.*, that the request requires manipulation by a customer-defined script. In that case, the request rewriter **1720** executes the script. In a present implementation a table (the GCO) is used which, in conjunction with the apparent target of the request, to decide whether or not it is worth it to continue further processing at all (i.e., whether the request is associated with a valid customer). At this point, the system checks whether there is a programmed sequence of handlers appropriate for that customer. If not, the system retrieves and runs the Customer Configuration Script, whose function it is to program the sequence of handlers. Then the handlers are run to process the request.

[00176] The next step is to determine if the cache has any information about the requested object. The request is presented to a manifest channel which then inspects the request and uses the information it has internally (a manifest) to determine how best to handle the request, including by providing a reference to a cached object, requesting a fill or a refresh, etc. The manifest channel maintains the manifest data and also provides the intelligence to use the manifest data. The URL is looked up in the cache index **1722**, which is essentially a database listing the objects already in the cache. The result of the index lookup is either null, or a manifest listing all the data, metadata and ongoing activities that might be relevant in responding to the request.

[00177] At this point, the request processing engine has a set of request-specific information, comprising the parsed request, a set of policies for handling the request, and a manifest of pertinent cache information. As noted, a manifest channel **1706** is responsible for determining how to respond to the request. In general, the decision will depend on the request-specific information, the object-

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specific information, the current state of the machine, the global state of the CDN, and the set of capabilities implemented in the cache. There may be one strategizer instance running for each actively referenced manifest in the cache, and that strategizer handles all clients and activities referencing that manifest. In a current implementation the strategizer is the manifest channel.

[00178] The manifest channel **1706** has at its disposal a variety of modules, implementing services, the services including the storage service, fill service and peering service. Other modules may be available for error message generation, authentication, logging, throttling, etc. The role of the strategizer is to orchestrate these services to construct a reply to the request, and preferably to fully process the request (since logging is part of the processing but not necessarily part of the reply).

[00179] The manifest channel **1706** contains much of the intelligence in the cache. New capabilities may be added and special handling provided in the manifest channel **1706** for new classes of resources. For this reason, the architecture is designed to provide clean separation of mechanism and policy. Machinery/mechanisms implementing individual services are encapsulated into separate modules, and the manifest channel **1706** essentially acts as a conductor, supervising the construction of a response.

[00180] The most common scenario is expected to be a simple cache hit, where the cache has an easily accessible copy of the requested object. In this case, the manifest channel **1706** invokes the storage service (store manager **1724**) to retrieve the object, which may be in memory, or on solid-state or hard disk (generally denoted **1734**). In the process, the manifest channel **1706** may also provide guidance to the storage service (store manager **1724**) on what type of future access is expected, so that the object can be optimally placed in the appropriate type of store.

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[00181] Another common scenario involves a dynamically-generated response, such as a response to a control command, a statistics report, or an error message.

[00182] When a request is received, an initial sequence of handlers is assembled to handle the request (based on the target of the request and the listener it came in on). The handlers either generate a response because the request is directed at them, add some value by performing a request or response manipulation, or take themselves out of that instance of the sequence because they are not relevant to the request at hand. A handler may be a script handler, and that script can perform any number of functions (as outlined previously) to generate a response or to manipulate a request or response. The "manifest channel" is one component used by a series of handlers, but it is concerned with dealing with cachable resources. It is generally not involved in determining whether, *e.g.*,, pre-authentication needs to be performed (which could be handled by a handler in the cli-req hook or similar).

[00183] As noted earlier, an important aspect of the architecture is that essentially all data items, including machine configuration, customer policies, logs, billing data and statistics, are simply web objects, which appear in the index and are retrieved through the strategizer just like customer web resources. As critical resources, they do have policies engaging specific authentication, persistence and prefilling services, but the machinery of these services is also available to ordinary resources when necessary.

[00184] A feature of Unix file I/O is that read and write operations on standard files are synchronous, and will block the calling thread if the data needs to be physically retrieved from or written to disk. Since the cache likely has plenty of other work to do while disks are being accessed, the IO library **1728** provides a way for the cache to hand off disk I/O to a separate thread that can block without holding up the cache activities. In addition, the IO library **1728** provides a richer,

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more efficient API to the physical disks than the normal open/read/write/close interface.

[00185] If the request is not a cache hit, the manifest channel **1706** will typically invoke the peering service (peer manager **1726**) to see if a nearby cache has the requested object. Since other services may also need to communicate with neighboring caches, and it is inefficient to open or operate multiple TCP connections to multiple neighbors, an intercache transport protocol module **1730** multiplexes various types of intercache communication over a single general-purpose link. For instance, the peering service might offer to migrate the client connection to a neighbor that has the resource; the strategizer could choose to use this option, in which case it would invoke the migration service, which would use the intercache transport protocol to transfer the client connection state. As before, it should be appreciated that one or more handlers perform this function.

[00186] If the request is not a hit, or internally serviced or migrated, the resource needs to be fetched via the network, and the fill service (fill manager **1712**) is invoked. The fill manager's role is to balance and prioritize the outgoing network activity between all strategizers, and operate protocol handlers for the supported set of protocols. In particular, for HTTP fills, the strategizer will create an HTTP fill request in internal format, and the fill service will format that request using the HTTP formatter **1716**, send it to the appropriate target host, and manage the data transfer. For efficiency, connections are created and managed by an outgoing connection manager **1710**, which maintains a pool of connections to frequently accessed hosts, tracks responsiveness, implements traffic shaping, etc. In a current implementation, the manifest channel creates the fill request.

[00187] Some fill operations will be peer fills from other caches, and these likely constitute the main class of intercache communication not using the Intercache Transport Protocol. Such fills may use the internal message format and bypass unnecessary HTTP formatting and parsing steps.

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[00188] Fill responses arriving from the network are handed back to the manifest channel **1706**, which decides whether to cache the object, and how to process it before replying to waiting clients.

[00189] It should be appreciated that the manifest channel **1706** would not invoke a "reply rewriter." Rather, such a rewriter (if any) would exist at one of the hook points on the response path, *e.g.*, *client-resp*, and would be used regardless of whether a manifest channel was involved in generating the response. Such a rewriter may inspect the response to determine if it came from cache, however it is not up to the manifest channel to invoke this rewriter. The manifest channel would not generally be involved in a request which was *a priori* known to be non-cacheable. On the other hand, a "reply rewriter" may well be involved in such a request.

[00190] As on the input path, the manifest channel **1706** invokes appropriate services to do the actual work, and supports optional processing by a reply rewriter **1720** just prior to final formatting and output to the client. Those of skill in the art will realize and understand, upon reading this description, that this type of processing (final formatting, etc.) is performed by one or more handlers on the way "out" of the processing sequence.

[00191] The manifest channel **1706** is responsible for handling a single URL, and optimizing the experience of the clients currently requesting the resource associated with that URL. The global strategizer **1708** is responsible for optimizing the overall cache behavior, and the behavior of the CDN as a whole. The global strategizer **1708** comprises a set of permanently running background tasks and services that monitor and manage the cache, performing operations such as discarding old objects, prefetching latency-sensitive objects, and enforcing quotas. Like the manifest channel, global strategizer is preferably architected to cleanly separate policy and mechanisms, thereby allowing for future enhancement and adjustment.

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[00192] The global strategizer **1708** influences the manifest channel **1706** by adjusting a variety of modes and levels which the manifest channels consult when making their decisions. In turn, the global strategizer monitors the effects of the mode and level changes, and adjusts them as necessary to achieve the desired global conditions. Thus, the global strategizer is the module in charge of the various feedback loops in the cache. For instance, by adjusting the maximum allowed object age, it can control the amount of data in the cache, and by adjusting the maximum size of objects allowed in the memory store, it can influence the amount of memory in use. In some implementations there may be no global strategizer and the storage system will manage its own resources, etc.

[00193] Implementations and embodiments of various components are described in greater detail below. Those skilled in the art will realize and understand, upon reading this description, that the details provided below are exemplary and are not intended to limit the scope of the invention.

The manifest channel 1706

[00194] The manifest channel **1706** handles issues related to a single resource. Its job is to deliver an optimal response to each client based on various factors such as, *e.g.*, request details, policy settings, cache contents, state of devices, peer caches, origin server, network, etc. The manifest channel **1706** consists of an extensible collection of efficient mechanisms, *e.g.*, for retrieval from disk; connection migration; filling from origin; checking peers, etc. A control module orchestrates the mechanisms, using canned algorithms for common situations and providing hooks for introducing variations to these canned algorithms. The Manifest channel **1706** may be completely scriptable, if necessary. The manifest channel **1706** may provide clean separation of mechanism and policy and may be more general than a pipeline. In a present implementation, the manifest channel **1706** is sequence (a pipeline of sorts),

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although each of the steps of the sequence may be arbitrarily intelligent (including being a script).

[00195] At any moment, there is one instance of the manifest channel **1706** running for each manifest being actively accessed. The role of the manifest channel is to coordinate all activities associated with the manifest, ensure that each client requesting the object is sent an individualized response meeting the policy constraints, and that this is done as efficiently as possible and without violating other constraints imposed by the global strategizer.

[00196] The manifest channel **1706** preferably includes a set of mechanisms with associated logic to perform some or all of the following (this is essentially a potential list of "handlers."):

Mechanism	**Functionality**
Authentication	Performs authentication handshakes with the client and queries internal databases or external servers as necessary for permission to serve the resource to the client. These are typically synchronous operations. Internal databases are cached web objects, and may also need to be refreshed periodically.
Referer Checking	Handles cases where the reply depends on the HTTP referer header. General functions in the rulebase and rewriter will classify the referrer, and this module implements the consequences of that classification (this is essentially an example of authentication)
Browser Identification	Handles cases where the reply depends on the HTTP User-Agent header and potentially on other headers.

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Mechanism	Functionality
Hot Store	Allow objects to be identified as high-popularity and worth keeping in fast storage such as application memory, the OS page cache or solid-state disks, and for communicating that fact to the storage manager.
Cold Store	Allow objects to be identified as low-popularity and suitable for archiving to more extensive but higher latency un-indexed mass storage.
Peering	Checking for information about which peers are likely to have an object, and for directly querying peers via the peering service.
Migration	Deciding when to migrate a connection to a neighboring cache, and for marshalling the state to be transferred.
Connection Splicing	Handling non-cacheable traffic such as POST requests, by delegating further interaction with the client to the operating system, so that it can efficiently relay raw data between the client and the remote server. Also monitor the progress of such relays for logging and diagnostic purposes.
Longtail	Dealing with resources making up working sets that exceed the size of the cache. The module includes counters for determining the popularity of such resources, and support for special types of filling and redirection that allow the CDN to handle them efficiently.
Fill Target Selection	Support for filling resources in a flexible way, *e.g.*, from load balanced clusters, from various locations, or with a variety of protocols.
Range	Dealing with range requests, for deciding whether it is worth fetching the entire object, and for formatting HTTP Partial

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Mechanism	Functionality
	Content (206) replies.
Partial Object Handling	Assembling separately-fetched parts of the same object into a complete object, either logically or physically.
Error Message Construction	Formatting of informative and appropriate HTTP error messages for the client when the request fails in some way.
Redirection	Efficiently redirecting clients to other locations.
Command Handling	Acting upon requests to the command, monitoring and logging subsystems, and for constructing a variety of internally generated responses.
Vary	Content negotiation is defined in Network Working Group, Request for Comments 2616, Hypertext Transfer Protocol – HTTP/1.1 (hereinafter "RFC2616"), the entire contents of which are fully incorporated herein by reference for all purposes. The Vary field value indicates the set of request-header fields that fully determines, while the response is fresh, whether a cache is permitted to use the response to reply to a subsequent request without revalidation. For uncacheable or stale responses, the Vary field value advises the user agent about the criteria that were used to select the representation. A Vary field value of "*" implies that a cache cannot determine from the request headers of a subsequent request whether this response is the appropriate representation. RFC2616 section 13.6 describes the use of the Vary header field by caches. According to RFC2616, an HTTP/1.1 server should include a Vary header field with any cacheable response that is subject to server-driven negotiation. Doing so allows a cache to

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Mechanism	Functionality
	properly interpret future requests on that resource and informs the user agent about the presence of negotiation on that resource. According to RFC2616, a server may include a Vary header field with a non-cacheable response that is subject to server-driven negotiation, since this might provide the user agent with useful information about the dimensions over which the response varies at the time of the response. According to RFC2616, a Vary field value consisting of a list of field-names signals that the representation selected for the response is based on a selection algorithm which considers only the listed request-header field values in selecting the most appropriate representation. According to RFC2616, a cache may assume that the same selection will be made for future requests with the same values for the listed field names, for the duration of time for which the response is fresh. The field-names given are not limited to the set of standard request-header fields defined by the RFC2616 specification. Field names are case-insensitive and, according to RFC2616, a Vary field value of "*" signals that unspecified parameters not limited to the request-headers (*e.g.*, the network address of the client), play a role in the selection of the response representation. According to RFC2616, the "*" value must not be generated by a proxy server; it may only be generated by an origin server. In some cases it may be desirable to have a communication channel between the CDN and the origin server, in order to ingest policy information about variant selection performed at

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Mechanism	Functionality
	the origin so that the same can be directly replicated within the CDN rather than being inferred from a series of responses from the origin.
Content Encoding	Content negotiation as defined in RFC2616.
Transforms	Converting from one content encoding to another within the cache, as a service to customers.
Logging	Controlling the amount and type of logging information generated by the request processing, and for saving that information in internally generated objects for later retrieval by special HTTP requests and/or remote logging.
Tracing	Enabling diagnostic tracing of the processing, either globally or for a specifiable subset of requests or resources.
Billing	Collecting a variety of billing-related information while the request is being processed.
Throttling	Allow certain types of actions to be delayed based on advice from the global strategizer.
Keepalive	Checking various factors that influence the decision to allow connections to persist, and methods for conveying or delegating the final decision to the connection manager.
Transfer Encoding	Deciding what transfer encoding to apply, and for applying it.
Shaping	Deciding on what bandwidth to allocate to a network activity, and for conveying this information to the connection managers.
Prefetch	Allows a request for one resource to trigger prefetching of other resources, from disk, peers or the origin.
Refresh	Implementation of the HTTP “GET If-Modified-Since” etc.,

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Mechanism	Functionality
	and "304 Not Modified" mechanism, as well as the background refresh feature.
Retry and Failover	Allow failed fills to be retried from the same or a different fill target.
Cachability	Decides if, where and for how long an object should be cached by the Storage Service.
Script execution	Execute requests and replies that are CDN internal scripts.
Replacement	Decide which objects in the manifest are no longer sufficiently useful and can be destroyed.

Global Strategizer 1708

[00197] The global strategizer **1708** is the subsystem responsible for overseeing the operation of the cache as a whole, and the cache's relationship to other parts of the CDN. The global strategizer is preferably running at all times, and keeps track of extrinsic parameters such as the amount of storage used, the number of clients, etc. In turn, it controls operation of the cache by adjusting intrinsic parameters like the LRU (Least Recently Used) Aggression and the listener poll and accept rates.

[00198] **Invalidation.** The global strategizer is responsible for fetching, preferably roughly once per second, updates to the primary invalidation journal from the CDN control core, fetching updates to any secondary journals that the primary indicates have changed, and invalidating the resources that the secondary journals indicate have been invalidated. It should be appreciated that the control core for customer invalidations may not be the same control core as used for configuration data (and invalidations associated with it). Different groups of customers may be put onto different such control cores for invalidation.

[00199] **Automatic Refresh.** This mechanism allows selected resources to be refreshed even when they are not being requested externally, so that they are

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always up to date. The invalidation journal mechanism is essentially a special case of this.

[00200] **Load Metrics.** The global strategizer is in charge of measuring the total load on the machine, and responding to requests for load status.

[00201] **Platform Configuration and Control.** Mechanism to act upon configuration information from the control core.

[00202] **Listener and IO Event Rate Control.** Controls the rate at which new connections are accepted, and the rate at which file descriptors are polled for readiness.

[00203] As with the other components / mechanisms described herein, the functions described here are not necessarily performed by a single entity or mechanism but by multiple tasks or sequences. However, those of skill in the art will realize and understand, upon reading this description, that the set of tasks which perform these functions could be considered as making up the "global strategizer."

CONTROL CORE DATA

[00204] As noted above, the control core **108** maintains the authoritative database of the current CDN configuration and of information needed to operate the CDN. The database includes various interconnected tables that are used to describe and/or manage the CDN. With reference to **FIGS. 18-19**, the database includes system configuration objects **1802**, customer configuration objects **1804**, a customer invalidation journal **1806**, and a master journal **1808**. Those of skill in the art will realize and understand, upon reading this description, that different and/or other objects may be maintained in the database.

[00205] In a presently preferred implementation, the control core **108** maintains and stores some or all of the following information (as part of the system configuration objects **1802** or customer configuration objects **1804**), some

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of which may be used for rendezvous, and some of which is used by cache machines:

Global Configuration Object (GCO) (1912)

[00206] The GCO is described in connection with request response processing.

Customer Configuration Scripts (CCSs)

[00207] Customer Configuration Scripts are described in connection with request response processing.

HostTable (1902)

[00208] The HostTable **1902** is a list of all machines in the network. This list is maintained in a table (HostTable) that includes, for each machine, its network address (IP address), and preferably its bandwidth capacity.

[00209] The HostTable preferably stores a Bandwidth Capacity value (*BWcap*). A *BWCap* value is also stored in the cluster table, described below. An actual value for Bandwidth Capacity value is derived from these two values according to the following table in which *clusterBW* represents the bandwidth capacity value set on the cluster, *hostBW* represents the bandwidth capacity value set on the cache and *nhosts* represents the number of machines in the cluster:

clusterBW	HostBW	BandwidthCapacity
0	0	0
>0	0	clusterBW/nhosts
0	>0	hostBW
>0	>0	min(clusterBW/nhosts, hostBW)

[00210] While it should be sufficient to use just one of these tables to set BandwidthCapacity, as described here, this is not always the correct approach. Specifically, the calculated BandwidthCapacity variable is preferably not used by the server selector (SS) mechanism (of the rendezvous mechanism), rather the server selector directly uses the value from the ClusterTable for shedding based on

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cluster-total bandwidth, and the value from the HostTable for shedding based on per-host bandwidth. The BandwidthCapacity is set in both tables, since the HostTable entry tracks the uplink from host to switch whilst the BandwidthCapacity at the cluster is the uplink from switch into the network fabric.

[00211] The reason that the server selector does not use the calculated per-host BandwidthCapacity is that it is generally wrong for purposes of controlling shedding to avoid saturating a per-host uplink. That is, if BandwidthCapacity is set only in the ClusterTable, then the system calculates a per-host value as *clusterBW/nhosts* (see above table). But *e.g.*, if there are twenty machines sharing a 10G uplink, that value is 0.5G, which is too small: each machine should be able to individually burst to 1G (or higher, depending on the connection from each server to the switch) before causing shedding (assuming the overall cluster uplink is not saturated, *i.e.*, not all machines using 1G at the same time). Or, *e.g.,* if there are five machines sharing a 10G uplink, the system would calculate 2G, which would be too large if the individual machines only have a 1G link.

[00212] Therefore the *BWcap* values should generally be set both in the HostTable and ClusterTable.

[00213] As there should be an entry in the HostTable for every machine in the network, non content serving machines should have their *BWCap* value set to zero.

[00214] Each type of machine at a location should be grouped into one or more clusters, with a corresponding entry in the ClusterTable (**1904**).

SMED Table (1908)

[00215] The SMED Table **1908** is a list of "measurement equivalent" caches in a table (SMEDTable). In practice, this list equates to a rack of hardware; *i.e.*, the set of machines plugged into a single router. Each entry includes one or more clusters.

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Cluster Table (1904)

[00216] The Cluster Table **1904** describes each cluster. Recall that a cluster is not the same as a site (all of the machines that are plugged into a given switch), but the subset of those machines that share the same set of VIPs. As such, there may be multiple ClusterTable entries for a given site. The Cluster Table stores information about the region(s) that each cluster is in.

[00217] Each cluster contains a number of HostTable entries, one for each physical machine, and one or more VIPs (each of which is represented by an entry in the VIPTable).

[00218] All machines on the network should be represented in this ClusterTable (and directly in the HostTable). To be able to identify which are content serving machines, there is a flavor column in the ClusterTable.

[00219] As with the HostTable, non content serving clusters should have BWCap set to zero. Having these machines represented in these tables allow for infrastructure components such as the measurement components to make use of processes on non-content serving machines.

VIP Table 1906

[00220] A VIP is the locally load-balanced address, handed out as the target of rendezvous. If this VIP is used for secure traffic, it contains a reference to a node in the SSLTable, otherwise the sslKey is set to NULL (indicating HTTP traffic).

[00221] As such, there is one entry for each VIP address in the network. Non content-serving clusters do not need to have VIPs defined.

SSL Table 1910

[00222] An entry in the SSLTable describes one "secure" property; it identifies the mapping between super-name and certificate.

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Flavors Table 1912

[00223] The Flavors Table **1912** describes characteristics that are shared by all machines of a certain flavor (*e.g.*, content serving). The term "flavor" is used here to distinguish between machines that perform different functions within the CDN (*e.g.*, content serving, etc.).

CoServers Table 1916

[00224] As used herein, a co-server, with respect to a particular resource, is an origin server – the authoritative source of the particular resource. The CoServers Table contains descriptions of all CoServers (origin servers) and Alias Nodes defined in the system. This table holds information about all customer origin servers registered with the CDN. This table is used to associate incoming requests to these entries, and describes how, and from where, the resource needed to satisfy that request is to be retrieved. Note that as CDN objects are also handled by the CDN, some CDN servers may function, at times, as co-servers.

[00225] Alias Nodes are associated with a Base CoServer, and provide a way to separately report and log traffic associated with a particular alias attached to a CoServer without needing to cache the same resource multiple times.

[00226] The CoServers table preferably includes the following fields:

Field	Description
IsActive	Flag indicating whether or not the entry is considered to be active.
SubID	A numerical subscriber ID number; a key into the Subscriber Table (**1918**).
CosID	The unique ID number associated with this entry (this value is also a key into this table). When adding an entry to the table, this is set to the value of NextCosID.
Port	The port number over which the origin server associated

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Field	Description
	with this entry should be contacted for cache fill purposes.
Alt WebRoot	The Alternate Web Root, the location within the content tree of the origin server where the 'root' associated with this property is configured to be. That is, when performing a cache fill the value of this is prepended to the incoming URI path on the request (see Extended Aliases). Defaults to '/' (although any trailing '/' on this value is removed during the conversion process, making the default effectively ").
Hostname	The name of the origin server associated with this entry. Can be specified as either a FQDN or as an IP address. If no AltOrigin specification is in place, this is used to both find the address of the origin server to contact for a cache fill, and specifies the value of the Host: header when filling over either the HTTP or HTTPS protocol This field also provides the root name of any log files associated with this entry.
IsAlias	A Boolean flag (1 or 0) which indicates whether this entry is an Alias or not. An entry can be either an Alias or CoServer. It is not possible to have both this and IsCoserver set. This flag may be combined with IsCoserver into a single flag since only one of these two flags can be set.
CSWFlags	A list of CoServer-Wide Flags that specify properties or configuration options that apply to the CoServer as a whole.
IsCoserver	A Boolean flag (1 or 0) which indicates whether or not this entry is a CoServer. This flag may be combined with IsAlias into a single flag since only one of these two flags can be set.
Protocol	Which protocol to use when contacting the origin server associated with this entry. In presently preferred

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Field	Description
	implementation, options are 'HTTP', 'HTTPS' and 'FTP'.
AliasList	A list of aliases associated with this entry. An incoming request is compared to the list of these aliases when determining which entry is associated with that request. As such, each alias needs to be unique, and so these form an additional key.
SeqNum	As for all transaction tables, this indicates the table sequence number which last updated this row.

Subscriber Table 1818

[00227] The Subscriber Table **1818** includes information about subscribers to the CDN (*e.g.*, the CDN's customers).

Aliases

[00228] An Alias is a name by which a CoServer is known to the network, and is used to identify that CoServer during request processing. The term alias can refer to both the format of this identifier, as well as certain attributes of the identifier. A list of ways that the term is used follows:

Term	Meaning
Simple Alias	a FQDN (Fully Qualified Domain Name); the value of the Host: provided to the CDN by the client. *e.g.*, fp.example.com
Extended Alias	an alias may include a top-level directory, in which case a match requires that both the presented Host: header and initial path element match the alias. *e.g.*, fp.example.com/dir. This allows behavior to be specified for different top-level directories of URLs presented to the CDN; for instance, a particular directory could be filled from a different origin server. In some cases this may include an arbitrary amount of path.

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Term	Meaning
Wildcard Alias	the initial element of the hostname portion of an alias can be a'*' in which case it will match any subdomains. *e.g.*, *.example.com will match fp.example.com and fp.subdir.example.com, as well as the unadorned example.com. Note: that a Wildcard Alias may also be an Extended Alias; *e.g.*, *.example.com/dir. The wildcard character has to be a complete hostname element; *i.e.*, it is not possible to have *fp.example.com.
Primary Alias	The first alias in the list associated with a given CoServer. Any request using a Secondary Alias is rewritten early on in request processing so that it seems to the system that it was actually using the Primary Alias. As such, if the Primary Alias is a Wildcard Alias, then there cannot be any Secondary Alias. Also, each matching Host: header presented will cause a separate resource to be resource (*i.e.*, the system will behave as if all the resources for that CoServer included a Vary: Host).
Secondary Alias	Any non-Primary Alias on the list associated with a given CoServer. When a request is received that matches a Secondary Alias, the URL is internally converted so that it seems that the request was requested using the Primary Alias instead. This means that the list of Secondary Aliases is treated as synonyms of the Primary Alias. See also AltID Aliases below.
AltID Aliases	A Secondary Alias (qv) that is associated with an alias node, this allows traffic received over specific Secondary Aliases to be tracked (for both logging and reporting/billing purposes) separately. The Alt ID reErs to the ID number of the alias node under which the request

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Term	Meaning
	should be logged/tracked.
Alias Node	This is an additional entry in the ReflectorTable that is associated with a given CoServer (which is then referred to as the Alias Node's Base CoServer). This must belong to the same Subzone as the Base CoServer, and should be configured to have the same hostname, etc. The CoServer ID associated with this Alias Node is then used when logging/tracking traffic for this AltID Alias. The Primary Alias of the Alias Node should be set to the same value as the AltID Alias of the Base CoServer (but without the AltID itself). This value is used as the Nickname when displaying data for this alias in the Reporting Portal
Request Processing	The complete set of active aliases (*i.e.*, those associated with active CoServers), be they Simple, Extended, AltID, Primary or Secondary, are used to populate a hash table within the agents of the network. This hash table provides a mapping from each alias to the CoServer ID associated with that alias. When a request is received, the first path element of the request is joined to the value of the Host: header, and a lookup into this hash table performed. If no match is found, a second lookup is performed of just the Host: If a match is then found, processing completes since the appropriate CoServer has then been found. In some embodiments the initial lookup is done with the Host: header only, and if an extended alias exists, a flag is set that indicates so and then a second lookup performed. If no match is found, then a second hash table is inspected, which contains down cased versions of the directory element of each extended alias (the Host: value always being processed down case).

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Term	Meaning
	If a match is then found, and this CoServer has the *ncurl= CSWFlag* set, then a match is declared, and processing completes. If however no match is yet found, a search for a possible Wildcard Alias match then begins. The most significant two hostname elements (*e.g.*, *example.com*) are looked for in another hash table; if an entry there exists, then the next hostname element is added and another check performed. This continues until an entry marked with an hasWildcard flag is set, indicating that a matching Wildcard Alias exists. If the matching entry is marked as having a directory extension, then a check of the top-level path element from the URL is then made, similar to the processing for a normal Extended Alias. If no such match is found, then a match on the Wildcard Alias is only declared if a Simple Wildcard Alias is defined.

Request-Response Processing

[00229] **FIG. 13** showed the logical structure of a cache and its various components. The processing performed by some or all of these components may be performed by sequencers. A sequencer uses a sequence control object which is made up of an ordered list of handlers. In a presently preferred implementation, a sequencer is an Executive task (preferably a channel), and the handlers associated with a sequencer (task) are implemented by events. It is necessary for the task to be an Executive channel so that it can use the submit (potentially asynchronous) model.

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Request-Response Processing Flow

[00230] Request-response processing flow is described now with reference to **FIGS. 20A-20C**. For the purposes of this description, assume that the processing is being handled by a cache server such as server **1102** (**Fig. 11**) in a CDN.

[00231] The cache server obtains data (an incoming connection) at a port and parses sufficient incoming data (at **2002**) to determine that the data correspond to an appropriate type of request (*e.g.*, HTTP). The incoming data will include sufficient information to allow the cache to determine whether or not it can serve the requested resource. *E.g.*, in the case of an HTTP request, the incoming data will include HTTP header information, including (a version of) the URL that was used to make the request.

[00232] In order to determine whether or not it can serve the request, the cache server needs to compare information associated with the request with information in the global configuration object (GCO). The cache server therefore needs to determine whether it has a valid GCO (at **2004**). If necessary, the GCO is retrieved by the cache from the control core (at **2006**). If the current GCO is valid then it can be used, otherwise the GCO must be validated or a new one obtained. It should be appreciated that if the if the cache is unable to obtain a valid GCO after some predetermined number of tries then it should not serve the requested content and should fail (and take itself out of rotation for selection until it is able to retrieve a valid GCO).

[00233] In a current implementation the GCO acts as a "white list" carrying valid protocols, hostnames and path prefixes. In some cases, for certain reseller properties, customer identification can also be performed based on the VIP on which the request came in. Such a technique may also be used to provide a simple transparent proxy implementation. The GCO maps the protocol, hostname and path prefix to a customer identifier (Customer ID). The following table shows an example GCO (the numbers in the left column are provided for purposes of description, and are not intended to be limiting in any way.)

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	String	Customer ID
1	http://customer1.com/	1.1
2	http://customer2.com/	2.1
3	http://*.customer3.com/	3.1
4	http://*.special.images.customer3.com/	3.2
5	http://*.images.customer3.com	3.3
6	http://images.customer3.com	3.4
7	http://customer4.com/	4.1
8	http://customer4.com/topd1/	4.2
9	http://customer4.com/topd1/subd/	4.3
10	http://customer4.com/topd2/	4.3
11	http://customer5.com/	5.1
12	https://customer5.com/	5.2
13	*://customer6.com/	6.1
14	http://customer7.com/	7.1
15	http://customer7.com:8080/	7.2

[00234] The string in a GCO is some or all of a URL. Wildcards may be used, but are limited. Recall that (for the purposes of this description) a URL has the form:

<<protocol>>://<<domain>>/<<path>>

where <<protocol>> may be, *e.g.*, "http", "https", "ftp", and so on; <<domain> is a domain name and path specifies a location. A formal URL description is given in RFC 1738, Uniform Resource Locators (URL), by T. Berners-Lee et al., URIs are described in Network Working Group RFC 2396, "Uniform Resource Identifiers (URI): Generic Syntax," by T. Berners-Lee et al., August, 1998, the entire contents of each of which are fully incorporated herein for all purposes.

[00235] The "protocol" may be replaced with a label for the listener the on which the request came in. The reason is that a given customer may have a dedicated SSL listener which presents their server certificate, so the cache will only want to satisfy requests for that particular customer on that listener. In that case, the GCO may have, e.g., "https-CUST" (e.g., if CUST is a customer with a customer SSL VIP) as the "protocol."

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[00236] In the GCO, the protocol may be replaced by an "*" (a wildcard character), indicating all supported protocols map to the same Customer ID (see, *e.g.* no. 13 in the table above). A wildcard character (*e.g.*, "*"). may also be used as first component (only) of hostname (*e.g.*, nos. 3, 4, 5). Thus, "http://a1.customer3.com" and "http://a2.customer3.com" will both match entry number 3 in the table above. In order to simplify the rules for resolving ambiguities, in some implementations wildcards may not be used anywhere else.

[00237] Having completed the raw parse (at **2002**), the cache knows the URL that was used to make the request.

[00238] Once the cache has a valid GCO it tries to find a match for the input URL in the GCO (at **2008).** Preferably a "Best match wins" strategy is used. The hostname is checked first, and an exact match wins, otherwise, a wildcard match is used with greatest number of literal matches wins. For example, for *customer3.com*: the string "special.images.customer3.com" maps to 3.2 (more literal matches than 3.3); images.customer3.com maps to 3.4 (exact match). Next the port and protocol are looked up, then, longest path prefix wins.

[00239] The flow chart in **FIGS 20A-20C** shows a potential loop from the GCO-Exception hook if no response is generated. To prevent a loop from occurring the system may only try the GCO lookup a limited number of times, *e.g.*, up to two times. The point of the GCO-Exception hook is to allow inspection/correction of the request such that it can be found in the GCO. However, the system preferably only gets one shot at correction.

[00240] Each customer may have corresponding scripts (sequences) that are to be used to process that customer's requests. These Customer Configuration Scripts (CCSs) are associated with the customer ids, and, if the request (the URL) relates to a valid customer (at **1610**) (based on the lookup in the GCO), then processing continues to determine whether there are CCS (Customer Configuration Scripts) corresponding to that customer. The CCS is checked for validity and a new CCS is fetched (from the control core) if needed. As noted

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previously, the CCS is used to assemble sequences, which are then cached and used until they become invalid (due, *e.g.*, to a new CCS being retrieved). It should be appreciated that scripts and sequences are not the same thing, although as mentioned previously, a particular handler may invoke a script to perform its function.

[00241] In presently preferred implementation the CCS is a Lua script retrieved from the Control Core. The name of the script may be based on the customer's ID, *e.g.*, for Customer ID 4.2 the script may be obtained at:

https://core.fp.net/ccs/ccs-4.2.luac

[00242] The script sets up customer-specific subsequences at various hook points in the main processing sequence. Results of setup are preferably cached, and the CCS is not run on every request. It is re-run if the script is reloaded or if conditions change. For example, if results of script are cached persistently, then agent revision could change. The compiled script is an object consumed by the caches, but the script itself is generated from customer configuration description in a database.

[00243] Once the CCS is configured (loaded and validated), processing continues with a hook (denoted "cli-req" – client request) to handle any corresponding custom processing. That is, "cli-req" is a hook point where a subsequence of customer-specific handlers (which may include a script) is inserted. As an example, suppose that a certain customer requires:

- Set ***www.customer1.com*** as canonical hostname
- Strip ***sessionid*** parameter from all query strings

[00244] These actions may be taken in cli-req (client request) hook, for which exemplary CCS source would be:

```
hook["cli-req"].add("set-host('www.customer1.com')")
hook["cli-req"].add("strip-query('sessionid')")
```

where both *set-host* and *strip-query* are simple one-shot handlers, inserted into a larger sequence.

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[00245] As another example, suppose the customer has the same client-side requirements as above, but also wants to set the fill target to be **origin.customer1.com**

[00246] The corresponding CCS source would be:

```
hook["cli-req"].add("set-host('www.customer1.com')")
hook["cli-req"].add("strip-query('sessionid')")
hook["fill-req"].add("set-target('origin.customer1.com')")
```

where *set-host*, *strip-query,* and *set-target* are simple one-shot handlers, inserted into a larger sequence.

[00247] This CCS adds an action to the fill-req (fill request) hook.

[00248] As another example of a configuration script, suppose that a customer requires proxy authentication using **auth.customer1.com** for remote authentication. The customer's CCS would include:

[00249] **hook["cli-req"].add("proxy-auth('auth.customer1.com')")**

[00250] The **proxy-auth** handler launches a sequence of its own to perform the actual authentication request and waits for the response. This is an example of a blocking handler which launches a helper request. Based on the response to the authentication request, the **proxy-auth** handler may generate a 401 response immediately or allow processing to continue.

[00251] Another way to handle this with CCS (if a native **proxy-auth** handler is not always available) may be:

```
if handlers["proxy-auth"] == nil then
hook["cli-req"].add(
        "lua-txn('proxy-auth.luac', 'auth.customer1.com')")
else
hook["cli-req"].add(
        "proxy-auth('auth.customer1.com')")
end
```


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[00252] This logic is part of CCS builder, not the configuration writer. A single network-wide CCS can make these decisions based on local environment. CCS can use arbitrarily complex logic to assemble the building blocks for the customer, including making additional requests, etc. "Native" handlers could also be built-in scripts behind the scenes, but preferably native handlers are expected to be efficient C code. It should be appreciated that the CCS is a per-customer object. It should also be appreciated that a human configuration writer does not need to deal with this detail; they just need to know that they want authentication.

[00253] In addition, it should be appreciated that the CCS is not necessarily run on every request. Rather, the CCS is used to configure the agent to handle a given customer's requests by setting up the appropriate handlers at the various hook points. Those handlers themselves may invoke a script or scripts, but they do not have to and it is expected that a typical customer's requests will be handled without using scripts (*e.g.*, Lua) at all in the main request processing path. The fact that the CCS is a script rather than a simple list of handlers to install at hook points means it can be flexible in inspecting its surroundings to determine the proper handlers for the environment (software revision, region, etc.) in which it is running.

[00254] As can be seen from the flow diagram in **FIGS. 20A-20C**, hooks are available at numerous points in the processing sequence. In a present implementation there are hooks available for, amongst other things:

- client requests
- cache fills
- GCO exceptions
- cache misses
- fill responses
- fill pump
- client responses

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- client pump

[00255] Those of skill in the art will realize and understand, upon reading this description, that different and/or additional hooks may be available and used in a particular implementation.

[00256] As noted earlier, default processing is available, and the cache will service requests without any customer-specific sequences, provided the customer is valid (*e.g.*, found in the GCO) and requires no customer-specific processing.

[00257] As the various elements of the CDN are themselves potential clients (and sources of resources), the CDN may provide a CCS for CDN resources. From an implementation perspective, the CDN may be treated as a customer, with entries in the GCO and with its own CCS.

EXAMPLE

[00258] **FIG. 21A** depicts an exemplary CDN, including multiple caches (corresponding to the caches **102** in **FIG. 1**), forming a cache cloud, and associated components (collectively **116**). Each cache (*e.g.*, a cache cluster site) is depicted by a shaded circle in the drawing in **FIG. 21A**. Other components of the CDN system / framework are shown, including core control mechanisms (denoted by pentagon shapes in the drawing, corresponding, collectively, to control core **108** in **FIG. 1**), collector mechanisms (denoted by triangle shapes in the drawing and corresponding to collectors **106** in **FIG. 1**), and origin servers / server sites (denoted by black circles in the drawing). While the various components are shown in **FIG. 21A**, by way of example, overlaying maps of the United States and Europe, those of skill in the art will realize and understand, upon reading this description, that these overlays are merely exemplary and are not intended to limit the actual locations of components or the number of components.

[00259] With reference to **FIG. 21B** (and again to **FIG. 21A**), the caches (which correspond, *e.g.*, to the caches **102** in **FIG. 1**) correspond to locations in the CDN **100** from which client **110** can obtain resources that the CDN is providing

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(*e.g.*, serving) on behalf of content providers (such as content provider **112**). The origin servers / server sites correspond to locations from which the CDN cache servers / server sites can obtain content provider content. The origin servers / server sites may be part of the CDN (*e.g.*, if content provider content is preloaded into the CDN by content providers), or they may be operated by the content providers independently of the CDN.

[00260] The collector mechanisms (denoted with triangles in the drawing and corresponding to the collectors **106** in **FIG. 1**) are distributed around the system and collect information regarding resources delivered on behalf of content providers (*e.g.*, logs and performance data) from the caches. The collector mechanisms may provide the collected information (in a raw or processed form) to content providers regarding resources delivered on their behalf. Information provided to content providers may be provided through a separate administrative entity that collects and maintains data collected by the collector mechanisms.

[00261] **FIG. 21C** shows an exemplary logical organization of a portion of CDN caches shown in **FIGS. 21A** and **21B**. As shown in **FIG. 21C**, the CDN caches may be arranged in one or more tiers (denoted in the drawing as "Edge Tier", "Cluster Tier", …, "Rack Tier", and "Region Tier"). These tiers correspond to the "Edge Tier," "Parent Tier (tier 2)", "Tier 3," and so on in **FIG. 8**. The caches in the so-called "Edge Tier" are preferably "closest" to clients (by some measure(s) of network distance), and so resources served to clients from caches in the edge tier will likely provide the most efficient delivery of those resources to those clients. A particular CDN may have only one tier. From the point of view of caches in any tier, the caches in the next inner tier are considered their parent caches. So, *e.g.*, in the example in **FIG. 21C**, the caches in the cluster tier are parent caches to the caches in the edge tier. Similarly, the caches in the region tier are parent caches to the caches in the rack tier. In general, if there are n tiers denoted T_1 to T_n, with T_n being the outermost or edge tier, the caches in tier T_i are

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parents of the caches in tier T_{i+1}. Caches in the same tier are referred to as peer caches.

[00262] In the example in **FIG. 21C**, the tiers are as follows:

Tier	Tier Name
T_0	Region Tier
T1	Rack Tier
T_{n-1}	Cluster Tier
T_n	Edge Tier

[00263] Organization of the caches into tiers may correspond to physical aspects of the caches, including, *e.g.*, their relative locations, how they are connected to the network and to other networks, their speeds, capacities, types, etc.

[00264] The caches may also be organized into one or more regions (denoted "Region 1", "Region 2," etc. in the drawing). The regions in **FIG. 21C** correspond to the groups in **FIG. 9**. Regional/group organization may also be made based on physical aspects of the caches (*e.g.*, the geographical locations), but it may be made for other organizational reasons (*e.g.*, to implement policies). While six exemplary and distinct regions / groups are shown in the drawing, those of skill in the art will realize and understand, upon reading this description, that any number of regions / groups may be used, including overlapping regions. Those of skill in the art will also realize and understand, upon reading this description, that regions may be of different sizes and that some regions may not include caches in all tiers.

[00265] For example, the caches in a particular country may be treated as being in a region in order to implement content delivery policies for that country. Those caches may also be treated as being in one or more regions in order to implement content delivery policies on behalf of content providers. These regions (country regions and content provider regions) may overlap.

[00266] **FIG. 21D** shows various components of the CDN system of **FIG. 21A** operating in their various roles. **FIG. 21D** includes the rendezvous

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mechanisms (denoted using stars in the drawing). As noted earlier, the presently preferred rendezvous mechanism is implemented using the DNS system, and preferably acts to select or identify a "best" or "optimal" cluster from which to serve a given client. Preferably "best" cache selection happens at DNS lookup time. **FIG. 21D** shows three typical operations occurring in the CDN. On the left side of the drawing (and shown in greater detail in **FIG. 21E**), the control core cluster performs distribution of control data to various cache clusters (preferably in response to an hierarchical pull of the data from the cache clusters). On the top right of the drawing(and shown in greater detail in **FIG. 21F**), cache clusters are performing content delivery. On the bottom of the drawing (and shown in greater detail in **FIG. 21G**), the collector mechanism is collecting information from cache clusters.

[00267] **FIG. 21H** shows the hierarchical operation of caches (*A00, A02, A03*) in the edge tier, pulling resources from the origin servers and control / traffic data from the control core via caches in the CDN hierarchy. Similarly, the collectors pull traffic (essentially in the other direction) from the edge caches, via the CDN hierarchy.

[00268] **FIG. 10** showed the general process of content delivery to clients outside the CDN. **FIG. 22** shows the same process within the CDN. As can be seen, and as was noted above with respect to **FIG. 10**, the processing of resource requests is the same inside and outside the CDN. A client **2210** (which could be any CDN component, including a cache, a collector, the control core, etc.) wants an object from a source (which could also be any CDN component, including a cache, a collector, the control core, etc.). The client request is directed to a location in the CDN that should have that resource. That location could also be any CDN component, including a cache, a collector, the control core, etc. If that location does not have the requested resource, it gets a copy from the co-server for that resource (*i.e.*, from the authoritative source for that resource).

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[00269] While the client **2210** and the co-server **2212** are shown outside the box labeled CDN **100**, in this example they are within that box (they are shown outside to aid in the description).

COMPUTING

[00270] The operations and acts shown and described above are implemented, at least in part, by software running on one or more computers of CDN **100**.

[00271] One of ordinary skill in the art will readily appreciate and understand, upon reading this description, that the various processes described herein may be implemented by, *e.g.*, appropriately programmed general purpose computers, special purpose computers and computing devices. One or more such computers or computing devices may be referred to as a computer system (as noted above, **FIG. 23** illustrates a typical computer).

[00272] A computer **2302** includes one or more processors **2306**, memory **2308**, storage (*e.g.*, disk storage) **2310** connected via bus **2316** or the like. The computer **2302** may also include peripheral devices **2314** such as a keyboard, display monitor, printer and the like. The computer **2302** can connect to a network or other computers or devices via network interface(s) **2312**.

[00273] As used herein, a "processor" means one or more microprocessors, central processing units (CPUs), computing devices, microcontrollers, digital signal processors, or like devices or any combination thereof, regardless of their architecture. An apparatus that performs a process can include, *e.g.*, a processor and those devices such as input devices and output devices that are appropriate to perform the process.

[00274] The various programs described herein will typically reside as programs **2320** in the memory/memories **2308** of one or more computers.

[00275] Programs that implement such methods (as well as other types of data) may be stored and transmitted using a variety of media (*e.g.*, computer

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readable media) in a number of manners. Hard-wired circuitry or custom hardware may be used in place of, or in combination with, some or all of the software instructions that can implement the processes of various embodiments. Thus, various combinations of hardware and software may be used instead of software only.

[00276] As used herein, the term "computer-readable medium" refers to any medium, a plurality of the same, or a combination of different media, which participate in providing data (*e.g.*, instructions, data structures) which may be read by a computer, a processor or a like device. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media include, for example, optical or magnetic disks and other persistent memory. Volatile media include dynamic random access memory **2308**, which typically constitutes the main memory of the computer. Transmission media include coaxial cables, copper wire and fiber optics, including the wires that comprise a system bus coupled to the processor. Transmission media may include or convey acoustic waves, light waves and electromagnetic emissions, such as those generated during radio frequency (RF) and infrared (IR) data communications. Common forms of computer-readable media include, for example, a disk, magnetic tape, any other magnetic medium, a CD-ROM, DVD, any other optical medium, any other physical medium with patterns of holes, a RAM, a PROM, an EPROM, a FLASH-EEPROM, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read.

[00277] Various forms of computer readable media may be involved in carrying data (*e.g.* sequences of instructions) to a processor. For example, data may be (i) delivered from RAM to a processor; (ii) carried over a wireless transmission medium; (iii) formatted and/or transmitted according to numerous formats, standards or protocols; and/or (iv) encrypted in any of a variety of ways well known in the art.

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[00278] A computer-readable medium can store (in any appropriate format) those program elements which are appropriate to perform the method.

[00279] One of ordinary skill in the art will readily appreciate and understand, upon reading this description, that embodiments of an apparatus may include a computer/computing device operable to perform some (but not necessarily all) of the described process.

[00280] Embodiments of a computer-readable medium storing a program or data structure include a computer-readable medium storing a program that, when executed, can cause a processor to perform some (but not necessarily all) of the described process.

[00281] Where a process is described herein, those of skill in the art will appreciate that the process may operate without any user intervention. In another embodiment, the process includes some human intervention (*e.g.*, a step is performed by or with the assistance of a human).

The Executive

[00282] It is anticipated that in a CDN a cache machine with a 10 Gb/sec link, serving about 1 Mb/second per client, should be able to serve on the order of 10,000 concurrent clients, with about ten (10) activities per client. This requires on the order of 100,000 concurrent activities. The inventors realized that in order for a cache machine (and thus a CDN) to operate efficiently and to take advantage of new multi-core computer architectures, the cache machine would have to implement some efficient form of concurrency.

[00283] More specifically, and based on their experience with CDNs, the inventors realized and understood that network applications (*e.g.*, serving and distributing content in a CDN) typically involved long wait periods. They therefore realized that it would be useful to perform many small jobs in order to be efficient (*i.e.*, in the case of a CDN cache, it would be beneficial to do tens or even hundreds of thousands of things concurrently). They also realized that it would be

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useful and beneficial to keep all processors (CPUs) active simultaneously. The inventors realized that the handling of an individual request in this type of application generally consists of small amounts of computation separated by relatively long wait times (long here being relative to the speed of modern CPUs). Therefore, while requests are in the waiting stage, other requests can be in the compute stage, thereby keeping the CPUs busy. However, the inventors also realized, based on their experience with CDNs, that not all requests required long wait times, and that a concurrency scheme that assumed that there would always be long wait times would disadvantage those requests where there were no long wait times.

[00284] The inventors also realized that a concurrency scheme used in caches could take advantage of the type of work that caches were expected to perform in order to improve performance. For example, most network applications have similar structure and most network operations take on the order of milliseconds. A cache could perform useful operations while waiting for relatively slower network operations or disk operations to complete. (Disk operations sometimes take longer than milliseconds.) In addition, networking (and the timing in large networks such as the Internet) is inherently and largely unpredictable and unreliable. To deal with these aspects, a preferred concurrency scheme should support asynchrony (to deal with unpredictable timing) and organized exception handling (to deal with lots of potential failure modes and unreliability of networks).

[00285] The inventors considered approaches such as one thread per client to be too limiting for challenges of real-world caches in operational CDNs. In a thread-per-client model each client consumes an inordinate amount of system resources while spending most of their time waiting (for network or disk I/O). A thread-per-client approach has other drawbacks. *E.g.*, pthreads require a minimum 16 KB stack per thread, implying 1.6 GB used for an anticipated 10,000 concurrent clients.

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[00286] Those of skill in the art will realize and understand, upon reading this description, that these other approaches to concurrency may work for smaller caches or CDNs, but they do not scale well. Thus, while the disclosed executive approach is preferred, other approaches are contemplated and may be used.

[00287] The presently preferred version of the Executive assumes a 64-bit CPU with 64-byte cache lines. Basic data structures are all cache-line sized and aligned. While this approach improves efficiency with respect to retrieving data, moving it around, and storing it, it may force some overloading of data fields within data structures. Those of skill in the art will realize and understand, upon reading this description, that other implementations may be used.

Tasks, events, and vcores

[00288] The basic objects in the Executive are tasks, events, and vcores (Virtual CPU cores). **FIGS. 24A-24B** show relationships between the Executive's tasks, events and vcores.

[00289] A virtual CPU core or vcore may be considered, in some aspects, to be like a *pthread* with some data. There may be any number of vcores, although the Executive is expected to be most efficient when there is one vcore per physical core, with each vcore bound to or associated with a fixed physical core.

[00290] In order to support synchronization, each vcore is assigned a vcore identifier (**vid**), and each task has a **vid** field that specifies the vcore to which that task belongs.

[00291] Each task has a corresponding input event list. For example, as shown in **FIG. 24A**, the task block *T* has a list of three events (denoted E1, E2, E3 in the drawing).

[00292] Each vcore has a prioritized list of tasks called its run queue. E.*g.*, **FIG. 24B** shows vcore no. 2 with a run queue comprising a number of tasks (denoted T1, T2, T3), each with a corresponding event list (E11 for task T1, E21 and E22 for task T2, and E31 for task T3). One task (T4) is currently running, and

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a number of tasks (T5 … T6) are waiting. The task block *T* in **FIG. 24A** is shown with VID = 2 (*i.e.*, that task is associated with vcore no. 2).

[00293] An Executive task is described by a function pointer (*f*), a data pointer (*d*), and some other (*e.g.*, task accounting) information. A task may be run by invoking the function on the data (*e.g.*, *f(d)*). Each task has a task identifier or handle (**tid**). With reference to the exemplary task structure in **FIG. 24C**, preferably a task is packed into a 128-byte structure, and is identified by a 4-byte integer task handle ("*tid*" or *task id*).

[00294] Channels are a special type of Executive task. A channel task contains pointer to "Channel Information Block" (*chib*). Each *chib* is channel-type-specific, and contains methods for:

- dropoff (asynchronous), submission (maybe synchronous) and return (deliver) of events (where the events being returned are being returned to a channel from another channel)
- timeout
- close, destroy
- migrating
- create entry point
- and various others.

[00295] Channels have flags set and wake/chib points to a *chib*. User tasks have no flags, wake/chib points to wakeup predicate (this is an example of the field overloading referred to earlier). *Prio* determines where a task gets placed on the run queue.

[00296] The following channel types are presently supported:

- **Network**
  - serv passive listener
  - conn active connection
  - udp datagram

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  - resolv DNS resolver
- **Async I/O**
  - aios aio slave
  - aio aio master
- **HTTP**
  - fpnsh_conn HTTP parser and formatter
- **Application Specific, *e.g.*, for cache:**
  - the sequencer channel (manages running of handlers)
  - various Lua-related channels (handle dealing with Lua engines and running them)

[00297] In some embodiments, the Async IO channels may be performed by the IO library. A *aios* and *aio* may not be used, and a separate non-Executive library (libfpio) will handle asynchronous I/O.

[00298] As used herein "cid" refers to a "channel id" and "tid" means a "task id". In practice, the "cid" field may be used as the "to" address and the "tid" field is used as the from address of an event. There are cases of both task-to-task and channel-to-channel communication where a "cid" may actually be a task id, and vice versa.

[00299] The task structure is preferably cache aligned. In the drawing, the function pointer is denoted *func*. A task structure has an additional 64 bytes for use as scratch space. There are 48+64 bytes free for task use, although a given task is always free to allocate more memory for itself and keep track of it by placing a pointer in the task structure.

[00300] Every task contains a reference counter (*refs*), and a task dies if it is dispatched with its reference counter set to zero (*refs == 0*). A reference (also known as "*cid*" or *channel id*, also known as "*tid*") is a copy of the integer id of a task and is created when the task is created, or when a task itself calls *ns_tid_alloc()*. A reference is destroyed when returned to task during close or discard or the task itself calls *ns_tid_free()*.

[00301] Reference are capabilities that should not be duplicated or destroyed and should be carefully tracked. They are used in tid and cid fields of events.

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[00302] The Executive uses counting references to prevent stale references (they are an Executive analog of locks).

[00303] An event is a message block (preferably 128 bytes, including 64 bytes for scratch space) and contains two task references (two *tids*), one for the initiator task (*tid*) and the other for the target task (*cid*). The 64-byte scratch space may be divided into internal and external scratch space. Events may be linked.

[00304] In operation, each vcore thread runs an endless loop and:

- retrieves (*e.g.*, pops) the highest priority task *t* from its run queue;
- calls *t->f(t)*;
- calls *ns_dispatch(t)* to requeue, destroy or abandon the task *t*.

[00305] The following two rules should ensure memory consistency:

- **Access rule**: If another task has the same vid as you, you can safely access its data.
- **Migration rule**: Only vcore *n* can change a vid value to or from *n*.

[00306] The Executive is started on a host by creating an appropriate number of vcores for that host and then starting the first task. *E.g.*, to start the Executive with *n* vcores, call:

```
ns_begin(first_task_func, n);
```

The first task creates and launches more tasks and channels, *e.g.*, as follows:

```
first_task_func()
{
t = ns_task();
ns_launch(t);
cid1 = ns_chan(foospec, 0);
...
}
```


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[00307] Tasks and channels create events and communicate with each other:

```
e = ns_event()
e->cid = cid1
ns_dropoff(e)
```

[00308] Tasks, channels and events are created and die as necessary.

```
ns_task(); ns_chan(); ns_event(); return ns_die();
```

[00309] In a preferred implementation, the Executive will exit when the last task exits.

[00310] There are two styles of communication within the Executive, namely guaranteed asynchronous communication and potentially asynchronous communication.

[00311] *Guaranteed asynchronous* communication puts an event on the input queue of a destination task, and wakes the destination task, *i.e.*, puts it on the run queue. The destination task runs (later) and an event arrives back on the input queue of the source task. It should be appreciated that the source task may choose to send the event "anonymously" (that is, without a *tid*), in which case no response will return. Another option is for the source task to provide the *tid* of some third task to which the event will be delivered once the destination task is done with it. This type of communication is lightweight and non-blocking. *E.g.*, *ns_event_dropoff(e)* uses e->cid as destination; *ns_event_deliver(e)* uses *e->tid* as destination. Basically, *ns_event_dropoff* is used by tasks to drop an event off to a channel, and *ns_event_deliver* is used by tasks to return events to whoever sent them.

[00312] *Potentially asynchronous* communication is invoked, *e.g.*, by

```
e = submit(e).
```

[00313] This approach works as follows:

S1	Passes event to destination task
S2	Suspends current task
S3	Executes destination task instead
S4	Event pointer returned as function return value
S5	Resumes current task.

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[00314] Potentially asynchronous communication can go asynchronous by returning null pointer in step S4, and delivering event later.

[00315] Communication reverts to asynchronous if, *e.g.*, the destination task is not on the same vcore, or there is too much work to do in one run, or the task needs to wait for internal asynchronous operations.

[00316] The destination does not know/care if it was called via *dropoff()* (i.e., as *Guaranteed asynchronous*) or *submit()* (i.e., as *Potentially asynchronous).* Events always arrive on the input queue, which is accessed via *ns_next_event()*. Events are returned by channels using *ns_event_deliver()*. If the destination is a channel, it can know whether an event was dropped off or submitted, since these are separate chib entry points which can be overridden.

[00317] Events can be transferred, *e.g.*, using the following code:

```
ns_event_t *e = ns_event();
e->tid = ns_tid();
e->cid = some_cid;
some_cid = 0;
e->opcode = Executive_OP_READ_BUFFER;
e->timeout = 5.0;
e->ns_buf_arg = malloc(1024);
e->ns_buf_count = 1024;
e = ns_submit(e);
```

[00318] This example demonstrates care about reference counting. Since *some_cid* represents a reference and that reference has been transferred to *e->cid*, the value of *some_cid* gets zeroed.

[00319] This event transfer may be wrapped in a function, e.g., as:

```
ns_event_t *e = ns_event();
e->tid = ns_tid();
e->cid = some_cid;
e = ns_submit_1k_read(e, 1024);
```


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Event Driven programs

[00320] The following code shows a basic "loop-switch" skeleton for an Executive task function presented in a 'C' like language:

```
task_func(t)
{
while((e = ns_next_event())) {
        switch(event_type(e)) {
            case TYPE0:
...
break;
        ...
        case TYPEn:
...
break;
         }
            ns_return(e);
    }
    return ns_wait();
    }
```

[00321] The following example code shows a basic "loop-switch" skeleton for an Executive task function with *submit()*:

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```
            task_func(t)
            {
               e = 0;
            while(e || (e = ns_next_event())) {
                switch(event_type(e)) {
                    case TYPE0:
        e = submit(e);
        continue;
               ...
               case TYPEn:
        ...
        break;
                }
                   ns_return(e);
            }
            return ns_wait();
            }
```

[00322] **FIGS. 25A-25B** compare the Executive stack of the Executive submit operation to that for C procedure calls. The Executive Submit operation (*e = submit(e)*) is analogous to a C procedure call, with the important difference that there is the option to go asynchronous when an event is submitted. The Executive's task blocks are analogous to C stack frames. The Executive's event blocks are analogous to C's *arg and return address* areas; and the Executive's *tid & tag* are analogous to C's return address.

[00323] However, in the Executive multiple calls can be active simultaneously and frames can live on after the call. This allows writing a potentially asynchronous hook, *e.g.*,

```
e = submit_op_foo(e, args);
```

[00324] Channels may be created using a parameter block called a spec, *e.g.*:

```
ns_foo_t *spec = ns_foo();  /* create spec for foo channel
*/
spec->param1 = val1;        /* set parameter */
spec->param2 = val2;        /* set parameter */
```


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```
cid = ns_chan(spec, 5);      /* create foo chan, return 5
refs*/
ns_foo_(spec);               /* destroy spec */
```

[00325] A channel may be closed by returning the refs, *e.g.*:

```
ns_close_cid(cid, 4);/* Explicit close, 1 + 4 refs */
ns_discard_cid(cid, 1);/* Return 1 + 1 refs */
ns_discard_cid(cid, 2);/* Return 1 +2 refs, implicit close */
```

[00326] A channel will not be destroyed until all refs have been returned.

[00327] A global exchange (see **FIG. 26**) may be used to transfer pointer ownership between vcores. Typed pointers are packed into cache lines which are used to transfer the pointers efficiently, via mutex-protected queues. While various techniques are used to make the global exchange efficient, *e.g.,* amortization of lock cost by transferring multiple messages with a single lock transaction, lock-free inspection of a queue to see if there may be data (only need the lock if data is seen), etc, it should be appreciated that a "direct exchange" is preferable, and that the queues involved may be created using lock-free techniques.

[00328] The following example shows synchronization in task migration. In this example, task *t* wants to migrate from vid = 2 to vid = 3.

- Initially *t->vid = 2*.
- t func sets *t->vid = 1003* and returns Executive_RUN.
- *ns-dispatch()* notices *t->vid != 2* and puts (t, RUN, 3) on global exchange.
- Global exchange transfers the triple to vcore 3.
- Vcore 3 sets t->*vid = 3* and adds task to its run queue.

[00329] Note that t->vid is set to 1003.

[00330] The Executive provides a multi-core solution in which each processor (CPU) has a queue of tasks which can run on that processor (in a vcore – virtual core on that processor). Processes can check if other processes are running on the same core and then determine/share information with those processes.

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[00331] In prior concurrency/parallel processing systems, tasks or processes get spawned off and return when they are complete. An important aspect of cache processing, especially in the context of a CDN, is that some tasks may be able to complete right away. In those cases there is no reason to delay the return. In other words, if we know that a task might complete its processing right away (*i.e.*, relatively quickly), we can have that task provides its result without delay.

[00332] One example of the use of this technique is when a Lua script is executed: in many cases, the script may perform such a small operation that it can complete essentially right away, which saves the overhead of needing to schedule it as a task unless that becomes necessary. Another example of this technique is in the sequencer channel: If a series of handlers runs quickly, then calling the sequencer is essentially a function call. Only if a handler needs to wait for data or if too much computation needs to get done will the sequencer become a scheduled task.

[00333] This may be achieved by the following:

```
if(event = submit(event)) == null)
return ns_wait() ;
// if non-null then done, otherwise wait.
```

[00334] This approach (do it right away if you can, otherwise give me the answer later) provides a potentially asynchronous solution to cache specific problems.

[00335] Additionally, programming in a "potentially asynchronous" style means that if it is later determined that some feature or aspect (which was synchronous previously) needs to go asynchronous, this can be done without having to rewrite other code. Those of skill in the art will realize and understand, upon reading this description, that there are costs/risks to this approach, *e.g.*, if only the synchronous path is taken in a given situation, the asynchronous path may be untested or the performance of the application may degrade if a previously

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synchronous operation becomes asynchronous. However, these risks can be mitigated, *e.g.,* by forcing everything to be asynchronous for testing purposes.

[00336] In some preferred embodiments, the Executive is implemented using a system sometimes referred to as Shell or NetShell. It should be appreciated that the Executive and NetShell described herein are unrelated to any products or tools of any other entity. In particular, as used herein NetShell does not refer to Microsoft Corporation's scriptable command-line tool, nor does *executive* or NetShell refer to a Unix shell-like user interface.

[00337] While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

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WHAT IS CLAIMED:

1. A content delivery network (CDN) comprising:

(a) a control core; and

(b) a plurality of cache servers, each particular cache server of said plurality of cache servers being constructed and adapted to:

(b)(1) upon joining the CDN,

(b)(1)(1) obtain global configuration data from the control core; and

(b)(2) having joined the CDN,

(b)(2)(1) obtain updated global configuration data, if needed; and

(b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN;

(b)(2)(3) serve a particular resource associated with a particular customer of the CDN in accordance with (i) the global configuration data, and (ii) customer configuration information obtained in (b)(2)(2) and associated with the particular customer.

2. The CDN of claim 1 wherein each particular cache server of said plurality of cache servers is constructed and adapted to, upon joining the CDN,

(b)(1)(2) obtain data from one or more other locations in the CDN.

3. The CDN of claim 1 wherein processing by a cache server in (b)(2)(2) to obtain customer configuration information associated with a specific customer occurs upon receipt of a request for a resource associated with the specific customer.

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4. The CDN of claim 1 wherein processing by a cache server in (b)(2)(2) to obtain customer configuration information associated with a specific customer occurs prior to receipt of a request for a resource associated with the specific customer.

5. The CDN of claim 1 wherein customer configuration information associated with the particular customer comprises one or more scripts to be used by the particular cache server to process requests for resources associated with the particular customer.

6. The CDN of claim 1 wherein the customer configuration information comprises at least one CDN resource.

7. The CDN of claim 1 wherein the customer configuration information associated with the particular customer comprises at least one customer configuration script (CCS) associated with the particular customer.

8. The CDN of claim 1 wherein the customer configuration information associated with the particular customer specifies customer-specific processing requirements for resources served on behalf of that customer.

9. The CDN of claim 1 wherein the global configuration data comprises at least one CDN resource.

10. The CDN of claim 9 wherein the global configuration data comprises global configuration object (GCO).

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11. The CDN of claim 2 wherein the one or more other locations in the CDN comprise at least one location selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

12. The CDN of claim 11 wherein the one or more other locations in the CDN comprise at least one peer location.

13. The CDN of claim 2 wherein the particular cache server determines said one or more other locations using said information in said global configuration data.

14. The CDN of claim 1 wherein said particular cache server obtains said updated global configuration data from one or more locations in the CDN.

15. The CDN of claim 14 wherein the one or more locations in the CDN comprise one or more locations selected from: (i) the control core; and (ii) one or more locations in selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

16. The CDN of claim 1 wherein the control core comprises a distributed system consisting of a plurality of machines.

17. The CDN of claim 16 wherein the control core uses a distributed consensus algorithm to achieve consensus among the plurality of machines.

18. The CDN of claim 1 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

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determine validity of a version of global configuration data stored on said particular cache server, and wherein said particular cache server obtains updated global configuration data in (b)(2)(1) when said particular cache server determines that said version of said global configuration data stored on said particular cache server is invalid.

19. The CDN of claim 1 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

determine validity of a version of particular customer configuration information associated with a particular customer and stored on said particular cache server, and wherein said particular cache server obtains customer configuration information in (b)(2)(2) when said particular cache server determines that said version of said particular customer configuration information stored on said particular cache server is invalid.

20. The CDN of claim 19 wherein said particular cache server is constructed and adapted to determine said validity of said version of particular customer configuration information stored on said particular cache server in response to a request to serve content associated with said particular customer.

21. The CDN of claim 1 further comprising:

(c) at least one rendezvous mechanism.

22. The CDN of claim 1 further comprising:

(d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to:

(d)(1) obtain information from at least one cache server.

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23. The CDN of claim 22 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

(b)(3) generate information; and

(b)(4) provide at least some of said generated information to said collector system.

24. The CDN of claim 21 wherein each particular cache server of said plurality of cache servers provides at least some of said generated information in (b)(4) by streaming said at least some of said generated information to one or more collector mechanisms in said collector system.

25. The CDN of claim 1 wherein the CDN has customer configuration information associated therewith, and wherein each particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN.

26. The CDN of claim 1 wherein at least one cache server of said plurality of cache servers comprises an executive system supporting concurrent processing of tasks on said at least one cache server.

27. A computer-implemented method, operable in a content delivery network (CDN) comprising: (a) a control core; and (b) a plurality of cache servers, the method comprising, by hardware and software on a particular cache server of said plurality of cache servers:

(A) obtaining global configuration data from the control core;

(B) selectively obtaining updated global configuration data; and

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(C) obtaining customer configuration information associated with a particular customer of the CDN;

(D) serving a particular resource associated with the particular customer in accordance with (i) the global configuration data; and (ii) the customer configuration information associated with the particular customer.

28. The method of claim 27 further comprising:

(A)(2) obtaining data from one or more other locations in the CDN.

29. The method of claim 27 wherein the obtaining of said customer configuration information in (C) occurs upon receipt of a request of said particular cache server for a resource associated with the particular customer.

30. The method of claim 27 wherein the obtaining of said customer configuration information in (C) occurs prior to receipt of a request of said particular cache server for a resource associated with the particular customer.

31. The method of claim 27 wherein the customer configuration information comprises one or more scripts to be used by the particular cache server to process requests for resources associated with the particular customer.

32. The method of claim 27 wherein the customer configuration information comprises at least one CDN resource.

33. The method of claim 27 wherein the customer configuration information comprises at least one customer configuration script (CCS) associated with the particular customer.

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34. The method of claim 27 wherein the customer configuration information associated with the particular customer specifies customer-specific processing for resources served on behalf of that customer.

35. The method of claim 27 wherein the global configuration data comprises at least one CDN resource.

36. The method of claim 35 wherein the global configuration data comprises global configuration object (GCO).

37. The method of claim 28 wherein the one or more other locations in the CDN comprise at least one location selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

38. The method of claim 37 wherein the one or more other locations in the CDN comprise at least one peer location.

39. The method of claim 28 wherein the particular cache server determines said one or more other locations using said information in said global configuration data.

40. The method of claim 27 wherein said particular cache server obtains said updated global configuration data in (B) from one or more locations in the CDN.

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41. The method of claim 40 wherein the one or more locations in the CDN comprise one or more locations selected from: (i) the control core; and (ii) one or more locations in selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

42. The method of claim 27 wherein the control core comprises a distributed system consisting of a plurality of machines.

43. The method of claim 42 wherein the control core uses a distributed consensus algorithm to achieve needed consensus among the plurality of machines.

44. The method of claim 27 further comprising, by said particular cache server:

(F) determining validity of a version of global configuration data stored on said particular cache server, and wherein said particular cache server obtains updated global configuration data in (B) when said particular cache server determines that said version of said global configuration data stored on said particular cache server is invalid.

45. The method of claim 27 further comprising, by said particular cache server:

(G) determining validity of a version of particular customer configuration information associated with the particular customer and stored on said particular cache server, and wherein said particular cache server obtains customer configuration information in (C) when said particular cache server

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determines that said version of said particular customer configuration information stored on said particular cache server is invalid.

46. The method of claim 45 wherein said particular cache server determines validity of said version of particular customer configuration information in (G) in response to a request to serve content associated with said particular customer.

47. The method of claim 27 wherein the CDN further comprises: (d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to obtain information from at least one cache server, the method further comprising, by said particular cache server:

(E) generating information; and

(F) providing at least some of said generated information to said collector system.

48. The method of claim 47 wherein said providing in (F) comprises:

(F)(1) streaming said at least some of said generated information to one or more collector mechanisms in said collector system.

49. The method of claim 27 further comprising, by said particular cache server of said plurality of cache servers:

(E) obtaining second customer configuration information associated with a second customer of the CDN, said second customer being distinct from said particular customer; and

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(F) serving a second particular resource associated with the second customer in accordance with (i) the global configuration data, and (ii) the second customer configuration information associated with the second customer.

50. The method of claim 27 wherein the CDN has customer configuration information associated therewith, and wherein the particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN.

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ABSTRACT OF THE DISCLOSURE

A content delivery network (CDN) includes a control core; and a plurality of caches, each of said caches constructed and adapted to: upon joining the CDN, obtain global configuration data from the control core; and obtain data from other caches. Each of the caches is further constructed and adapted to, having joined the CDN, upon receipt of a request for a particular resource: obtain updated global configuration data, if needed; obtain a customer configuration script (CCS) associated with the particular resource; and serve the particular resource in accordance with the CCS.

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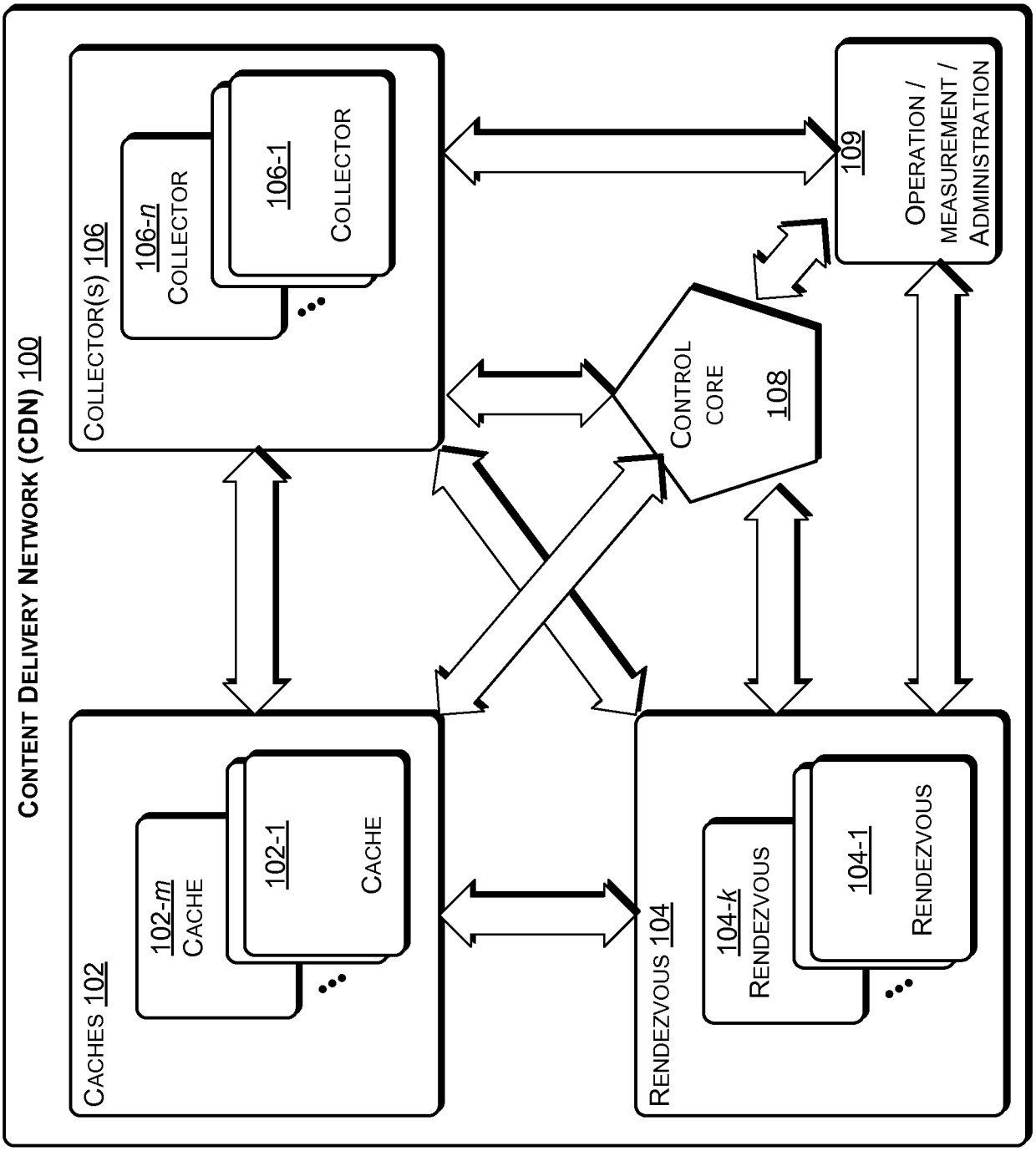

CONTENT DELIVERY NETWORK (CDN) 100
COLLECTOR(S) 106
106-n COLLECTOR
106-1 COLLECTOR
CACHES 102
102-m CACHE
102-1 CACHE
RENDEZVOUS 104
104-k RENDEZVOUS
104-1 RENDEZVOUS
CONTROL CORE 108
109
OPERATION / MEASUREMENT / ADMINISTRATION

Fig.1

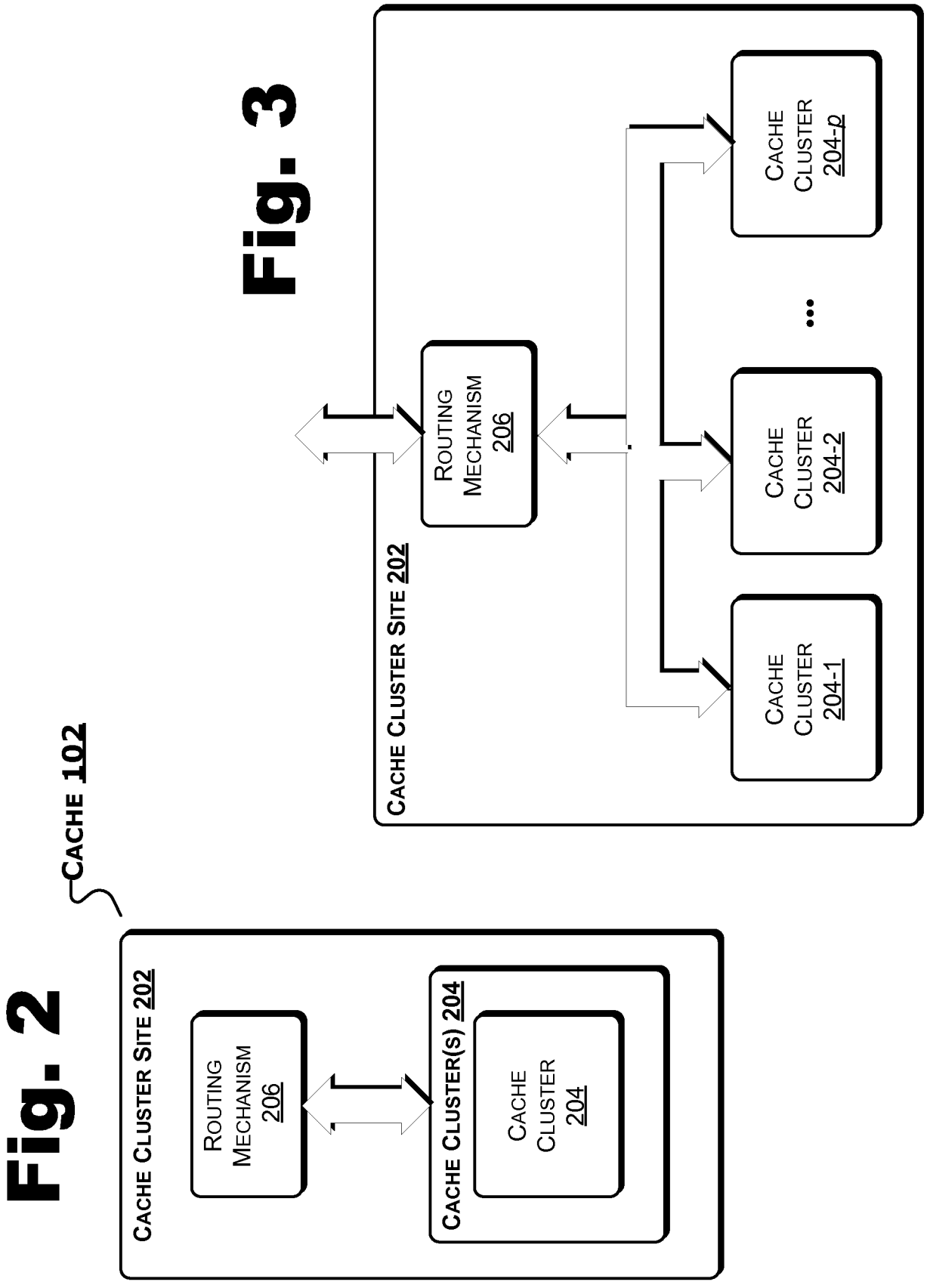

Fig. 2
CACHE 102
CACHE CLUSTER SITE 202
ROUTING MECHANISM 206
CACHE CLUSTER(S) 204
CACHE CLUSTER 204
Fig. 3
CACHE CLUSTER SITE 202
ROUTING MECHANISM 206
CACHE CLUSTER 204-1
CACHE CLUSTER 204-2
CACHE CLUSTER 204-p

Fig. 4

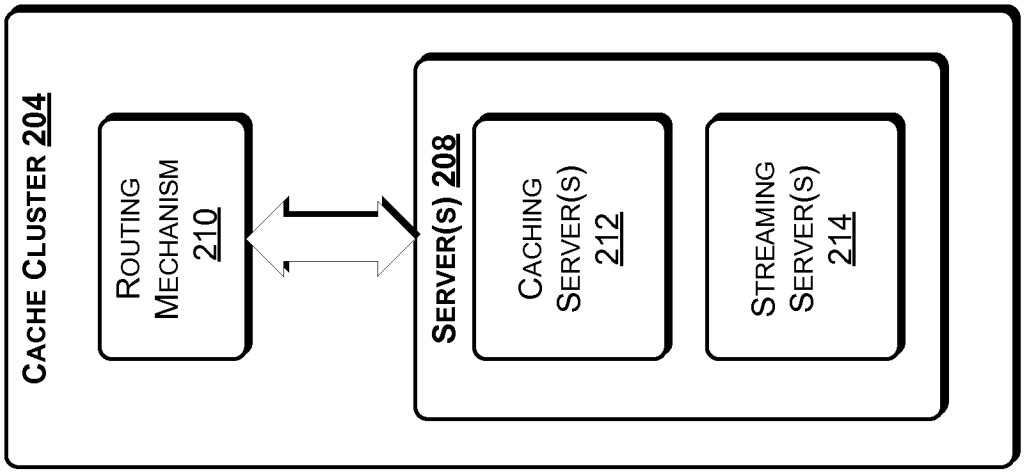

CACHE CLUSTER 204
ROUTING MECHANISM 210
SERVER(S) 208
CACHING SERVER(S) 212
STREAMING SERVER(S) 214

Fig. 5

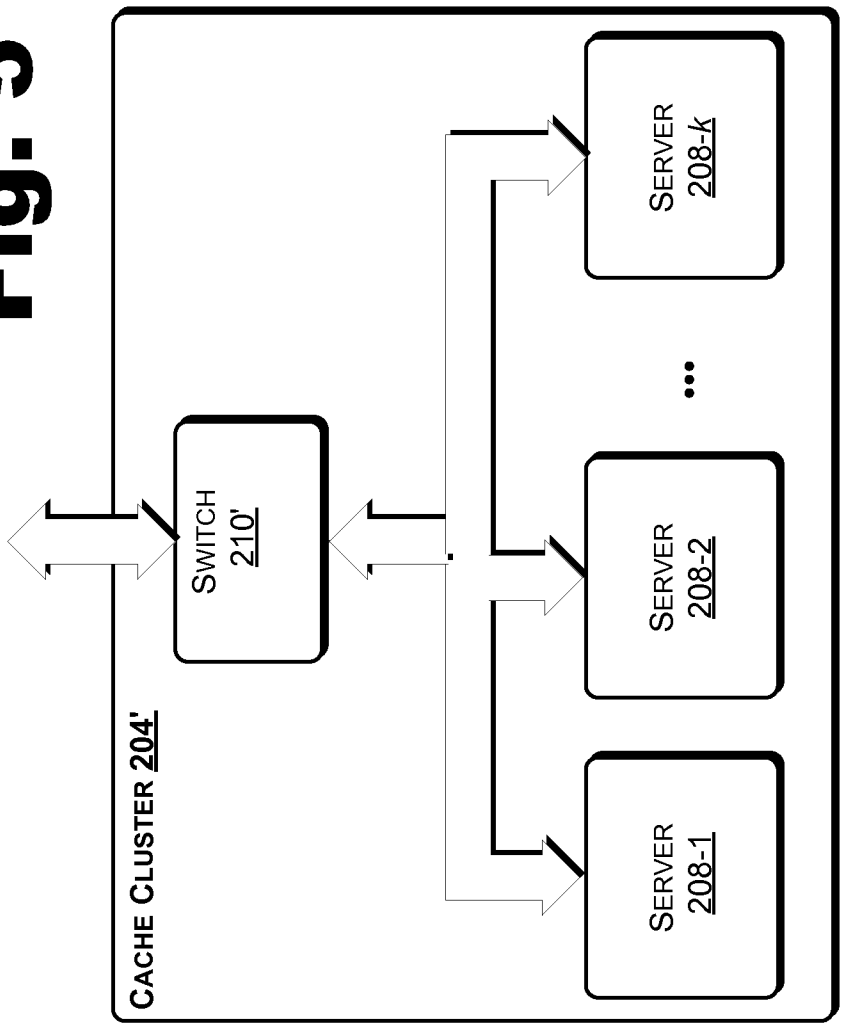
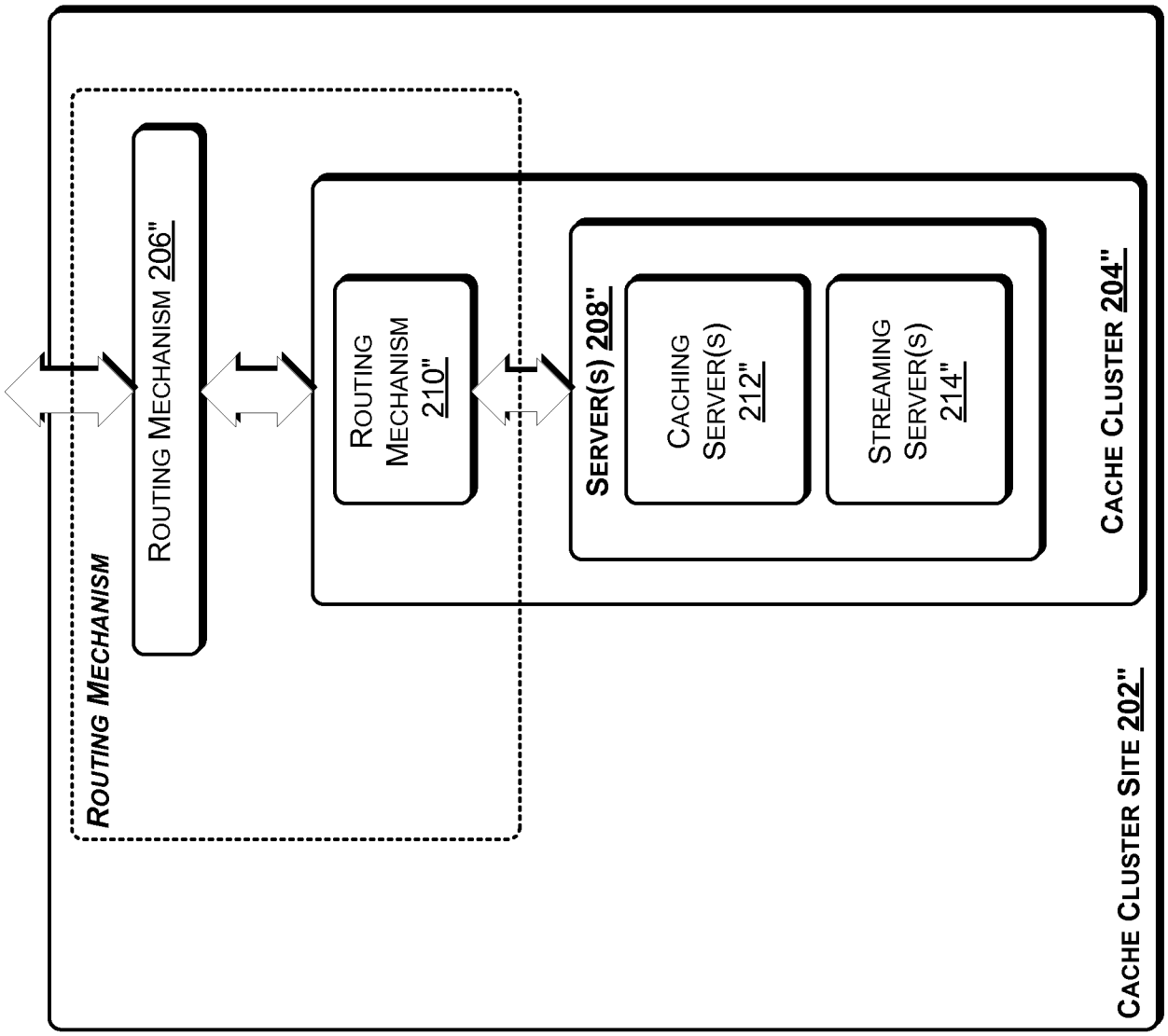

CACHE CLUSTER 204'
SWITCH 210'
SERVER 208-1
SERVER 208-2
SERVER 208-k

Fig. 6


ROUTING MECHANISM
ROUTING MECHANISM 206"
ROUTING MECHANISM 210"
SERVER(S) 208"
CACHING SERVER(S) 212"
STREAMING SERVER(S) 214"
CACHE CLUSTER 204"
CACHE CLUSTER SITE 202"

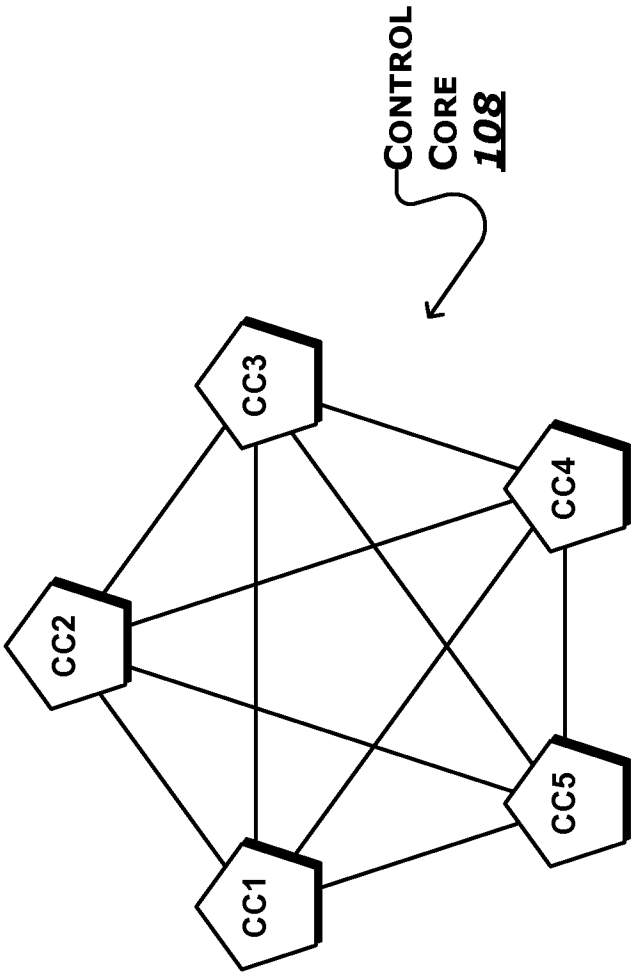
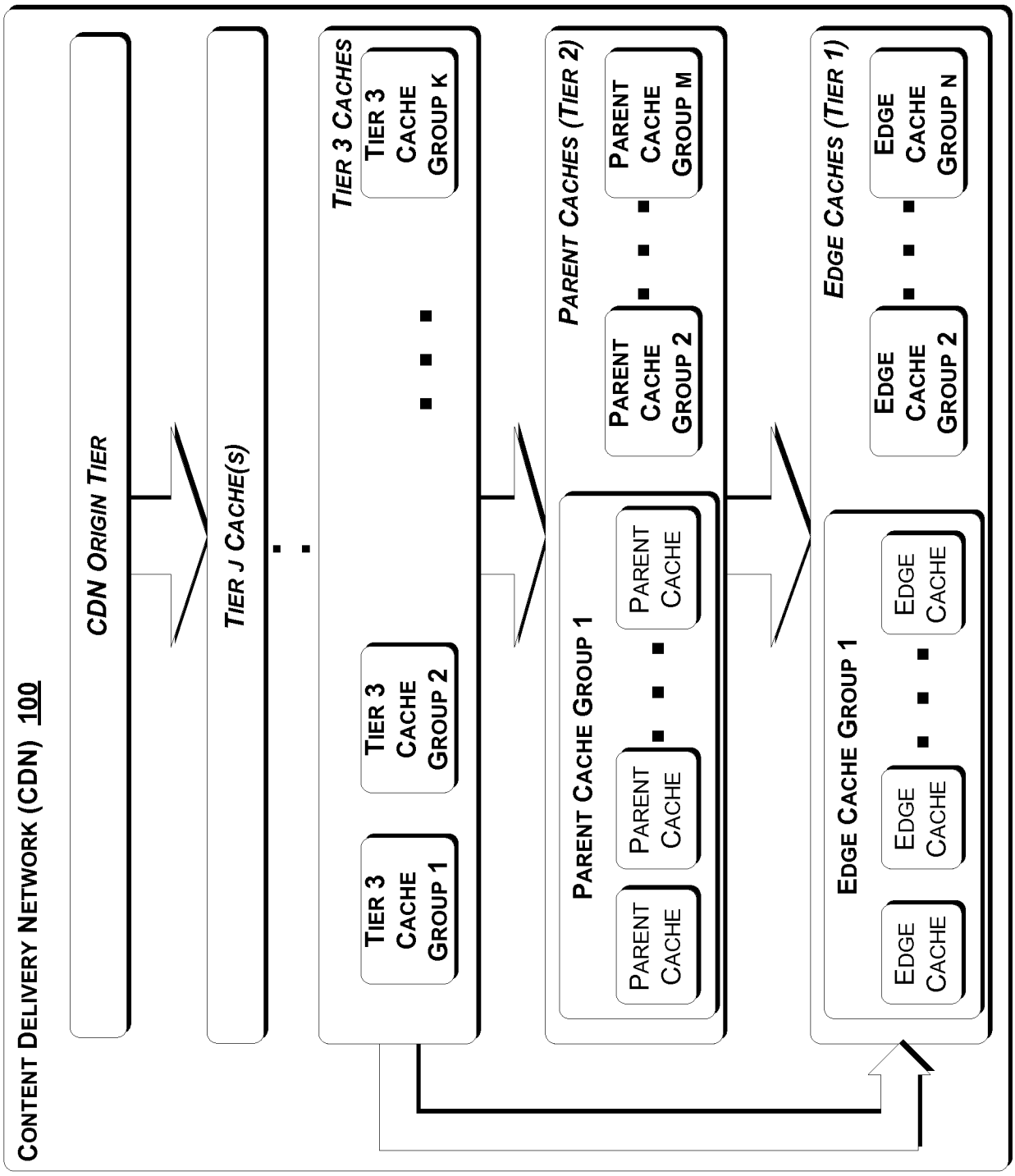


Fig. 7

Fig. 8


CONTENT DELIVERY NETWORK (CDN) 100
CDN ORIGIN TIER
TIER J CACHE(S)
TIER 3 CACHES
TIER 3 CACHE GROUP 1
TIER 3 CACHE GROUP 2
TIER 3 CACHE GROUP K
PARENT CACHES (TIER 2)
PARENT CACHE GROUP 1
PARENT CACHE
PARENT CACHE
PARENT CACHE
PARENT CACHE GROUP 2
PARENT CACHE GROUP M
EDGE CACHES (TIER 1)
EDGE CACHE GROUP 1
EDGE CACHE
EDGE CACHE
EDGE CACHE
EDGE CACHE GROUP 2
EDGE CACHE GROUP N

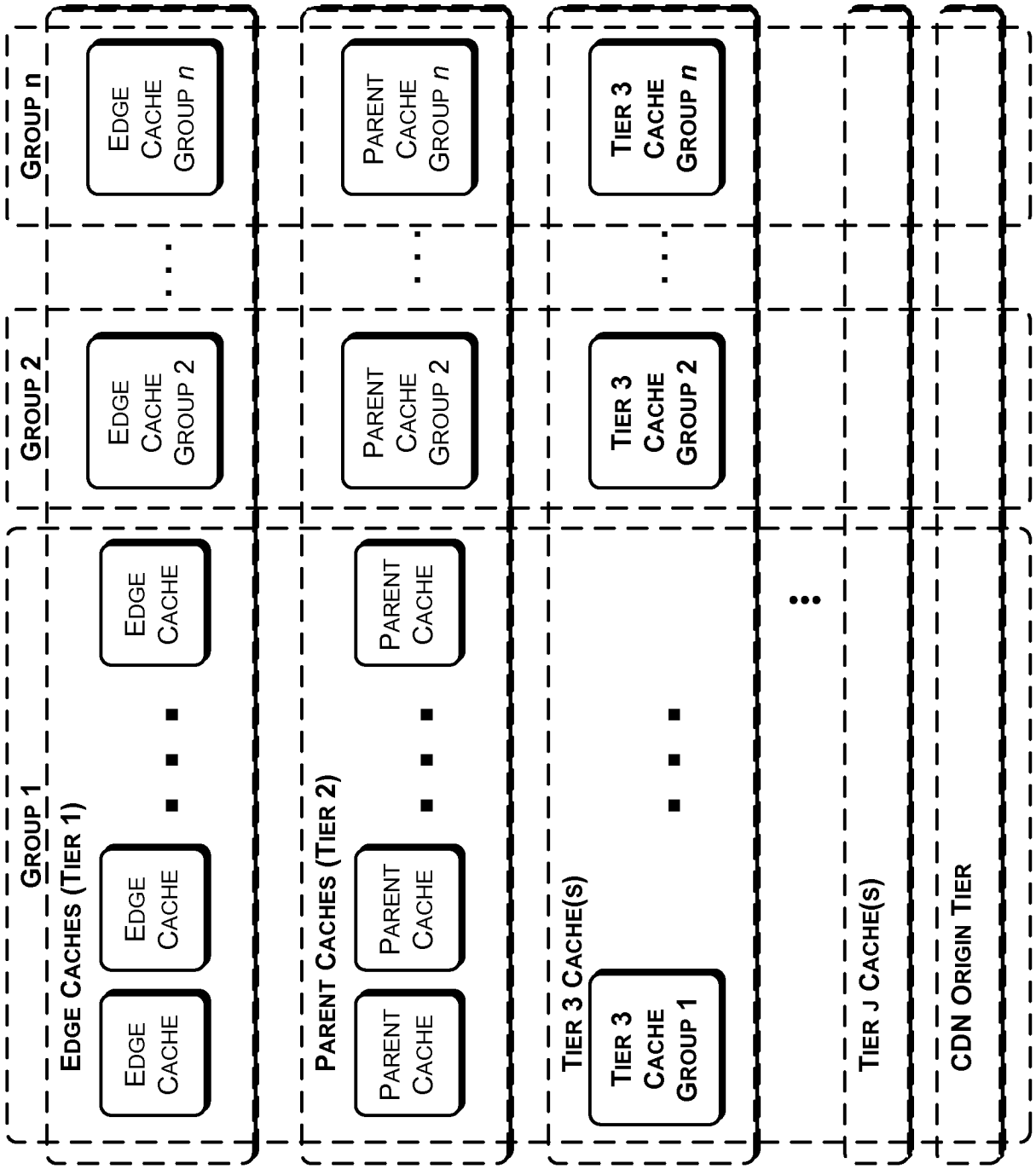
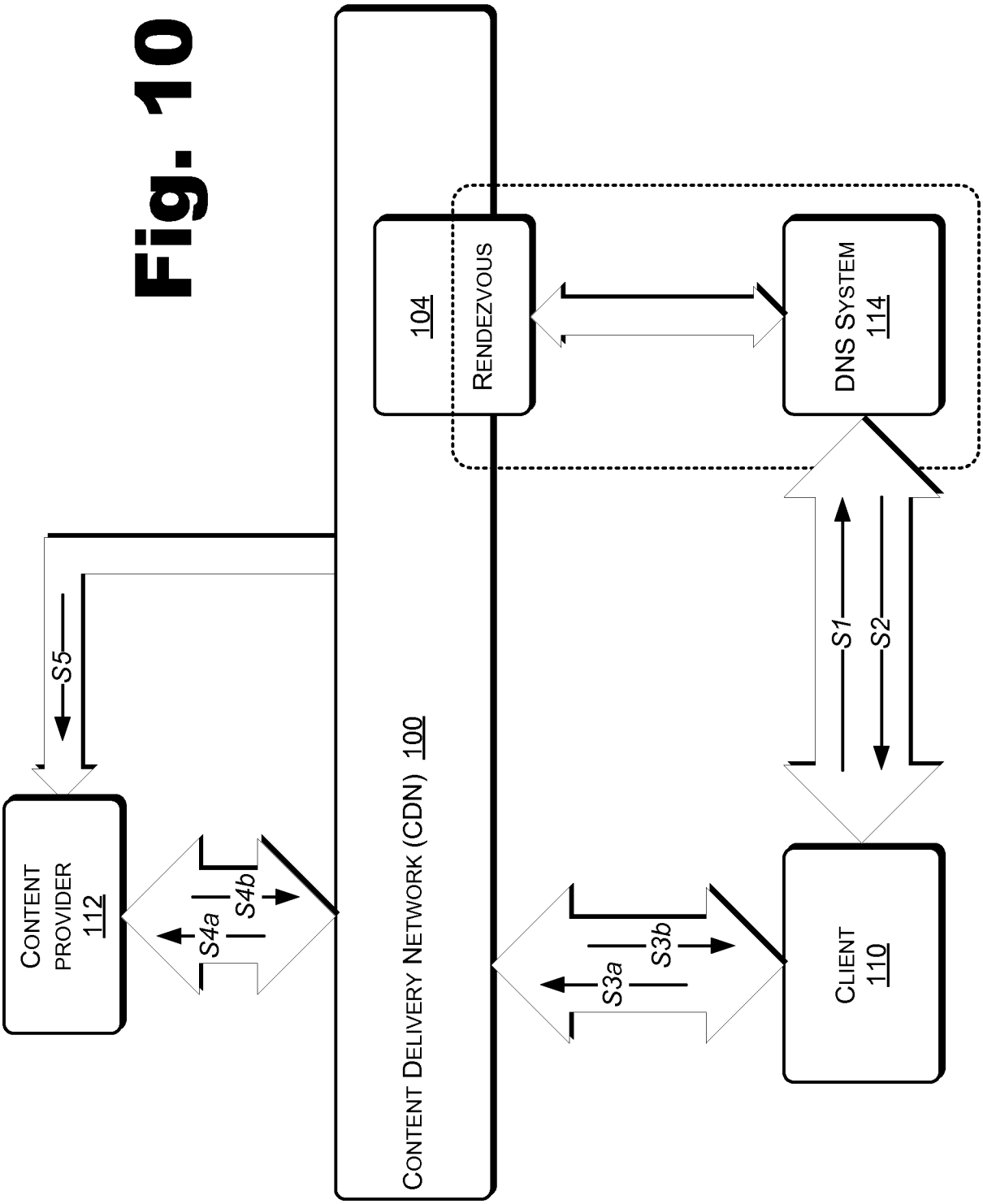

GROUP 1
EDGE CACHES (TIER 1)
EDGE CACHE
EDGE CACHE
EDGE CACHE
PARENT CACHES (TIER 2)
PARENT CACHE
PARENT CACHE
PARENT CACHE
TIER 3 CACHE(S)
TIER 3 CACHE GROUP 1
TIER J CACHE(S)
CDN ORIGIN TIER
GROUP 2
EDGE CACHE GROUP 2
PARENT CACHE GROUP 2
TIER 3 CACHE GROUP 2
GROUP n
EDGE CACHE GROUP n
PARENT CACHE GROUP n
TIER 3 CACHE GROUP n

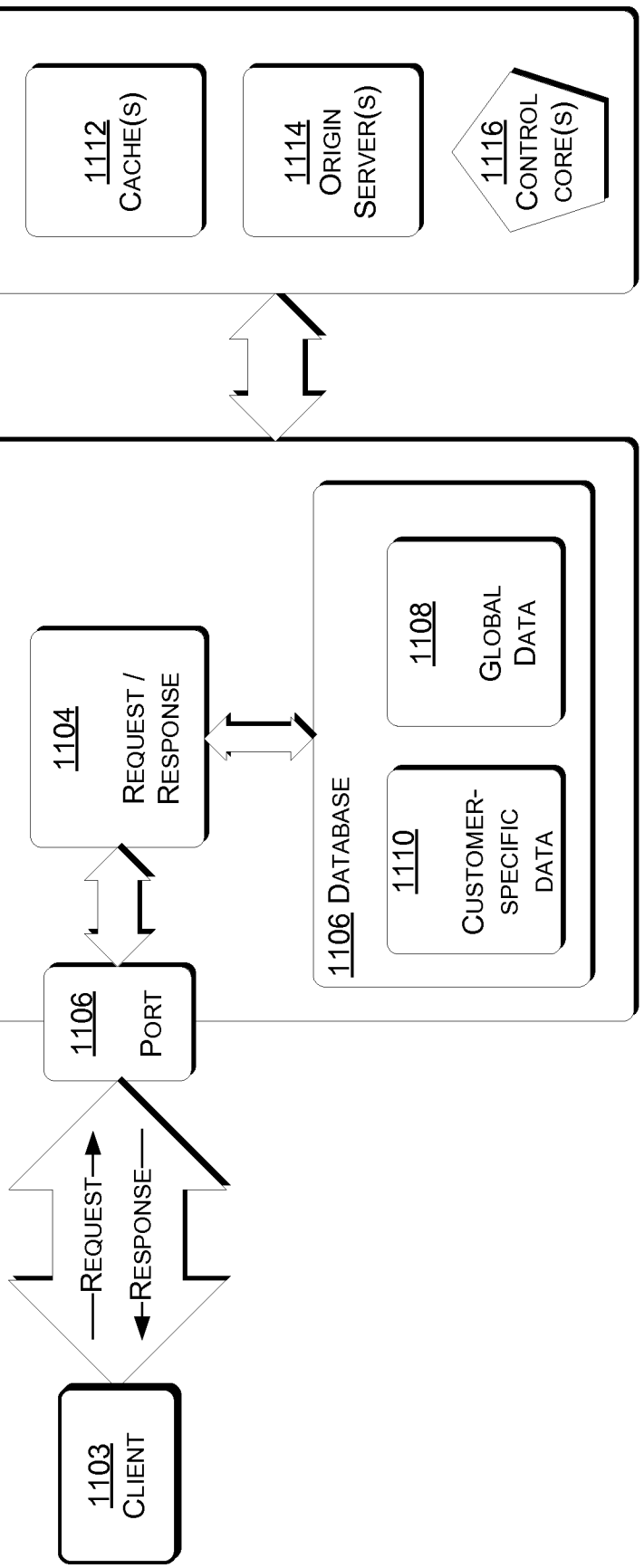
Fig. 9

Fig. 10


CONTENT DELIVERY NETWORK (CDN) 100
104
RENDEZVOUS
DNS SYSTEM
114
CONTENT
PROVIDER
112
CLIENT
110
S1
S2
S3a
S3b
S4a
S4b
S5

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Fig. 11



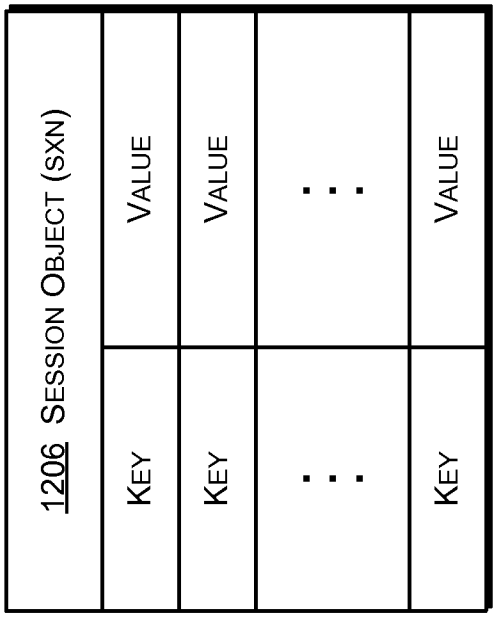


Fig. 12B

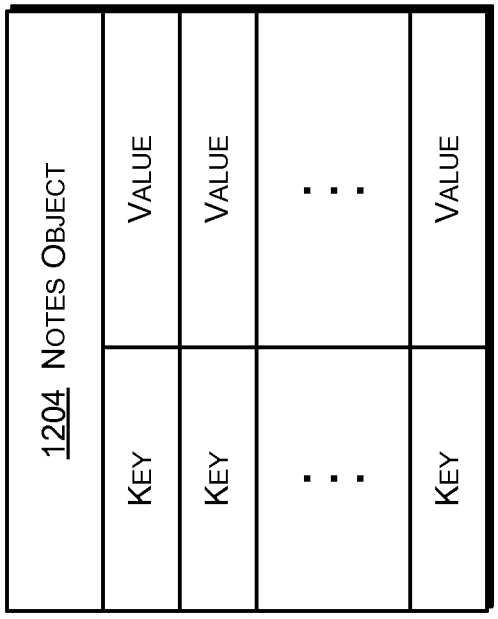


Fig. 12A

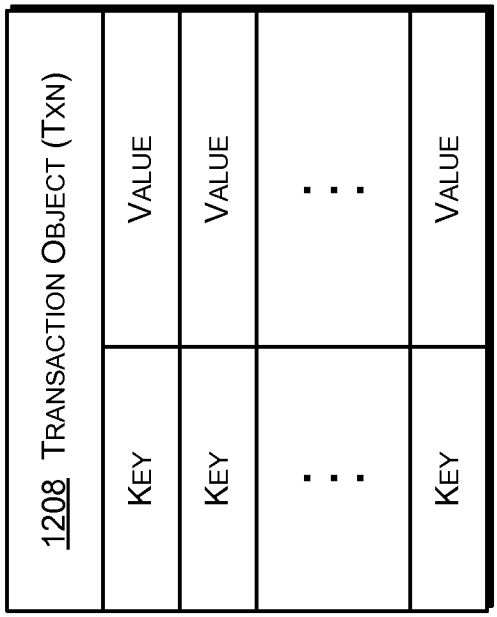


Fig. 12C

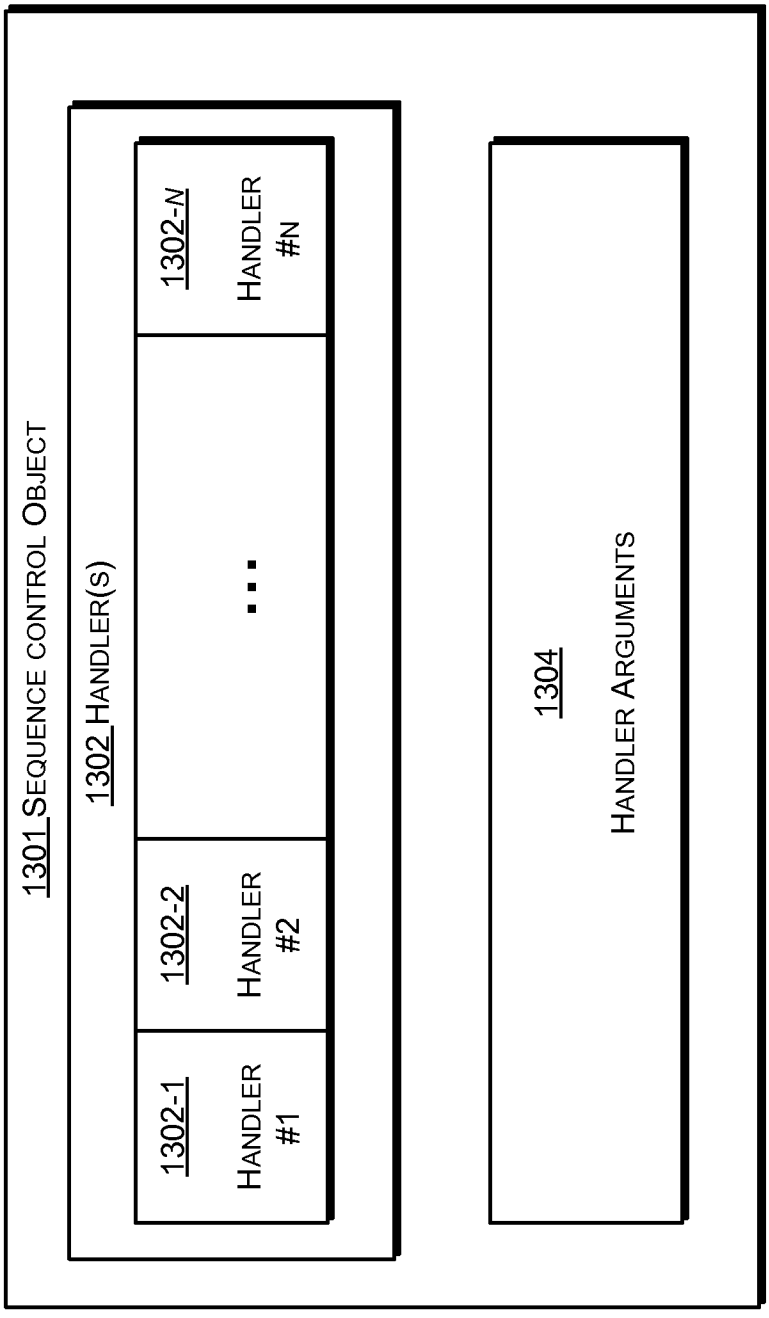

1301 SEQUENCE CONTROL OBJECT
1302 HANDLER(S)
1302-1
HANDLER #1
1302-2
HANDLER #2
...
1302-N
HANDLER #N
1304
HANDLER ARGUMENTS

Fig. 13A

Fig. 13B

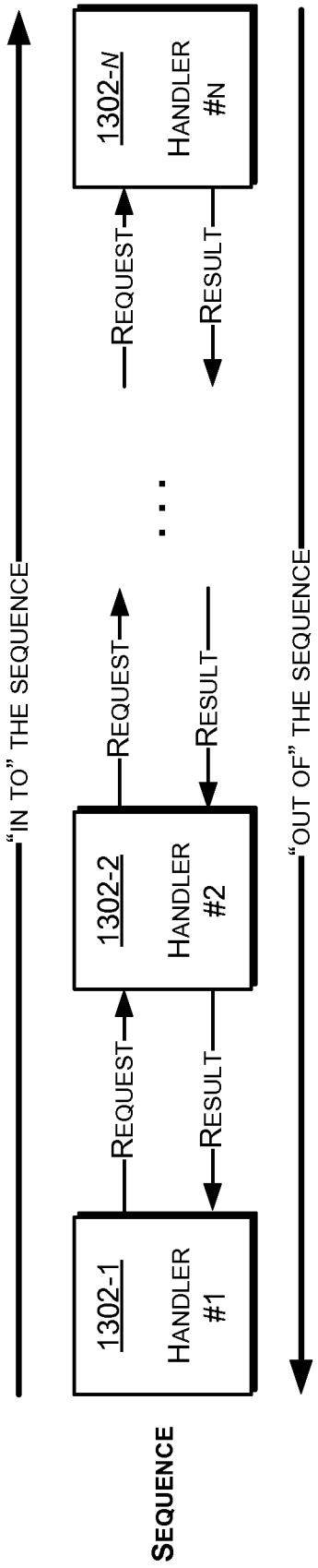
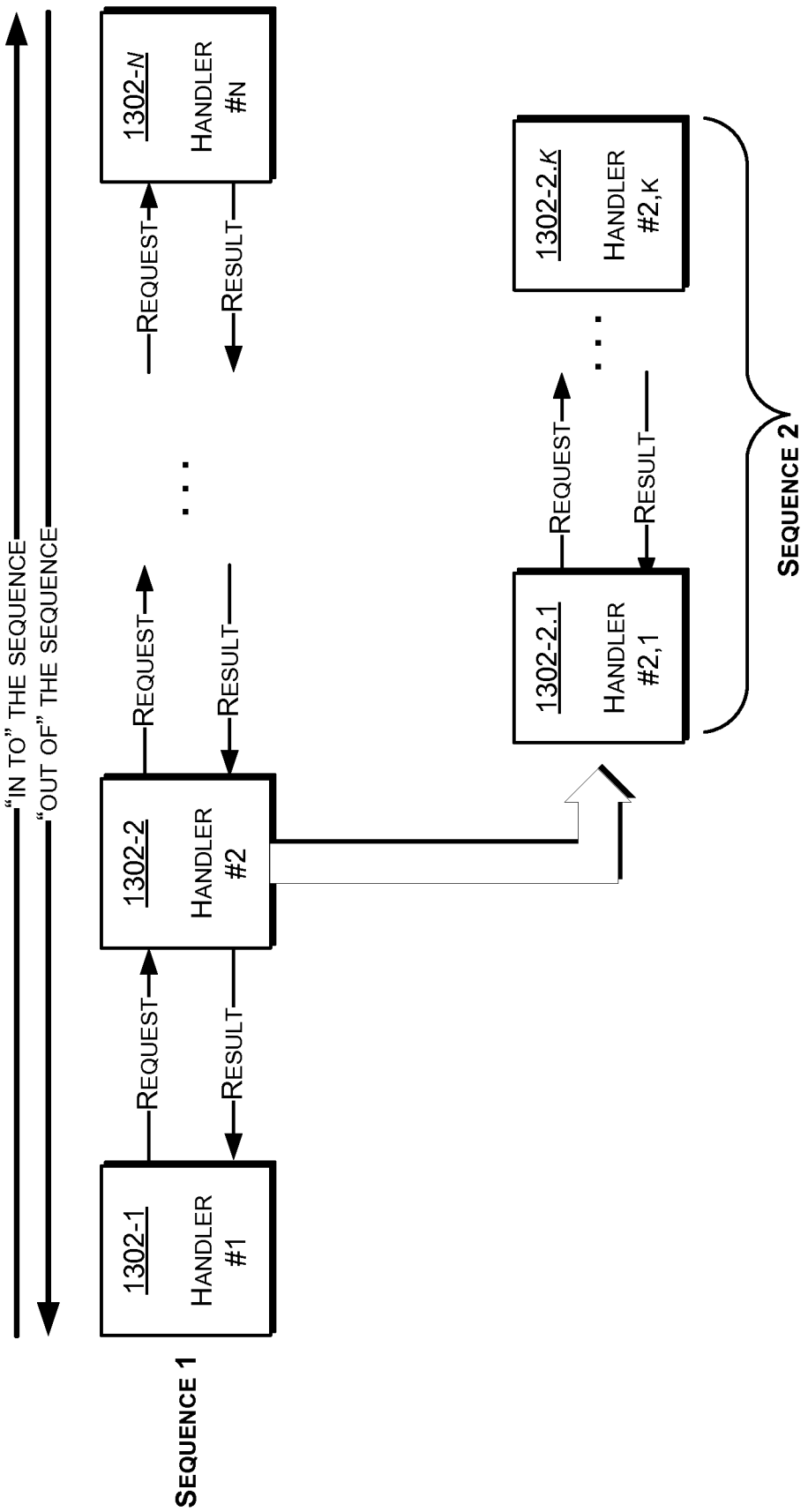

"IN TO" THE SEQUENCE
"OUT OF" THE SEQUENCE
1302-1
HANDLER #1
1302-2
HANDLER #2
1302-N
HANDLER #N
REQUEST
RESULT
REQUEST
RESULT
REQUEST
RESULT
. . .
SEQUENCE

Fig. 13C


"IN TO" THE SEQUENCE
"OUT OF" THE SEQUENCE
1302-1
HANDLER #1
REQUEST
RESULT
1302-2
HANDLER #2
REQUEST
RESULT
1302-N
HANDLER #N
REQUEST
RESULT
1302-2.1
HANDLER #2,1
REQUEST
RESULT
1302-2.K
HANDLER #2,K
SEQUENCE 1
SEQUENCE 2

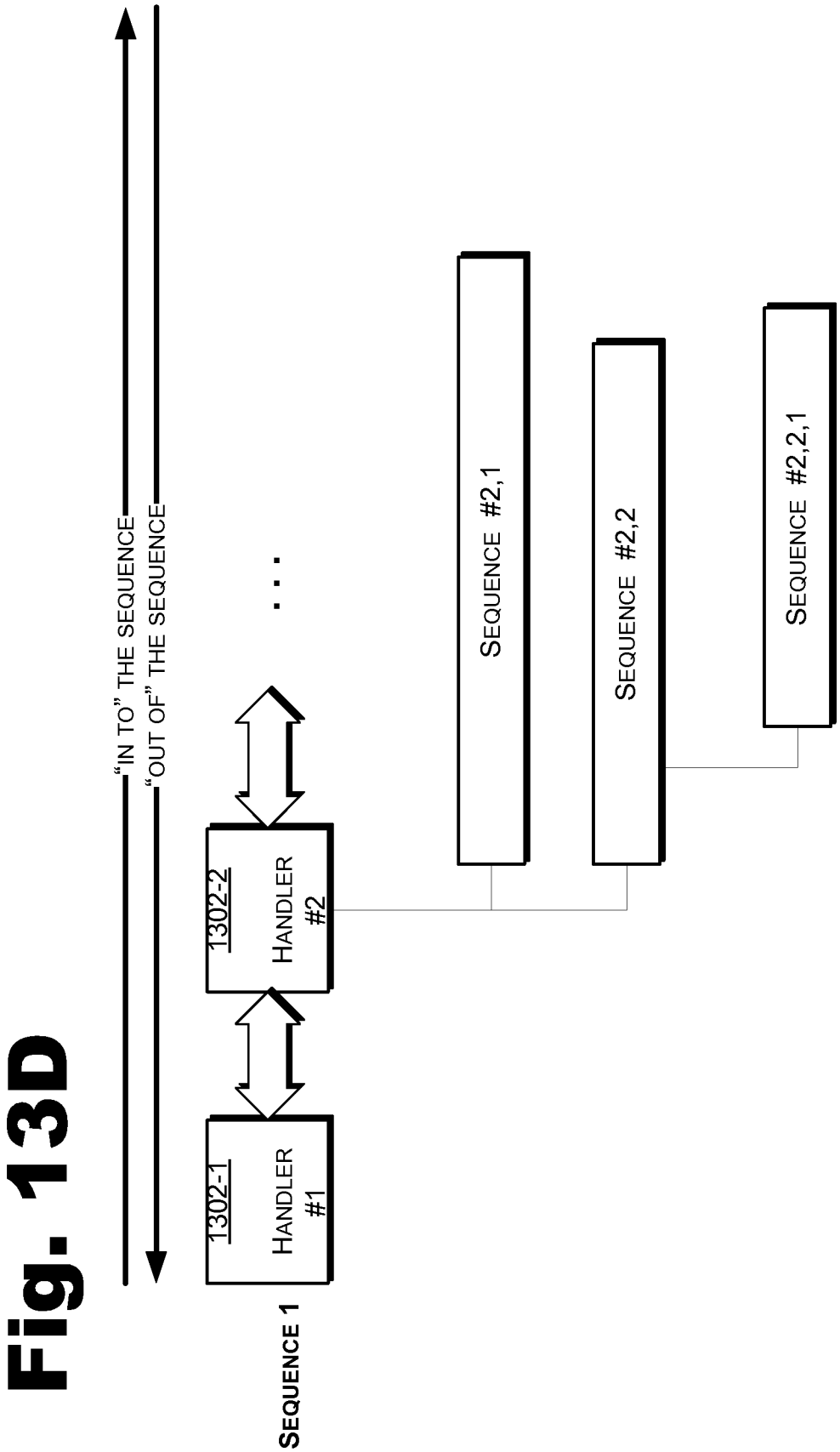

"IN TO" THE SEQUENCE
"OUT OF" THE SEQUENCE
1302-1
HANDLER #1
1302-2
HANDLER #2
. . .
SEQUENCE #2,1
SEQUENCE #2,2
SEQUENCE #2,2,1
SEQUENCE 1

Fig. 13D

Fig. 14A

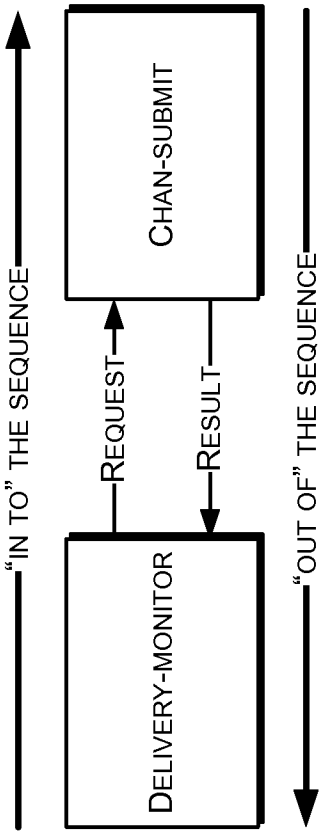
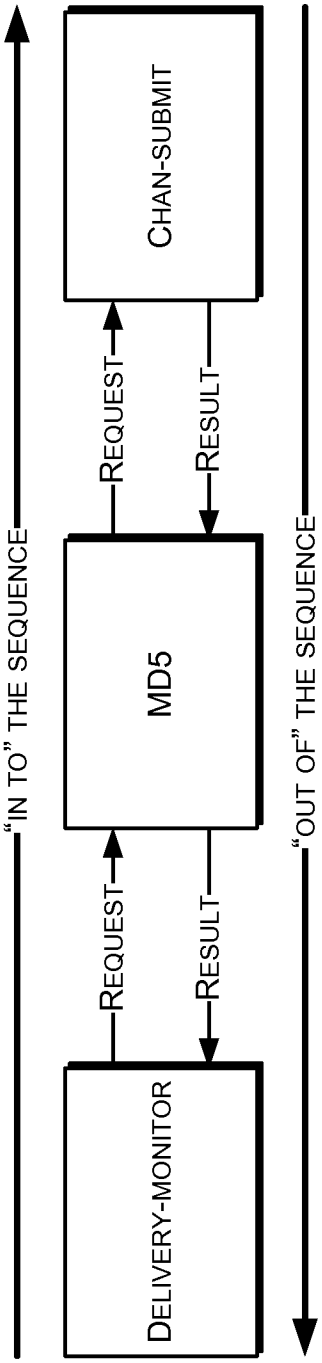


Fig. 14B



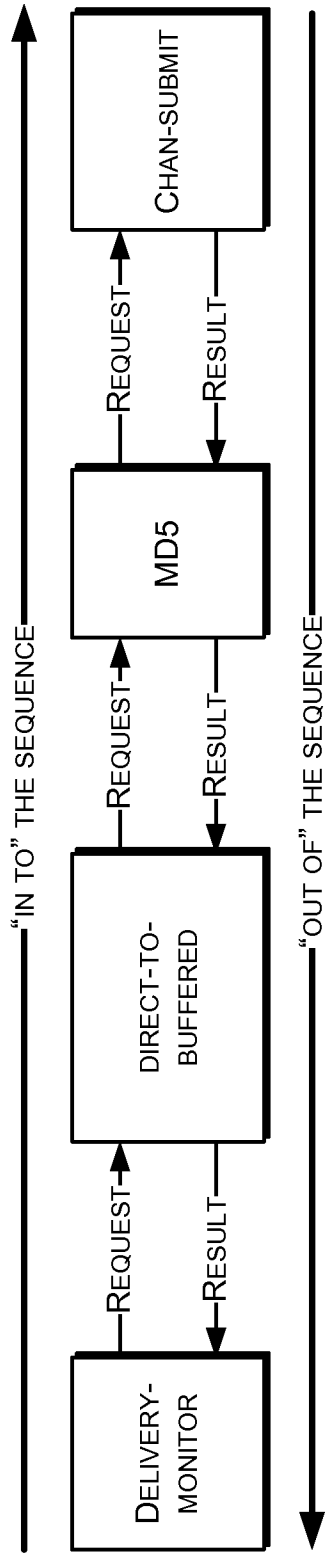


Fig. 14C

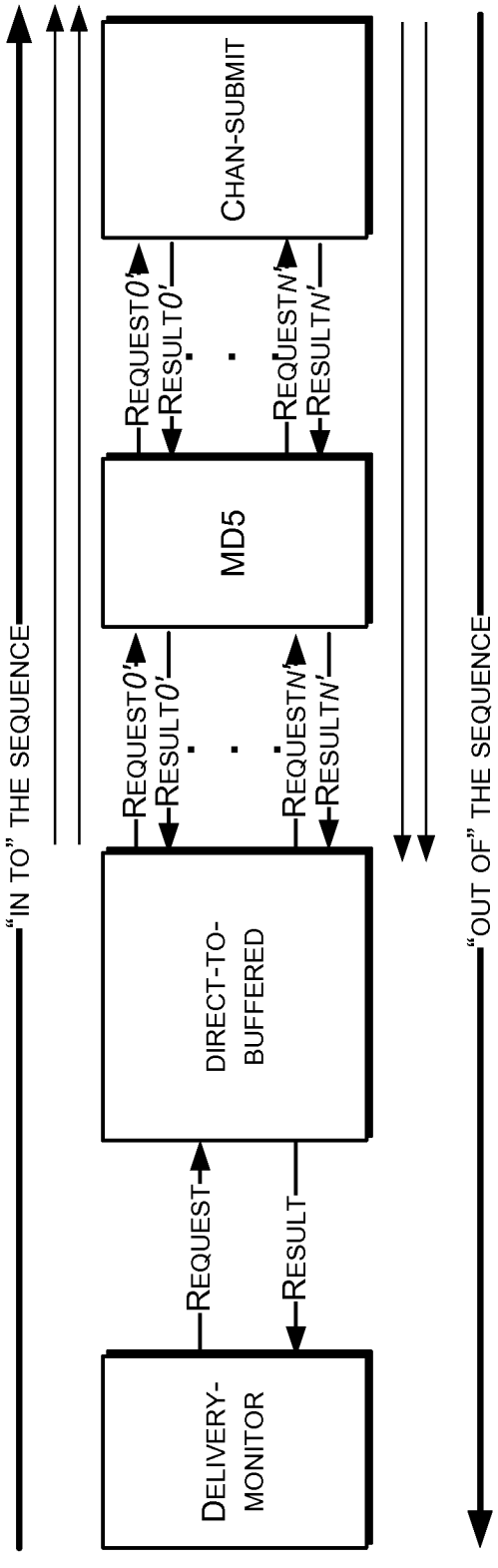


Fig. 14D

Fig. 15A

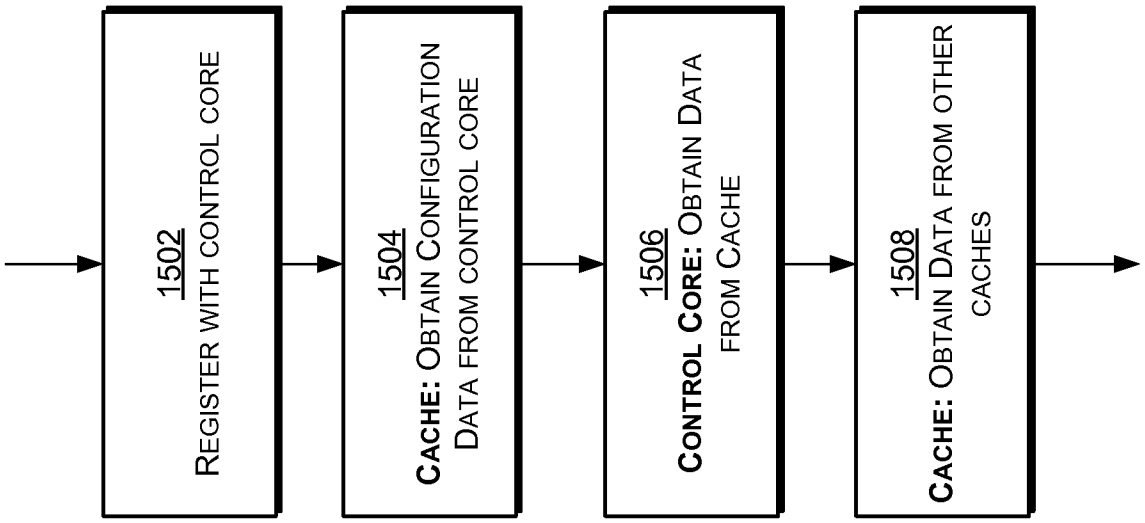
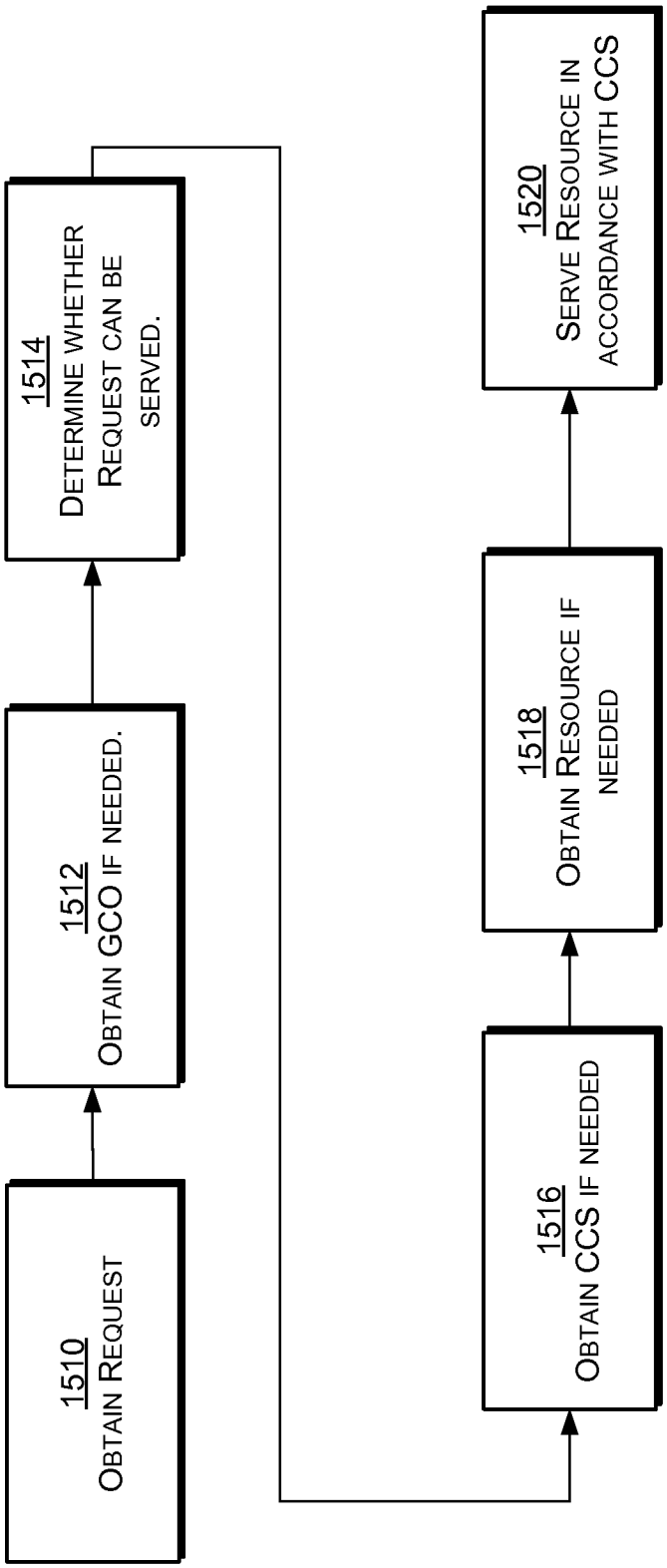

1502
REGISTER WITH CONTROL CORE
1504
CACHE: OBTAIN CONFIGURATION DATA FROM CONTROL CORE
1506
CONTROL CORE: OBTAIN DATA FROM CACHE
1508
CACHE: OBTAIN DATA FROM OTHER CACHES

Fig. 15B


1510
OBTAIN REQUEST
1512
OBTAIN GCO IF NEEDED.
1514
DETERMINE WHETHER REQUEST CAN BE SERVED.
1516
OBTAIN CCS IF NEEDED
1518
OBTAIN RESOURCE IF NEEDED
1520
SERVE RESOURCE IN ACCORDANCE WITH CCS

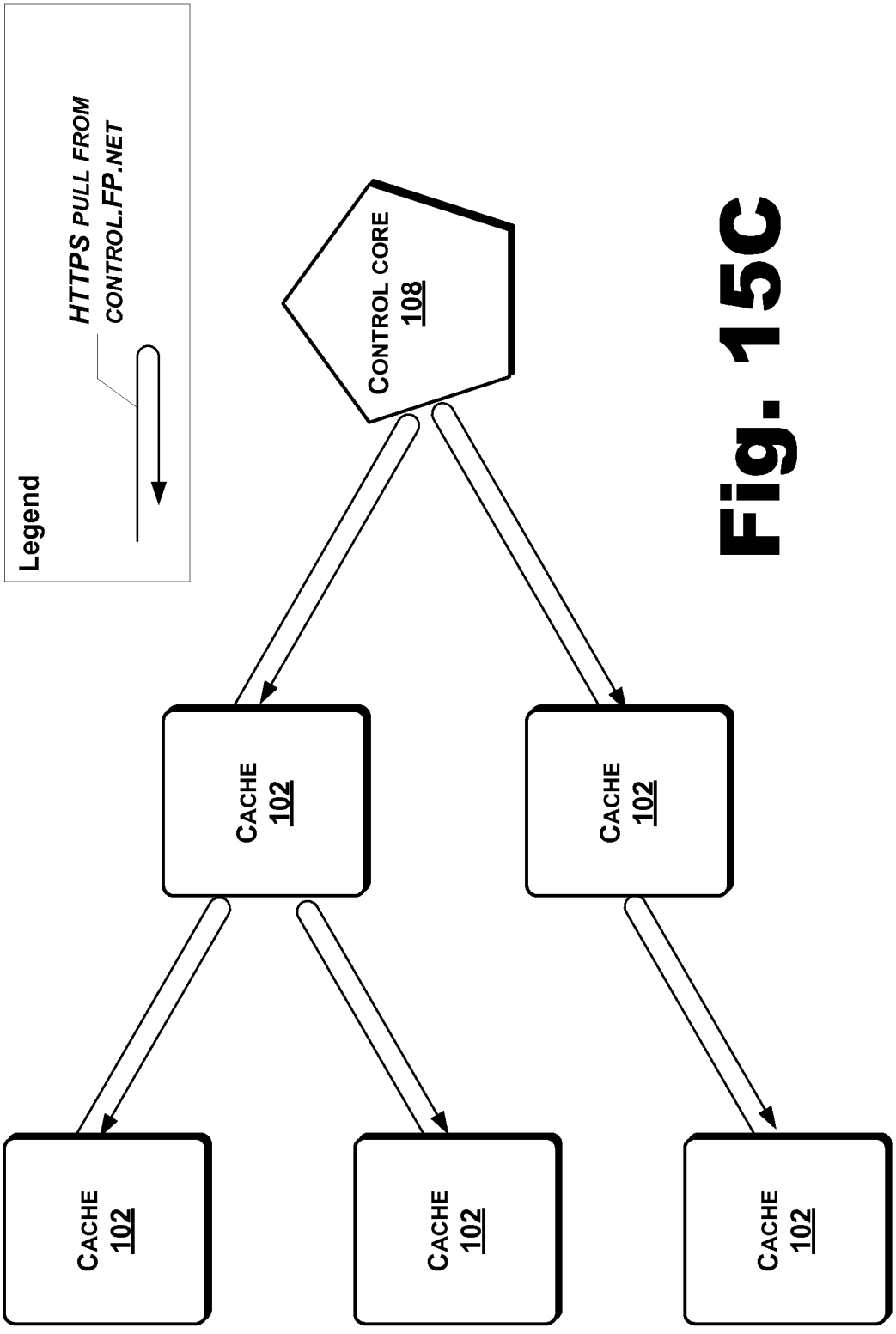

Legend
HTTPS PULL FROM CONTROL.FP.NET
CONTROL CORE 108
CACHE 102
CACHE 102
CACHE 102
CACHE 102
CACHE 102

Fig. 15C

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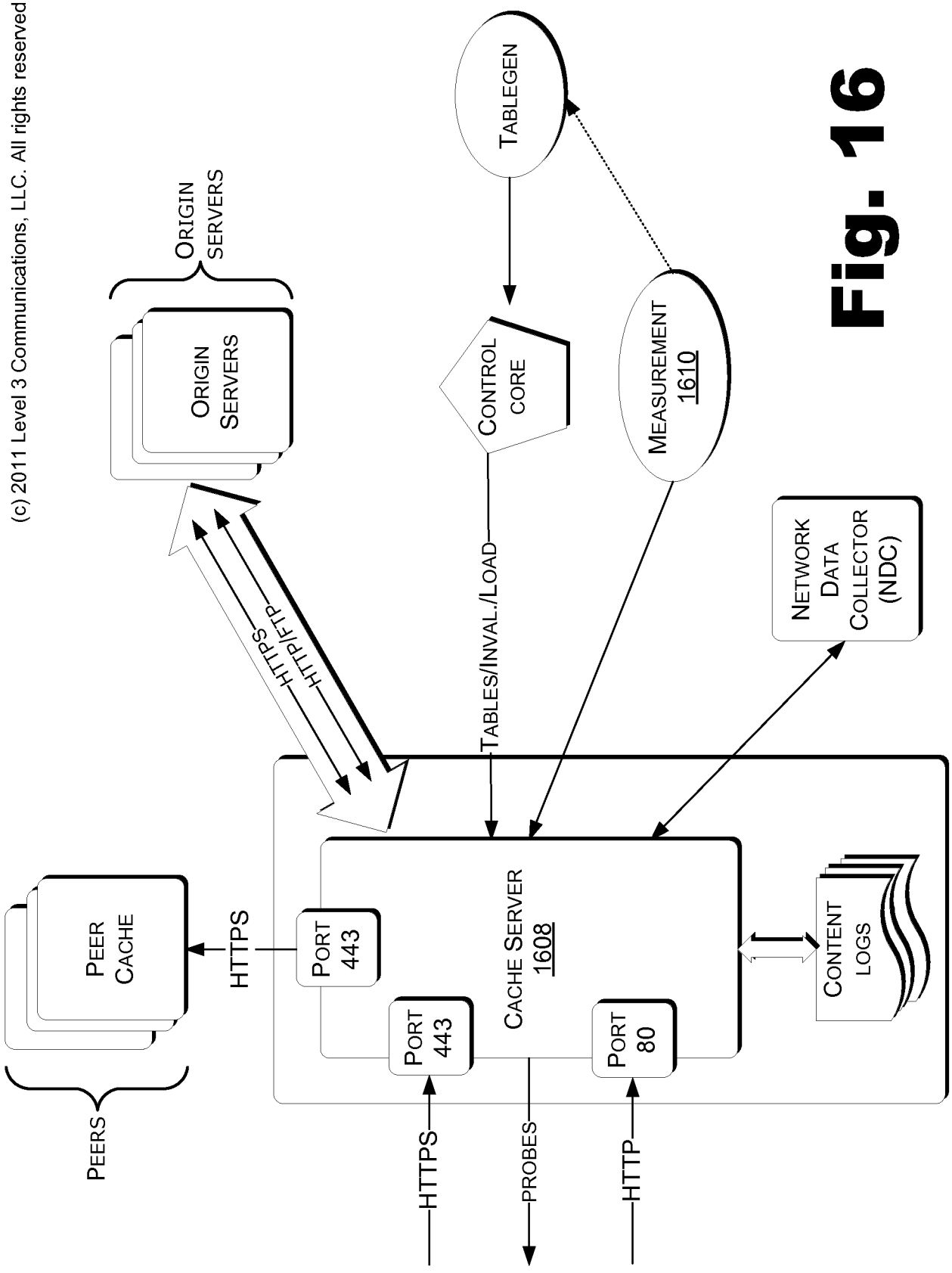
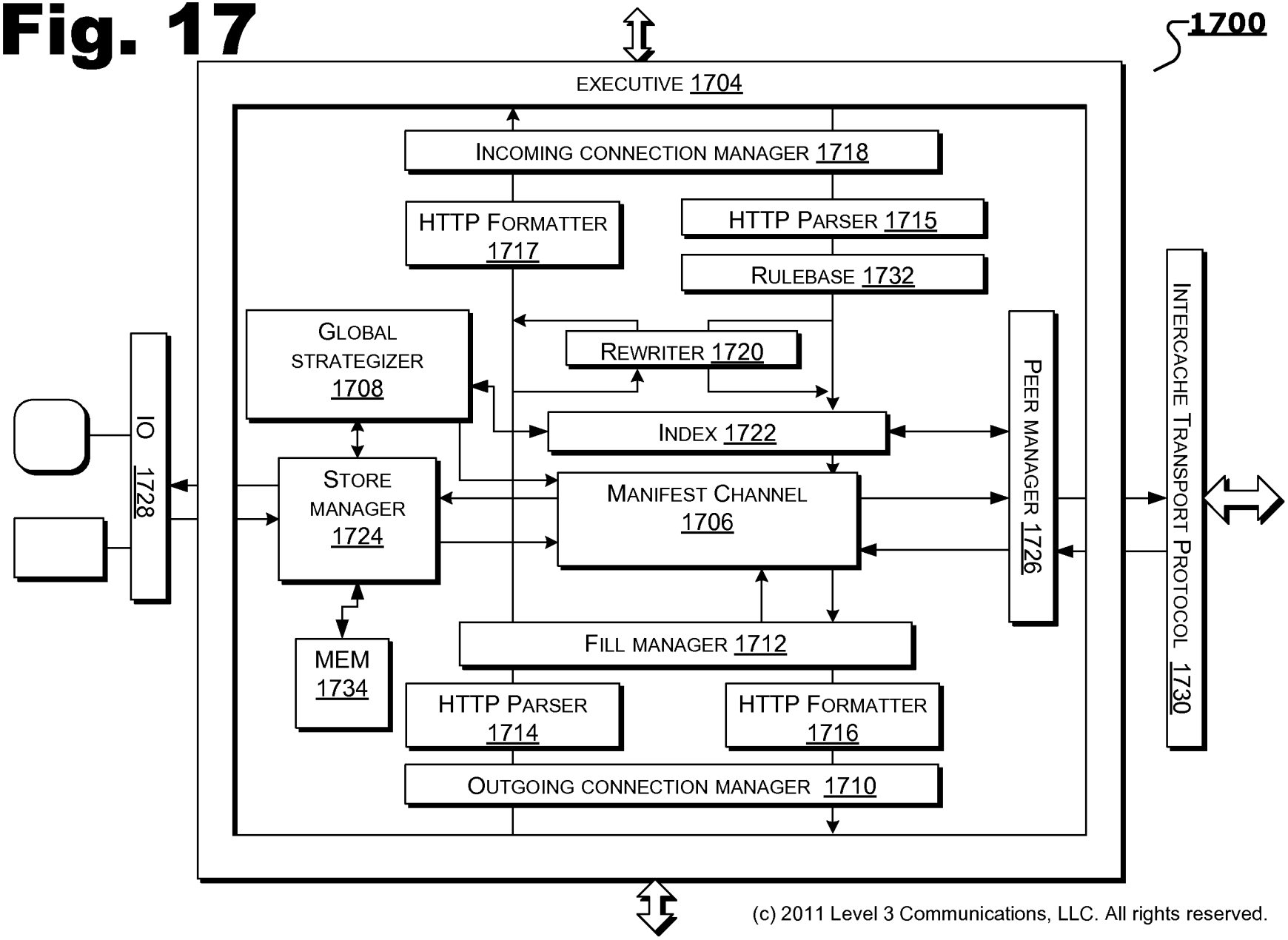


Fig. 16

Fig. 17



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ORGANIZATION OF MAJOR CACHE MODULES

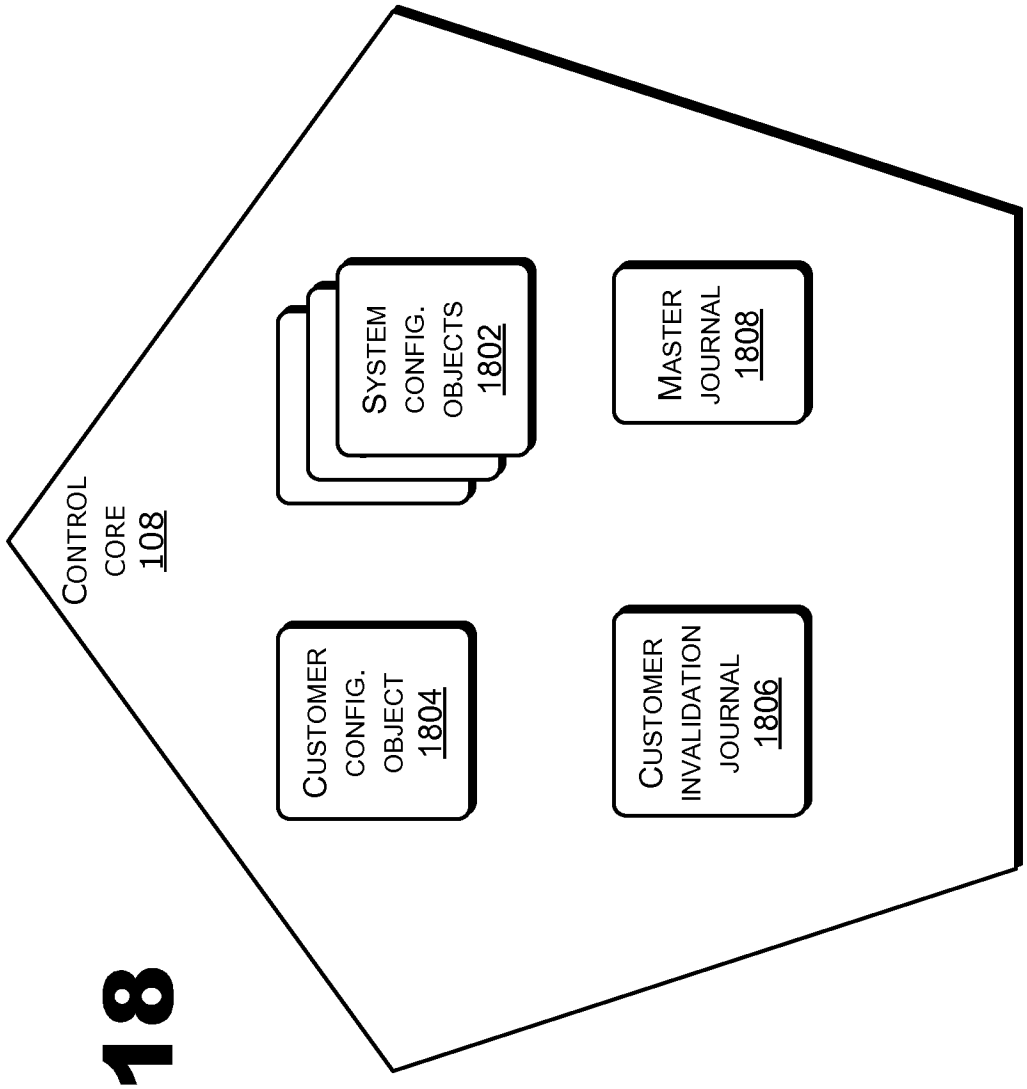

CONTROL CORE 108
SYSTEM CONFIG. OBJECTS 1802
MASTER JOURNAL 1808
CUSTOMER CONFIG. OBJECT 1804
CUSTOMER INVALIDATION JOURNAL 1806

Fig. 18

Fig. 19

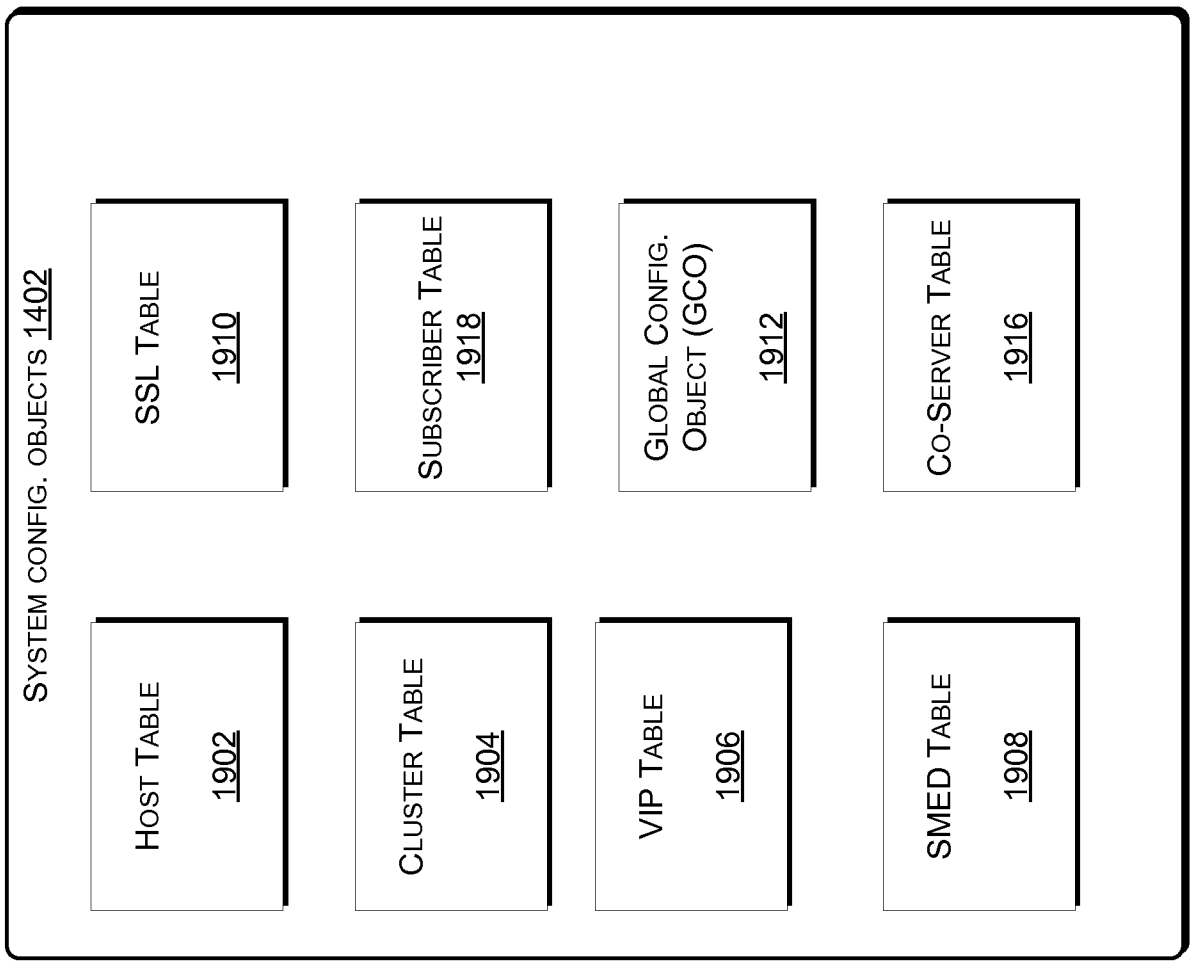

SYSTEM CONFIG. OBJECTS 1402
SSL TABLE 1910
SUBSCRIBER TABLE 1918
GLOBAL CONFIG. OBJECT (GCO) 1912
CO-SERVER TABLE 1916
HOST TABLE 1902
CLUSTER TABLE 1904
VIP TABLE 1906
SMED TABLE 1908

Fig. 20A

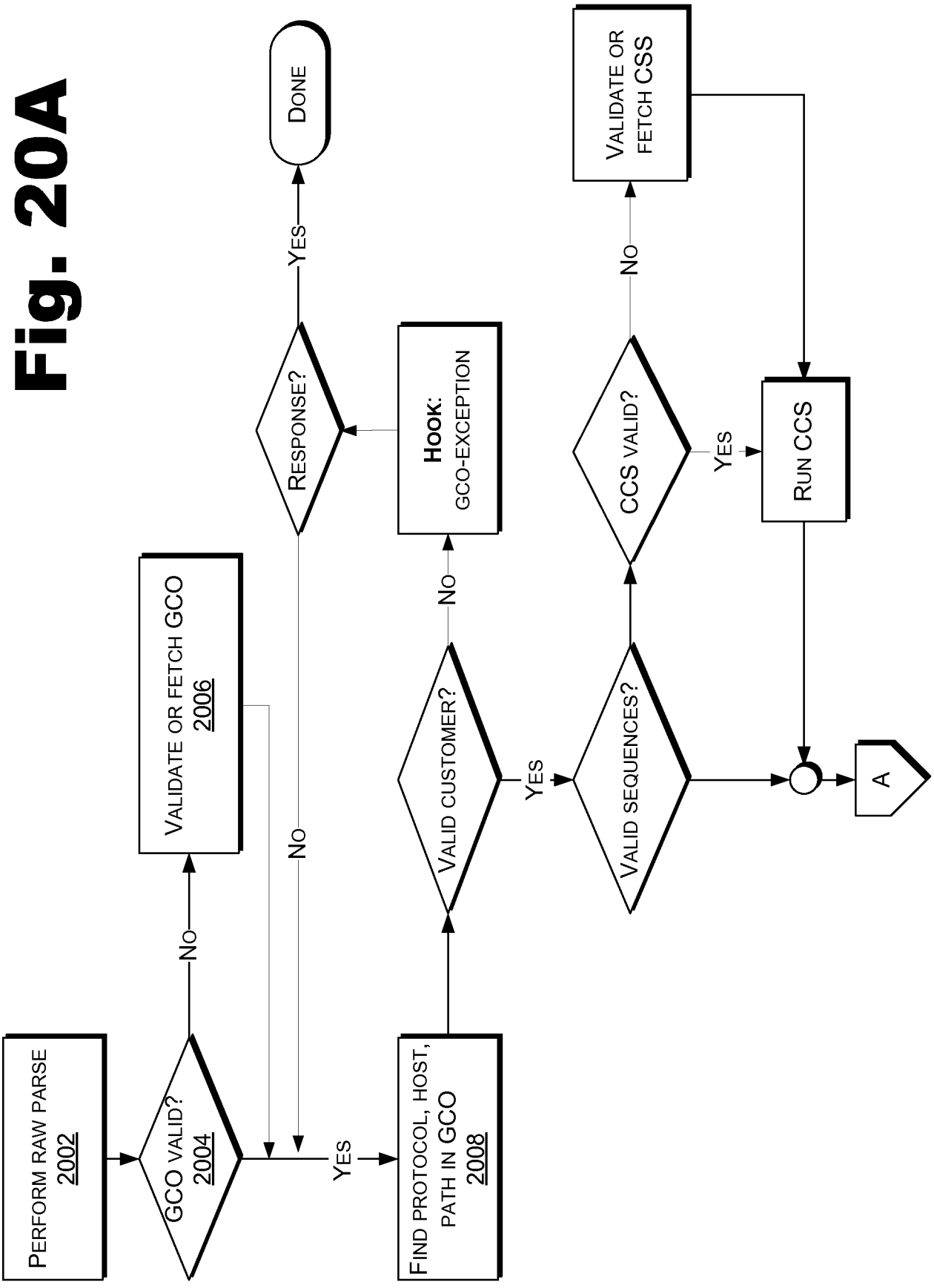
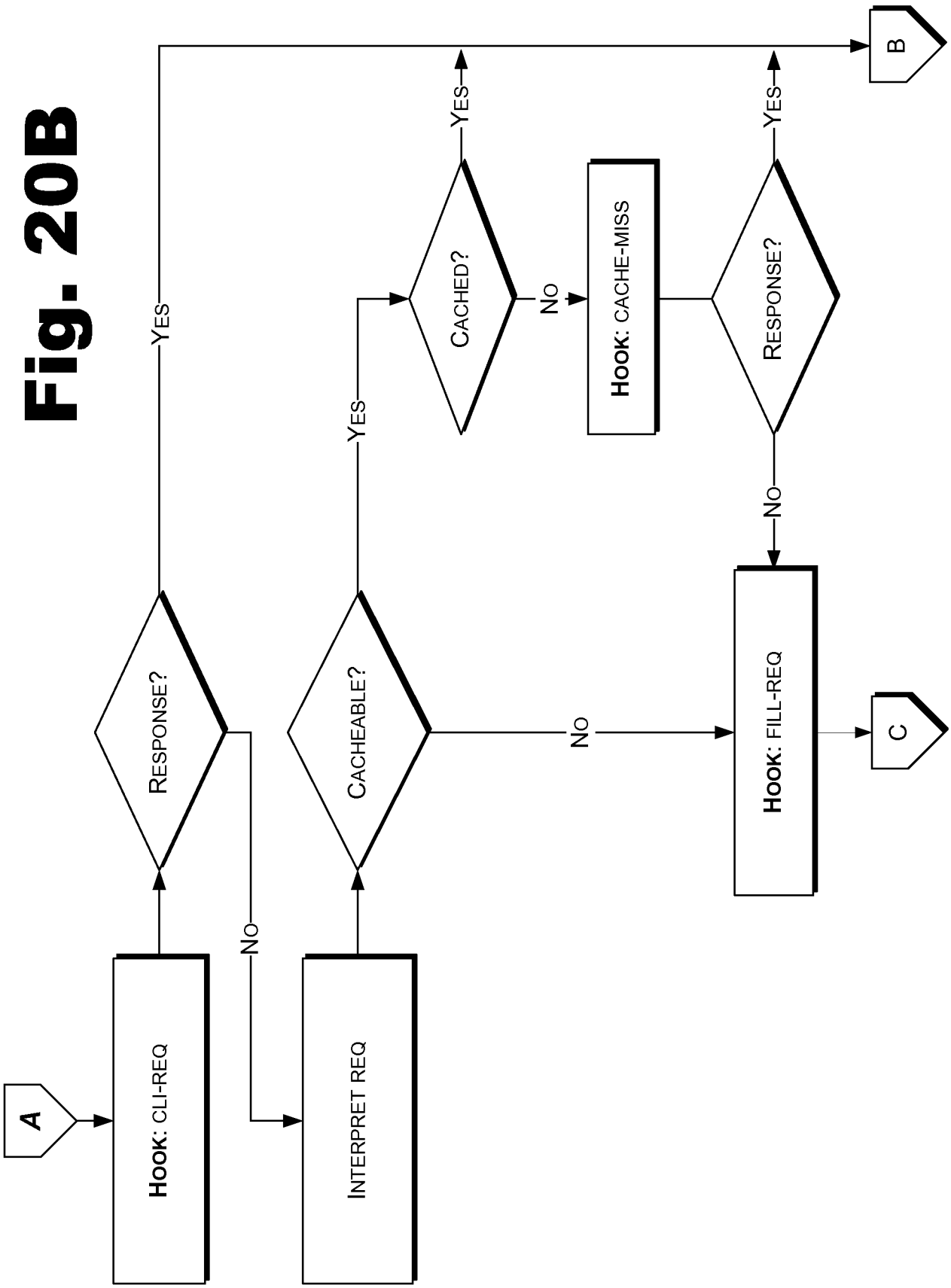

PERFORM RAW PARSE 2002
GCO VALID? 2004
NO
VALIDATE OR FETCH GCO 2006
YES
FIND PROTOCOL, HOST, PATH IN GCO 2008
VALID CUSTOMER?
NO
HOOK: GCO-EXCEPTION
YES
RESPONSE?
YES
DONE
NO
VALID SEQUENCES?
CCS VALID?
NO
VALIDATE OR FETCH CSS
YES
RUN CCS
A

Fig. 20B


A
HOOK: CLI-REQ
INTERPRET REQ
RESPONSE?
CACHEABLE?
CACHED?
HOOK: CACHE-MISS
RESPONSE?
HOOK: FILL-REQ
B
C
YES
NO
YES
NO
YES
NO

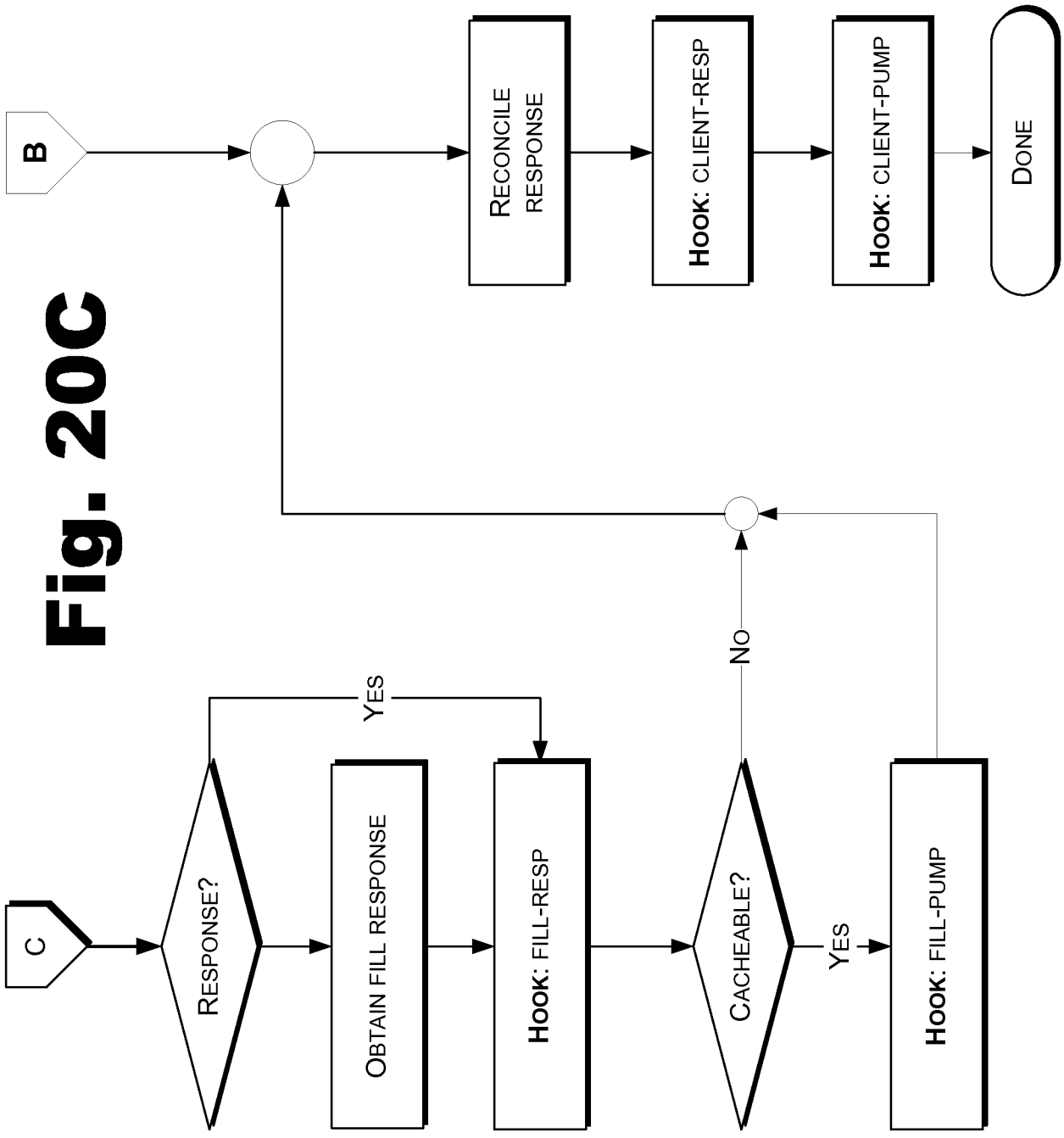
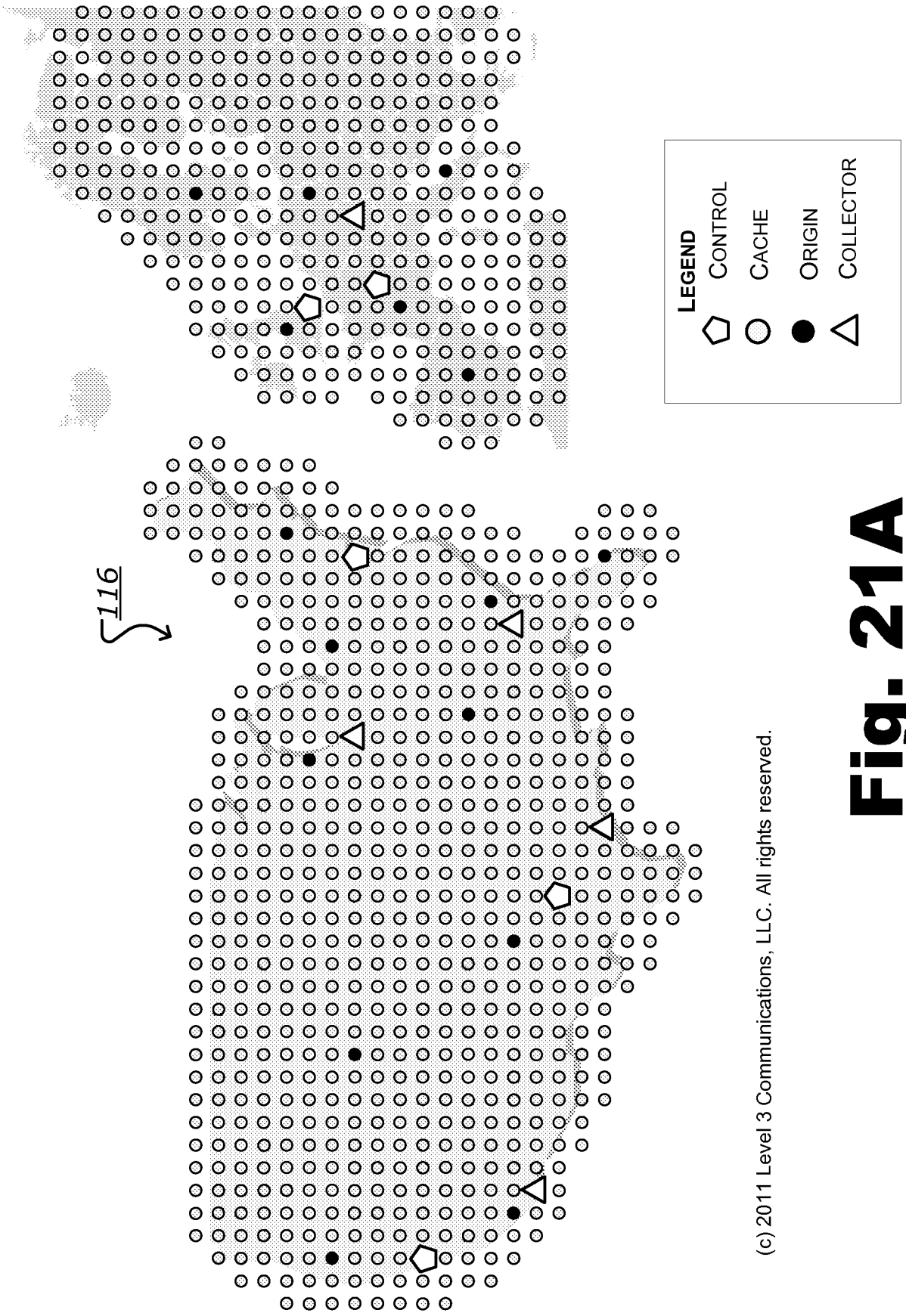

B
RECONCILE RESPONSE
HOOK: CLIENT-RESP
HOOK: CLIENT-PUMP
DONE
C
RESPONSE?
YES
OBTAIN FILL RESPONSE
HOOK: FILL-RESP
CACHEABLE?
NO
YES
HOOK: FILL-PUMP

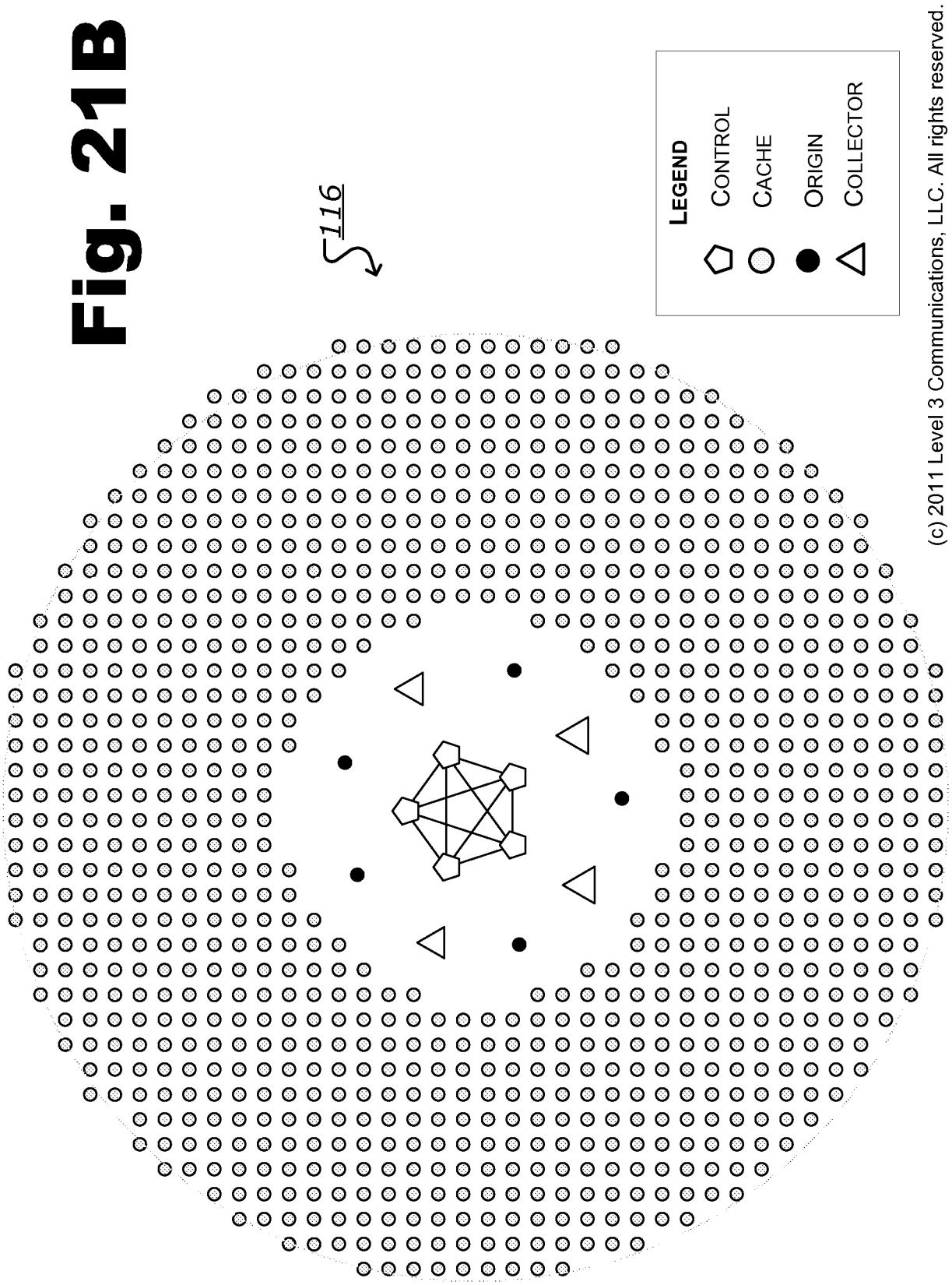
Fig. 20C



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Fig. 21A

Fig. 21B



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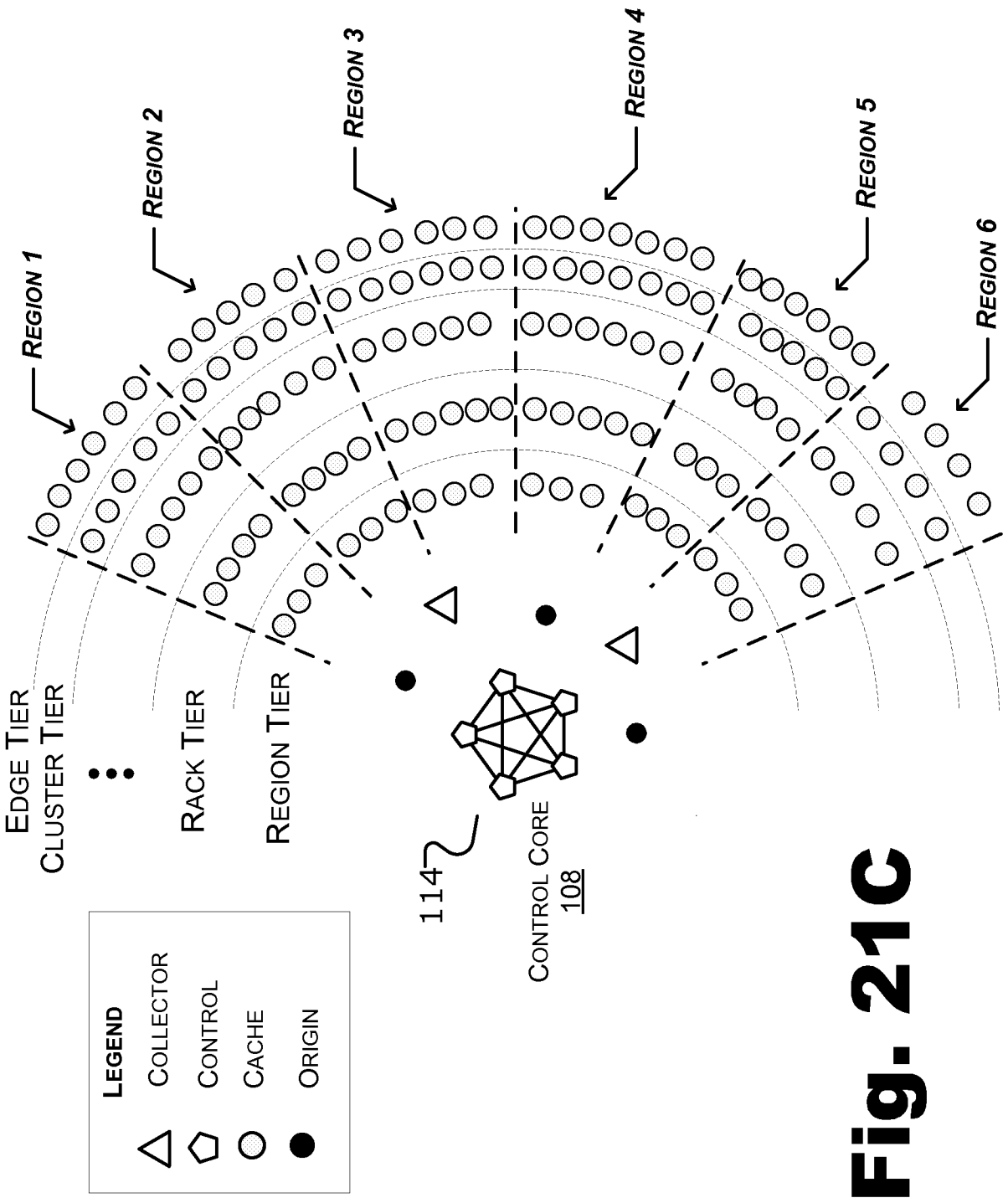
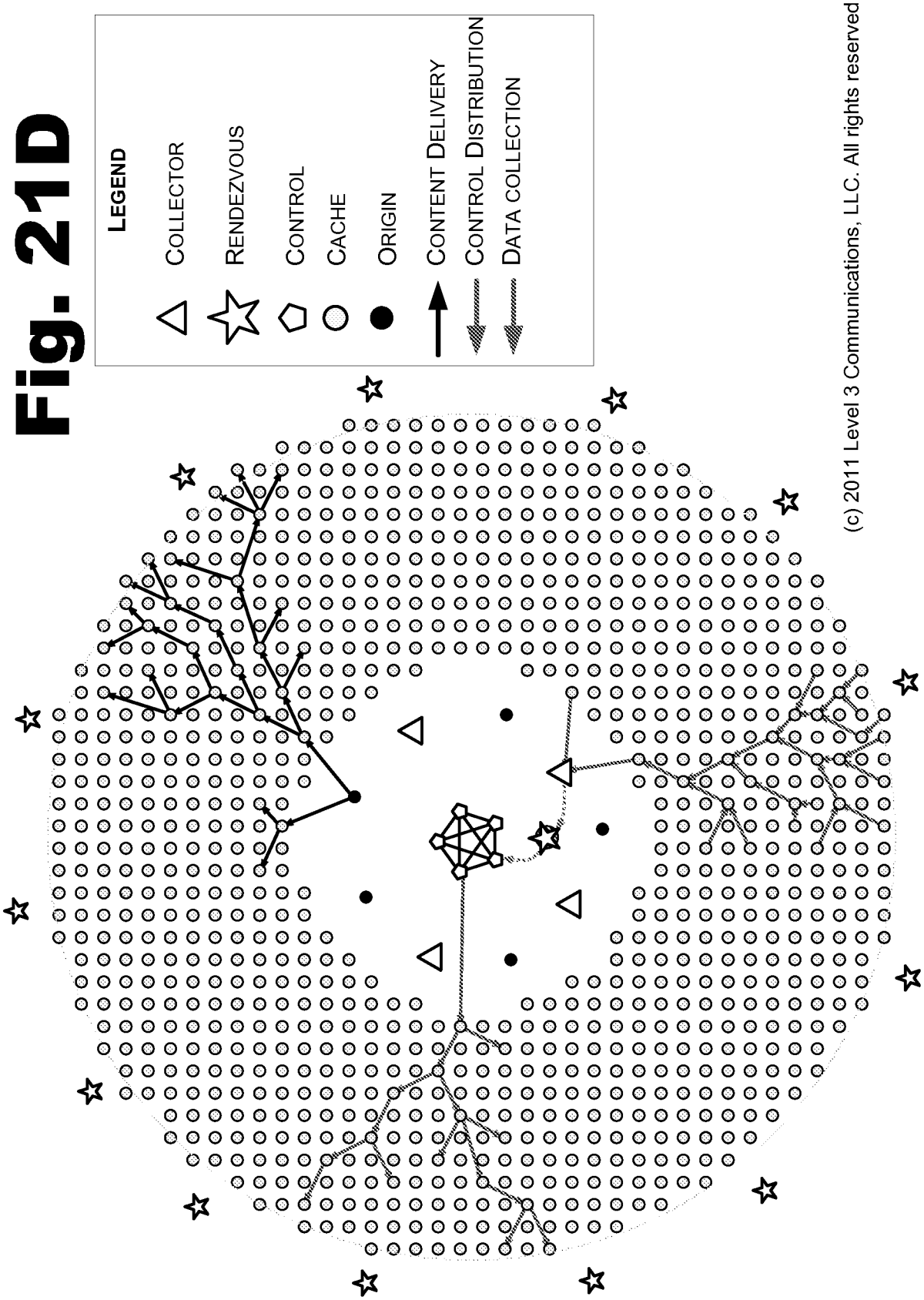


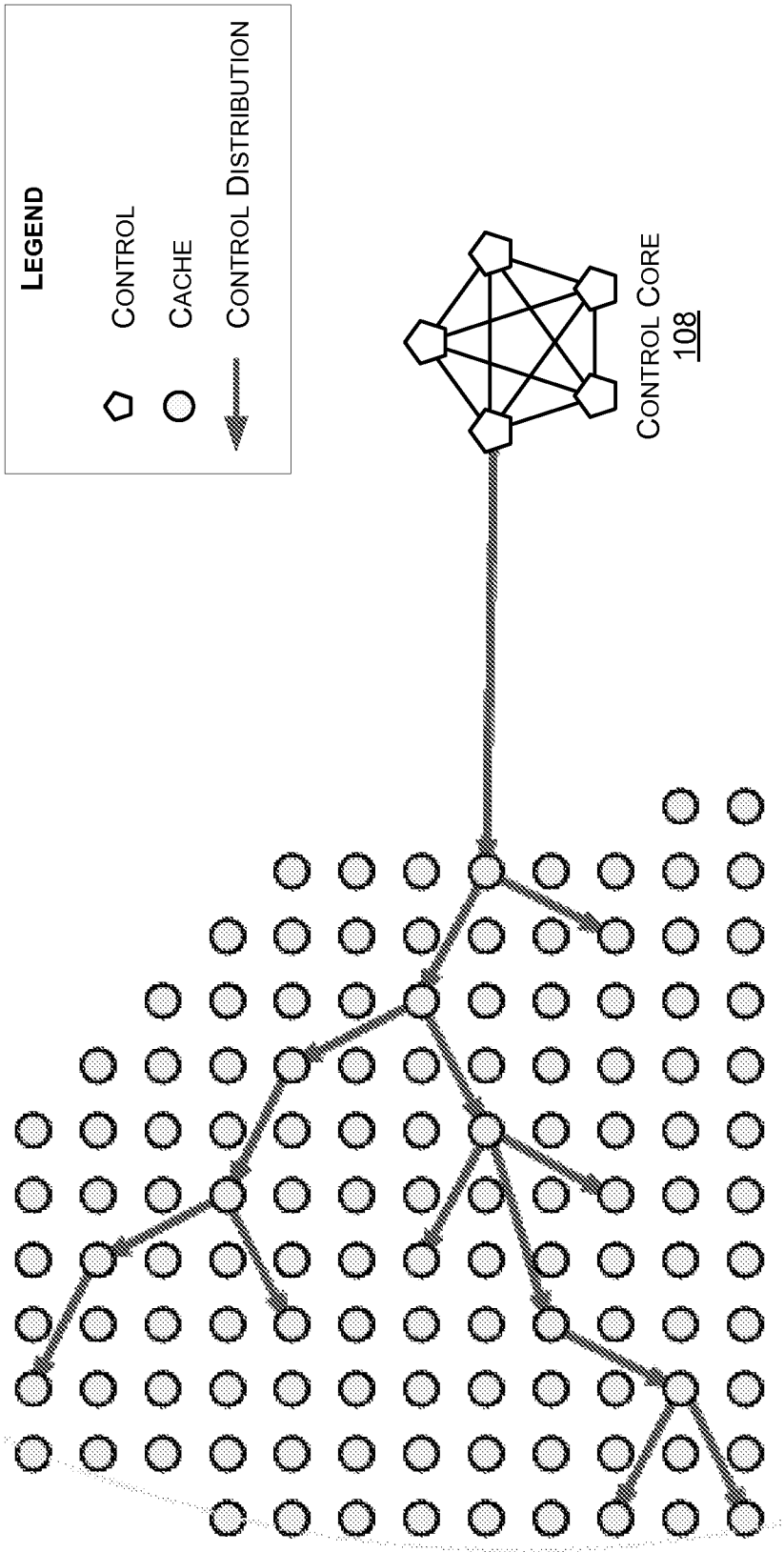
Fig. 21C

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Fig. 21D

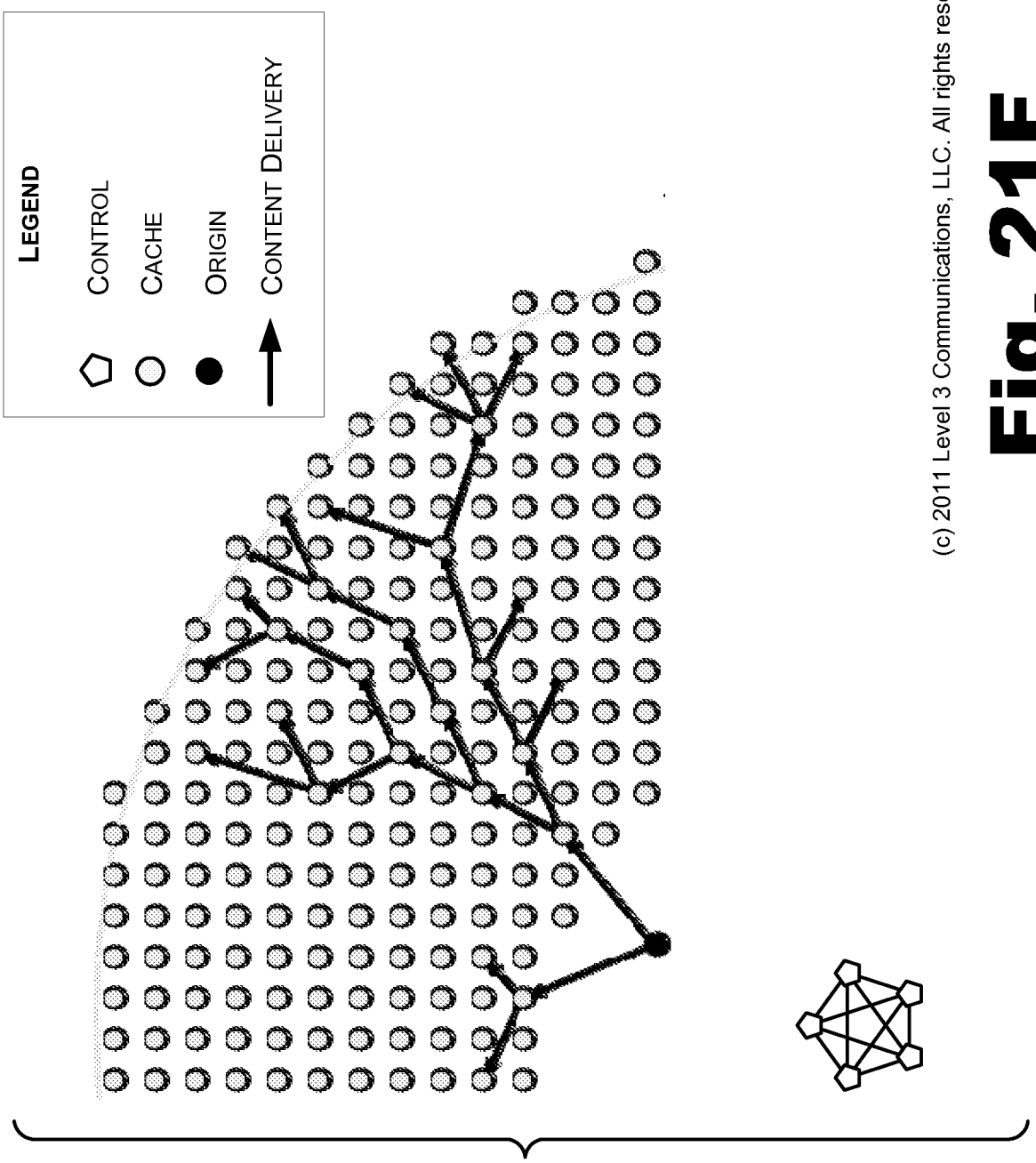


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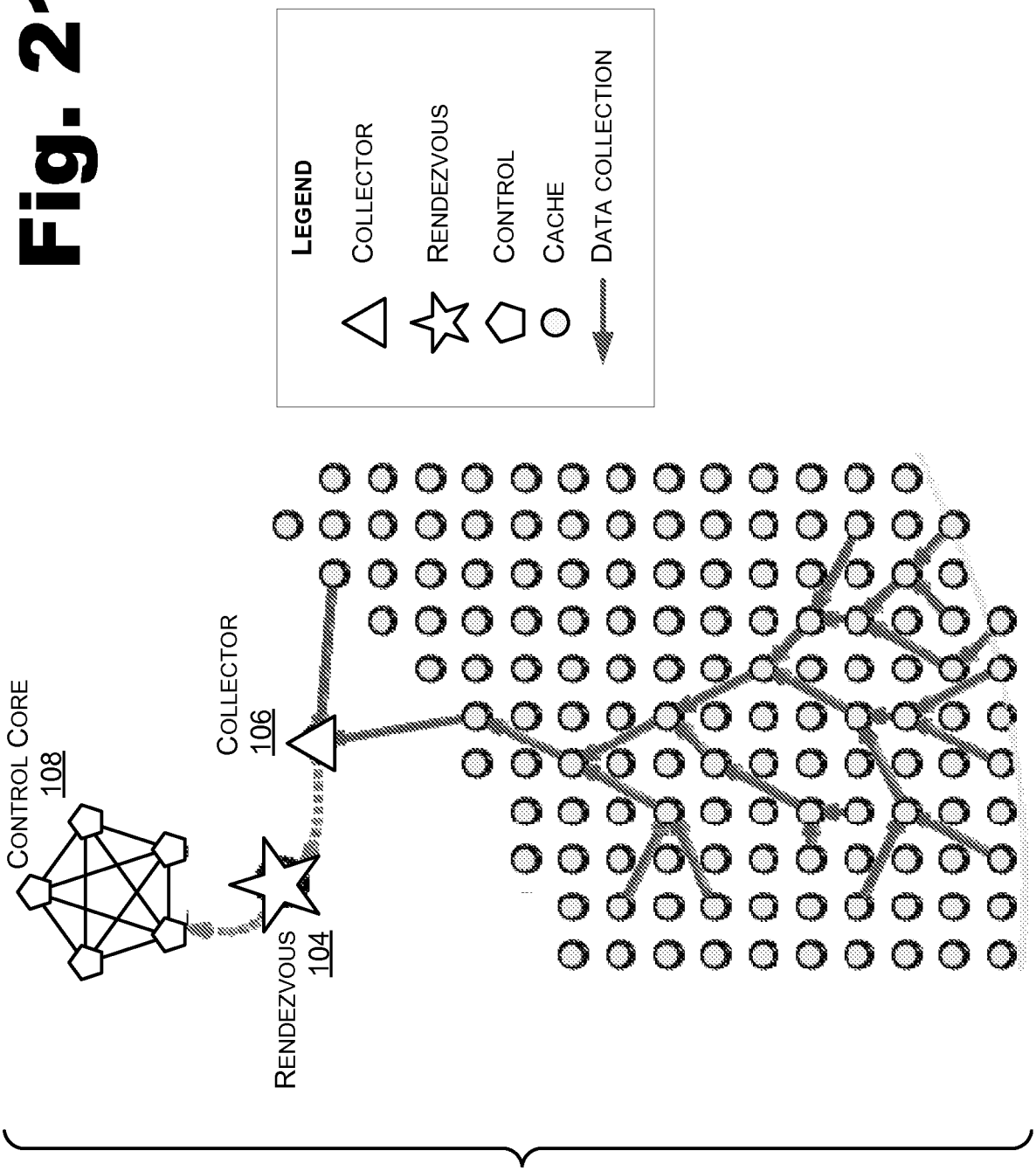
Fig. 21E



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Fig. 21F

Fig. 21G



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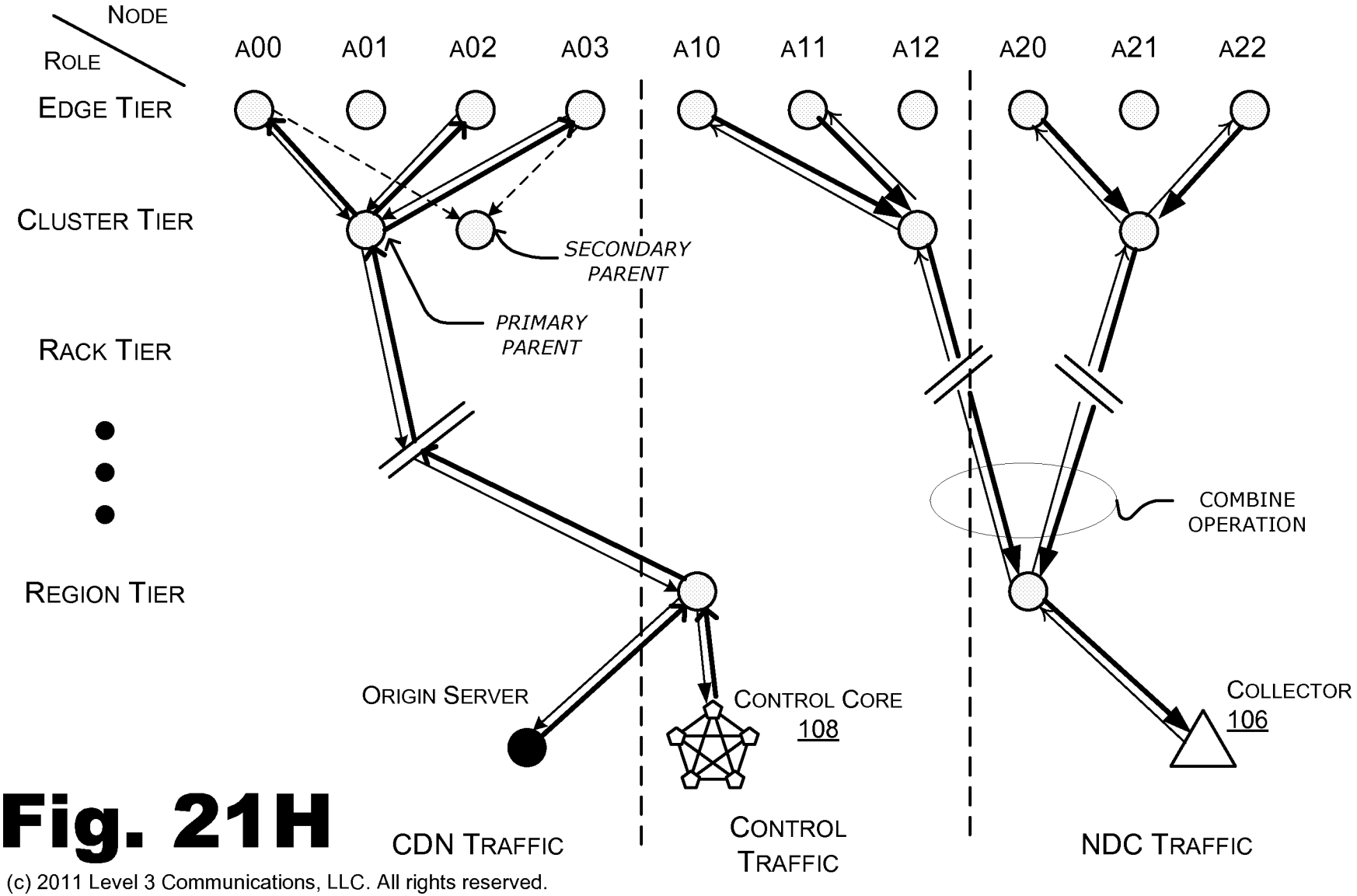
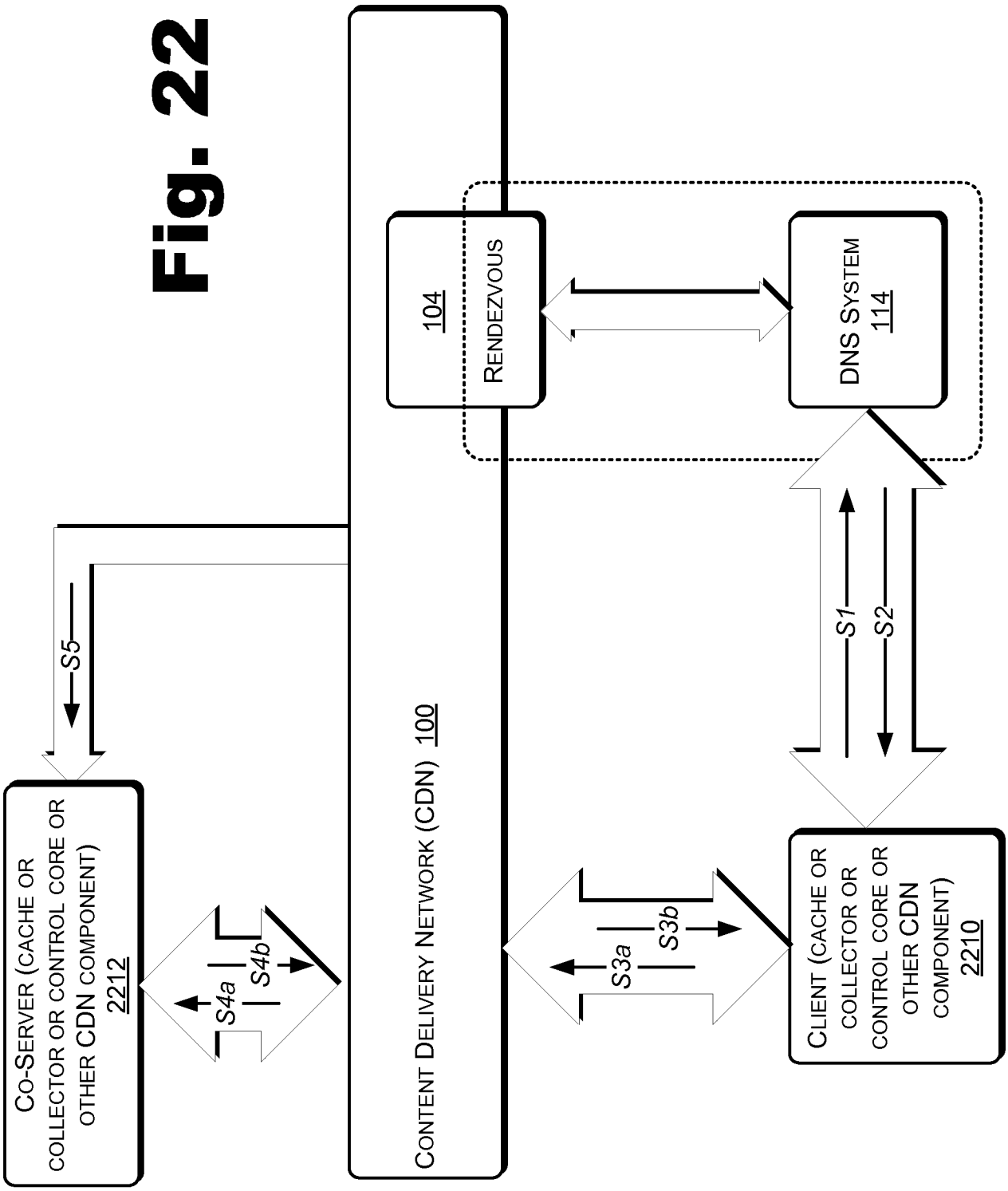


Fig. 21H

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Fig. 22


CONTENT DELIVERY NETWORK (CDN) 100
104
RENDEZVOUS
DNS SYSTEM
114
CO-SERVER (CACHE OR COLLECTOR OR CONTROL CORE OR OTHER CDN COMPONENT)
2212
CLIENT (CACHE OR COLLECTOR OR CONTROL CORE OR OTHER CDN COMPONENT)
2210
S1
S2
S3a
S3b
S4a
S4b
S5

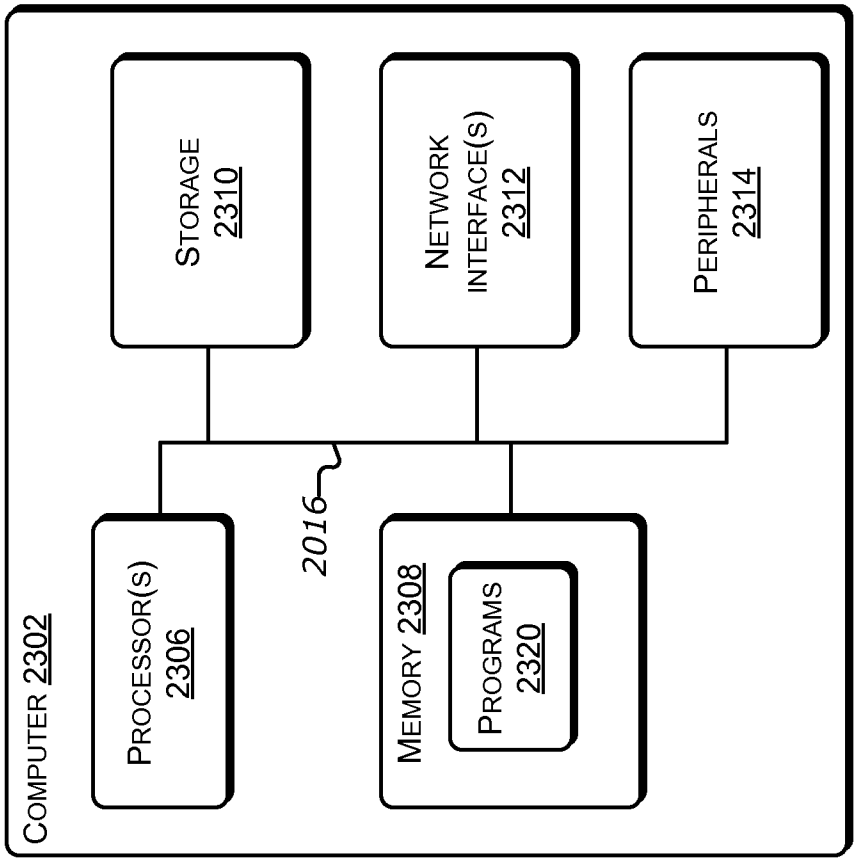

COMPUTER 2302
PROCESSOR(S) 2306
2016
MEMORY 2308
PROGRAMS 2320
STORAGE 2310
NETWORK INTERFACE(S) 2312
PERIPHERALS 2314

Fig. 23

Fig. 24A

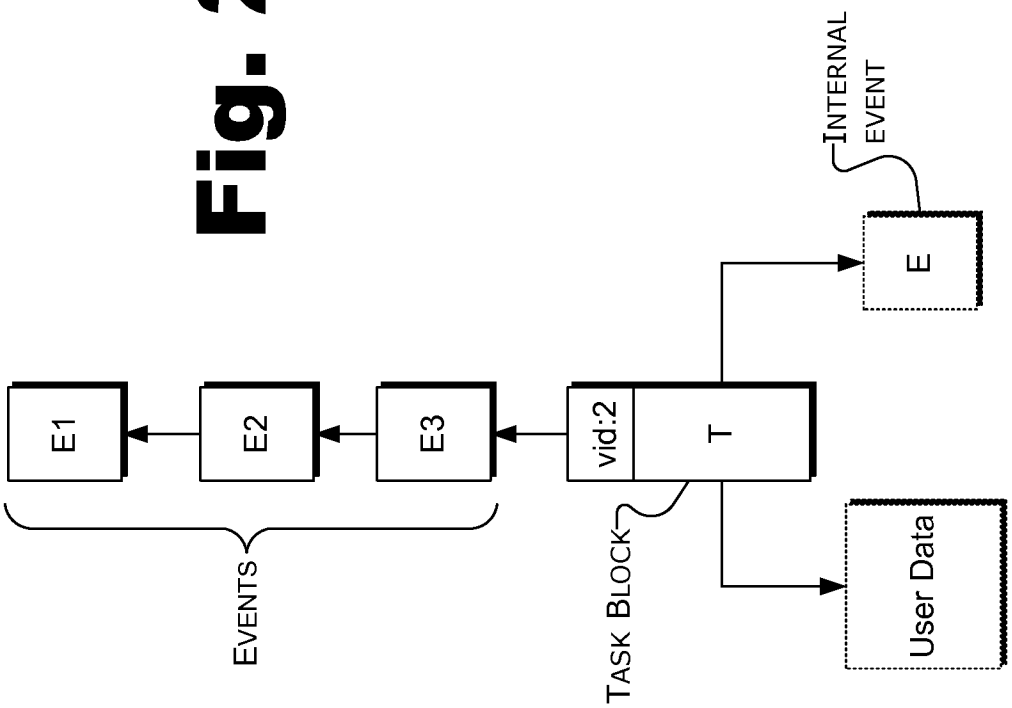
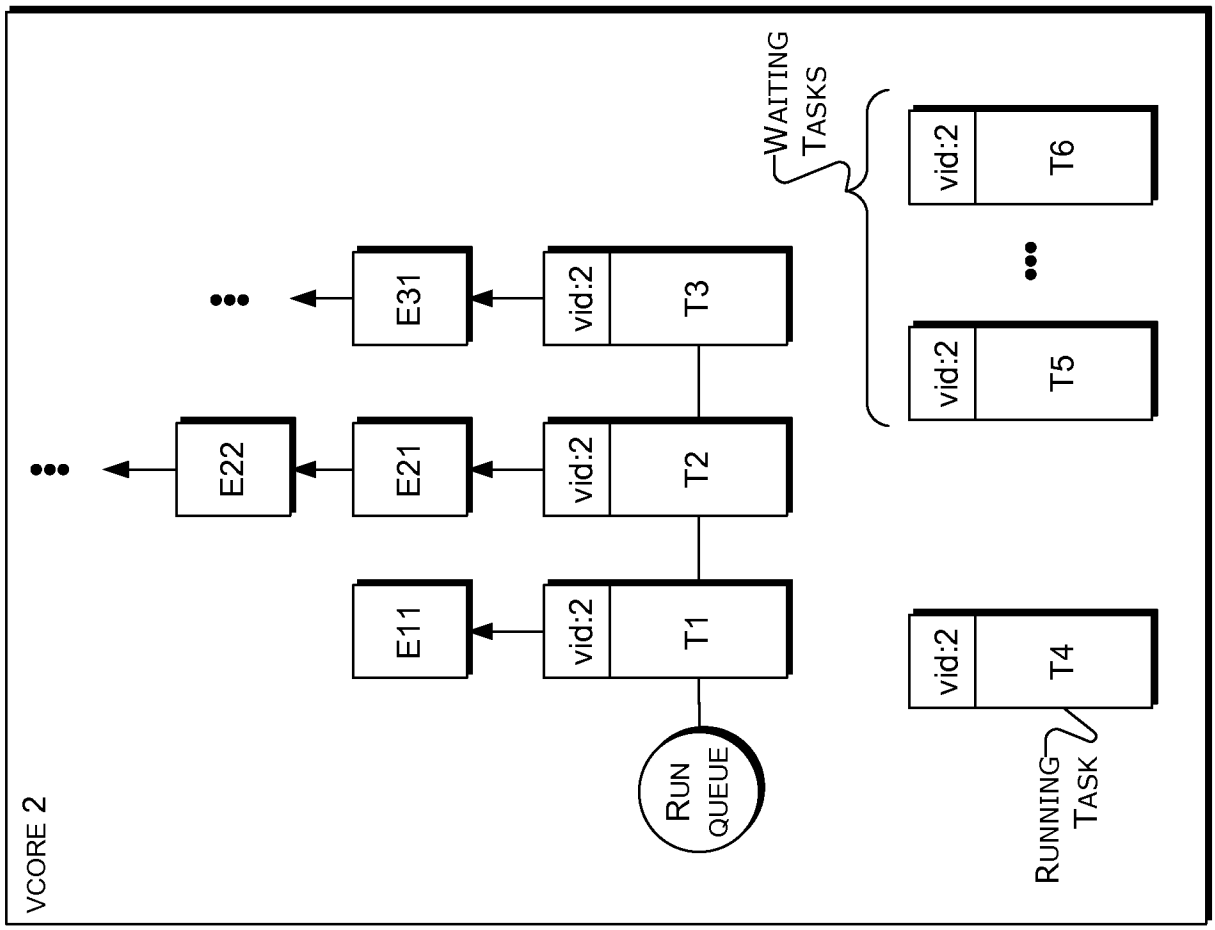


Fig. 24B


VCORE 2
RUN QUEUE
vid:2
T1
E11
vid:2
T2
E21
E22
vid:2
T3
E31
WAITING TASKS
vid:2
T4
RUNNING TASK
vid:2
T5
vid:2
T6

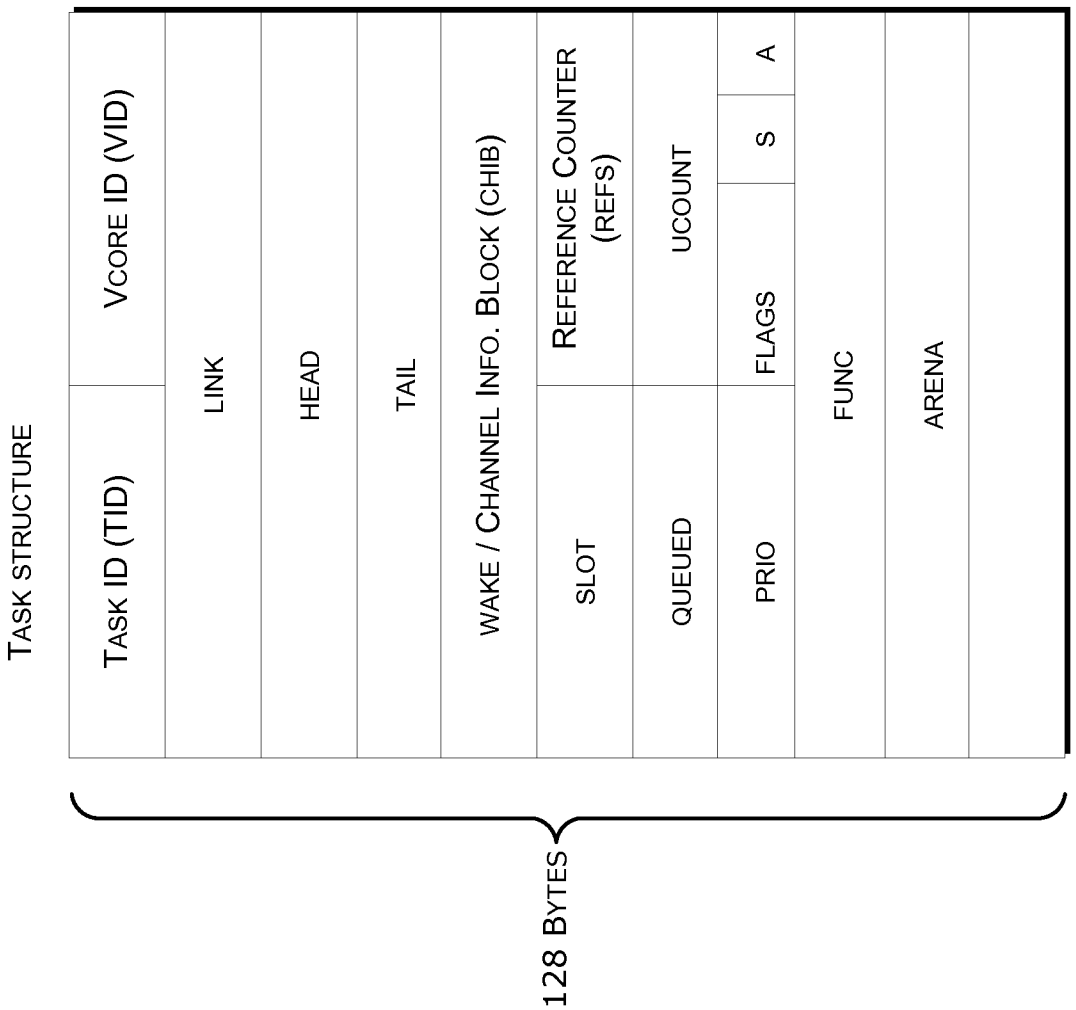
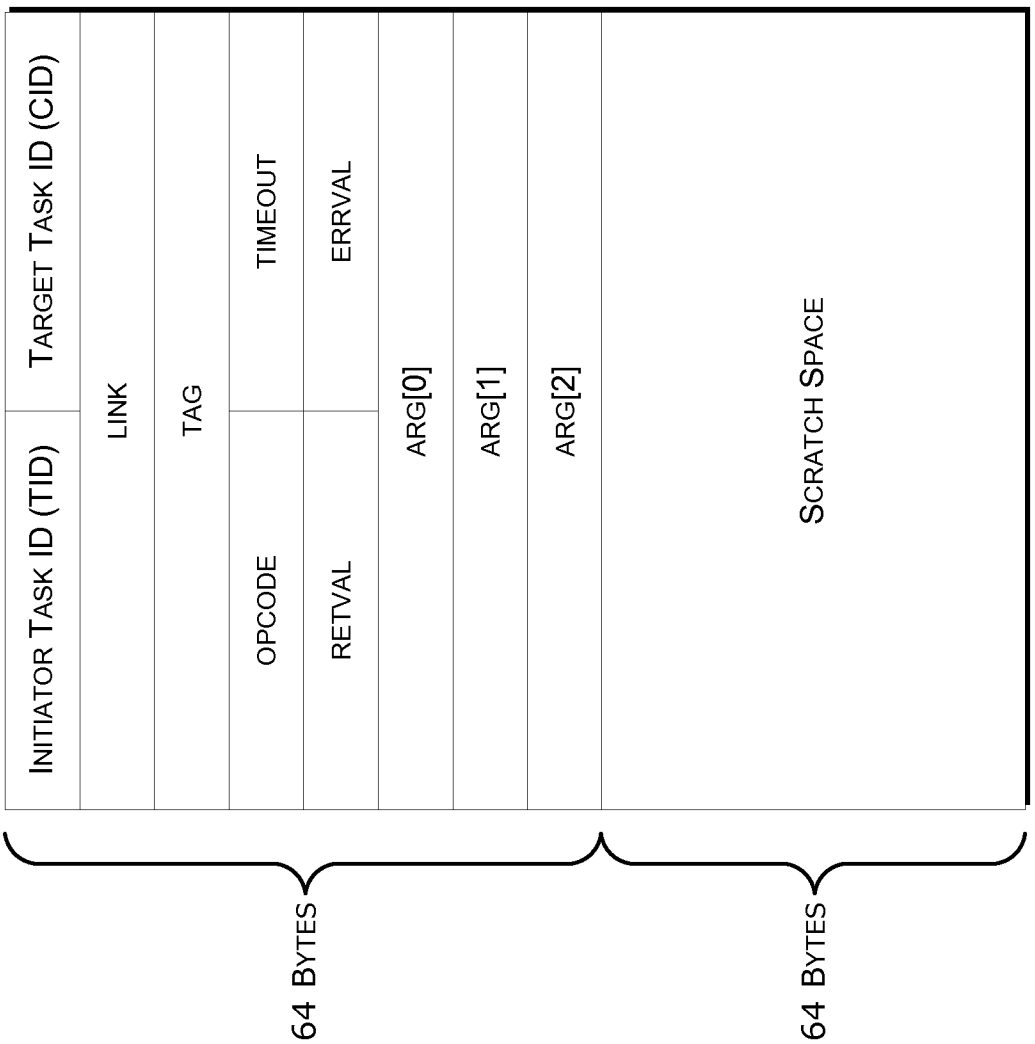

TASK STRUCTURE
TASK ID (TID)
VCORE ID (VID)
LINK
HEAD
TAIL
WAKE / CHANNEL INFO. BLOCK (CHIB)
SLOT
REFERENCE COUNTER (REFS)
QUEUED
UCOUNT
PRIO
FLAGS
S
A
FUNC
ARENA
128 BYTES

Fig. 24C

Fig. 24D


TASK ID (TID)
CHANNEL ID (CID)
LINK
SCRATCH SPACE
EVENT STRUCTURE (BETWEEN USER TASKS)
64 BYTES
64 BYTES



EVENT STRUCTURE (ASSUMED BY CHANNELS)

Fig. 24E

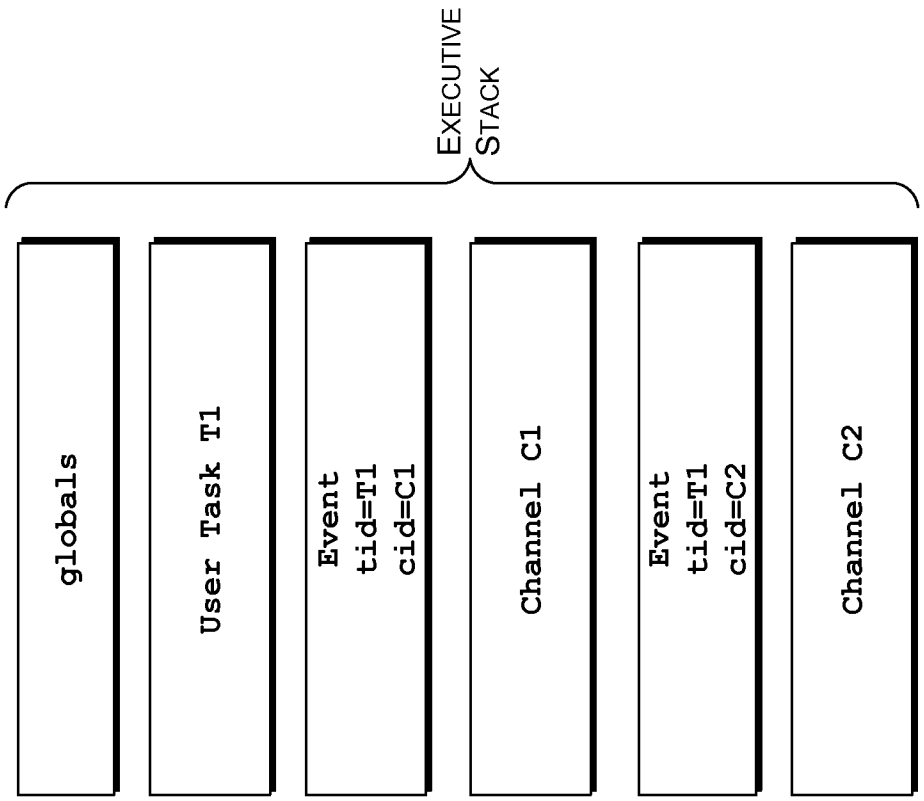


Fig. 25B

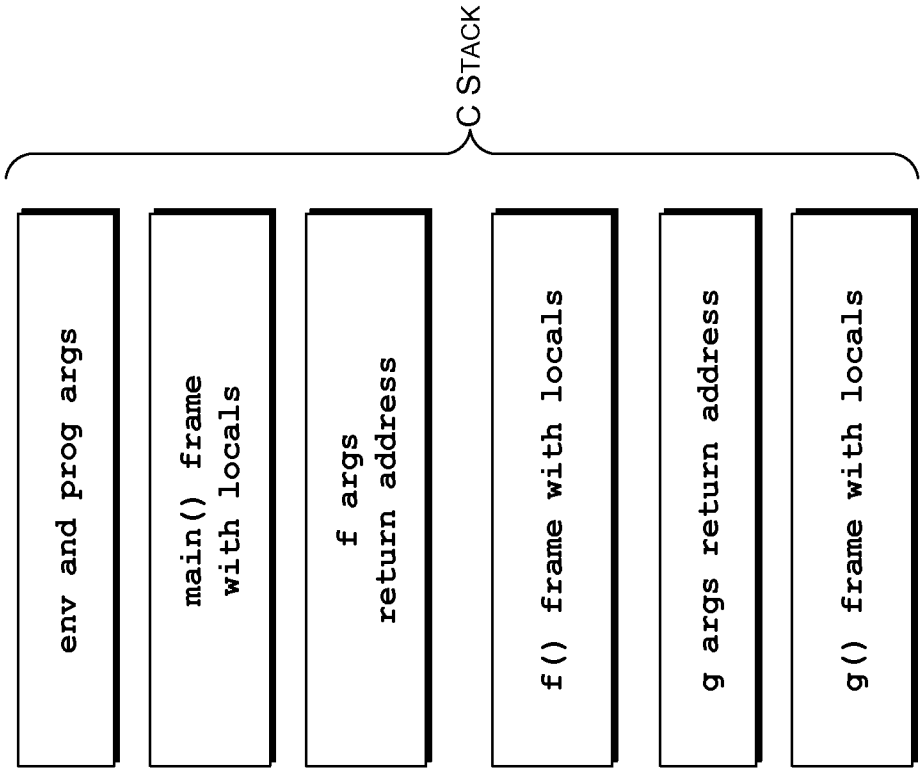


Fig. 25A

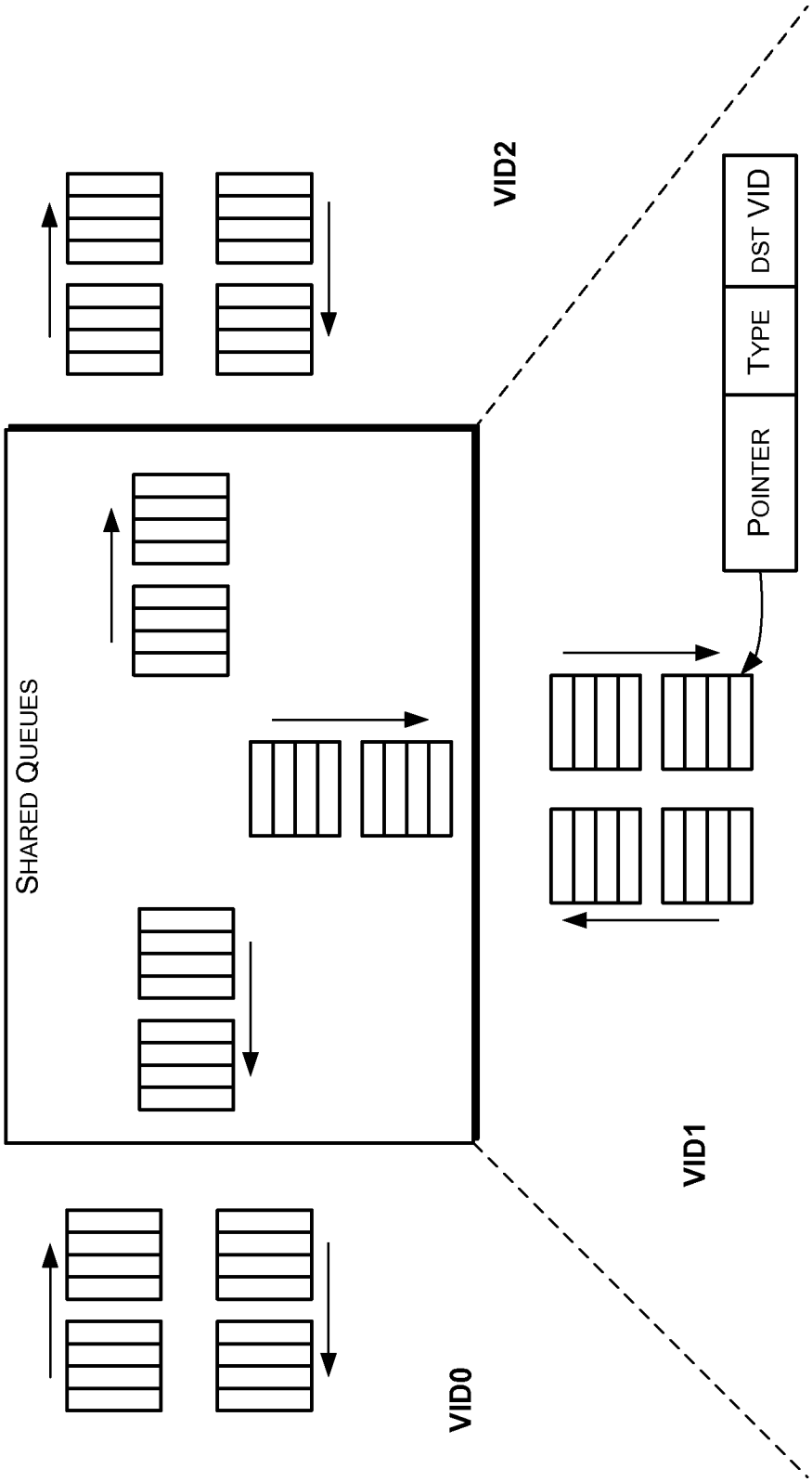


Fig. 26

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0394-US-U01
	Application Number	
Title of Invention	CONTENT DELIVERY NETWORK	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Christopher		Newton	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Westlake Village	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	981 Via Colinas		
Address 2			
City	Westlake Village	State/Province	CA
Postal Code	91362	Country i	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Laurence	R.	Lipstone	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Calabasas	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	22724 Sparrow Dell Drive		
Address 2			
City	Calabasas	State/Province	CA
Postal Code	91302	Country i	US

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	William		Crowder	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0394-US-U01
	Application Number	
Title of Invention	CONTENT DELIVERY NETWORK	

City	Camarillo	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	68 Marine View Drive		
Address 2			
City	Camarillo	State/Province	CA
Postal Code	93010	Country i	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Jeffrey	G.	Koller	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Oxnard	State/Province	CA	Country of Residence i	US

Mailing Address of Inventor:

Address 1	3549 Glen Abbey Lane		
Address 2			
City	Oxnard	State/Province	CA
Postal Code	93036	Country i	US

Inventor 5 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	David		Fullagar	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Boulder	State/Province	CO	Country of Residence i	US

Mailing Address of Inventor:

Address 1	755 Cherryvale Road		
Address 2			
City	Boulder	State/Province	CO
Postal Code	80303	Country i	US

Inventor 6 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Maksim		Yevmenkin	

Residence Information (Select One) (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Thousand Oaks	State/Province	CA	Country of Residence i	US

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0394-US-U01
	Application Number	
Title of Invention	CONTENT DELIVERY NETWORK	

Mailing Address of Inventor:

Address 1	427 Sundance Street		
Address 2			
City	Thousand Oaks	**State/Province**	CA
Postal Code	91360	**Country**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	83579		
Email Address	bs@dbjg.com	Add Email	Remove Email

Application Information:

Title of the Invention	CONTENT DELIVERY NETWORK		
Attorney Docket Number	0394-US-U01	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	43	**Suggested Figure for Publication (if any)**	21D

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0394-US-U01
	Application Number	
Title of Invention	CONTENT DELIVERY NETWORK	

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	83579		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61570448	2011-12-14
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61570486	2011-12-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Priority Claimed
			◉ Yes ○ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0394-US-U01
	Application Number	
Title of Invention	CONTENT DELIVERY NETWORK	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Remove

◉	Assignee	○	Legal Representative under 35 U.S.C. 117
○	Person to whom the inventor is obligated to assign.	○	Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :	

If the Assignee is an Organization check here. ☒

Organization Name	Level 3 Communications, LLC

Mailing Address Information:

Address 1	1025 Eldorado Boulevard		
Address 2			
City	Broomfield	**State/Province**	CO
Country [i]	US	Postal Code	80021
Phone Number		Fax Number	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	0394-US-U01
	Application Number	
Title of Invention	CONTENT DELIVERY NETWORK	

Email Address	

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Brian Siritzky/			Date (YYYY-MM-DD)	2012-12-14
First Name	Brian	Last Name	Siritzky	Registration Number	37497

Additional Signature may be generated within this form by selecting the Add button. Add

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	Brian Siritzky
Attorney Docket Number:	0394-US-U01

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	390	390
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Claims in excess of 20	1202	30	62	1860
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**3120**

Electronic Acknowledgement Receipt

EFS ID:	14467414
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	Brian Siritzky
Filer Authorized By:	
Attorney Docket Number:	0394-US-U01
Receipt Date:	14-DEC-2012
Filing Date:	
Time Stamp:	01:04:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$3120
RAM confirmation Number	8047
Deposit Account	501860
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0394_US_U01-PA-Application_12-14-2012.pdf	614678 622d4a36e0fc4f6874fca1e13122d8eada8e29b2	yes	100

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	89
Claims	90	99
Abstract	100	100

Warnings:					
Information:					
2	Drawings-only black and white line drawings	0394-US-U01-PA-Drawings_12-14-2012.pdf	521409 bc3e9584411f6b4a6369f19418d41278b90a4a3b	no	43
Warnings:					
Information:					
3	Application Data Sheet	0394-US-U01-PA-ADS-12-14-12.pdf	870937 3653542be5bde68f5318033c0a585d87f6067af1	no	7
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	36464 994f09be3a94e9499fdadba0570a145a32d272a8	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2043488		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

SCORE Placeholder Sheet for IFW Content

Application Number: 13714410 Document Date: 12/14/2012

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions developed by SIRA.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (http://es/ScoreAccessWeb/).
- External customers may access SCORE content via the Public and Private PAIR interfaces.

Form Revision Date: February 8, 2006

Electronic Acknowledgement Receipt

EFS ID:	14467414
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
01/14/2013 SSOK11 00000020 501860 13714410 01 FC:1051 130.00 DA **Title of Invention:**	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	Brian Siritzky
Filer Authorized By:	
Attorney Docket Number:	0394-US-U01
Receipt Date:	14-DEC-2012
Filing Date:	
Time Stamp:	01:04:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$3120
RAM confirmation Number	8047
Deposit Account	501860
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees) Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)	

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/714,410

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	390
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	50 minus 20 =	* 30			OR	x 62 =	1860
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	3120

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/714,410	12/14/2012	Christopher Newton	0394-US-U01

CONFIRMATION NO. 9250

83579
LEVEL 3 COMMUNICATIONS, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

NOTICE



Date Mailed: 01/22/2013

INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  All
  Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/714,410	12/14/2012	2447	3250	0394-US-U01	50	2

CONFIRMATION NO. 9250

83579
LEVEL 3 COMMUNICATIONS, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

FILING RECEIPT

OC00000058657479

Date Mailed: 01/22/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Christopher Newton, Westlake Village, CA;
Laurence R. Lipstone, Calabasas, CA;
William Crowder, Camarillo, CA;
Jeffrey G. Koller, Oxnard, CA;
David Fullagar, Boulder, CO;
Maksim Yevmenkin, Thousand Oaks, CA;

Applicant(s)

Level 3 Communications, LLC, Broomfield, CO

Assignment For Published Patent Application

Level 3 Communications, LLC, Broomfield, CO

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/570,448 12/14/2011
and claims benefit of 61/570,486 12/14/2011

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 01/14/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/714,410**

Projected Publication Date: 06/20/2013

Non-Publication Request: No

Early Publication Request: No

Title

CONTENT DELIVERY NETWORK

Preliminary Class

709

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Not Yet Assigned

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020010798	Jan 24, 2002	Ben-Shaul, Israel et al.	
		20020174168	Nov 21, 2002	Beukema, Bruce L., et al.	
		20020184357	Dec 5, 2002	Traversat, Bernard A., et al.	
		20030140111	Jul 24, 2003	Pace, Charles P., et al.	
		20040162871	Aug 19, 2004	Pabla, Kuldipsingh A., et al.	
		20050010653	Jan 13, 2005	McCanne, Steve	
		20060112176	May 25, 2006	Liu, Zaide E., et al.	
		20100257258	Oct 7, 2010	Liu, Zaide et al.	
		20110099290	Apr 28, 2011	Swildens, Eric S., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		International Search Report, dated February 20, 2013, Int'l Appl. No. PCT/US12/069712, Int'l Filing Date December 14, 2012, Dkt. No. 0394-WO-01, 4 pgs.	
		Written Opinion, dated February 20, 2013, Int'l Appl. No. PCT/US12/069712, Int'l Filing Date December 14, 2012, Dkt. No. 0394-WO-01, 6 pgs.	
		KOSTADINOVA, R. , "Peer-to-Peer Video Streaming", [online; retrieved on 25 Jan 2013]; Retrieved from the Internet <URL: http://www.ee.kth.se/php/modules/publications/reports/2008/XR-EE-LCN_2008_004.pdf>, especially section 5.4.1 2008 , 1-53	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
GREGORY DURBIN
700 WEST 47TH STREET SUITE 1000
KANSAS CITY, MO 64112

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	20 FEB 2013
Applicant's or agent's file reference 0394-WO-01	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 12/69712	International filing date *(day/month/year)* 14 December 2012 (14.12.2012)
Applicant LEVEL 3 COMMUNICATIONS, LLC	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide,* International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer Lee W. Young PCT Helpdesk: 571-272-4300 Telephone No. PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0394-WO-01	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 12/69712	International filing date *(day/month/year)* 14 December 2012 (14.12.2012)	(Earliest) Priority Date *(day/month/year)* 14 December 2011 (14.12.2011)
Applicant LEVEL 3 COMMUNICATIONS, LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 21D

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 12/69712

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06F 15/167 (2013.01)
USPC - 709/214
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8): G06F 15/167 (2013.01)
USPC: 709/214

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8): G06F 15/167 (2013.01); USPC: 709/213, 214, 218, 249 (keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase; Google Scholar; Google Patents; FreePatentsOnline. Search terms used: content-deliver CDN distribute-resources distribute-content, core control-core central-server central-host server host, cache-server edge-server edge-cache join-CDN join-network join-distribute join-deliver cache-join-network cache-join-distribute cache-join-deliver etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/0010653 A1 (MCCANNE) 13 January 2005 (13.01.2005) entire document, especially Abstract; para [0022], [0026], [0029], [0085], [0087], [0088], [0098], [0104], [0105], [0179], [0182], [0183], [0193], [0195], [0197], [0224]	1 - 50
Y	US 2011/0099290 A1 (SWILDENS et al.) 28 April 2011 (28.04.2011) entire document, especially Abstract; Fig. 9; para [0011], [0048], [0091], [0115]-[0119], [0307], [0320], [0347], [0357], [0383], [0458]-[0469]	1 - 50
Y	US 2006/0112176 A1 (LIU et al.) 25 May 2006 (25.05.2006) entire document, especially Abstract; para [0022], [0079]	10, 36
Y	US 2002/0174168 A1 (BEUKEMA et al.) 21 November 2002 (21.11.2002) entire document, especially Abstract; para [0011], [0022]	17, 43
A	US 2010/0257258 A1 (LIU et al.) 07 October 2010 (07.10.2010) entire document	1 - 50
A	US 2004/0162871 A1 (PABLA et al.) 19 August 2004 (19.08.2004) entire document	1 - 50
A	US 2003/0140111 A1 (PACE et al.) 24 July 2003 (24.07.2003) entire document	1 - 50
A	US 2002/0184357 A1 (TRAVERSAT et al.) 05 December 2002 (05.12.2002) entire document	1 - 50
A	US 2002/0010798 A1 (BEN-SHAUL et al.) 24 January 2002 (24.01.2002), entire document	1 - 50

☒ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 January 2013 (27.01.2013)	20 FEB 2013
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 12/69712

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KOSTADINOVA. "Peer-to-Peer Video Streaming" [online]. Dated 2008. [retrieved on 25 January 2013 (25.01.2013)] Retrieved from the Internet <URL: http://www.ee.kth.se/php/modules/publications/reports/2008/XR-EE-LCN_2008_004.pdf>, especially section 5.4.1	1 - 50

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: GREGORY DURBIN
700 WEST 47TH STREET SUITE 1000
KANSAS CITY, MO 64112

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	20 FEB 2013
Applicant's or agent's file reference 0394-WO-01	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 12/69712	14 December 2012 (14.12.2012)	14 December 2011 (14.12.2011)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06F 15/167 (2013.01)
USPC - 709/214

Applicant LEVEL 3 COMMUNICATIONS, LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	27 January 2013 (27.01.2013)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 12/69712

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 12/69712

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1 - 50	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1 - 50	NO
Industrial applicability (IA)	Claims	1 - 50	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-9, 11-16, 18-35, 37-42 and 44-50 lack an inventive step under PCT Article 33(3) as being obvious over US 2005/0010653 A1 (McCanne) in view of US 2011/0099290 A1 to Swildens et al. (hereinafter, 'Swildens').

As to claim 1, McCanne teaches a content delivery network (CDN) comprising: (a) a control core (para [0104]); and (b) a plurality of cache servers, each particular cache server of said plurality of cache servers (para [0087]) being constructed and adapted to: (b)(1) upon joining the CDN, (b)(1)(1) obtain global configuration data from the control core (para [0022] - globally consistent multicast routing tree; para [0179] - redirectors join an application level multicast group);

but fails to explicitly disclose (b)(2) having joined the CDN, (b)(2)(1) obtain updated global configuration data, if needed; and (b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN; (b)(2)(3) serve a particular resource associated with a particular customer of the CDN in accordance with (i) the global configuration data, and (ii) customer configuration information obtained in (b)(2)(2) and associated with the particular customer.

However, Swildens does teach (b)(2) having joined the CDN, (b)(2)(1) obtain updated global configuration data, if needed (para [0347]); and (b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN (para [0115]); (b)(2)(3) serve a particular resource associated with a particular customer of the CDN in accordance with (i) the global configuration data, and (ii) customer configuration information obtained in (b)(2)(2) and associated with the particular customer (para [0048], [0119]).

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to combine the content distribution system for operation over an internetwork including content peering arrangements of McCanne with the method for determining metrics of a content delivery and global traffic management network of Swildens, because McCanne and Swildens are directed to systems and methods for content delivery networks. Furthermore, users and designers benefit from systems and/or methods adapted for enabling every server in the network that needs configuration information to have a copy of the appropriate current Speedera configuration file, because such systems/methods can be used for determining metrics of a content delivery and global traffic management network (Swildens, para [0011]).

As to claim 27, McCanne teaches a computer-implemented method, operable in a content delivery network (CDN) comprising: (a) a control core (para [0104]); and (b) a plurality of cache servers, the method comprising, by hardware and software on a particular cache server of said plurality of cache servers: (A) obtaining global configuration data from the control core (para [0022]);

but fails to explicitly disclose (B) selectively obtaining updated global configuration data; and (C) obtaining customer configuration information associated with a particular customer of the CDN; (D) serving a particular resource associated with the particular customer in accordance with (i) the global configuration data; and (ii) the customer configuration information associated with the particular customer.

However, Swildens does teach (B) selectively obtaining updated global configuration data (para [0347]); and (C) obtaining customer configuration information associated with a particular customer of the CDN (para [0115]); (D) serving a particular resource associated with the particular customer in accordance with (i) the global configuration data (para [0048]); and (ii) the customer configuration information associated with the particular customer (para [0119]).

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to combine the content distribution system for operation over an internetwork including content peering arrangements of McCanne with the method for determining metrics of a content delivery and global traffic management network of Swildens, because McCanne and Swildens are directed to systems and methods for content delivery networks. Furthermore, users and designers benefit from systems and/or methods adapted for enabling every server in the network that needs configuration information to have a copy of the appropriate current Speedera configuration file, because such systems/methods can be used for determining metrics of a content delivery and global traffic management network (Swildens, para [0011]).

As to claims 2 and 28, in combination with Swildens, McCanne further discloses wherein each particular cache server of said plurality of cache servers is constructed and adapted to, upon joining the CDN, (b)(1)(2) {(A)(2)} obtain data from one or more other locations in the CDN (para [0026], [0088]).

As to claims 3 and 29, in combination with Swildens, McCanne further discloses wherein processing by a cache server in (b)(2)(2) {(C)} to obtain customer configuration information associated with a specific customer occurs upon receipt of a request for a resource associated with the specific customer (para [0193]).

- Please See Supplemental Box -

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 12/69712

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and explanations:

As to claims 4 and 30, in combination with Swildens, McCanne further discloses wherein processing by a cache server in (b)(2)(2) {(C)} to obtain customer configuration information associated with a specific customer occurs prior to receipt of a request for a resource associated with the specific customer (para [0224] - predictive hints... infer).

As to claims 5 and 31, in combination with McCanne, Swildens further discloses wherein customer configuration information associated with the particular customer comprises one or more scripts to be used by the particular cache server to process requests for resources associated with the particular customer (para [0458]-[0459]).

As to claims 6 and 32, in combination with McCanne, Swildens further discloses wherein the customer configuration information comprises at least one CDN resource (para [0459]-[0469]).

As to claims 7 and 33, in combination with McCanne, Swildens further discloses wherein the customer configuration information associated with the particular customer comprises at least one customer configuration script (CCS) associated with the particular customer (para [0459]-[0469]).

As to claims 8 and 34, in combination with Swildens, McCanne further discloses wherein the customer configuration information associated with the particular customer specifies customer-specific processing requirements for resources served on behalf of that customer (para [0195]).

As to claims 9 and 35, in combination with McCanne, Swildens further discloses wherein the global configuration data comprises at least one CDN resource (para [0347]).

As to claims 11 and 37, in combination with Swildens, McCanne further discloses wherein the one or more other locations in the CDN comprise at least one location selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site (para [0183] - cache... site).

As to claims 12 and 38, in combination with Swildens, McCanne further discloses wherein the one or more other locations in the CDN comprise at least one peer location (para [0029]).

As to claims 13 and 39, in combination with Swildens, McCanne further discloses wherein the particular cache server determines said one or more other locations using said information in said global configuration data (para [0182] - all edge locations).

As to claims 14 and 40, in combination with McCanne, Swildens further discloses wherein said particular cache server obtains said updated global configuration data from one or more locations in the CDN (para [0347], [0383]).

As to claims 15 and 41, in combination with Swildens, McCanne further discloses wherein the one or more locations in the CDN comprise one or more locations selected from: (i) the control core (para [0104]); and (ii) one or more locations in selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site (para [0183] - cache... site).

As to claims 16 and 42, in combination with Swildens, McCanne further discloses wherein the control core comprises a distributed system consisting of a plurality of machines (para [0104]).

As to claims 18 and 44, in combination with McCanne, Swildens further discloses wherein each particular cache server of said plurality of cache servers is further constructed and adapted to: determine validity of a version of global configuration data stored on said particular cache server, and wherein said particular cache server obtains updated global configuration data in (b)(2)(1) when said particular cache server determines that said version of said global configuration data stored on said particular cache server is invalid (para [0307], [0320], [0357]; Fig. 9).

As to claims 19 and 45, in combination with McCanne, Swildens further discloses wherein each particular cache server of said plurality of cache servers is further constructed and adapted to: determine validity of a version of particular customer configuration information associated with a particular customer and stored on said particular cache server, and wherein said particular cache server obtains customer configuration information in (b)(2)(2) when said particular cache server determines that said version of said particular customer configuration information stored on said particular cache server is invalid (para [0048], [0091], [0115]).

As to claims 20 and 46, in combination with McCanne, Swildens further discloses wherein said particular cache server is constructed and adapted to determine said validity of said version of particular customer configuration information stored on said particular cache server in response to a request to serve content associated with said particular customer (para [0115]-[0118]).

As to claim 21, in combination with Swildens, McCanne further discloses (c) at least one rendezvous mechanism (para [0197] - "client-driven service rendezvous" (CDSR)).

As to claim 22, in combination with McCanne, Swildens further discloses (d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to: (d)(1) obtain information from at least one cache server (para [0458]).

- Please See Supplemental Box -

Form PCT/ISA/237 (Supplemental Box) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 12/69712

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and explanations:

As to claim 23, in combination with McCanne, Swildens further discloses wherein each particular cache server of said plurality of cache servers is further constructed and adapted to: (b)(3) generate information (para [0458]); and (b)(4) provide at least some of said generated information to said collector system (para [0458]).

As to claim 24, in combination with McCanne, Swildens further discloses wherein each particular cache server of said plurality of cache servers provides at least some of said generated information in (b)(4) by streaming said at least some of said generated information to one or more collector mechanisms in said collector system (para [0458]).

As to claim 25, in combination with McCanne, Swildens further discloses wherein the CDN has customer configuration information associated therewith, and wherein each particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN (para [0115], [0347]).

As to claim 26, in combination with Swildens, McCanne further discloses wherein at least one cache server of said plurality of cache servers comprises an executive system supporting concurrent processing of tasks on said at least one cache server (para [0085]).

As to claim 47, in combination with McCanne, Swildens further discloses wherein the CDN further comprises: (d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to obtain information from at least one cache server, the method further comprising, by said particular cache server: (E) generating information (para [0458]); and (F) providing at least some of said generated information to said collector system (para [0458]).

As to claim 48, in combination with McCanne, Swildens further discloses wherein said providing in (F) comprises: (F)(1) streaming said at least some of said generated information to one or more collector mechanisms in said collector system (para [0458]).

As to claim 49, in combination with Swildens, McCanne further discloses, by said particular cache server of said plurality of cache servers: (E) obtaining second customer configuration information associated with a second customer of the CDN, said second customer being distinct from said particular customer (para [0085] - each client... individual connection); and (F) serving a second particular resource associated with the second customer in accordance with (i) the global configuration data, and (ii) the second customer configuration information associated with the second customer (para [0022] - globally consistent multicast routing tree; para [0105] - client configuration).

As to claim 50, in combination with Swildens, McCanne further discloses wherein the CDN has customer configuration information associated therewith, and wherein the particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN (para [0022] - globally consistent multicast routing tree; para [0098] - provision enough resource on their edge; para [0105] - client configuration).

Claims 10 and 36 lack an inventive step under PCT Article 33(3) as being obvious over McCanne in view of Swildens, and further in view of US 2006/0112176 A1 to Liu et al. (hereinafter, 'Liu').

As to claims 10 and 36, the combination of McCanne and Swildens teaches the CDN of claim 9 and the method of claim 35, but fails to explicitly disclose wherein the global configuration data comprises global configuration object (GCO).
However, Liu does teach wherein the global configuration data comprises global configuration object (GCO) (para [0079]).
It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to combine the content distribution system for operation over an internetwork including content peering arrangements of McCanne (as enhanced by Swildens) with the domain name resolution using a distributed DNS network of Liu, because McCanne, Swildens and Liu are directed to systems and methods for content delivery networks. Furthermore, users and designers benefit from systems and/or methods adapted for allowing - when new content is published on the origin site with a new name - to be immediately available from all caches in the present network, because such systems/methods allow for reducing network traffic on the entire Internet address space as broken up into multiple zones, where each zone is assigned to a group of caching servers, such that, if a caching server gets a request from a client that is not in the zone assigned to that caching server, it forwards the request to the caching server assigned to that zone (Liu, para [0022]).

- Please See Supplemental Box -

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 12/69712

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and explanations:

Claims 17 and 43 lack an inventive step under PCT Article 33(3) as being obvious over McCanne in view of Swildens, and further in view of US 2002/0174168 A1 to Beukema et al. (hereinafter, 'Beukema').

As to claims 17 and 43, the combination of McCanne and Swildens teaches the CDN of claim 16 and the method of claim 42, but fails to explicitly disclose wherein the control core uses a distributed consensus algorithm to achieve consensus among the plurality of machines. However, Beukema does teach wherein the control core uses a distributed consensus algorithm to achieve consensus among the plurality of machines (para [0022]).

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention to combine the content distribution system for operation over an internetwork including content peering arrangements of McCanne (as enhanced by Swildens) with the primitive communication mechanism for adjacent nodes in a clustered computer system of Beukema, because McCanne, Swildens and Beukema are directed to systems and methods for content delivery networks. Furthermore, users and designers benefit from systems and/or methods adapted for enabling a communication mechanism that permits a clustered computer system network to be initialized and modified in a fairly automated and dynamic manner, e.g., by assigning and distributing network-wide addresses to the nodes in connection with a distributed consensus algorithm, because such systems/methods allow a node desiring to communicate information to another node to receive a port identifier from the other node that identifies the network port on the other node through which the pair of nodes are coupled (Beukema, para [0011]).

Claims 1 - 50 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

Electronic Acknowledgement Receipt

EFS ID:	15017109
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	21-FEB-2013
Filing Date:	14-DEC-2012
Time Stamp:	15:52:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394USU1_IDS.pdf	35737 1b54d4ac56f25c4ea6ec1d7bbf7754daafc9d0db	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394USU1_SB08.pdf	30074 d39197b32300211838a54ca094c0da7cc26c8b2a	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	PCT_US12_069712_394ISR.pdf	574707 132b8429b4e923bab8146e2268a4790c6cd210ab	no	4
Warnings:					
Information:					
4	Non Patent Literature	PCT_US12_069712_394WO.pdf	984814 ad77aa4235be08e38cef8cf63827161c3190f02d	no	6
Warnings:					
Information:					
5	Non Patent Literature	Kostadinova.pdf	7666758 80a87d45bf5cde1f86e00987c02bf0253062091e	no	55
Warnings:					
Information:					
			Total Files Size (in bytes):	9292090	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2447
Filed	:	December 14, 2012	Examiner	:	Not Yet Assigned
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

INFORMATION DISCLOSURE STATEMENT
PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III

CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: February 21, 2013

/JCS/

Jonathan C. Siekmann
Registration No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140
Fax: 720-888-5619

PTO/AIA/01 (06-12)
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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Content Delivery Network

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/714,410 filed on December 14, 2012.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Christopher Newton Date (Optional): 23/JAN/2013

Signature: C. Newton

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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LEGAL NAME OF INVENTOR

Inventor: Laurence R. Lipstone Date (Optional) :

Signature:

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: William Crowder Date (Optional): 1/23/2013

Signature: William C. Crowder

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: Jeffrey G. KOLLER Date (Optional): 3/4/2013

Signature: /Jeffrey G. Koller/

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: David Fullagar Date (Optional): 3/5/2013

Signature: David Fullagar

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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Electronic Acknowledgement Receipt

EFS ID:	15188087
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	12-MAR-2013
Filing Date:	14-DEC-2012
Time Stamp:	13:21:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	394_U1_oath.pdf	399648 470ee6c27b0b842ee31a8493dfefa82a8b54456c	no	5

Warnings:	
Information:	

Total Files Size (in bytes):	399648

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In the United States Patent & Trademark Office

In re PATENT Application of:	Confirmation No.: 9250
Newton et al.	Attorney Docket: 0394-US-U1
Appl. S.N.: 13/714,410	Group Art Unit: 2447
Filing Date: 12-14-2012	
Title: Content Delivery Network	Date: March 28, 2013

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Please amend the above-identified application as follows prior to examination:

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

In the Specification

Please amend the claims as follows:

Please replace paragraph 0003 (on pages 1 and 2) in its entirety with the following:

[0003] The entire contents of each of ~~This application is related to~~ the following co-owned U.S. Patents and co-pending patent applications~~, the entire contents of each of~~ ~~which~~ are fully incorporated herein by reference for all purposes:

1. U.S. Patent No. 7,822,871 titled "Configurable Adaptive Global Traffic Control And Management," filed 09/30/2002, issued 10/26/2010;
2. U.S. Patent No. 7,860,964 titled "Policy-Based Content Delivery Network Selection," filed 10/ 26/2007, issued 12/28/2010;
3. U.S. Patent No. 6,185,598 titled "Optimized Network Resource Location," filed 02/10/1998, issued 02/06/ 2001;
4. U.S. Patent No. 6,654,807 titled "Internet Content Delivery Network," filed 12/06/2001, issued 11/25/2003;
5. U.S. Patent No. 7,949,779 titled "Controlling Subscriber Information Rates In A Content Delivery Network," filed 10/31/2007, issued 05/24/2011;
6. U.S. Patent No. 7,945,693 titled "Controlling Subscriber Information Rates In A Content Delivery Network," filed 10/31/2007, issued 05/17/2011;
7. U.S. Patent No. 7,054,935 titled "Internet Content Delivery Network," filed 03/13/2002, issued 05/30/2006;

8. U.S. Published Patent Application No. 2009-0254661 titled "Handling Long-Tail Content In A Content Delivery Network (CDN)," filed 03/21/2009;
9. U.S. Published Patent Application No. 2010-0332595 titled "Handling Long-Tail Content In A Content Delivery Network (CDN)," filed 09/13/2010;
10. U.S. Patent No. 8,015,298 titled "Load-Balancing Cluster," filed 02/23/2009, issued 09/06/2011; and
11. U.S. Published Patent Application No. 2010-0332664 titled "Load-Balancing Cluster," filed 09/13/2010.

Please replace **paragraph 0109** (on page 22) in its entirety with the following:

[00109] As shown above, a sequence may be is used to interpret a request and get to the point that a response is available to be pumped. ~~To~~ The same basic sequencing mechanism can be used to implement a programmable pump/filter, although of course the handlers themselves are now performing a different task. **FIG. 14A** shows a bidirectional sequence that is part of a pump/filter. The pump task uses "direct delivery" requests, *e.g.*, *sendfile()*, because it does not need to see the data itself. It should be appreciated that *sendfile()* is not the request, it is just one way a direct delivery request may be implemented by the channel involved. The delivery sequence consists of two handlers:

- **delivery-monitor** (account bytes, monitors performance); and
- **chan-submit** (submits request to a channel, waits for response). The channel may be, *e.g.*, an object channel, downstream channel, etc.

Please replace **paragraph 0182** (on page 45) in its entirety with the following:

[00182] When a request is received, an initial sequence of handlers is assembled to handle the request (based on the target of the request and the listener it came in on). The handlers either generate a response because the request is directed at them, add some value by performing a request or response manipulation, or take themselves out of that instance of the sequence because they are not relevant to the request at hand. A handler may be a script handler, and that script can perform any number of functions (as outlined previously) to generate a response or to manipulate a request or response. The "manifest channel" is one component used by a series of handlers, but it is concerned with dealing with ~~cachable~~ cacheable resources. It is generally not involved in determining whether, *e.g.*,[[,]] pre-authentication needs to be performed (which could be handled by a handler in the cli-req hook or similar).

REMARKS

Various typographical errors are also corrected herein.

Paragraph 0003 mistakenly referred to certain patents and patent applications (which are incorporated into the application by reference) as related. This has been corrected by the amendment hereto.

Spelling errors are corrected in paragraphs 0109 and 0182.

No new matter has been added by this amendment, and its entry is respectfully requested.

An early action on the merits of this application is respectfully requested.

CHARGE STATEMENT: Deposit Account No. 501860, order no. 2711-6001	
The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Accounting/ Order Nos. shown above. This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.	
CUSTOMER NUMBER 83579	Respectfully submitted, **/Brian Siritzky/Reg. No. 37,497** By: Brian Siritzky, Ph.D. Registration No.: 37,497

Electronic Acknowledgement Receipt

EFS ID:	15383430
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	Brian Siritzky
Filer Authorized By:	
Attorney Docket Number:	0394-US-U1
Receipt Date:	28-MAR-2013
Filing Date:	14-DEC-2012
Time Stamp:	17:47:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		0394-US-U01-PA-Prelim-Amdt-03-28-2013.pdf	199083 f7e7b9731c2fdcdb1973649b14a15f806c8c25c6	yes	6

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Preliminary Amendment	1	1
	Specification	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	6
Warnings:			
Information:			
	Total Files Size (in bytes):	199083	

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New Applications Under 35 U.S.C. 111
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National Stage of an International Application under 35 U.S.C. 371
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/714,410	12/14/2012	Christopher Newton	0394-US-U1

CONFIRMATION NO. 9250

83579
LEVEL 3 COMMUNICATIONS, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

PUBLICATION NOTICE

OC00000062098915

Title:CONTENT DELIVERY NETWORK

Publication No.US-2013-0159472-A1
Publication Date:06/20/2013

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	1	of	4	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20060064485	Mar 23, 2006	Baron, Anthony et al.	
		20090254661	Oct 8, 2009	Fullagar, David et al.	
		20100064035	Mar 11, 2010	Branca, Salvatore et al.	
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		20130159473	Jun 20, 2013	Newton, Christopher et al.	
		6185598	Feb 6, 2001	Farber, David A., et al.	
		6654807	Nov 25, 2003	Farber, David A., et al.	
		7054935	May 30, 2006	Farber, David A., et al.	
		7370102	May 6, 2008	Chu, Jie et al.	
		7395346	Jul 1, 2008	Pinder, Howard G., et al.	
		7822871	Oct 26, 2010	Stolorz, Paul E., et al.	
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		7945693	May 17, 2011	Farber, David A., et al.	
		7949779	May 24, 2011	Farber, David A., et al.	
		8015298	Sep 6, 2011	Yevmenkin, Maksim et al.	
		8060613	Nov 15, 2011	Farber, David A., et al.	
		8260841	Sep 4, 2012	Maity, Sanjoy	
		8489750	Jul 16, 2013	Yevmenkin, Maksim et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Non-Final Office Action, mailed September 10, 2013, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 9 pgs.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	2	of	4	Attorney Docket No: 0394-US-U1

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		Non-Final Office Action, mailed September 23, 2013, Application No. 13/838,414, filed March 15, 2013; Dkt No. 0447-US-U14-C1, 23 pgs.	
		Notice of Allowance, mailed September 13, 2013, Application No. 13/837,216, filed March 15, 2013; Dkt. No. 0447-US-U2-C1, 14 pgs.	
		U.S. Application No. 13/714,412, filed December 14, 2012, "Content Delivery Framework;" Dkt. No. 0447-US-U1	
		U.S. Application No. 13/714,416, filed December 14, 2012, "Request Processing in a Content Delivery Network"; Dkt. No. 0447-US-U2	
		U.S. Application No. 13/714,417, filed December 14, 2012, "Content Delivery Framework with Dynamic Service Network Topologies"; Dkt. No. 0447-US-U3	
		U.S. Application No. 13/714,475, filed December 14, 2012, "Framework Supporting Content Delivery with Reducer Services Network"; Dkt. No. 0447-US-U4	
		U.S. Application No. 13/714,489, filed December 14, 2012, "Framework Supporting Content Delivery with Collector Services Network"; Dkt. No. 0447-US-U5	
		U.S. Application No. 13/714,510, filed December 14, 2012, "Framework Supporting Content Delivery with Rendezvous Services Network"; Dkt. No. 0447-US-U6	
		U.S. Application No. 13/714,537, filed December 14, 2012, "Framework Supporting Content Delivery with Delivery Services Network"; Dkt. No. 0447-US-U7	
		U.S. Application No. 13/714,711, filed December 14, 2012, "Framework Supporting Content Delivery with Hybrid Content Delivery Services"; Dkt. No. 0447-US-U8	
		U.S. Application No. 13/714,760, filed December 14, 2012, "Framework Supporting Content Delivery with Content Delivery Services"; Dkt. No. 0447-US-U9	
		U.S. Application No. 13/714,956, filed December 14, 2012, "Framework Supporting Content Delivery with Adaptation Services"; Dkt. No. 0447-US-U10	
		U.S. Application No. 13/715,109, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Adaptation Services"; Dkt. No. 0447-US-U11	

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Sheet	3	of	4	Attorney Docket No: 0394-US-U1

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Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		U.S. Application No. 13/715,270, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Adaptation Services"; Dkt. No. 0447-US-U12	
		U.S. Application No. 13/715,304, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Adaptation Services with Provisioning"; Dkt. No. 0447-US-U13	
		U.S. Application No. 13/715,345, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Adaptation Services with Feedback"; Dkt. No. 0447-US-U14	
		U.S. Application No. 13/715,466, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Adaptation Services with Feedback from Health Service"; Dkt. No. 0447-US-U15	
		U.S. Application No. 13/715,590, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Dynamically Configurable Log Information"; Dkt. No. 0447-US-U16	
		U.S. Application No. 13/715,650, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Delivery Services Having Dynamically Configurable Log Information"; Dkt. No. 0447-US-U17	
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		U.S. Application No. 13/715,747, filed December 14, 2012, "Devices and Methods Supporting Content Delivery with Rendezvous Services"; Dkt. No. 0447-US-U20	
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		U.S. Application No. 13/802,051, filed March 13, 2013, "Invalidation Systems, Methods, and Devices"; Dkt. No. 0447-US-U22	
		U.S. Application No. 13/802,093, filed March 13, 2013, "Systems, Methods, and Devices for Gradual Invalidation of Resources"; Dkt. No. 0447-US-U23	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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				Complete if Known
				Application Number 13/714,410
				Filing Date Dec 14, 2012
				First Named Inventor Christopher Newton
				Art Unit 2447
				Examiner Name Joon H. Hwang
Sheet	4	of	4	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		U.S. Application No. 13/802,143, filed March 13, 2013, "Maintaining Invalidation Information"; Dkt. No. 0447-US-U24	
		U.S. Application No. 13/802,291, filed March 13, 2013, "Responsibility-Based Request Processing"; Dkt. No. 0447-US-U25	
		U.S. Application No. 13/802,335, filed March 13, 2013, "Responsibility-Based Peering"; Dkt. No. 0447-US-U26	
		U.S. Application No. 13/802,366, filed March 13, 2013, "Responsibility-Based Cache Peering"; Dkt. No. 0447-US-U27	
		U.S. Application No. 13/802,406, filed March 13, 2013, "Rendezvous Systems, Methods, and Devices"; Dkt. No. 0447-US-U28	
		U.S. Application No. 13/802,440, filed March 13, 2013, "Event Stream Collector Systems, Methods, and Devices"; Dkt. No. 0447-US-U29	
		U.S. Application No. 13/802,470, filed March 13, 2013, "Layered Request Processing in a Content Delivery Network (CDN)"; Dkt. No. 0447-US-U30	
		U.S. Application No. 13/802,489, filed March 13, 2013, "Layered Request Processing with Redirection and Delegation in a Content Delivery Network (CDN)"; Dkt. No. 0447-US-U31	
		U.S. Application No. 13/837,216, filed March 15, 2013, "Content Delivery Framework with Dynamic Service Network Topology"; Dkt. No. 0447-US-U2-C1	
		U.S. Application No. 13/837,821, filed March 15, 2013, "Framework Supporting Content Delivery with Content Delivery Services"; Dkt. No. 0447-US-U9-C1	
		U.S. Application No. 13/838,414, filed March 15, 2013, "Devices and Methods Supporting Content Delivery with Adaptation Services with Feedback"; Dkt. No. 0447-US-U14-C1	
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		U.S. Application No. 13/841,134, filed March 15, 2013, "Configuring a Content Delivery Network (CDN)"; Dkt. No. 0447-US-U33	

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EFS ID:	17008766
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	01-OCT-2013
Filing Date:	14-DEC-2012
Time Stamp:	15:22:43
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394USU1_SIDS.pdf	46852 451a0673576d7f94c5cc54605ab47e968679e6a2	no	7

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2	Information Disclosure Statement (IDS) Form (SB08)	394USU1_SB08.pdf	56550 f77715abc2e54a2d0ca32dd164a4c7559483c91e	no	4
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3	Other Reference-Patent/App/Search documents	US13837216_noar_13Sep2013_447USU2C1.pdf	647703 a439d76177ecac209a8f6a89c014cf6667e58732	no	14
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<u>New Applications Under 35 U.S.C. 111</u>
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>
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2447
Filed	:	December 14, 2012	Examiner	:	Joon H. Hwang
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
STATEMENT OF RELATEDNESS (Under M.P.E.P. § 2001.06(b))

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and in accordance with M.P.E.P. § 2001.06(b), the Examiner is respectfully requested to consider the following pending applications (listed in the attached IDS document) which are owned by the Applicant of the present application. The following pending applications may include subject matter similar to that of the present application:

Application No.	Patent No./Status	Title
13/714,411	Pending	CONTENT DELIVERY NETWORK
13/714,412	Pending	CONTENT DELIVERY FRAMEWORK
13/714,416	Pending	REQUEST PROCESSING IN A CONTENT DELIVERY NETWORK

Application No.	Patent No./Status	Title
13/714,417	Pending	CONTENT DELIVERY FRAMEWORK WITH DYNAMIC SERVICE NETWORK TOPOLOGIES
13/714,475	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH REDUCER SERVICES NETWORK
13/714,489	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH COLLECTOR SERVICES NETWORK
13/714,510	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES NETWORK
13/714,537	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES NETWORK
13/714,711	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH HYBRID CONTENT DELVIERY SERVICES
13/714,760	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH CONTENT DELVIERY SERVICES
13/714,956	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,109	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,270	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,304	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH PROVISIONING
13/715,345	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/715,466	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK FROM HEALTH SERVICES
13/715,590	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,650	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,683	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,730	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES
13/715,747	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES

Application No.	Patent No./Status	Title
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13/802,051	Pending	INVALIDATION SYSTEMS, METHODS, AND DEVICES
13/802,093	Pending	SYSTEMS, METHODS, AND DEVICES FOR GRADUAL INVALIDATION OF RESOURCES
13/802,143	Pending	MAINTAINING INVALIDATION INFORMATION
13/802,291	Pending	RESPONSIBILITY-BASED REQUEST PROCESSING
13/802,335	Pending	RESPONSIBILITY-BASED PEERING
13/802,366	Pending	RESPONSIBILITY-BASED CACHE PEERING
13/802,406	Pending	RENDEZVOUS SYSTEMS, METHODS, AND DEVICES
13/802,440	Pending	EVENT STREAM COLLECTOR SYSTEMS, METHODS, AND DEVICES
13/802,470	Pending	LAYERED REQUEST PROCESSING IN A CONTENT DELIVERY NETWORK (CDN)
13/802,489	Pending	LAYERED REQUEST PROCESSING WITH REDIRECTION AND DELEGATION IN A CONTENT DELIVERY NETWORK (CDN)
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13/839,400	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/841,023	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
13/841,134	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)

As the related U.S. patent applications are stored electronically at the PTO, no copies are being provided herewith. If the Examiner requires copies of any of these applications or any additional information regarding any of the documents cited herein, the Examiner is respectfully requested to contact the undersigned at the number provided.

VI
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VII
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: October 1, 2013

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	December 14, 2012
First Named Inventor	NEWTON
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		U.S. Application No. 14/094,868, filed December 3, 2013, "Tracking Invalidation Completion in a Content Delivery Framework"; Dkt. No. 0447-US-U34	
		U.S. Application No. 14/088,362, filed November 23, 2013, "Invalidation in a Content Delivery Framework"; Dkt. No. 0447-US-U35	
		U.S. Application No. 14/095,079, filed December 3, 2013, "Dynamic Topology Transitions in a Content Delivery Framework"; Dkt. No. 0447-US-U36	
		U.S. Application No. 14/105,981, filed December 13, 2013, "Content Delivery Framework with Autonomous CDN Partitioned Into Multiple Virtual CDNs"; Dkt. No. 0447-US-U37	
		U.S. Application No. 14/088,358, filed November 23, 2013, "Verification and Auditing in a Content Delivery Framework"; Dkt. No. 0447-US-U38	
		U.S. Application No. 14/088,367, filed November 23, 2013, "Rendezvous Optimization in a Content Delivery Framework"; Dkt. No. 0447-US-U39	
		U.S. Application No. 14/105,915, filed December 13, 2013, "Content Delivery Framework Having Autonomous CDN Partitioned into Multiple Virtual CDNs to Implement CDN Interconnection, Delegation, and Federation"; Dkt. No. 0447-US-U40	
		U.S. Application No. 14/088,542, filed November 25, 2013, "Selective Warm Up and Wind Down Strategies in a Content Delivery Network"; Dkt. No. 0447-US-U42	
		U.S. Application No. 14/088,356, filed November 23, 2013, "Configuration and Control in Content Delivery Framework"; Dkt. No. 0447-US-U43	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	17752835
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	24-DEC-2013
Filing Date:	14-DEC-2012
Time Stamp:	12:31:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394USU1_IDS.pdf	49484 d1962ef719e216f4c8b711398a61e29beeefb7f7	no	8

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394USU1_SB08.pdf	29542 f867f2d806a3a96251a64fa260e173231671c6fe	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	79026

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2447
Filed	:	December 24, 2012	Examiner	:	Joon H. Hwang
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

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The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
STATEMENT OF RELATEDNESS (Under M.P.E.P. § 2001.06(b))

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and in accordance with M.P.E.P. § 2001.06(b), the Examiner is respectfully requested to consider the following pending applications (listed in the attached IDS document) which are owned by the Applicant of the present application. The following pending applications may include subject matter similar to that of the present application:

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13/714,510	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES NETWORK
13/714,537	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES NETWORK
13/714,711	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH HYBRID CONTENT DELVIERY SERVICES
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13/715,345	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/715,466	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK FROM HEALTH SERVICES
13/715,590	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,650	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,683	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,730	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES
13/715,747	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES
13/715,780	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH REDUCER SERVICES

Application No.	Patent No./Status	Title
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13/802,093	Pending	SYSTEMS, METHODS, AND DEVICES FOR GRADUAL INVALIDATION OF RESOURCES
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13/802,291	Pending	RESPONSIBILITY-BASED REQUEST PROCESSING
13/802,335	Pending	RESPONSIBILITY-BASED PEERING
13/802,366	Pending	RESPONSIBILITY-BASED CACHE PEERING
13/802,406	Pending	RENDEZVOUS SYSTEMS, METHODS, AND DEVICES
13/802,440	Pending	EVENT STREAM COLLECTOR SYSTEMS, METHODS, AND DEVICES
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13/837,821	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH CONTENT DELIVERY SERVICES
13/838,414	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/839,400	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/841,023	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
13/841,134	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
14/094,868	Pending	TRACKING INVALIDATION COMPLETION IN A CONTENT DELIVERY FRAMEWORK
14/088,362	Pending	INVALIDATION IN A CONTENT DELIVERY FRAMEWORK
14/095,079	Pending	DYNAMIC TOPOLOGY TRANSITIONS IN A CONTENT DELIVERY FRAMEWORK
14/105,981	Pending	CONTENT DELIVERY FRAMEWORK WITH AUTONOMOUS CDN PARTITIONED INTO MULTIPLE VIRTUAL CDNs

Application No.	Patent No./Status	Title
14/088,358	Pending	VERIFICATION AND AUDITING IN A CONTENT DELIVERY FRAMEWORK
14/088,367	Pending	RENDEZVOUS OPTIMIZATION IN A CONTENT DELIVERY FRAMEWORK
14/105,915	Pending	CONTENT DELIVERY FRAMEWORK HAVING AUTONOMOUS CDN INTERCONNECTION, DELEGATION, AND FEDERATION
14/088,542	Pending	SELECTIVE WARM UP AND WIND DOWN STRATEGIES IN A CONTENT DELIVERY NETWORK
14/088,356	Pending	CONFIGURATION AND CONTROL IN CONTENT DELIVERY FRAMEWORK

As the related U.S. patent applications are stored electronically at the PTO, no copies are being provided herewith. If the Examiner requires copies of any of these applications or any additional information regarding any of the documents cited herein, the Examiner is respectfully requested to contact the undersigned at the number provided.

VI
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VII
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: December 24, 2013

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
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Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20090164621	Jun 25, 2009	Kothari, Pankaj et al.	
		20120079083	Mar 29, 2012	Branca, Salvatore et al.	
		20130159500	Jun 20, 2013	Reus, Edward et al.	
		20130326032	Dec 5, 2013	Duarte, Mario J., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	18853917
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	24-APR-2014
Filing Date:	14-DEC-2012
Time Stamp:	17:00:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	49457 f25579e0f70bb3fcb908d32b8d2ac237eb89b99d	no	8

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1sb08.pdf	27829 bd8f690d5c1edc5cd0c70c74f14cae1ed318ea2b	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	77286

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2447
Filed	:	December 24, 2012	Examiner	:	Joon H. Hwang
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
STATEMENT OF RELATEDNESS (Under M.P.E.P. § 2001.06(b))

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and in accordance with M.P.E.P. § 2001.06(b), the Examiner is respectfully requested to consider the following pending applications (listed in the attached IDS document) which are owned by the Applicant of the present application. The following pending applications may include subject matter similar to that of the present application:

Application No.	Patent No./Status	Title
13/714,411	Pending	CONTENT DELIVERY NETWORK
13/714,412	Pending	CONTENT DELIVERY FRAMEWORK
13/714,416	Pending	REQUEST PROCESSING IN A CONTENT DELIVERY NETWORK
13/837,216	Pending	CONTENT DELIVERY FRAMEWORK WITH DYNAMIC SERVICE NETWORK TOPOLOGY

Application No.	Patent No./Status	Title
13/714,417	Pending	CONTENT DELIVERY FRAMEWORK WITH DYNAMIC SERVICE NETWORK TOPOLOGIES
13/714,475	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH REDUCER SERVICES NETWORK
13/714,489	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH COLLECTOR SERVICES NETWORK
13/714,510	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES NETWORK
13/714,537	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES NETWORK
13/714,711	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH HYBRID CONTENT DELVIERY SERVICES
13/714,760	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH CONTENT DELVIERY SERVICES
13/837,821	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH CONTENT DELIVERY SERVICES
13/714,956	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,109	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,270	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,304	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH PROVISIONING
13/715,345	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/838,414	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/839,400	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/715,466	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK FROM HEALTH SERVICES
13/715,590	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,650	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION

Application No.	Patent No./Status	Title
13/715,683	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,730	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES
13/715,747	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES
13/715,780	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH REDUCER SERVICES
13/802,051	Pending	INVALIDATION SYSTEMS, METHODS, AND DEVICES
13/802,093	Pending	SYSTEMS, METHODS, AND DEVICES FOR GRADUAL INVALIDATION OF RESOURCES
13/802,143	Pending	MAINTAINING INVALIDATION INFORMATION
13/802,291	Pending	RESPONSIBILITY-BASED REQUEST PROCESSING
13/802,335	Pending	RESPONSIBILITY-BASED PEERING
13/802,366	Pending	RESPONSIBILITY-BASED CACHE PEERING
13/802,406	Pending	RENDEZVOUS SYSTEMS, METHODS, AND DEVICES
13/802,440	Pending	EVENT STREAM COLLECTOR SYSTEMS, METHODS, AND DEVICES
13/802,470	Pending	LAYERED REQUEST PROCESSING IN A CONTENT DELIVERY NETWORK (CDN)
13/802,489	Pending	LAYERED REQUEST PROCESSING WITH REDIRECTION AND DELEGATION IN A CONTENT DELIVERY NETWORK (CDN)
13/841,023	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
13/841,134	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
14/094,868	Pending	TRACKING INVALIDATION COMPLETION IN A CONTENT DELIVERY FRAMEWORK
14/088,362	Pending	INVALIDATION IN A CONTENT DELIVERY FRAMEWORK
14/095,079	Pending	DYNAMIC TOPOLOGY TRANSITIONS IN A CONTENT DELIVERY FRAMEWORK
14/105,981	Pending	CONTENT DELIVERY FRAMEWORK WITH AUTONOMOUS CDN PARTITIONED INTO MULTIPLE VIRTUAL CDNs

Application No.	Patent No./Status	Title
14/088,358	Pending	VERIFICATION AND AUDITING IN A CONTENT DELIVERY FRAMEWORK
14/088,367	Pending	RENDEZVOUS OPTIMIZATION IN A CONTENT DELIVERY FRAMEWORK
14/105,915	Pending	CONTENT DELIVERY FRAMEWORK HAVING AUTONOMOUS CDN INTERCONNECTION, DELEGATION, AND FEDERATION
14/088,542	Pending	SELECTIVE WARM UP AND WIND DOWN STRATEGIES IN A CONTENT DELIVERY NETWORK
14/088,356	Pending	CONFIGURATION AND CONTROL IN CONTENT DELIVERY FRAMEWORK

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Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VII
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: April 24, 2014

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020161823	Oct 31, 2002	Casati, Fabio et al.	
		20050192995	Sep 1, 2005	Li, Wen-Syan et al.	
		20080215735	Sep 4, 2008	Farber, David A., et al.	
		20100281224	Nov 4, 2010	Ho, Wesley J., et al.	
		20120166589	Jun 28, 2012	Swildens, Eric S., et al.	
		20120215779	Aug 23, 2012	Lipstone, Laurence R.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]
		WO-200215014A1	Feb 21, 2002	Wootton, Bruce C., et al.		
		WO-200225463A1	Mar 28, 2002	Salerno, Antonio		

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		International Search Report, dated May 23, 2014, Int'l Appl. No. PCT/US13/074824, Int'l Filing Date December 12, 2013; Dkt. No. 0447-WO-01 , 9 pgs.	
		U.S. Application No. 14/302,865, filed June 12, 2014, "Request-Response Processing in a Content Delivery Network"; Dkt. No. 0394-US-U1-C1	
		U.S. Application No. 14/302,944, filed June 12, 2014, "Customer-Specific Request-Response Processing in a content Delivery Network"; Dkt. No. 0394-US-U1-C2	
		U.S. Application No. 14/303,314, filed June 12, 2014, "Collector Mechanism in a Content Delivery Network"; Dkt. No. 0447-US-U29-C1	
		U.S. Application No. 14/303,389, filed June 12, 2014, "Collector Mechanisms in a Content Delivery Network"; Dkt. No. 0447-US-U29-C2	
		U.S. Application No. 14/307,374, filed June 17, 2014, "Invalidation Sequencing in a Content Delivery Framework"; Dkt. No. 0447-US-U23-I1	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	2	of	2	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		U.S. Application No. 14/307,380, filed June 17, 2014, "Automated Learning of Peering Policies for Popularity Driven Replication in Content Delivery Framework"; Dkt. No. 0447-US-U25-I1	
		U.S. Application No. 14/307,389, filed June 17, 2014, "Origin Server-Side Channel in a Content Delivery Framework"; Dkt. No. 0447-US-U42-I1	
		U.S. Application No. 14/307,399, filed June 17, 2014, "Beacon Services in a Content Delivery Framework"; Dkt. No. 0447-US-U37-I1	
		U.S. Application No. 14/307,404, filed June 17, 2014, "Geographic Location Determination in a Content Delivery Framework"; Dkt. No. 0447-US-U1-I4	
		U.S. Application No. 14/307,411, filed June 17, 2014, "Content Delivery Framework Having Fill Services"; Dkt. No. 0447-US-U1-I1	
		U.S. Application No. 14/307,423, filed June 17, 2014, "Content Delivery Framework Having Storage Services"; Dkt. No. 0447-US-U1-I2	
		U.S. Application No. 14/307,429, filed June 17, 2014, "Content Delivery Framework Having Origin Services"; Dkt. No. 0447-US-U1-I3	
		Written Opinion of the International Searching Authority, dated May 23, 2014, Int'l Appl. No. PCT/US13/074824, Int'l Filing Date December 12, 2013; Dkt. No. 0447-WO-01 , 43 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
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(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
21 February 2002 (21.02.2002)

PCT

(10) International Publication Number
WO 02/15014 A1

(51) International Patent Classification[7]: G06F 13/00

(21) International Application Number: PCT/US01/23948

(22) International Filing Date: 31 July 2001 (31.07.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/637,803 11 August 2000 (11.08.2000) US

(71) Applicant: IP DYNAMICS, INC. [US/US]; Fifth floor, 1901 S. Bascom Avenue, Campbell, CA 95008 (US).

(72) Inventors: WOOTTON, Bruce, C.; 1992 Barbara Drive, Palo Alto, CA 94303 (US). ALKHATIB, Hasan, S.; 15725 Apollo Heights Court, Saratoga, CA 95070-6361 (US).

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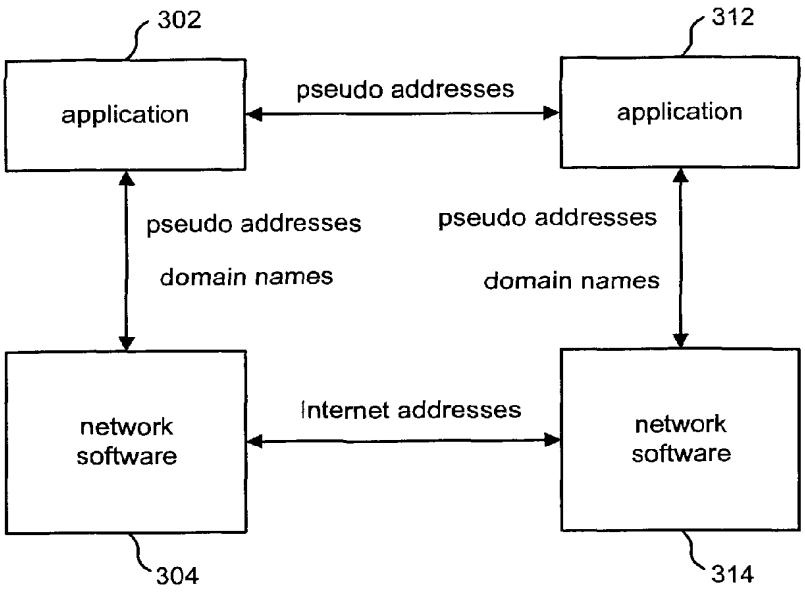
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(54) Title: PSEUDO ADDRESSING



(57) Abstract: The present invention provides for a system for communicating using pseudo addresses. Various embodiments of this system alleviate the diminishing IP address problem, allows for communication to continue after an entity (302, 312) has changed addresses and/or insulate the application software (302, 312) from the addressing formats of lower level protocols. The present invention also allows for communication to be initiated by a source entity (302) outside a private network that is directed to a destination entity (312) with a private address within the private network.

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PSEUDO ADDRESSING

CROSS REFERENCE TO RELATED APPLICATIONS

This application is related to the following Patents/Applications:

DOMAIN NAME ROUTING, Hasan S. Alkhatib, Serial No. 09/492,565, filed January 27, 2000, which is a continuation of U.S. Application 09/015,840, filed January 29, 1998;

IPNET GATEWAY, Hasan S. Alkhatib and Bruce C. Wootton, U.S. Application Serial No. 09/167,709, filed on October 6, 1998; and

COMMUNICATION USING TWO ADDRESSES FOR AN ENTITY, by Hasan S. Alkhatib and Fouad A. Tobagi, Attorney Docket No. TTCC-01003US1, filed the same day as the present application.

Each of the related Patents/Applications are incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention is directed to a system for communicating with entities on a network.

Description of the Related Art

Most machines on the Internet use TCP/IP (Transmission Control Protocol/Internet Protocol) to send data to other machines on the Internet. To transmit data from a source to a destination, the Internet Protocol (IP) uses an IP address. An IP address is four bytes long, which consists of a network number and a host number.

There are at least three different classes of networks currently in use: Class A, Class B and Class C. Each class has a different format for the combination of the network number and the host number in the IP addresses. Class A addresses include one byte to specify the network and three bytes to specify the host. The first bit of a

Class A address is a 0 to indicate Class A. Class B addresses use two bytes for the network address and two bytes for the host address. The first two bits of the Class B address are 10 to indicate Class B. The Class C address includes three bytes to specify the network and one byte for the host address. The first three bits of the Class C network address are 110 to indicate Class C. The formats described above allow for 126 Class A networks with 16 million hosts each; 16,382 Class B networks with up to 64K hosts each; and 4 million Class C networks with up to 256 hosts each.

When written out, IP addresses are specified as four numbers separated by dots (e.g. 198.68.70.1). Users and software applications rarely refer to hosts or other resources by their numerical IP address. Instead of using numbers, they use ASCII strings called domain names. A domain name is usually in the form of prefix.name_of_organization.top_level_domain. There are two types of top level domains: generic and countries. The generic domains are com (commercial), edu (educational institutions), gov (the U.S. Federal Government), int (international organizations), mil (the U.S. Armed Forces), net (network providers), and org (non-profit organizations). The country domains include one entry for each country. An example of a domain name is saturn.ttc.com. The term "saturn" is the prefix and may refer to a particular host in the network. The phrase "ttc" is the name of the organization and can be used to identify one or more networks to the outside world. The phrase "com" signifies that this address is in the commercial domain. The Internet uses a Domain Name System (DNS) to convert the domain name to an IP address.

The Internet Protocol has been in use for over two decades. It has worked extremely well, as demonstrated by the exponential growth of the Internet. Unfortunately, the Internet is rapidly becoming a victim of its own popularity: it is running out of addresses. Over 4 billion addresses exist, but the practice of organizing the address space into classes wastes millions of addresses. In particular, the problem is the Class B network. For most organizations, a Class A network, with 16 million addresses is too big, and a Class C network with 256 addresses is too small. A Class B network appears to be the right solution for most companies. In reality, however, a Class B address is far too large for most organizations. Many Class B networks have fewer than 50 hosts. A Class C network would have done the job, but many organizations that ask for Class B networks thought that one day they would outgrow the 8 bit host field.

One proposed solution to the depleting address problem is Classless Inter Domain Routing (CIDR). The basic idea behind CIDR is to allocate the remaining Class C networks in varied sized blocks. If a site needs 2,000 addresses, it is given a block of contiguous Class C networks, and not a full Class B network address. In addition to using blocks of contiguous Class C networks as units, the allocation rules for Class C addresses are also changed by partitioning the world into four zones. Each zone includes a predefined number of Class C networks. Although CIDR may buy a few more years time, IP addresses will still run out in the foreseeable future.

Another proposed solution is Network Address Translation (NAT). This concept includes predefining a number of Class A, Class B and Class C network addresses to be local addresses (also called private addresses). The remainder of the addresses are considered global addresses (also called public addresses). Global addresses are unique addresses that should only be used by one entity having access to the Internet. That is, no two entities on the Internet should have the same global address. Local addresses are not unique and are typically used for entities not having direct access to the Internet. Local addresses can be used by more than one organization or network. In the past, a local address could not be used to route on the Internet. Local addresses traditionally can only be used within a private network. NAT assumes that all of the machines on a private network will not need to access the Internet at all times. Therefore, there is no need for each machine to have a global address. A company can function with a small number of global addresses assigned to one or more gateway computers. The remainder of the machines on the private network will be assigned local addresses. When a particular machine on the private network using a local address attempts to initiate a communication to a machine outside of the private network (e.g. via the Internet), the gateway machine will intercept the communication, change the source machine's local address to a global address and set up a table for translation between global addresses and local addresses. The table can contain the destination address, port numbers, sequencing information, byte counts and internal flags for each connection associated with a host address. Inbound packets are compared against entries in the table and permitted through the gateway only if an appropriate connection exists to validate their passage. One problem with the NAT approach is that it only works for communication initiated by a host within the private network to a host on the Internet which has a global IP address.

The NAT approach specifically will not work if the communication is initiated by a host outside of the private network and is directed to a host with a local address in the private network.

A solution to the diminishing address problem that uses local and global addresses, and allows a communication to be initiated from outside the private network, needs a means for the application software to identify an entity with a local address. The application cannot use the local address because the local address does not uniquely identify the entity. The application cannot use the entity's global address because either the entity does not have a global address, the global address is temporary (and, therefore, not reliable), or the global address is not unique to the one entity.

Another solution that has been proposed is a new version of the Internet Protocol called IPv6 (Internet Protocol version 6, also known as IPng). IPv6 is not compatible with the existing Internet Protocol (IPv4). For example, IPv6 has a longer address than IPv4. Because IPv6 is not compatible with IPv4, almost all application software will need to be replaced with newer software that can use the IPv6 address. Such widespread updating of software is not practical, too expensive and not likely to be accepted by the millions of computer users.

Another technology that has ben effected by the IP address problem is mobile Internet access (including wireless access). Many mobile computing devices are now able to access the Internet, for example, laptop computers, cellular telephones, handheld computers (e.g. Palm Pilot), etc. There are not enough Internet addresses available to assign a static global Internet address to each mobile computing device. Thus, these devices are typically assigned temporary Internet addresses by an Internet Service Provider or other entity. Often, a mobile computing device's Internet address may change during a communication. For example, a cellular telephone may change its Internet address as it is moved to a different location. Currently, a communication between two entities cannot be maintained if one of the entities changes its Internet address.

SUMMARY OF THE INVENTION

The present invention, roughly described, provides for a system for communicating using pseudo addresses. Various embodiments of this system alleviate the diminishing IP address problem discussed above, allow for communication to

continue after an entity has changed addresses and/or insulate the application software from the addressing formats of lower level protocols. The present invention also allows for communication to be initiated by a source entity outside a private network that is directed to a destination entity with a local address within the private network.

One embodiment of the present invention includes a method for communicating. The method includes the step of receiving a request to communicate from a first application on a source entity. The request includes a first pseudo address used by the source entity to identify a destination entity. The first pseudo address is used to access a global address. A quantity of information is sent from the source toward the destination entity using the global address. One embodiment of the present invention further includes the steps of receiving the quantity of information at the destination entity, providing at least a subset of the quantity of information to an application on the destination entity and providing the pseudo address to the application on the destination entity.

One alternative embodiment further includes the steps of receiving the quantity of information at an intermediate entity, where the quantity of information includes a source address and a destination address. The destination address is a global address corresponding to the intermediate entity. The intermediate entity accesses a local address for the destination and sends the quantity of information to the destination using the local address.

The present invention can be accomplished using hardware, software, or a combination of both hardware and software. The software used for the present invention is stored on one or more processor readable storage media including a hard disk drive, CD-ROM, optical disk, floppy disk, RAM, ROM or other suitable storage device. In alternative embodiments, some or all of the software can be replaced by dedicated hardware including custom integrated circuits, gate arrays, FPGAs, PLDs, and special purpose computers.

These and other objects and advantages of the invention will appear more clearly from the following detailed description in which the preferred embodiment of the invention has been set forth in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 depicts an IP packet.

Figure 2 shows the format of a header of an IP packet.

Figure 3 is a block diagram of multiple entities connected to the Internet.

Figure 4 is a block diagram of one embodiment of hardware suitable for use with the present invention.

Figure 5 is a block diagram illustrating the use of pseudo addresses.

Figure 6 is a flow chart describing a high level operation according to one embodiment of the present invention.

Figure 7 is a flow chart describing a process of domain name resolution according to a first embodiment of the present invention.

Figure 8 depicts a table entry.

Figure 9 is a flow chart describing a process for starting communication according to a first embodiment of the present invention.

Figure 10 is a block diagram illustrating encapsulated packets.

Figure 11 depicts the format of information stored in an options field.

Figure 12 is a flow chart of the process of communicating according to a first embodiment of the present invention

Figure 13 is a flow chart describing a process of domain name resolution according to second embodiment of the present invention.

Figure 14 is a flow chart describing a process for starting communication according to a second embodiment of the present invention.

Figure 15 is a flow chart of the process of communicating according to a second embodiment of the present invention.

DETAILED DESCRIPTION

The TCP/IP reference model for designing and building a network includes at least four layers: the Physical and Data Link Layer, the Network Layer, the Transport Layer, and the Application Layer. The physical layer portion of the Physical and Data Link Layer is concerned with transmitting raw bits over a communication channel. The design issues include ensuring that when one side sends a 1 bit it is received by the other side as a 1 bit, not as a 0

bit. Typical questions addressed are how many volts should be used to represent a 1 bit, how many volts to represent a 0 bit, how many microseconds a bit lasts, whether transmissions may proceed simultaneously in both directions, how the initial connection is established, how it is torn down when both sides are finished, and how many pins the network connector has. The data link portion of Physical and Data Link Layer takes the raw transmission facility and transforms it into a line that appears to be relatively free of transmission errors. It accomplishes this task by having the sender break the input data up into frames, transmit the frames and process the acknowledgment frames sent back by the receiver.

The Network Layer permits a host to inject packets into a network and have them travel independently to the destination. The protocol used for the Network Layer on the Internet is called the Internet Protocol (IP). The main function of the Network Layer is routing packets from a source entity to a destination entity. In most cases, packets will require multiple hops to make the journey. The Network Layer software uses one or more routing methods for deciding which output line an incoming packet should be transmitted on. There are many routing methods that are well known in the art that can be used in a network layer. For purposes of this patent, no specific routing method is required. Any suitable routing method known in the art will suffice.

The network entity, the process implementing the network layer, receives a segment from the transport layer process. The network entity appends a header to the segment to form a packet. The packet is sent to a router on a network (e.g. the Internet). Each router has a table listing IP addresses for a number of distant networks and IP addresses for hosts in the network closest to the router. When an IP packet arrives, its destination address is looked up in the routing table. If the packet is for a distant network, it is forwarded to the next router listed in the table. If the distant network is not present in the router's tables, the packet is forwarded to a default router with more extensive tables. If the packet is for a local host (e.g. on the router's Local Area Network (LAN)), it is sent directly to the destination.

Although every machine in the Internet has an IP address, these addresses alone cannot be used for sending packets because the data link layer does not understand Internet addresses. Most hosts are attached to a LAN by an interface board

that only understands LAN addresses. For example, every Ethernet board comes equipped with a 48 bit Ethernet address. Manufacturers of Ethernet boards request a block of addresses from a central authority to ensure that no two boards have the same address. The boards send and receive frames based on a 48 bit Ethernet address. For one entity to transmit data to another entity on the same LAN using an Ethernet address, the entity can use the Address Resolution Protocol (ARP). This protocol includes the sender broadcasting a packet onto the Ethernet asking who owns the particular IP address in question. That packet will arrive at every machine on the Ethernet and each machine will check its IP address. The machine that owns the particular IP address will respond with its Ethernet address. The sending machine now has the Ethernet address for sending data directly to the destination on the LAN. At this point, the Data Link Layer on the sender builds an Ethernet frame addressed to the destination, puts the packet into the payload field of the frame and dumps the frame onto the Ethernet. The Ethernet board on the destination receives the frame, recognizes it is a frame for itself, and extracts the IP packet from the frame.

The Transport Layer is designed to allow peer entities on the source and destination to carry on a "conversation." On the Internet, two end-to-end protocols are used. The first one, the Transmission Control Protocol (TCP), is a reliable connection-oriented protocol that allows a byte stream originating on one machine to be delivered without error to another machine on the Internet. It fragments the incoming byte stream into discrete packets and passes each one to the Network Layer. At the destination, the receiving TCP process reassembles the received packets into the output stream. TCP also handles flow control to make sure a fast sender cannot swamp a slow receiver with more packets than it can handle. The second protocol used in the Transport Layer on the Internet, User Datagram Protocol (UDP), is an unreliable connectionless protocol for applications that do not want TCP sequencing or flow control. UDP is used for one-shot, client server type requests-reply queries for applications in which prompt delivery is more important than accurate delivery. The Transport Layer is considered to be above the Network Layer to indicate that the Network Layer provides a service to the Transport Layer. Similarly, the Transport Layer is below the Application Layer to indicate that the Transport Layer provides a service to the Application Layer. The Application Layer contains the high level

protocols, for example, Telnet, File Transfer Protocol (FTP), Electronic Mail - Simple Mail Transfer Protocol (SMTP), and HyperText Transfer Protocol (HTTP).

Communication in the Internet generally works as follows. The Transport Layer breaks up a stream of data from the Application Layer into a number of segments. The Network Layer, using the Internet Protocol, transports the segments in one or more IP packets from source to destination, without regard to whether these machines or entities are on the same network. Each segment can be fragmented into small units as it is transported. When all of the fragments finally get to the destination machine, they are reassembled by the Network Layer into the original segment. This segment is then handed to the Transport Layer, which inserts it into the receiving process' (Application Layer) input stream.

Figure 1 depicts the structure of an IP packet 10. IP packet 10 consists of header 12 and payload 14. Payload 14 stores the data received from the Transport Layer. Figure 2 depicts the format of a header of an IP packet. The header is depicted to include six rows. Each row is 32 bits wide. The first five rows of the header comprise a 20 byte fixed portion of the header. The last row of the header provides a variable sized options field 22. Version field 24 keeps track of which version of the protocol the packet belongs to. The current version used on the Internet is version 4. IHL field 26 describes the length of the header in 32 bit words. Type field 28 indicates the type of service requested. Various combinations of reliability and speed are possible. Length field 30 includes the size of the packet, including both the header and the data. Identification field 32 is needed to allow the destination host to determine which segment the received fragment belongs to. All fragments of a segment contain the same identification value. Next comes three flags, which include an unused bit 33 and then two 1 bit fields 34 and 36. In one embodiment of the present invention, the unused bit 33 is used to indicate that the packet was created according to the present invention and is storing both a global address and a local address for the destination. DF field 34 stands for don't fragment. It is an order to the routers not to fragment the segment because the destination is incapable of putting the pieces back together again. MF field 36 stands for more fragments. All fragments except for the last one have this bit set. Fragment offset field 38 indicates where in the current segment this fragment belongs. Time to Live field 40 is used to limit packet lifetime. It is supposed to count time in seconds, allowing a maximum life time of 255 seconds. In practice, it may

count hops. The time is decremented on each hop by a router. When the time to live hits 0, the packet is discarded and a warning is sent back to the source using an Internet Control Messaging Protocol (ICMP) packet. This feature prevents packets from wandering around forever. Protocol Field 42 indicates which transport layer type is to receive the segment. TCP is one possibility, UDP is another. The present invention is not limited to any particular protocol. Checksum field 44 verifies the header. One method for implementing a checksum is to add up all 16 bit half words as they arrive and take the ones compliment of the result. Note that the checksum must be recomputed at each hop because the Time to Live field 40 changes. Source field 46 indicates the IP address for the source of the packet and destination field 48 indicates the IP address for the destination of the packet.

Options field 22 is a variable length field designed to hold other information. Currently, options used on the Internet indicate security, suggested routing path, previous routing path and time stamps. In one embodiment of the present invention, it is contemplated that the source and/or destination's local addresses are added to Options field 22. In some alternatives, the two local addresses can be encoded, compressed, encrypted or otherwise altered to provide more efficient use of storage space, security or compatibility.

In another embodiment, the local addresses of the source, destination or both are added to the end of the data portion of a packet as a trailer. In this case, Length field 30 needs to account for the extra bytes added at the end of the data field. Legacy routers can treat this trailer as an integral part of the data field and ignore it. In yet another embodiment, source field 46 and destination field 48 can be enlarged to 64 bits each so that they each can store a local address and a global address.

In another embodiment in the present invention, the local address and global address of an entity are both stored in a packet by utilizing encapsulation. That is, one IP packet is encapsulated inside the payload of another IP packet.

Figure 3 shows two networks connected to Internet 138. The first network includes a Router connected to private network 144 which is made up of a number of entities using local addresses. Figure 3 shows three entities 146, 148 and 150; however, more or less than three entities can also be used. Entity 146 is labeled as A, and has a global IP address of GIP_A.

Figure 3 also shows a Gateway connected to Internet 138 and to private network 162. The Gateway has a global address of GIP_G. Figure 4 shows part of network 162 including three entities 166, 168 and 170; however, more or less than three entities can be used. Entity 170 is labeled as B and has a local address of LIP_B. In the description below, examples will be made referring to the entities depicted in Fig. 4. Other configurations will also work with the present invention. The present invention allows entity A to initiate a communication with entity B by using both the global address for the Gateway (GIP_G) and the local address for B (LIP_B). Similarly, B can initiate communication with A utilizing the global address for A (GIP_A). For example purposes, it is assumed that A and B are computers. Alternatively, A and B can be other electronic devices that can communicate on the Internet or other network.

Figure 3 also shows entity X and entity Y connected to the Internet. These entities can be computers or other devices. In one example, entity X is a mobile device that uses wireless communication to access the Internet (or other network).

Figure 4 shows one example of a hardware architecture for computers used to implement the present invention. The hardware includes a processor 202, a memory 204, a mass storage device 206, a portable storage device 208, a first network interface 210, a second network interface 212 and I/O devices 214. The choice of processor is not critical as long as a suitable processor with sufficient speed is chosen. Memory 204 can be any conventional computer memory. Mass storage device 206 can include a hard drive, CD-ROM or any other mass storage device. Portable storage 208 can include a floppy disk drive or other portable storage device. If the computer is acting as a router, it includes two or more network interfaces. In other embodiments, the computer may include only one network interface. The network interface can include a network card for connecting to an Ethernet or other type of LAN. In addition, one or more of the network interfaces can include or be connected to a firewall. For a gateway, one of the network interfaces will typically be connected to the Internet and the other network interface will typically be connected to a LAN. However, a gateway can exist physically inside a network. I/O devices 214 can include one or more of the following: keyboard, mouse, monitor, display, printer etc. Software used to perform the methods of the present invention are likely to be stored in mass storage 206 (or any form of non-volatile memory), a portable storage media (e.g. floppy disk or tape) and/or, at some point, in memory 204. Various embodiments, versions, and

modification of the system of Fig. 4 can be used to implement a gateway, a router, other host, etc. The above described hardware architecture is just one suitable example depicted in a generalized and simplified form. The present invention could include dedicated hardware, a dedicated router with software to implement the invention or other software and/or hardware architectures that are suitable.

Figure 5 is a block diagram illustrating the use of pseudo addresses. A pseudo address in its most generic form is an identification of an entity that is different from the entity's actual address. In one embodiment, the pseudo address is a random address chosen to identify a particular entity. The randomly chosen address is not the entity's actual address. In one alternative, the pseudo address is in the format for IPv4 addresses. Depicted in Figure 5 are application 302 and network software 304, which are both running on a single computer (in one embodiment). Network software 304 pertains to software at the transport layer, network layer, and other layers. Application software 302 pertains to software at the application layer. Figure 5 also shows application 312 and network software 314, both of which are running on a single computer (in one embodiment). In one example, application 302 communicates with application 312. According to the current invention, both applications 302 and 312 use pseudo addresses to communicate with each other. However, in actuality, application 302 communicates with application 312 using network software 304 and network software 314. Application 302 identifies application 312 to network software 304 using a domain name and a pseudo address. Network software 304 communicates with network software 314 using Internet addresses (e.g. global addresses). In one example, network software 304 and network software 314 use IPv4 addresses. Other address formats can also be used, including IPv6. Application 312 identifies application 302 to network software 314 using a pseudo address and a domain name. Thus, from the point of view of the application software, the pseudo addresses are being used to identify the applications. Therefore, if the Internet addresses of the two computers (or other entities) change, applications 302 and 312 do not need to know about the change in the Internet addresses, including changes in format, changes of actual address, etc. because the pseudo addresses have not changed. Additionally, because the applications are using pseudo addresses, the applications do not need to be concerned with the format or change of format of the IP addresses. Thus, an IPv4 application can be made

to work with IPv6. Note that if application 302 asks network software 304 for its own IP address, then network 304 will respond with the pseudo address.

Figure 6 is a flow chart describing a high level operation of one embodiment of the present invention. In step 330, the entity wishing to initiate communication performs a domain name resolution. For purposes of a first example, assume that entity X of Figure 3 is attempting to initiate communication with entity Y. In step 332, the communication is started. In step 334, the two entities communicate with each other. In step 336, the communication ends.

Figure 7 is a flow chart describing one embodiment of the method for domain name resolution, corresponding to step 330 of Figure 6. In step 350, the application software running on entity X requests a domain name resolution. Typically, when an application seeks to establish communication with an entity on the Internet, the application is only in possession of the entity's domain name. The application makes a call to a resolver process, which converts the domain name to an IP address. Every domain, whether it is a single entity or a top level domain, has a set of resource records associated with it. For a single entity, the most common resource record is its IP address. When a resolver process gives a domain name to the domain name system, it gets back the resource records associated with that domain name.

A resource record has five fields: domain name, time to live, class, type and value. The time to live field gives an indication of how stable the record is. Information that is highly stable is assigned a large value such as the number of seconds in a day. The third field is the class. For the Internet the class is IN. The fourth field tells the type of resource record. One domain may have many resource records. There are at least eight types of resource records that are important to this discussion: SOA, A, MX, NS, CNAME, PTR, HINFO, and TXT. The value field for an SOA record provides the name of the primary source of information about the name server zone, e-mail address of its administrator, a unique serial number and various flags and time outs in the value field. The value field for an A record holds a 32 bit IP address for the host. The value field for the MX record holds the domain name of the entity willing to accept e-mail for that particular domain name. The NS record specifies name servers. The CNAME record allows aliases to be created in the value field. A PTR record just points to another name in the value field, which allows look up of an IP address for a particular domain name. The value field of the HINFO record

indicates the type of machine and operating system that the domain name corresponds to.

When an application requests resolution of a domain name, the network software for that entity will contact a DNS server in order to obtain the authoritative resource record that indicates the IP address for the host associated with the domain name. This resource record will be returned to the network software for the entity X in step 352. In step 354, the network software for entity X will chose a pseudo address. In one embodiment, the pseudo address is chosen randomly. In other embodiments, a list of pseudo addresses to choose from can be prestored. In the current example, the pseudo address is in the same format as typical IPv4 Internet addresses. In step 356, the pseudo address chosen in step 354, the IP address resolved in step 352 and the domain name from step 350 are all stored in a table. In step 358, the pseudo address is provided to the application software.

Figure 8 shows an example of an entry in the table mentioned in step 356. The entry includes four fields: local pseudo address 402, remote pseudo address 404, remote local IP address 406 and remote global IP address 408. Using the example that entity X is initiating a communication with entity Y, assume that the entry of Figure 8 is on a table stored on entity X. Thus, local pseudo address 402 is a pseudo address used by entity Y to identify entity X. Remote pseudo address 404 is a pseudo address used by entity X to identify entity Y. Remote local IP address 406 is the private network address of entity Y (if entity Y has a private IP address) and remote global IP address 408 is a global IP address associated with entity Y. Note that in some embodiments, a table may contain less than all four fields. In other embodiments, this information can be stored in data structures other than a table. The exact format of the data structure is not important to the present invention.

Figure 9 is a flow chart describing the process of starting communication, which is step 332 of Figure 6. In step 500, network software 304 of entity X receives a request from application 302 of entity X to communicate with application 312 of entity Y. The request includes the pseudo address that application 302 uses to identify entity Y. Alternatively, the request can include an identification of entity Y by domain name or other means. In step 502, network software 304 of entity X creates a packet. This packet includes the pseudo address that entity X uses to identify entity Y. In one embodiment, the packet created in step 502 is an IP packet. The source field 46 of the

IP packet is the global IP address for entity X. The destination field 48 of the IP packet is the global IP address for entity Y. When network software 304 receives the pseudo address from application 302 of entity X, the pseudo address (remote pseudo address 404) is used to access the table to determine the global IP address 408 for entity Y. There are many different options for inserting the pseudo address of entity Y into the packet. One implementation uses encapsulation. A second implementation uses the options field 22 of the IP packet.

Figure 10 illustrates encapsulation. That is, Figure 10 shows three packets 620, 622 and 624. Packet 620 includes header portion 640 and data (or payload) portion 642. Packet 622 includes header portion 644 and payload portion 646. Packet 624 includes header portion 650 and payload portion 652. Packet 624 is encapsulated within packet 622. For example, packet 624 is included in the data portion 646 of packet 622. Packet 622 is encapsulated within packet 620. For example, packet 622 is within the data portion 642 of packet 620. In one embodiment, packet 624 is actually a TCP segment, packet 620 is a first IP packet and packet 622 is a second IP packet. Packet 622 has a source address equal to the IP address of X and a destination address equal to the global address of Y. Packet 620 is used to route on the Internet from entity X to entity Y. Packet 622 has a source equal to the global IP address of entity X, however, the destination is equal to the pseudo address that entity X uses to identify entity Y. Packet 622 is not used to route on the Internet. Rather, entity Y will read packet 622 and use it to access the pseudo address stored therein. In another embodiment, packet 622 can be a new format, called a pseudo address format. This new format would likely have fields for pseudo addresses and IP addresses. Packet 620 would have a flag to indicate that it is encapsulating a pseudo address packet. One option is to include a flag in the protocol field 42 to indicate that the encapsulated packet is a pseudo addresses packet.

Instead of using encapsulation to add a pseudo address to a packet, the pseudo address can be added to the options field 22 of the packet. Figure 11 shows the format for adding the pseudo address to option field 22. Data in the option field typically has a format including three fields: option type 670, length 672 and option 674. An option type would be created to indicate that the option is a pseudo address. Length 672 would indicate the length of the three fields. Option 674 would store the actual pseudo

address. As discussed above, one embodiment includes the pseudo address being in IPv4 format.

Looking back at Figure 9, in step 504, the packet is set from entity X to entity Y, via the Internet (or other network). In step 506, entity Y receives the packet. In step 508, entity Y accesses the pseudo address within the packet. In step 510, the pseudo address is added to a table on entity Y. In one embodiment, the table on entity Y is the same format as depicted in Figure 8. The pseudo address added to the table in step 510 is the pseudo address that entity X uses to identify entity Y. Step 510 also includes adding the remote global IP address 408 of entity X to the table. In step 512, entity Y chooses a pseudo address for entity X. As described above, one method for choosing a pseudo address includes randomly choosing an appropriately formatted address. Other embodiments include using prestored addresses. In step 514, the chosen address from step 512 is added to the table. In step 516, the remote pseudo address is provided to application 312 and entity Y. In step 518, entity Y, at the request of application 312 (of entity Y) or otherwise, creates a packet. The source of the packet is the IP address for entity Y and the destination of the packet is the IP address for entity X. The packet also includes a pseudo address that Y uses to identify X. In step 520, the packet is sent from entity Y to entity X. In step 522, entity X receives the packet. In step 524, entity X access the pseudo address from the packet. This is the pseudo address that entity Y uses to identify entity X. In step 526, the pseudo address is entered into the table on entity Y in local pseudo address 402.

Figure 12 is a flow chart describing the process for communicating between entity X and entity Y, which is step 334 of Figure 6. In step 700, network software 304 of entity X receives data and the pseudo address from application 302 of entity X, as part of a request to send that data to entity Y. In step 702, network software 304 accesses the table using the pseudo address to identify the global IP address for sending information to entity Y. In step 704, it is determined whether there has been a change in the connection. If there has not been a change in the connection, then in step 706, a packet is created. A packet includes the IP addresses for entity X and entity Y, but does not include any pseudo addresses.

During a communication between two entities, it is possible that the connection changes. For example, one of the entities may change its IP address. For example, if one of the entities is a cellular telephone traveling between two distinct areas, the IP

address may change when entering the new area. Other scenarios for an IP address changing also apply, as well as other reasons for changes in connections. If there is a change in connection (on the part of entity X) during communication, then (at step 704) the method loops to step 710. In step 710, a packet is created with the IP addresses for entity X and entity Y. The packet created by entity X will also include the pseudo address that entity Y uses to identify entity X. After step 706 or step 710, the method loops to step 708, and the packet is sent to the destination (e.g. entity Y). In step 712, the packet is received at entity Y. When the packet is received at entity Y, the IP address of the source of the packet is used to access the table to determine the pseudo address that entity Y uses to access entity X. In step 714, entity Y determines whether the packet contains a pseudo address. If the packet does not contain a pseudo address, then the data is presented to the application in step 716. Additionally, in step 716, the pseudo address for the source of the data is presented to the application. If, in step 714, it is determined that the received packet includes a pseudo address, then it is assumed that there was a change in the connection. In that case, the method loops to step 718 and the table is accessed using the pseudo address in the packet. This pseudo address is used to match the remote pseudo address 404 field of one of the entries in the table. The table entry matching the pseudo address is then updated by replacing the remote global IP address 408 with the IP address from the received packet. After step 720, the method loops to step 716.

Figure 13 is a second embodiment of the process of domain name resolution, which is step 330 of Figure 6. The embodiment described by Figures 13-15 pertain to a scenario where the communication is initiated by entity A (which has a global IP address) with entity B (which is on a private network). In step 740, the application requests domain name resolution, similar to step 350 of Figure 7. In step 742, the domain name is resolved to a global IP address, similar to step 352 of Figure 7. In step 744, entity X uses the global IP address returned in step 742 to contact the gateway. In step 742, the domain name (e.g. B.com) was resolved to the global IP address of the gateway GIP_G. In step 744, GIP_G is used in an IP packet to contact the Gateway and acquire the local address for B, which is LIP_B. In step 746, A chooses a pseudo address to identify B. Step 746 is similar to step 354 of Figure 7. In step 748, the pseudo address chosen for entity B, global address for entity B and local address for entity B

are added to the table. In step 750, the pseudo address for entity B is provided to the application who requested the domain name resolution in step 740.

In one embodiment of step 744, the Gateway stores a table. Each table entry includes at least two fields. One field stores a local address of an entity in the private network and the other field stores the corresponding domain name for the entity associated with the local address. Thus, step 744 includes sending a request to the gateway with a domain name and asking the gateway to return the local address based on the domain name. The domain name could be stored in options field 22 of the IP packet or can be stored within the packet using encapsulation.

Figure 14 is a second embodiment of the process for starting communication, corresponding to step 332 of Figure 6. In step 800, network software 304 on entity A receives a request to communicate from application 302 on entity A. In step 802, entity A creates a packet. The packet includes the global IP address for entity A as the source and the global IP address for the Gateway as the destination. The packet also includes the pseudo address that entity A uses to identify entity B. In step 804, the packet is sent from entity A to the Gateway.

In step 806, the Gateway receives the packet and changes the destination address in the packet from the global IP address for the Gateway (GIP_G) to the local IP address for entity B and sends the edited packet to entity B. In one embodiment, the packet sent from entity A to the Gateway includes the local IP address for entity B. That is, entity A will include the local IP address for entity B in the packet when the packet is created in step 802. In another embodiment, entity A can include the domain name or the pseudo address, which can be used to access a table which associates the domain name or pseudo address with the local addresses. In step 808, entity B receives the packet. In step 810, entity B accesses the pseudo address. In step 812, entity B adds the pseudo address that entity A uses to identify entity B, and entity A's global IP address to the table. In step 814, entity B chooses a pseudo address for entity A and adds that pseudo address to the table in step 816. In step 818, the pseudo address for entity A is provided to application 312 on entity B. In step 820, entity B creates a packet (in response to the application) which includes the global IP address for entity A as the destination and the local IP address for entity B as the source. The packet also includes the pseudo address that entity B uses to identify entity A. In step 822, entity B sends the packet. In step 824, the Gateway receives the packet and changes the source

address from the local IP address of entity B to the global IP address of the Gateway. This packet is then sent to entity A. In another embodiment, entity B can create the IP packet using the global IP address of the Gateway as the source and bypass all or part of step 824. In step 826, entity A receives the packet. In step 828, entity A accesses the pseudo address that entity B used to identify entity A and stores that pseudo address in the table in step 830.

Figure 15 is a second embodiment of the process of communicating, which is step 334 of Figure 6. In step 860, network software 304 of entity A receives data and a pseudo address from application 302 of entity A. The pseudo address is that used by entity A to identify entity B. In step 862, the pseudo address is used to access the table to identify the global IP address for the Gateway (GIP_G) and the local IP address for entity B (LIP_B). In step 864, it is determined whether the connection has changed. Step 864 is similar to step 704 of Figure 12. If the connection has not changed, then in step 866, a packet is created which includes the global IP address of the Gateway as the destination and the global IP address of entity A as the source. The local IP address of entity B is also stored in the packet. In one embodiment, the local IP address is stored in options field 22 of the IP packet. In another embodiment, the local IP address is encapsulated within a packet inside the IP packet. The packet created by step 866 does not include a pseudo address.

If there was a change in the connection (step 864), then in step 870 a packet is created. The packet includes the global IP address of the Gateway as the destination and the global IP address of entity A as the source. Additionally, the pseudo address that entity B uses to identify entity A is added to the packet. After step 866 or step 870, the method proceeds to step 868 and the packet is sent. In step 872, the Gateway receives the packet, replaces the destination of the global IP address for the Gateway with the local IP address of entity B by accessing the local IP address for entity B within the packet and sends the packet to entity B. In another embodiment, the Gateway does not translate the global address of the Gateway to the local address of entity B. Instead, the Gateway encapsulates the incoming packet in a new packet whose destination is the local address of entity B and the source address is the address of the Gateway. This embodiment enables preservation of the packet that originates from the source as is until it reaches the destination, allowing the application of IPsec to the original packet. This enables the use of IPsec end-to-end from source to

destination. IPsec breaks if the content of the original packet is modified along the way. In step 874, entity B receives the packet from the Gateway. If the packet does not include a pseudo address (step 876), then it is assumed that the connection did not change and the method proceeds to step 878. In step 878, the data from the packet is presented to the application along with the pseudo address used by entity B to identify entity A. If, in step 876, it is determined that the packet does contain a pseudo address, then it is assumed that the connection has changed. In step 880, the pseudo address within the packet is used to access the table entry. That table entry accessed in step 880 is updated in step 882 to change the old global IP address of entity A to the new global IP address for entity A found in the current packet. After step 882, the method loops to step 878.

In the above example, the local IP address for entity B is transmitted in Options field 22 of the IP packet. In other embodiments, the system can use encapsulation. That is, multiple IP packets can be encapsulated within each other. The outer IP packet can have a source address of the global IP address of entity A and the destination address of the global IP address for the Gateway. The second IP packet, encapsulated within the first IP packet, has a source equal to the global IP address of the Gateway and a destination address equal to the local IP address of entity B. The third packet, encapsulated inside the second packet, has a source of the global IP address of entity A and destination of the local IP address of entity B. The set of packets is first transmitted from entity A to the Gateway. When the packets are received at the Gateway, the Gateway strips off the first packet and sends the second packet (with the third packet inside) to entity B. When entity B receives the second packet, entity B removes the second packet and uses the third packet to determine how to reply.

In the embodiment described above with respect to Figure 13, the system first performed a regular domain name resolution to determine the global IP address of the Gateway and then contacts the Gateway to get the local IP address of entity B. In one embodiment, entity A can get the local IP address of entity B from the Gateway by doing a domain name resolution request directly with the Gateway. In another embodiment, entity A can obtain a local address for entity B from the Gateway by using an ICMP echo request. In another embodiment, rather than acquiring the global IP address of the Gateway and the local IP address of entity B in two separate steps, the

domain name resolution process can be altered such that when resolving the domain name for entity B (e.g. B.com), the resource record will return with both the global IP address for the Gateway and the local IP address of entity B. In yet another embodiment, the first domain name resolution returns the global address of the Gateway and a second domain name resolution sent to a different entity (other than the Gateway) returns the local address.

In one implementation, the pseudo addresses are communicated using a transport layer header, inserted between the IP header and the TCP or UDP header or a packet. The transport layer header includes the public addresses of the two communicating entities, the pseudo addresses of the two entities and the protocol of the packet payload (TCP or UDP).

The foregoing detailed description of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and obviously many modifications and variations are possible in light of the above teaching. The described embodiments were chosen in order to best explain the principles of the invention and its practical application to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the claims appended hereto.

CLAIMS

We Claim:

1. A method for communicating, comprising the steps of:

receiving a request to communicate from a first application on a source, said request includes a first pseudo address corresponding to a destination;

using said first pseudo address to access a public address; and

sending a quantity of information toward said destination using said public address.

2. A method according to claim 1, further comprising the steps of:

receiving said quantity of information at said destination;

providing at least a subset of said quantity of information to a second application on said destination; and

providing a second pseudo address to said second application on said destination, said second pseudo address corresponds to said source.

3. A method according to claim 2, further comprising the steps of:

receiving said quantity of information at an intermediate entity, said quantity of information having a source address and a destination address, said destination address is a public address corresponding to said intermediate entity;

accessing a private address for said destination; and

sending at least a subset of said quantity of information to said destination using said private address for said destination.

4. One or more processor readable storage devices having processor readable code, said processor readable code for programming a processor to perform a method comprising the steps of:

receiving a request to communicate from a first application on a source, said request includes a first pseudo address corresponding to a destination;

using said first pseudo address to access a public address; and

sending a quantity of information toward said destination using said global address.

Fig. 1

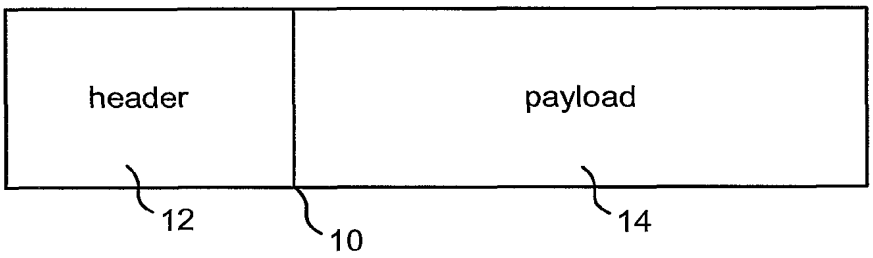


Fig. 2

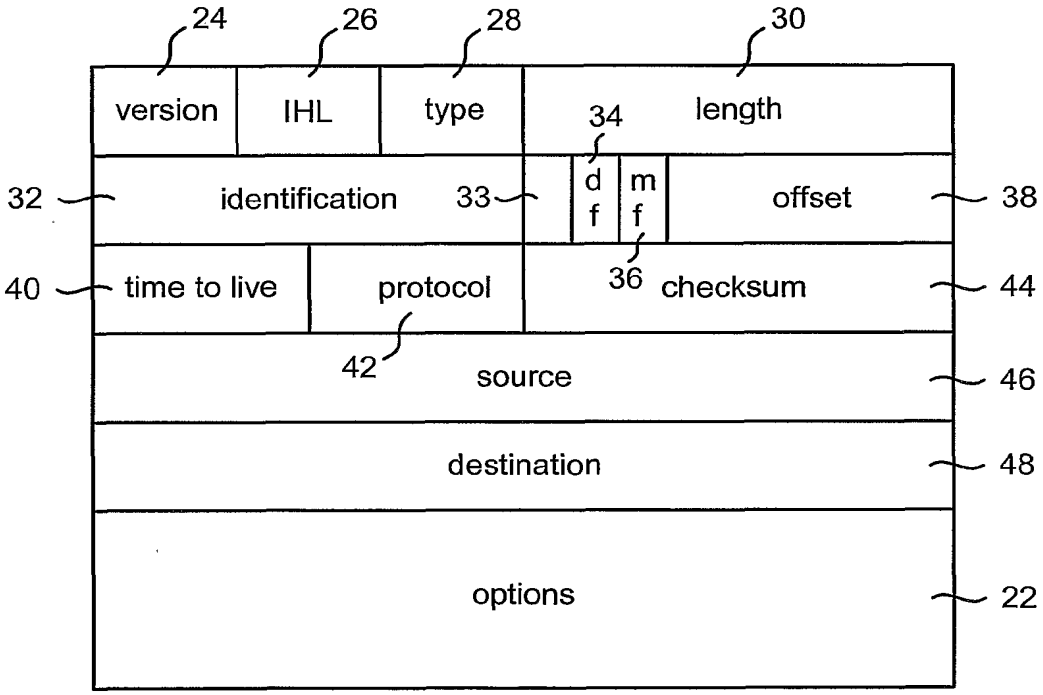


Fig. 8

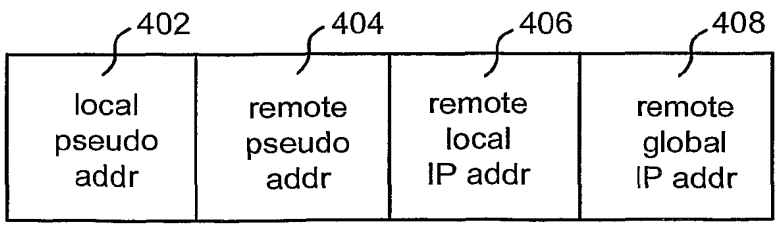


Fig. 3

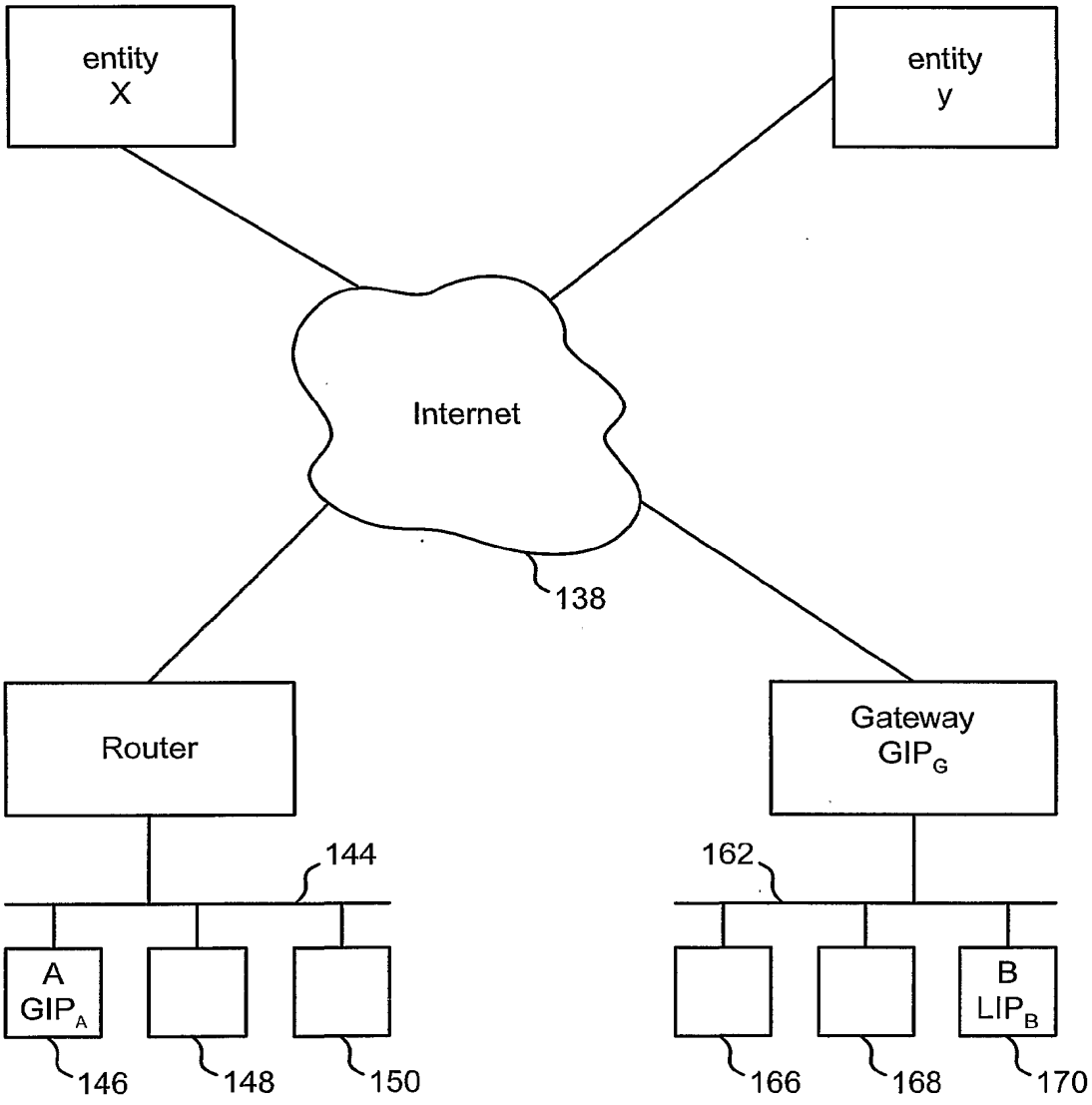

entity
X
entity
y
Internet
138
Router
Gateway
GIP$_G$
144
162
A
GIP$_A$
B
LIP$_B$
146
148
150
166
168
170

Fig. 4

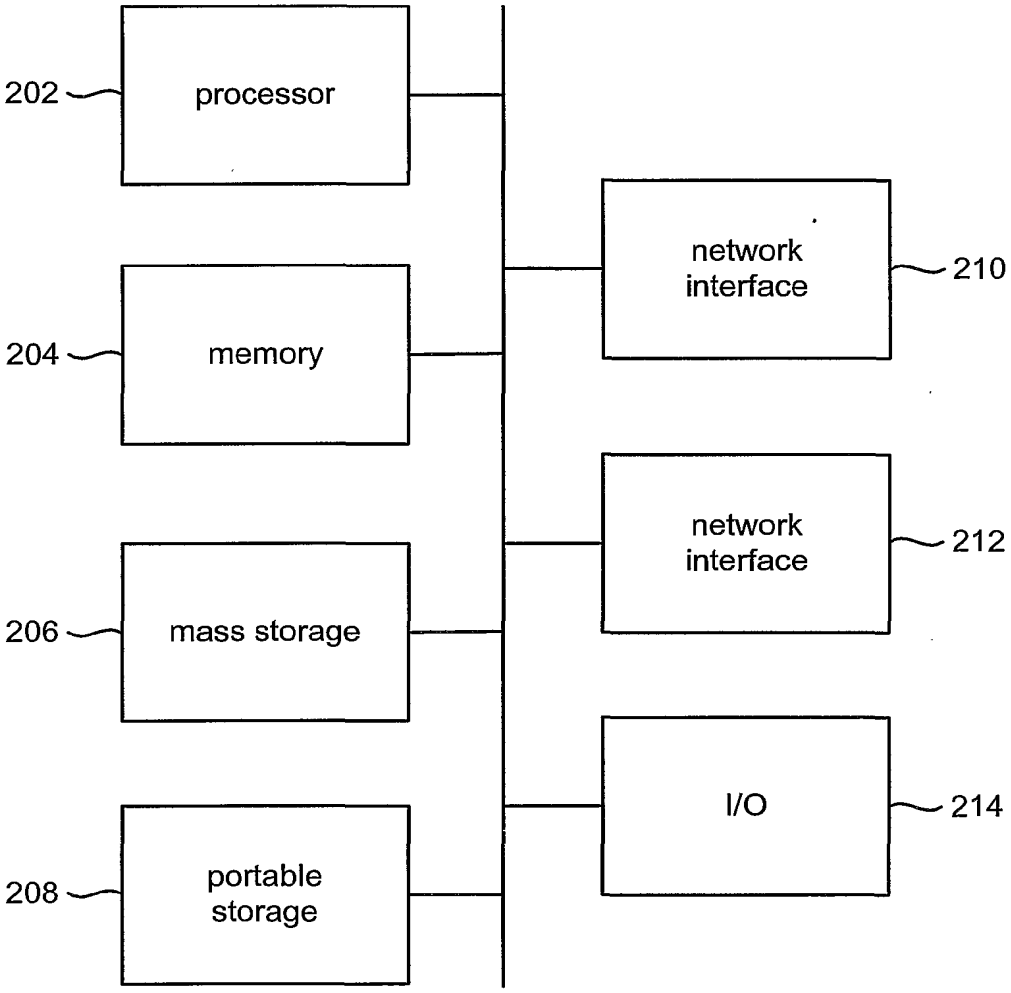

202
processor
204
memory
206
mass storage
208
portable storage
network interface
210
network interface
212
I/O
214

Fig. 5

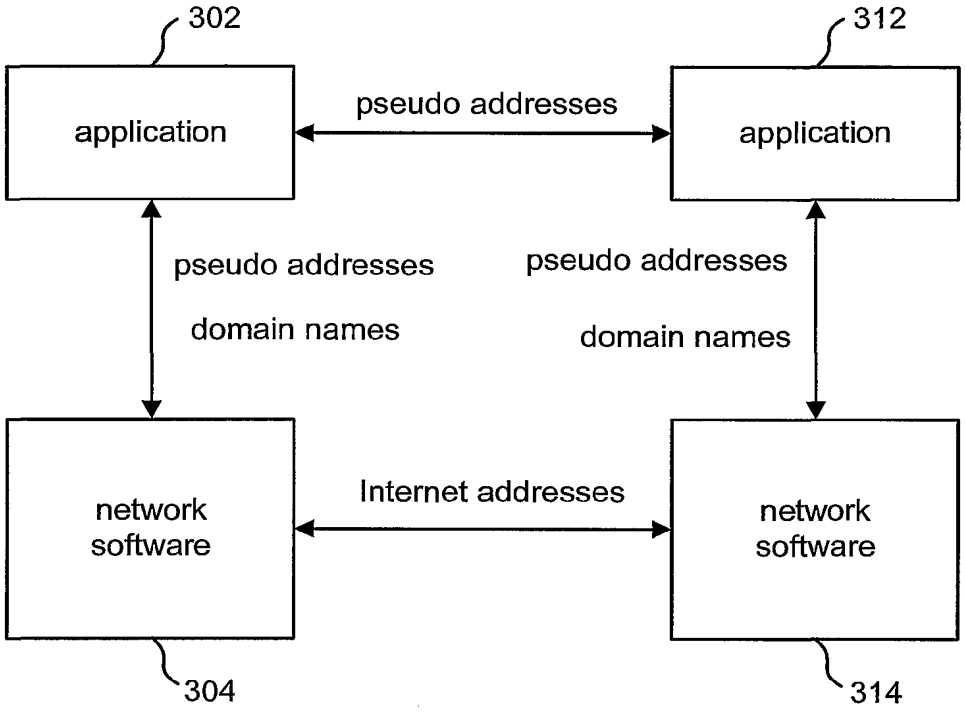

302
312
application
pseudo addresses
application
pseudo addresses
domain names
pseudo addresses
domain names
network software
Internet addresses
network software
304
314

Fig. 10

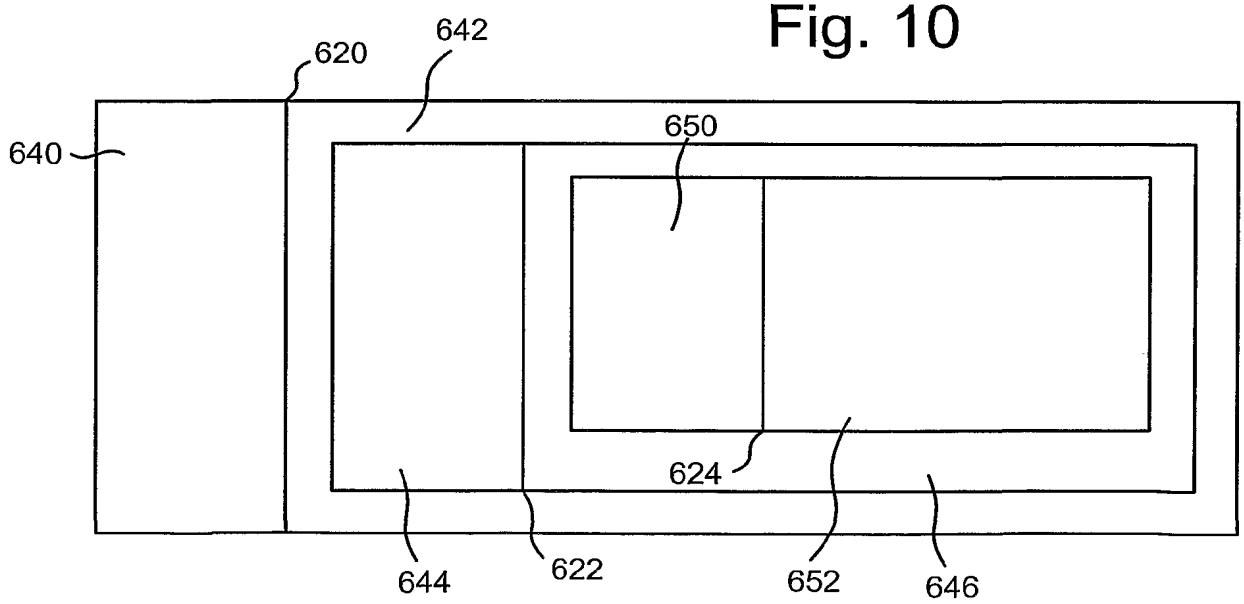

620
642
640
650
624
644
622
652
646

Fig. 6

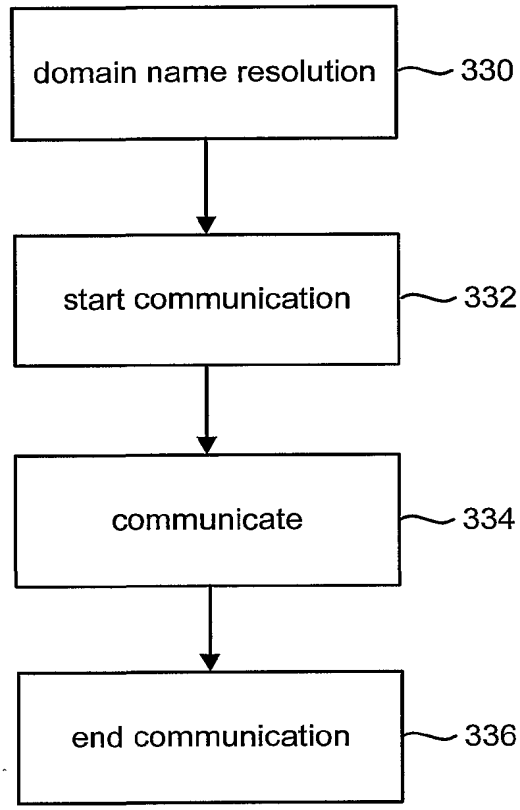


Fig. 7

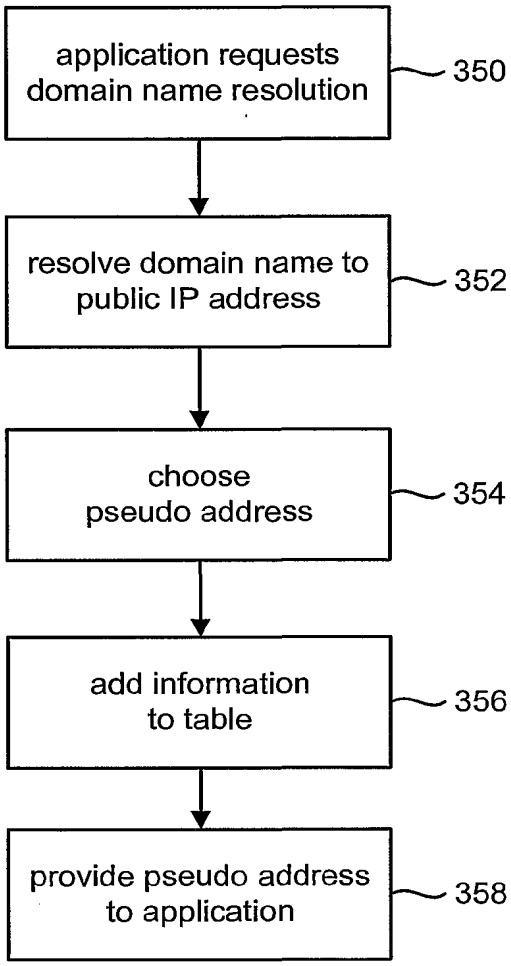


Fig. 11

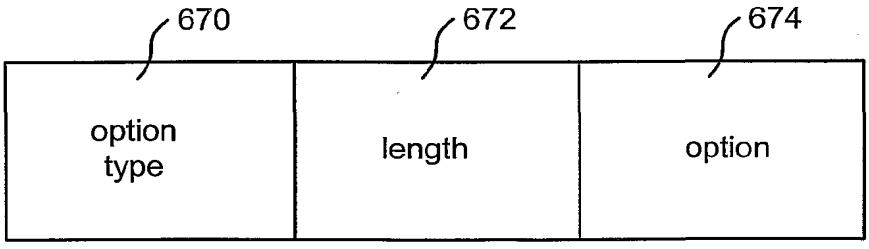
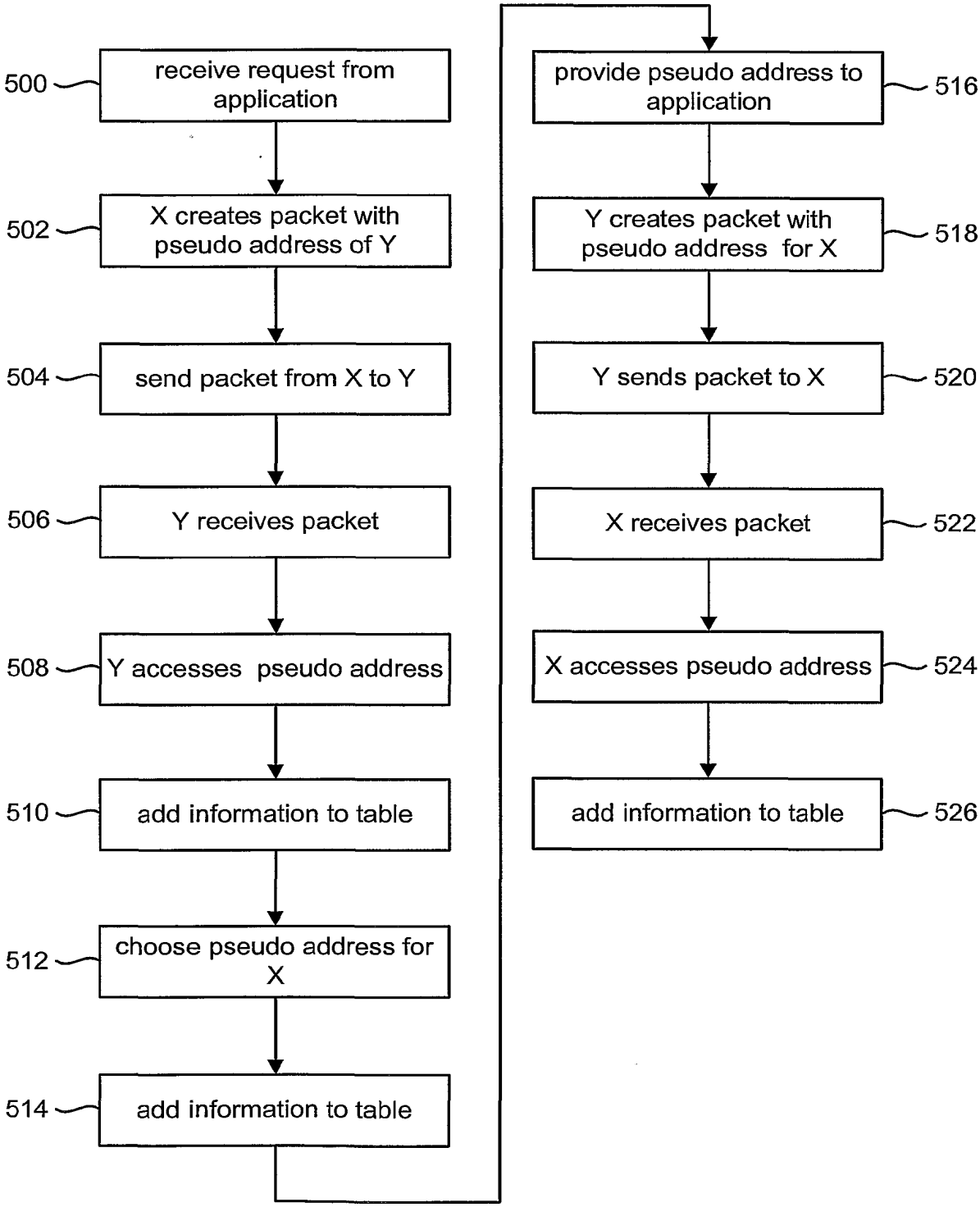


Fig. 9


500
receive request from application
502
X creates packet with pseudo address of Y
504
send packet from X to Y
506
Y receives packet
508
Y accesses pseudo address
510
add information to table
512
choose pseudo address for X
514
add information to table
516
provide pseudo address to application
518
Y creates packet with pseudo address for X
520
Y sends packet to X
522
X receives packet
524
X accesses pseudo address
526
add information to table

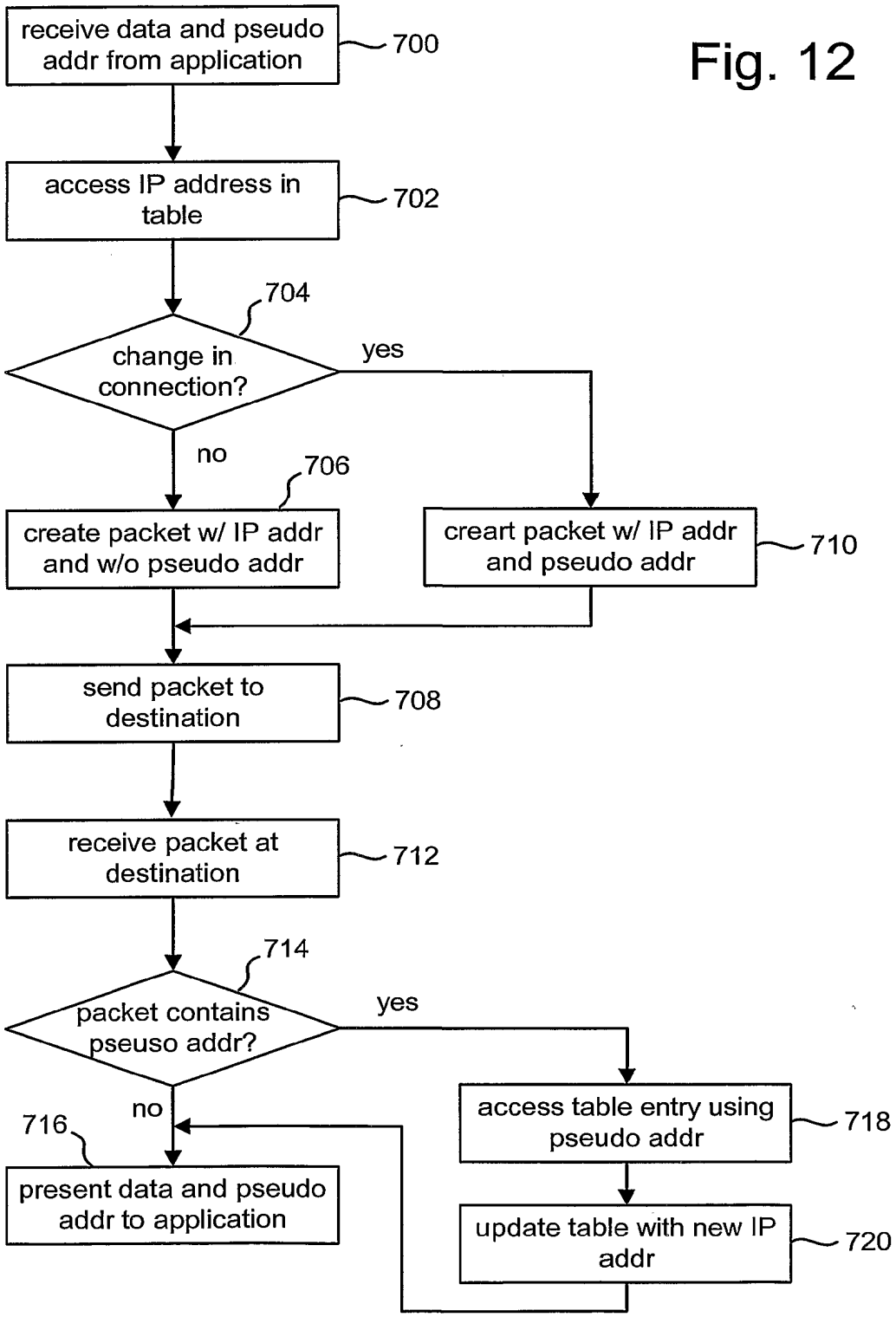

receive data and pseudo addr from application
700
access IP address in table
702
704
change in connection?
yes
no
706
create packet w/ IP addr and w/o pseudo addr
creart packet w/ IP addr and pseudo addr
710
send packet to destination
708
receive packet at destination
712
714
packet contains pseuso addr?
yes
no
716
present data and pseudo addr to application
access table entry using pseudo addr
718
update table with new IP addr
720

Fig. 12

Fig. 13

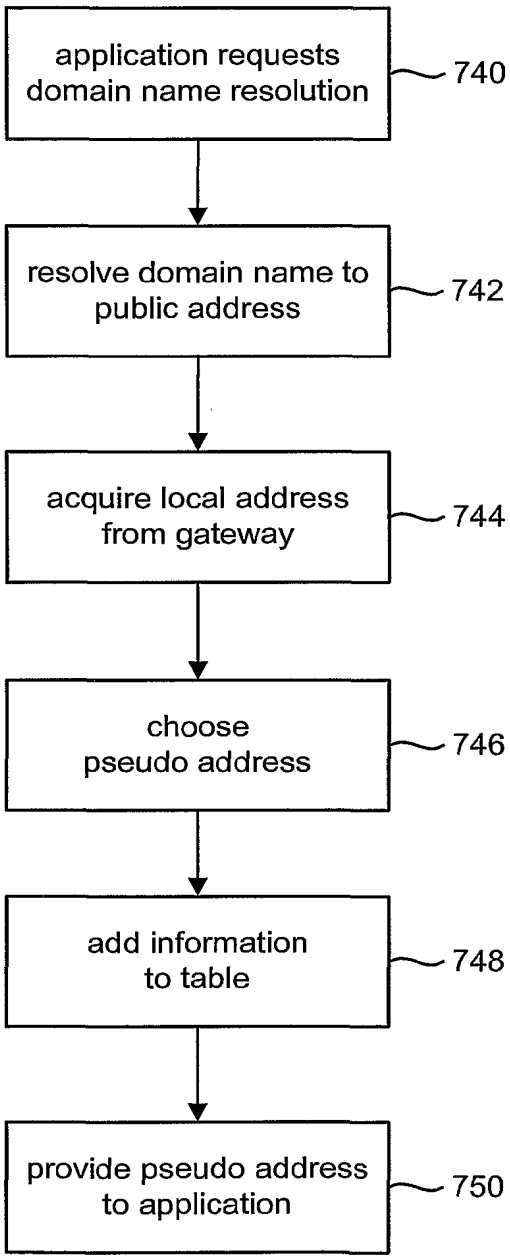
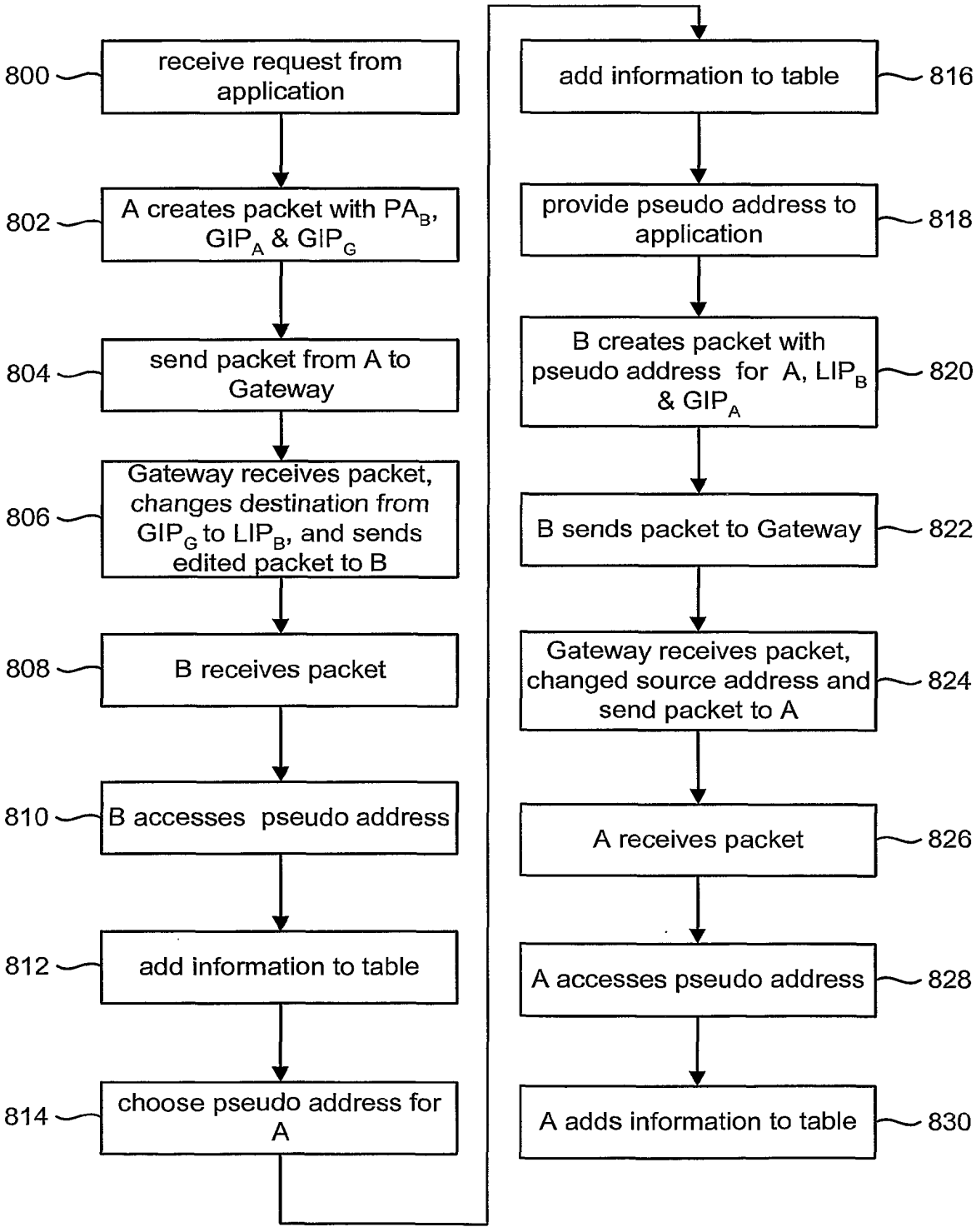

application requests domain name resolution
740
resolve domain name to public address
742
acquire local address from gateway
744
choose pseudo address
746
add information to table
748
provide pseudo address to application
750

Fig. 14


800
receive request from application
802
A creates packet with PA_B, GIP_A & GIP_G
804
send packet from A to Gateway
806
Gateway receives packet, changes destination from GIP_G to LIP_B, and sends edited packet to B
808
B receives packet
810
B accesses pseudo address
812
add information to table
814
choose pseudo address for A
816
add information to table
818
provide pseudo address to application
820
B creates packet with pseudo address for A, LIP_B & GIP_A
822
B sends packet to Gateway
824
Gateway receives packet, changed source address and send packet to A
826
A receives packet
828
A accesses pseudo address
830
A adds information to table

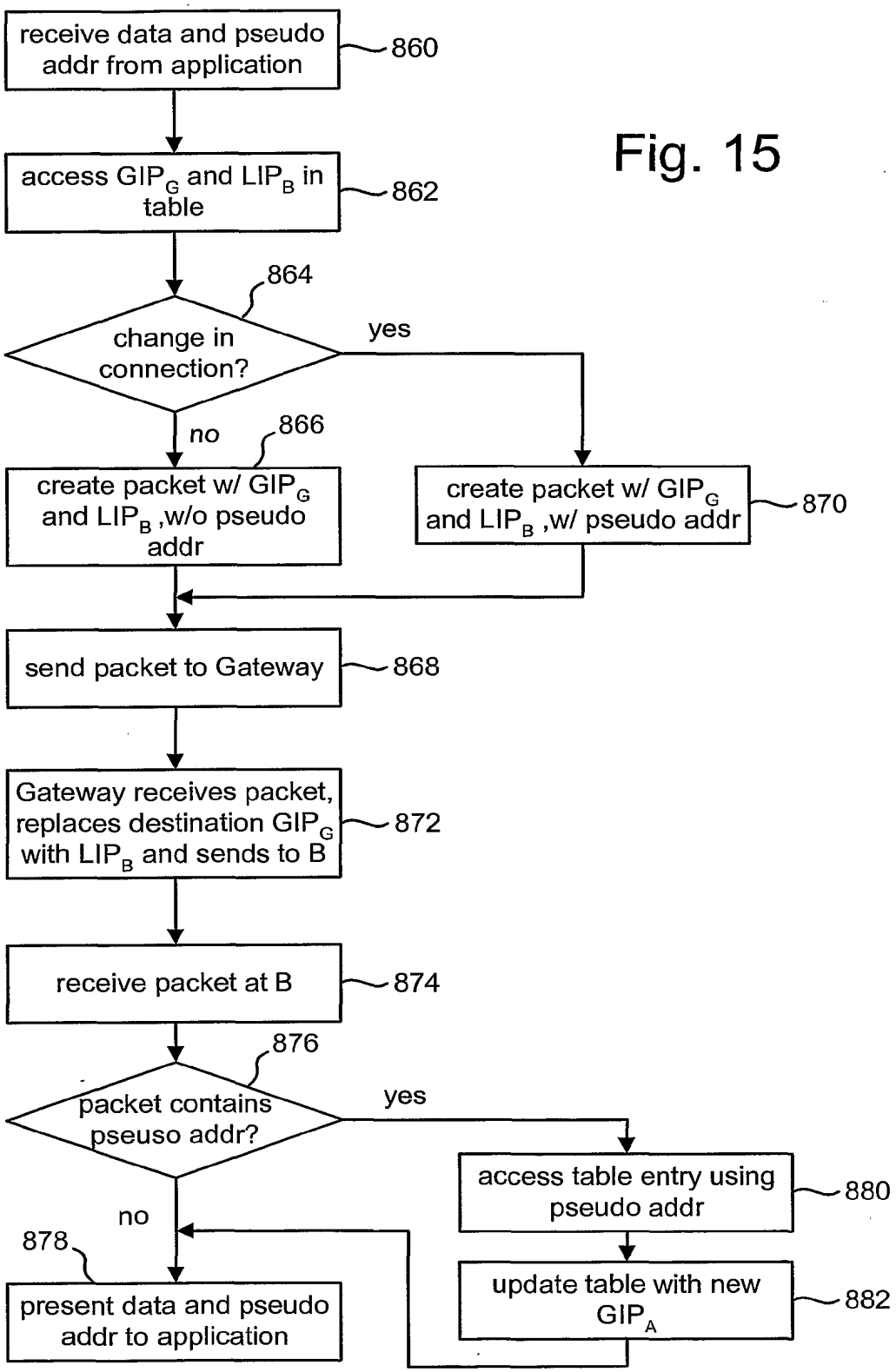

receive data and pseudo addr from application
860
access GIP$_G$ and LIP$_B$ in table
862
864
change in connection?
yes
no
866
create packet w/ GIP$_G$ and LIP$_B$,w/o pseudo addr
create packet w/ GIP$_G$ and LIP$_B$,w/ pseudo addr
870
send packet to Gateway
868
Gateway receives packet, replaces destination GIP$_G$ with LIP$_B$ and sends to B
872
receive packet at B
874
876
packet contains pseuso addr?
yes
access table entry using pseudo addr
880
no
878
update table with new GIP$_A$
882
present data and pseudo addr to application

Fig. 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/23948

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 13/00
US CL : 709/245

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/200,217,218,219,230,237,238,245

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST:
search terms: pseudo near1 address$

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,101,543 A (ALDEN et al.) 08 AUGUST 2000 see Abstract, figures 1-23, and col. 3 (line 1-et seq.).	1-4
A	US 5,159,592 A (PERKINS) 27 OCTOBER 1992 see Abstract, figures 1-5, col. 2 (line 60-et seq.).	1-4

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 13 SEPTEMBER 2001	Date of mailing of the international search report 04 OCT 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer ROBERT B. HARRELL James R. Matthews Telephone No. (703) 305-9692

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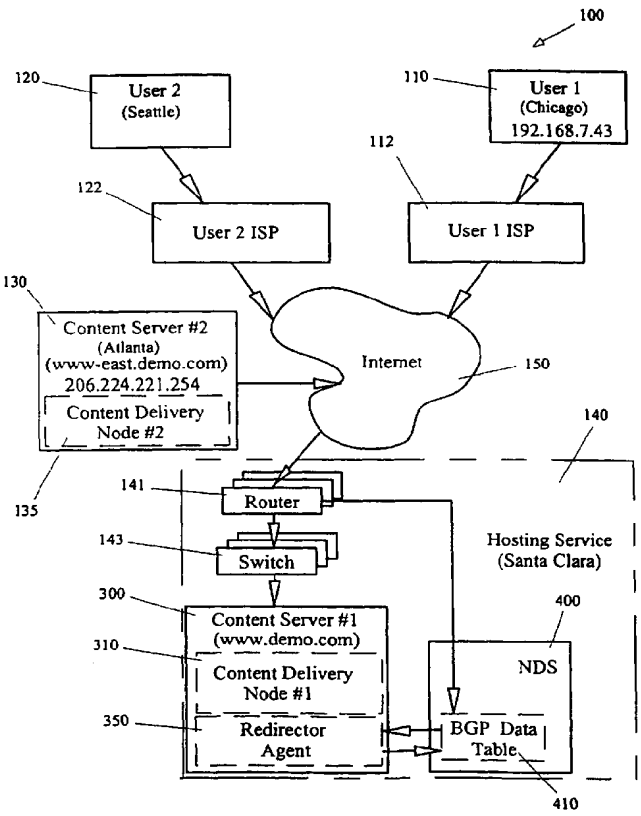
(74) Agents: KOHLER, Thomas, D. et al.; Pennie & Edmonds LLP, 1155 Avenue of the Americas, New York, NY 10036 (US).

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[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR DYNAMIC DETERMINATION OF OPTIMUM CONNECTION OF A CLIENT TO CONTENT SERVERS



(57) Abstract: The method and apparatus of the present invention provide dynamic routing selection of the optimum data server from among many data servers (130, 300) that form a distributed content cache on a communications network (100). A user client (110, 120) enters a request by one of several addressing protocols (112, 120). The method of the invention uses a combination of analytical tools to act upon information contained in the request to determine which of the many distributed content data servers will provide the optimum connection for the user client. Criteria used to make the selection include the type of request, the shortest.

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METHOD AND APPARATUS FOR DYNAMIC DETERMINATION OF OPTIMUM CONNECTION OF A CLIENT TO CONTENT SERVERS

BRIEF DESCRIPTION OF THE INVENTION

The subject of this invention relates to the data communications industry. Specifically, this invention describes a method and apparatus for dynamically determining the optimum one of many servers for delivery of content to a user client terminal.

BACKGROUND OF THE INVENTION

As the use of networks increases, more and more users are turning to network service providers for hosted data services. These service providers operate generally over the Internet, and are thus referred to as Internet Service Providers, or ISPs. It should be noted however that the Internet is not the only possible network topology that provides services to multiple users. Thus the discussion below can apply to a wide variety of network architectures including, but not limited to, local area networks [LANs], wide area networks [WANs], intranets and internets. Further, data communications encompasses a variety of data forms including, but not limited to, voice, video, audio, e-mail and software. For purposes of the present invention the discussion will center on the Internet.

Common to all network structures is the notion of clients and servers. Generally, a client is the source of a request for some service and a server provides that service. It is possible that the same device that is a server can, in a following transaction, become a client. For example, supposing that a user makes a request for some information through his ISP. The user's terminal is the client and the ISP is the server. But the information that the user has requested resides on a different network, thus the ISP must make a request from a different data terminal at some other network location, thus the ISP becomes the client and the distant terminal the server. Note that for purposes of this discussion, a data terminal is considered to be a device having data processing, display and input/output capability. Thus a data terminal could be any number of physical machines including a desktop PC, a laptop PC, a router, or any other device capable of communicating with other such devices.

In modern network architectures, individual data terminals are dispersed in logical and, in most cases, physical space. Some of these data terminal devices are strictly clients and are used by individual users to process data, access data and applications, and communicate with remote data terminal devices. Other data terminal devices act as communication portals and serve as both the server to an end user and as clients of other network data terminal devices. Still other data terminal devices contain large volumes of data and act only as servers, outputting requested data upon demand from a client device.

Modernly, data terminal devices on one network have the ability to communicate with data terminal devices on another network through the use of common protocols. The result is that many networks containing many data servers can be connected to a very large number of user clients. To identify which network and client are to be served, an address scheme has been adopted. Additionally, the demand for certain data, for example, a video feed of a sporting event, can be so large that more than one data server with identical data may be required to satisfy the demand. Typically, a network hosting service will supply these multiple data servers in different geographical parts of the world. These identical servers are referred to as data mirrors, or mirror sites. Mirror sites are used for a number of reasons, including data redundancy, traffic demand, and cost control, however, for this discussion the use of mirror sites is particularly related to optimizing data transfer to user clients.

Given that multiple mirror sites are available to serve a specific user client, a need arises to determine which of the mirror servers will be used to deliver the requested data. Numerous methods exist in the art to make this decision. These methods fall into two major types: fixed and dynamic. Fixed routing includes such methods as selecting a route from preprogrammed tables, calculating least delivery route cost, least delivery route weight, or least delivery route distance. Dynamic routing methods include deriving the optimum route from data supplied by the user clients and data servers, then making a calculation on-the-fly, or using statistical balancing to determine the best delivery route.

Centralized fixed routing uses a dedicated routing server to pick the optimum route from a table. Sometimes referred to as the minimum hop method, a table is used to determine the shortest distance from a user client to a data server. Variations of this method include the geographic location method and the preprogrammed logical location method. The fixed routing method ignores effects of local traffic demand on a single site, thus it suffers from delays in delivery and increases in connection time and cost, with an attendant reduction in network efficiency.

Another fixed routing method divides the network topology into low speed local and high speed backbone segments, then parses the available data servers into one or the other of the segments. This so-called network parsing method makes the delivery decision predicated upon a preprogrammed elimination of many of the otherwise available nodes based on which segment the node resides in, thus it suffers from inefficient selection of the least busy server. The result is again a less-than-optimal route selection with a potential increase in cost due to increased connection time.

Dynamic route selection methods include the least weight method, the least cost method, and the statistical balancing method. Each of these methods is dynamic since current network topology and traffic data are used to make the routing decision. The least weight method first uses data gathered about the end nodes in a specific communication session to assign a weight to a theoretical connection to all nodes of a network, then, in a second step, uses tabular data about the network topology with corresponding weighted values, and finally, in a third step, chooses the least weight answer from all possible connections formed by the addition of all of the weighted

values. This method is slow compared to other methods, and suffers further from an aggregation of communication delays throughout the network. The result is delayed connection from the user client to the desired data server.

The least cost method is based on traffic density and unit cost of data transferred. In this method an arbitrary cost is assigned to a set level of traffic such that when traffic on one data server reaches a predetermined value, the cost per unit of data transferred will become high, forcing the algorithm to direct new traffic to a different data server. This method ignores the effects of geographical location, forcing traffic over a longer, more delay prone route when traffic on the desired data server reaches the predetermined level. Further, the method is centralized, so it is prone to service interruptions if the decision making data terminal device fails.

Statistical balancing of user clients is another dynamic route selection method. In this method all of the possible routes are monitored for traffic levels, and the traffic loads balanced on a per server basis. This method, like the cost method above, ignores any geographical advantages, thus possibly choosing a sub-optimal route due to the distance the data must travel.

As can be seen, the existing methods suffer from one or more disadvantages. What would be desirable is a method for choosing an optimum connection from a user client to a data server dynamically and in such a way as to mitigate the disadvantages of the existing methods. Advantageously, the method should simultaneously provide the most efficient and cost effective routing decision.

SUMMARY OF THE INVENTION

The method and apparatus of the present invention provide dynamic routing selection of the optimum data server from among many data servers that form a distributed content cache on a communications network. A user client enters a request by one of several addressing protocols. The method of the invention uses a combination of analytical tools to act upon information contained in the request to determine which of the many distributed content data servers will provide the optimum connection for the user client. Criteria used to make the selection include the type of request, the shortest path, and, when needed, other factors such as route weighting and best bandwidth.

The method of the present invention combines a number of protocols and test methods to make the optimum routing decision. The protocols include, but are not limited to, HyperText Transfer Protocol [HTTP], HyperText Markup Language [HTML] and Dynamic Name Sever [DNS] addressing using Border Gateway Protocol [BGP] data. A significant advantage over the prior art is that the method of the present invention is platform independent, allowing it to be used for both internal networks, or externally across other networks of different types.

Operation of the present invention is accomplished through use of fully mirrored content data servers, or Content Delivery Nodes [CDN] containing an embedded Redirector Agent, and multiple redundant Node Decision Servers [NDS] located at strategic data hubs within the ISP hosting service. The CDNs may contain a variety of data types, for example live multi-cast, audio, video, standard web pages or simple data libraries. A user client issues a request, for example by entering a Universal Resource Locator [URL] address, which is received and analyzed by the Redirector Agent embedded in the CDN. Having identified the type of protocol to be used, the Redirector Agent queries the NDS for the optimum route decision. The NDS then reviews the status of the network based upon the most current BGP data, including peer outages and geographic location of the CDN closest to the requestor, and makes an optimum connection determination. Once the decision is made, the NDS returns the optimum path data to the Redirector Agent. Based on the received optimum route data from the NDS plus the application of other administrative factors, the Redirector Agent formulates and returns the optimum path data to the user client.

Because the method of the present invention is platform independent, user client requests can vary. For example, the Redirector Agent can receive and react to HTTP tasks submitted by the requestor's web browser and return to the user client the URL of the optimum CDN. Alternatively the method of the present invention can receive DNS lookup data from the requestor and, using a DNS lookup table, return the DNS address of the optimum CDN. A third alternative method delivers embedded HTML instructions containing the appropriate target CDN data.

The array of redundant NDSs receives constant updates as to the status of the network via BGP data which is fresh with each new communications session. Thus if one of a plurality of mirrored CDNs goes off line, the redundant NDS array factors this

peer outage into the decision criteria. In this way the optimum connection decision is dynamic, and always represents the best decision for any given communications session connection in real time. Once the off-line CDN returns to service, the network status is again updated and the optimum route decision is made accordingly. Thus a significant advantage of the present invention is the ability to provide the optimum connection from a requestor to a content data server in real time. This and other advantages of the present invention are discussed in detail below in conjunction with the figures attached.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates a high level block diagram of a system that can make use of a first embodiment of the method of the present invention.

Figure 2 presents a top level state diagram of an embodiment of the method of the present invention.

Figure 3 is a detailed block diagram of a data content server that can make use of the method of the present invention.

Figure 4 is a detailed block diagram of a node decision server that can make use of the method of the present invention.

Figure 5 presents a state diagram of a typical HTTP communications session using the method of the present invention.

Figure 6 presents a state diagram of a typical HTML communications session using the method of the present invention.

Figure 7 presents a state diagram of a typical DNS communications session using the method of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As described briefly above, there are a number of disadvantages with the current methods for optimizing the distribution of content from remotely located data servers including delays, sub optimum efficiency, and service interruptions among others. The method of the present invention overcomes these disadvantages by providing a method and associated apparatus that allows dynamic determination of the

most optimal target data server for content delivery without insertion of undesirable delays.

The method of the present invention will be more clearly understood through a brief discussion of the environment in which the invention operates. Note that for the detailed discussion that follows the terms "client" and "server" are used in their technical sense. That is, where a device is the source of a request, it is referred to as a client, whereas the same device responding to a request is referred to as a server.

Referring to Fig. 1, a high level block diagram of a system **100** that can make use of the present invention is shown. A Hosting Service **140** provides data services for numerous users. In this configuration, the Hosting Service **140** is located geographically in Santa Clara. The Hosting Service **140** maintains a number of Routers **141** and Switches **143** that interface to data content servers such as Content Server #1 **300**. As is known to those of skill in the art, this is not the only possible host services configuration and is shown here as an example only. Other configurations could be used without departing from the spirit of the invention, for example, the Switches **143** could be eliminated for smaller host configurations.

The Content Server #1 **300** contains, among other data and programs, a Content Delivery Node #1 **310** and a Redirector Agent **350**. As will be discussed in greater detail below, the Content Delivery Node #1 **310** contains the information that a remote user is seeking and is one of several mirrored content sites. The Redirector Agent **350**, also discussed in detail below, is a program that receives users' requests, processes user address data, and interfaces with a Node Decision Server [NDS] **400**, also located at the Hosting Service **140**. The NDS **400** uses the Border Gateway Protocol [BGP] Data Table **410** to make a decision as to which of a plurality of mirrored data content servers will be the best for a particular user and communications session.

The BGP Data Table **410** is updated with current network status with each new communications session. These data are contained in the incoming message and are sent to the NDS **400** by the Router **141** as part of its normal operation. The NDS **400** then interprets the BGP data sent and updates the BGP Data Table **410**. Each time a new communications session is started, regardless of the specific user, updated BGP data are sent to the BGP Data Table **410**. In this way the method of the present

invention maintains a detailed status of the current network conditions, including peer outages and active routes, advantageously allowing for a more accurate determination of an optimum content delivery path.

An example of a mirrored data content server is Content Server #2 **130** in Atlanta. Content Server #2 **130** contains the identical data content as Content Server #1 **300** as well as Content Delivery Node #2 **135**. As will be discussed below, this fully mirrored configuration has several nontrivial advantages over the prior art including more rapid determination of the optimum data content server for a particular user and communications session.

Shown in Fig. 1 are two typical remote users, User 1 **110** in Chicago and User 2 **120** in Seattle. These users each have an Internet Service Provider [ISP] (User 1 ISP **112** and User 2 ISP **122** respectively) connecting them to the Internet **150**. The function of an ISP is well understood by those of skill in the art and is thus not treated in detail as part of this discussion. These users have a need to connect to a content provider's information and do so by requesting the establishment of a communications session with a target data content server.

Fig. 2 presents a high level state diagram **200** of the method of the present invention. While there are numerous specific instances of the use of BGP data by the method of the present invention, each discussed in detail below, Fig. 2 is appropriate for describing the method at a high level of granularity. The process begins when the User **210** requests a communications session. Note that the User **210** in Fig. 2 is equivalent to User 1 **110** in Fig. 1 but is labeled differently here for clarity. Note further that Router **230**, Redirector Agent **280**, and NDS **250** all are equivalent to their counterparts in Fig. 1 but are labeled differently for clarity in Fig. 2.

The User Request **215** is sent to a Router **230**. The Router **230** sends the incoming message to the NDS **250** in the Send BGP data step **234**. The NDS **250** interprets the BGP data contained in the incoming message in the Interpret BGP Data step **252** and then updates the BGP table at the Update BGP Data Table step **254**. At this point in time the NDS **250** has a real time status of the entire network to use in its decision making process. The Router **230** also delivers the request to the Redirector Agent **280** at the Deliver Request step **236**.

Once the Redirector Agent **280** has received the request, the Determine Request Type step **282** is executed in order for the method of the present invention to understand what type of communication protocol is being used by the user's client device. After making this determination the Redirector Agent **280** forms a query and sends it to the NDS **250** via the Query NDS for Best Server step **284**. Using the very recently updated network status the NDS executes a Look-up Best Server step **265** and returns the results of the decision process to the Redirector Agent **280** in the Best Server Response step **258**.

Having received the best data content server decision from the NDS **250**, the Redirector Agent **280** executes the Apply Other Admin Factors step **286** prior to sending the optimum route decision via the Return Best Server step **288**. Other administrative factors may include such information as customer status, current traffic conditions and content status among others. The Router **230** receives the optimum data content server path information from the Redirector Agent **280** and passes it back to the User **210** via the Best Choice step **238**.

Fig. 3 provides the relevant detail of a typical Content Server **300**, such as Content Server #1 in Fig. 1. The server contains, among other things, a Content Delivery Node #1 **310**, in this case having a Universal Resource Locator [URL] of www-west.demo.com. Also contained in Content Server **300** is a Redirector Agent **350**. The redirector agent is a software program containing a Front End Processor module **352**, Application/Configuration Table **355** and NDS Interface module **358**. As will be obvious to those of skill in the art, a typical content server will contain many other components, both hardware and software, that are not relevant to the method of the present invention and are thus not addressed in this discussion.

While each of the modules contained in the Redirector Agent **350** will be discussed in greater detail in conjunction with Figs. 5 through 7 below, in general, the Front End Processor module **352** is responsible of accepting a user's request, parsing the incoming data, analyzing the data and formulating a decision query to be sent to the NDS. The query is based upon what type of application has been sent by the user, thus the Application/Configuration Table **355**, containing pre-configured data related to types of applications expected from users, is checked by the Front End Processor module **352** and the proper data is fetched for use in formulating the query to the NDS.

The NDS Interface module **358** is used to send queries and receive responses from the NDS.

Fig. 4 is a detailed block diagram of the NDS **400** in Fig. 1. The NDS **400** contains, among other things, the BGP Data Table **410**, the BGP Interpreter module **420**, The Network Status Data Table **430** and the Redirector Agent Interface module **440**. Note that the NDS **400** may contain other hardware and software that are not relevant to the method of the present invention and are thus not addressed in this discussion.

BGP Interpreter module **420** interprets the incoming message and extracts BGP data. These fresh data are then sent to the BGP Data Table **410**, and, in combination with the geographic location data from the Network Status Data Table **430**, form the decision data to be used in determining the optimum data content server location for the particular user request. The exact method for selection of the best possible data content server varies with the type of user request thus is not discussed in detail here; however, each method is covered in detail in conjunction with Fig.s 5 through 7 below. Redirector Agent Interface module **440** receives queries from and sends responses to the NDS Interface module, **358** of Fig. 3.

Recall that the precise best route selection method depends upon what application was used by the user to establish the communication session. Figs. 5 through 7 provide the process details for three types of communication sessions. These application types are exemplary in nature, and do not represent a limitation on the scope of the present invention. For Figs. 5 through 7 state diagrams have been used for clarity of understanding. It will be recognized by those of skill in the art that within each of the states shown various smaller steps are executed which do not add to the understanding of the method of the present invention and have been aggregated for clarity.

Fig. 5 presents a detailed state diagram **500** of the present invention using the HTTP redirect method. With this method the process starts with the User **510,** whose IP address happens to be 192.168.7.43, issuing a request to connect to www.demo.com at User Request **515**. The request takes the form of an HTTP GET/file.exe command. The Router **530** receives the command and then delivers the request via the Deliver Request step **536** to a Redirector Agent **580** embedded in a content server, for

example, Content Server #1 **300** in Fig. 1. Note that the Router **530** accomplishes other tasks as explained in conjunction with Fig. 2 above, for example, delivering the request message to the NDS **550** to accomplish the BGP data update.

The Redirector Agent **580** uses the data contained in the Application/Configuration Table, **355** of Fig. 3, to determine which type of communications protocol is being used at the Determine Request Type step **582**. Once determined, a query is formed and sent to the NDS **550** at the Best Server for 192.168.7.43 step **584**. Within the NDS **550** the Look-up Best Server step **556** determines the closest geographic data content server to the user from among a plurality of data content servers. Once the optimum geographical data content server has been determined, the NDS **550** responds to the Redirector Agent **580** with the location data at the Best Server = Content Server #2 step **558**.

The decision in the NDS **550** is based upon the current BGP data, the geographic locations of all possible relevant data content servers, which of the relevant data content servers have active routes, and which are administratively up or down. Where multiple geographic locations with active routes exist that are otherwise equal, a random distribution method of route assignment is used. In the example shown in Fig. 5, the optimum data content server selected by the NDS **550** happens to be Content Server #2 (**130** of Fig. 1) located in Atlanta. This comports with the geographic location of the User **510** who is located in Chicago. Were the incoming request from User 2, **120** in Fig 1., located in Seattle, the NDS **550** would respond with Content Server #1 (**300** of Fig. 1) instead, since it is located in Santa Clara.

Once the Redirector Agent **580** has received the response from the NDS **550**, other relevant data are applied to the decision at the Apply Other Admin Factors step **586**. Here, such factors as data content server loading, availability and data status are used to ensure that the proper content server has been selected. At step **588**, Return Best Server, the Redirector Agent **580** passes the decision to the Router **530**, which in turn sends the optimum route to the User **510** via the Best Choice = step **538**. Thus in this instance, a 302 HTTP://www-east.demo.com/file.exe redirect command is passed back to the user. The user's device then executes the command and connects the user to the appropriate data content sever via the optimum path.

Fig. 6 presents a detailed state diagram **600** of the present invention using the embedded HTML command method. With this method the process again starts with the User **610,** whose IP address again happens to be 192.168.7.43, issuing a request to connect to www.demo.com at User Request **615**. The request takes the form of an HTTP GET/index.html command. The Router **630** receives the command and then delivers the request via the Deliver Request step **636** to a Redirector Agent **680** embedded in a content server, for example, Content Server #1 **300** in Fig. 1. Note that the Router **630** accomplishes other tasks as explained in conjunction with Fig. 2 above, for example, delivering the request message to the NDS **650** to accomplish the BGP data update.

The Redirector Agent **680** uses the data contained in the Application/Configuration Table, **355** of Fig. 3, to determine which type of communications protocol is being used at the Determine Request Type step **682**. In this instance, the determination is made that an embedded HTML protocol has been received from the user. Steps **684** through **686** perform the same functions in the same manner as their counterparts in Fig. 5 and therefore are not detailed here. At step **688**, Return Best Server, the Redirector Agent **680** passes the decision to the Router **630**, which in turn sends the optimum route to the User **610** via the Best Choice = step **638**. Thus in this instance, an HTTP://www-east.demo.com/index.html redirect command is passed back to the user. The user's device then executes the command and connects the user to the appropriate data content sever via the optimum path.

Fig. 7 presents a detailed state diagram **700** of the present invention using the DNS lookup method. With this method the process again starts with the User **710,** whose IP address again happens to be 192.168.7.43, issuing a request to connect to www.demo.com at User Request **715**. The request takes the form of a DNS lookup www.demo.com command. The Router **730** receives the command and then delivers the request via the Deliver Request step **736** to a Redirector Agent **780** embedded in a content server, for example, Content Server #1 **300** in Fig. 1. Note that the Router **730** accomplishes other tasks as explained in conjunction with Fig. 2 above, for example, delivering the request message to the NDS **750** to accomplish the BGP data update.

The Redirector Agent **780** uses the data contained in the Application/Configuration Table, **355** of Fig. 3, to determine which type of

communications protocol is being used at the Determine Request Type step **782**. In this instance, the determination is made that a DNS lookup protocol has been received from the user. Steps **784** through **786** perform the same functions in the same manner as their counterparts in Fig. 5 and therefore are not detailed. At step **788**, Return Best Server, the Redirector Agent **780** passes the decision to the Router **730**, which in turn sends the optimum route to the User **710** via the Best Choice = step **738**. Thus in this instance, a DNS address of 206.224.221.254 is passed back to the user. The user's device then executes the connection to the appropriate data content sever via the optimum path in the normal manner.

A first advantage of the present invention is the ability to make an optimal route decision based on current network status. This is accomplished by reading and storing network conditions gained from fresh BGP data contained in each new session.

A second advantage of the present invention is the speed of the optimum route decision process. Rapid route selection reduces the user delays in connecting to the best content server thereby reducing overall network traffic and increasing efficiency.

A third advantage of the present invention is that it is platform independent. The Redirector Agent can be embedded in various communications environments making it broadly available to networks of all sizes and configurations.

A fourth advantage of the present invention is that it is application independent. Since the Redirector Agent is pre-configured based upon client protocol preferences, a variety of communication applications may be served from the same network hosting environment.

A fifth advantage of the present invention is that it is expandable. As new protocols and/or communications applications become available, the Redirector Agent can be programmed to recognize, analyze and react in an appropriate manner.

A sixth advantage of the present invention is that it is configurable on a client-by-client basis. This advantage allows the present invention to be changed as a client's needs change with little effort and expense.

A seventh advantage of the present invention is that it is mirrored. This redundancy of both data and process greatly increases the dependability of the method of the present invention and significantly reduces the deterioration in performance related to network outages.

An eighth advantage of the present invention is that it is economical since makes the optimum route selection based on best performance at the specific point in time when the user makes the content request. This is done through use of a many network factors including bandwidth, equipment status, geographic considerations, and session type, as well as others.

What is claimed is:

1. A method of providing dynamic determination of an optimal content server to service a request from a remote user terminal, comprising:

receiving a request from a remote user terminal, said request containing request data and protocol data;

updating a network status data table using said protocol data;

determining a request type based upon said request data;

comparing said request type to content server selection criteria contained in a network status data table;

choosing an optimal content server based upon said request type and said content server selection criteria; and

communicating information defining said optimal content server to said remote user terminal.

2. The method of Claim 1 wherein said determining step comprises the steps of:

parsing said request data;

characterizing said request data in accordance with request types maintained in an application/configuration table;

forming an optimal content server query; and

sending said optimal content server query to a content server node decision module.

3. The method of claim 2 wherein said characterizing step includes the step of characterizing said request data in accordance with requests types including Hypertext Transfer Protocol requests, Hypertext Markup Language requests, and Dynamic Name Server requests.

4. The method of claim 1 wherein said updating step includes updating said network status data

table with Border Gateway Protocol data.

5. The method of claim 1 wherein said choosing step includes the step of choosing an optimal

content server based upon said request type and content server selection criteria including updated network status, updated network communications bandwidth, user geographic data, and content server geographic data.

6. A computer readable memory to direct a digital device to function in a specified manner, comprising:

a redirector agent program including a front end processor module, an application/ configuration data table module, and a node decision server interface module, said redirector agent program identifying a user request type and an optimal server query to process a user request; and

a connection decision program including a protocol data table module, a protocol Interpreter module, a network status data table module and a redirector agent interface module, said connection decision program producing an optimal content server command corresponding to an optimal content server to process said user request.

7. The computer readable memory of claim 6 wherein said redirector program and said connection decision program are executed at a single geographic location.

8. The computer readable memory of claim 6 wherein said redirector program and said connection decision program are executed at different geographical locations.

9. The computer readable memory of claim 6 wherein said redirector program and said connection decision program are replicated at a plurality of geographic locations.

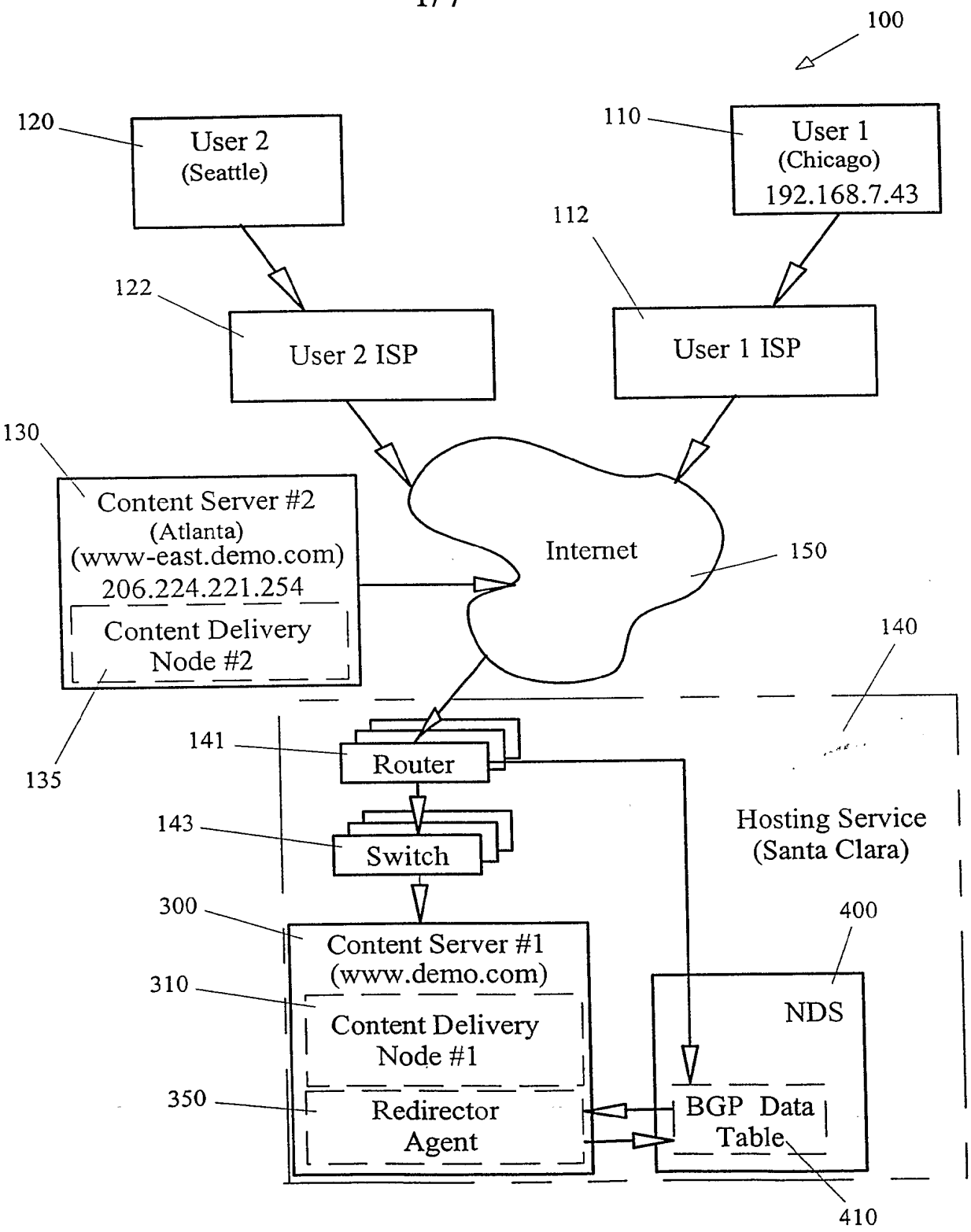

100
120
User 2
(Seattle)
110
User 1
(Chicago)
192.168.7.43
112
122
User 2 ISP
User 1 ISP
130
Content Server #2
(Atlanta)
(www-east.demo.com)
206.224.221.254
Content Delivery
Node #2
Internet
150
140
135
141
Router
143
Switch
Hosting Service
(Santa Clara)
300
Content Server #1
(www.demo.com)
400
310
Content Delivery
Node #1
NDS
350
Redirector
Agent
BGP Data
Table
410

Fig. 1

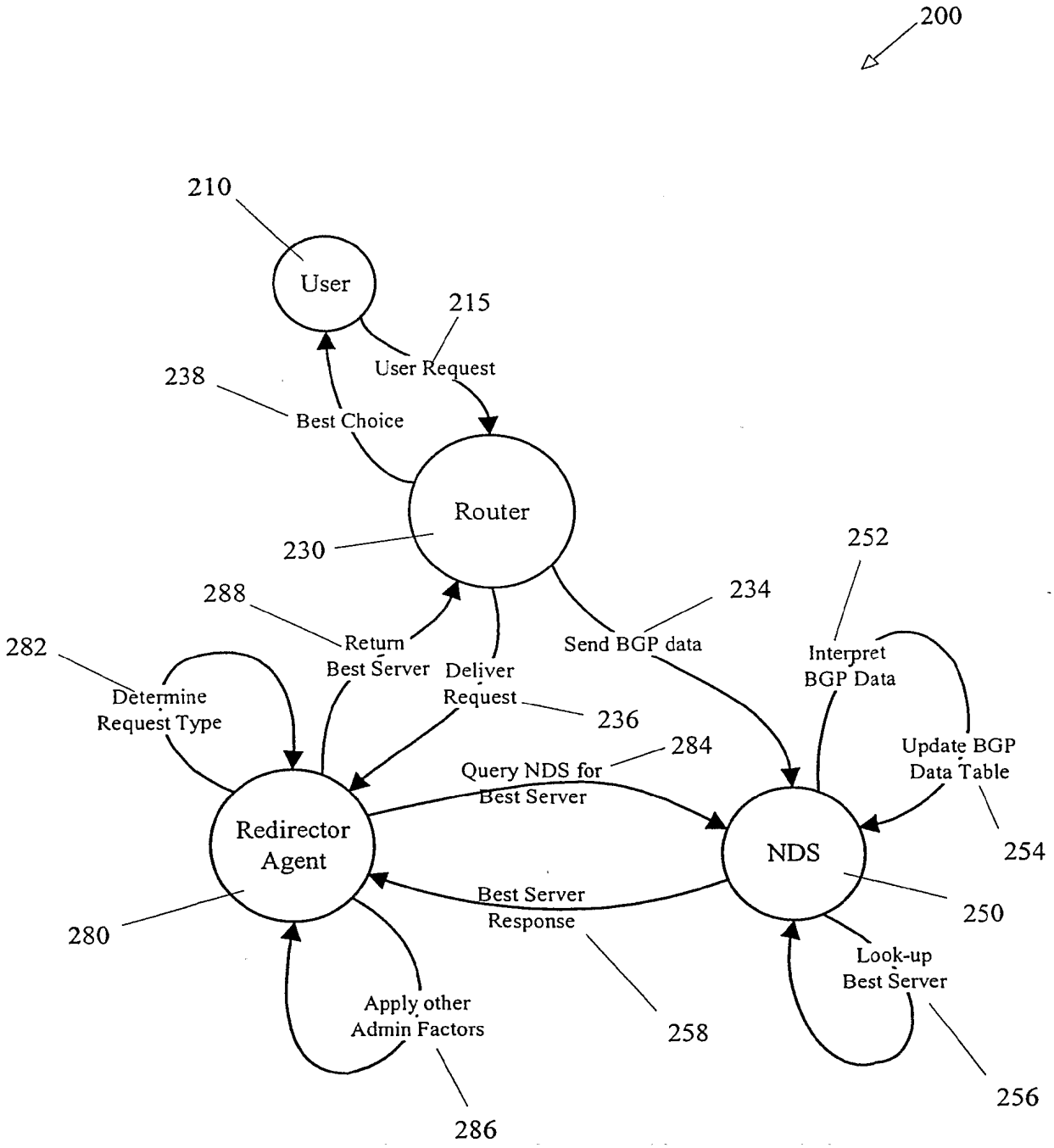

200
210
User
215
User Request
238
Best Choice
Router
230
252
234
288
Return
Best Server
Deliver
Request
236
Send BGP data
Interpret
BGP Data
282
Determine
Request Type
284
Query NDS for
Best Server
Update BGP
Data Table
254
Redirector
Agent
NDS
250
280
Best Server
Response
Look-up
Best Server
Apply other
Admin Factors
258
256
286

Fig. 2

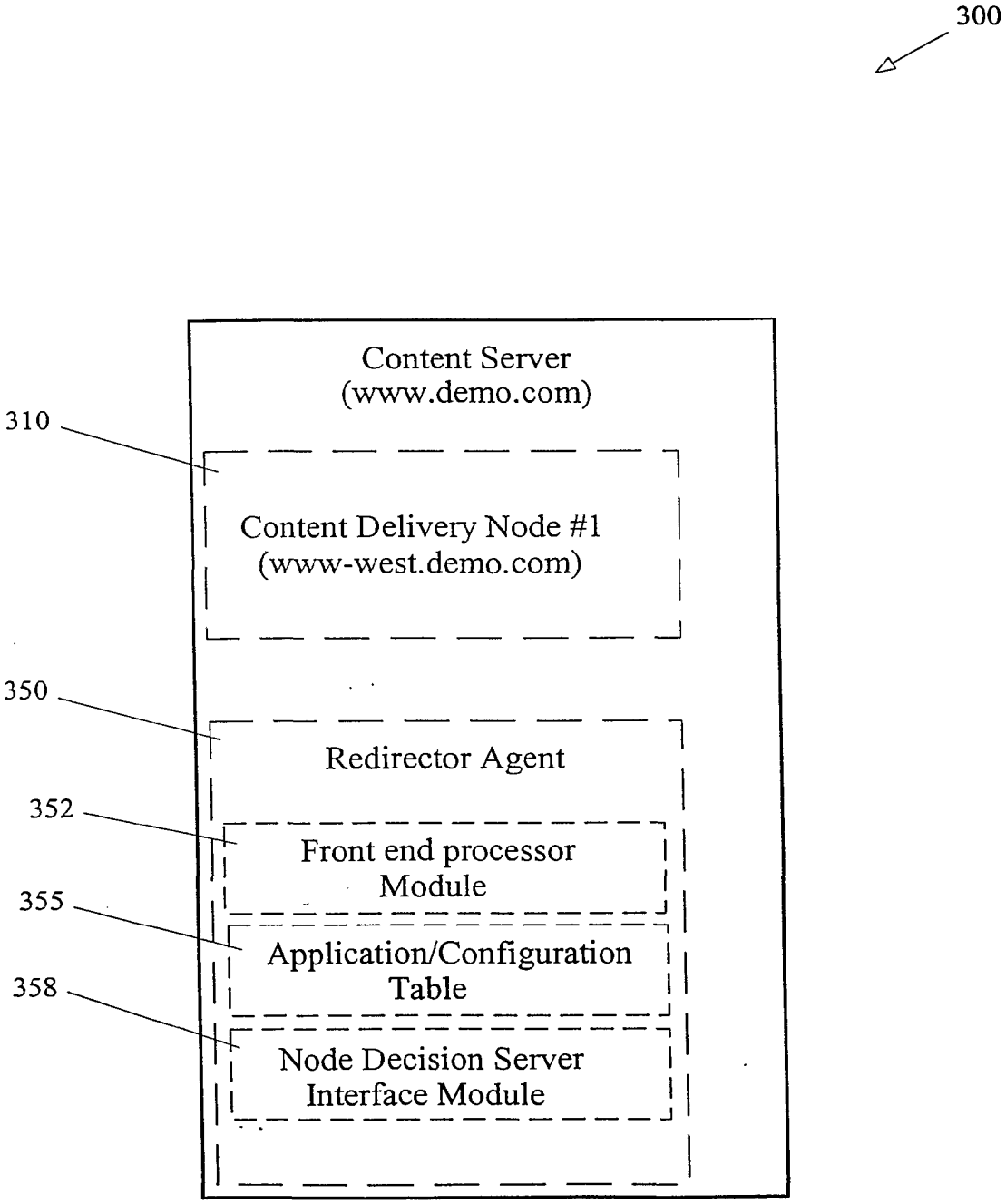

300
Content Server
(www.demo.com)
310
Content Delivery Node #1
(www-west.demo.com)
350
Redirector Agent
352
Front end processor
Module
355
Application/Configuration
Table
358
Node Decision Server
Interface Module

Fig. 3

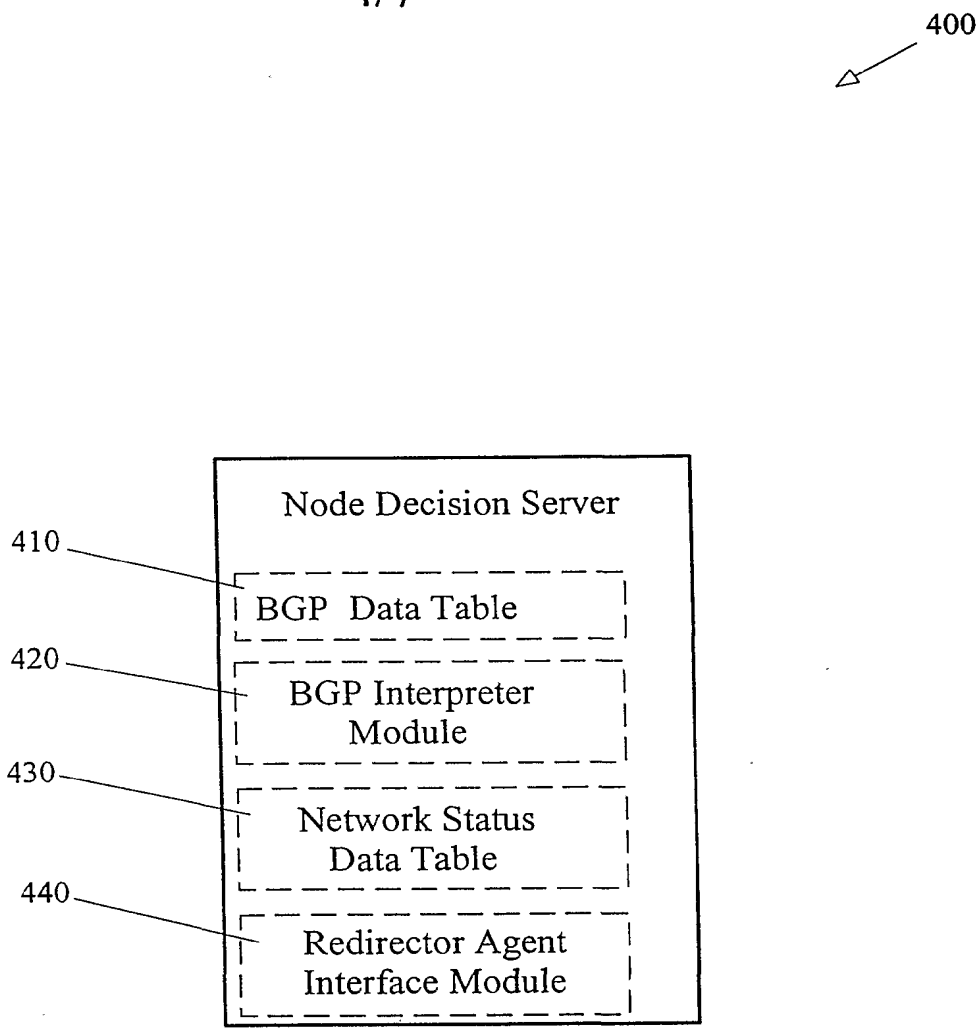

400
Node Decision Server
410
BGP Data Table
420
BGP Interpreter Module
430
Network Status Data Table
440
Redirector Agent Interface Module

Fig. 4

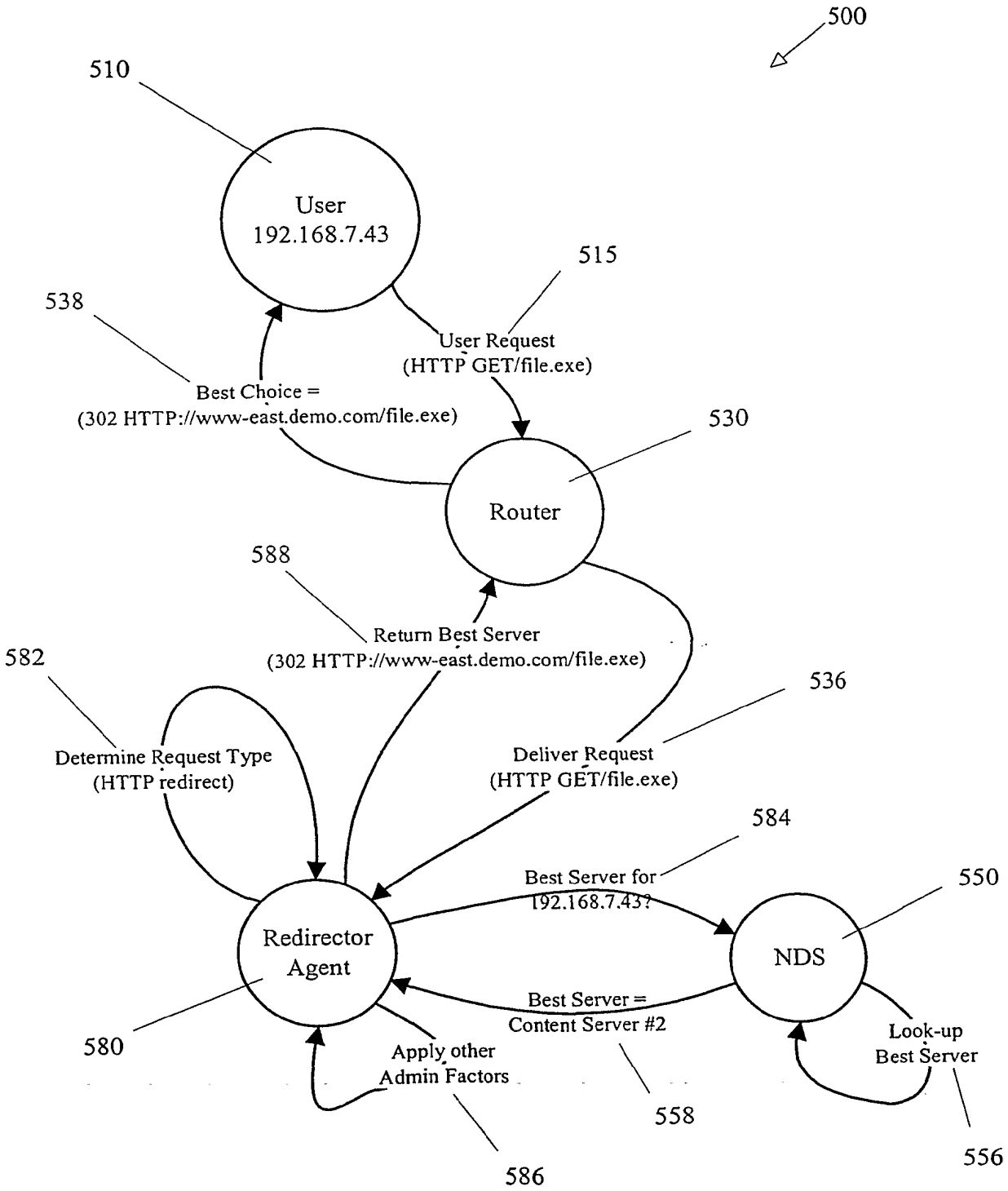

500
510
User
192.168.7.43
515
538
User Request
(HTTP GET/file.exe)
Best Choice =
(302 HTTP://www-east.demo.com/file.exe)
530
Router
588
Return Best Server
(302 HTTP://www-east.demo.com/file.exe)
582
536
Determine Request Type
(HTTP redirect)
Deliver Request
(HTTP GET/file.exe)
584
Best Server for
192.168.7.43?
550
Redirector
Agent
NDS
Best Server =
Content Server #2
580
Apply other
Admin Factors
Look-up
Best Server
558
556
586

Fig. 5

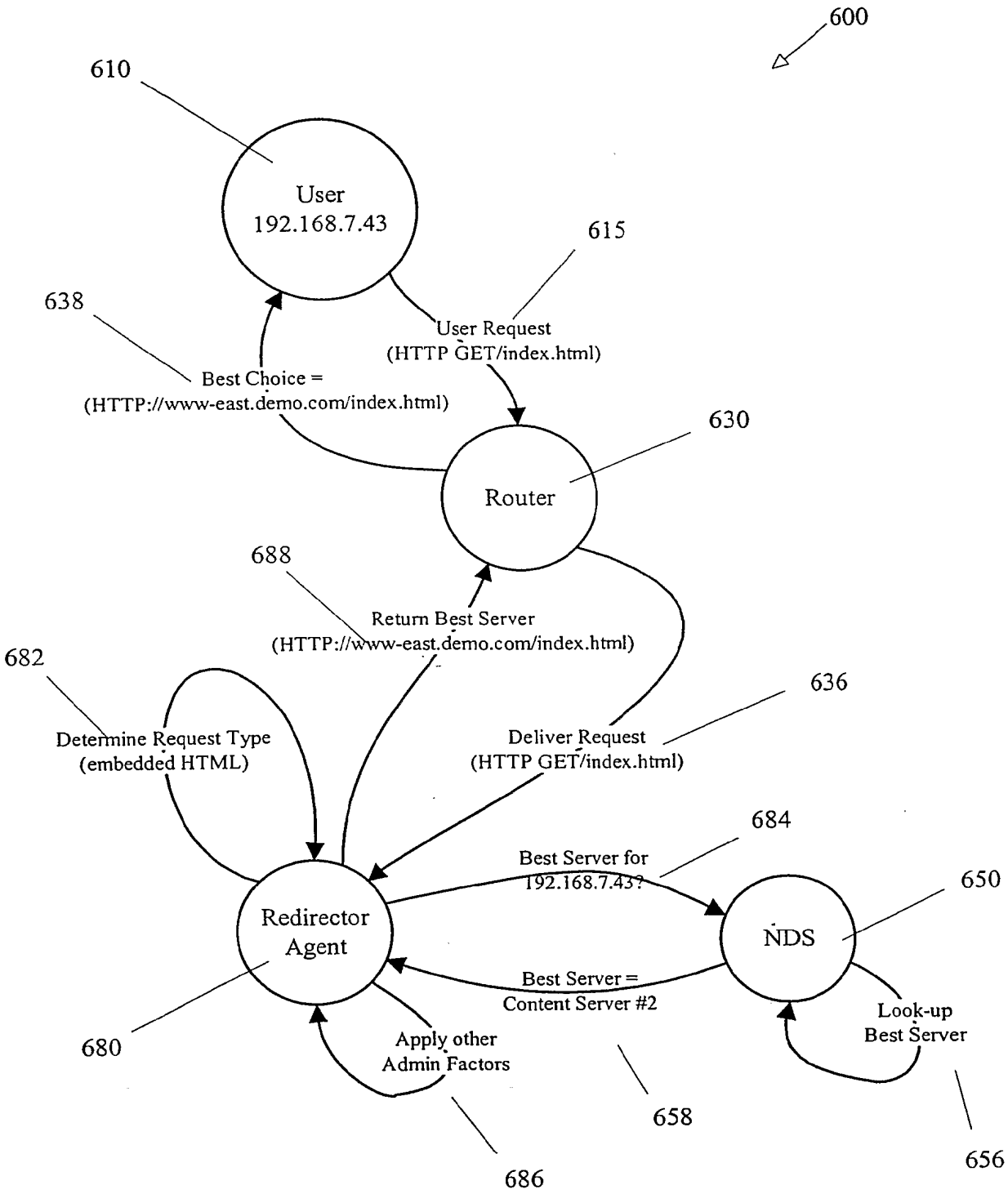

600
610
User
192.168.7.43
615
User Request
(HTTP GET/index.html)
638
Best Choice =
(HTTP://www-east.demo.com/index.html)
630
Router
688
Return Best Server
(HTTP://www-east.demo.com/index.html)
682
Determine Request Type
(embedded HTML)
636
Deliver Request
(HTTP GET/index.html)
684
Best Server for
192.168.7.43?
650
Redirector
Agent
NDS
Best Server =
Content Server #2
Look-up
Best Server
680
Apply other
Admin Factors
658
656
686

Fig.6

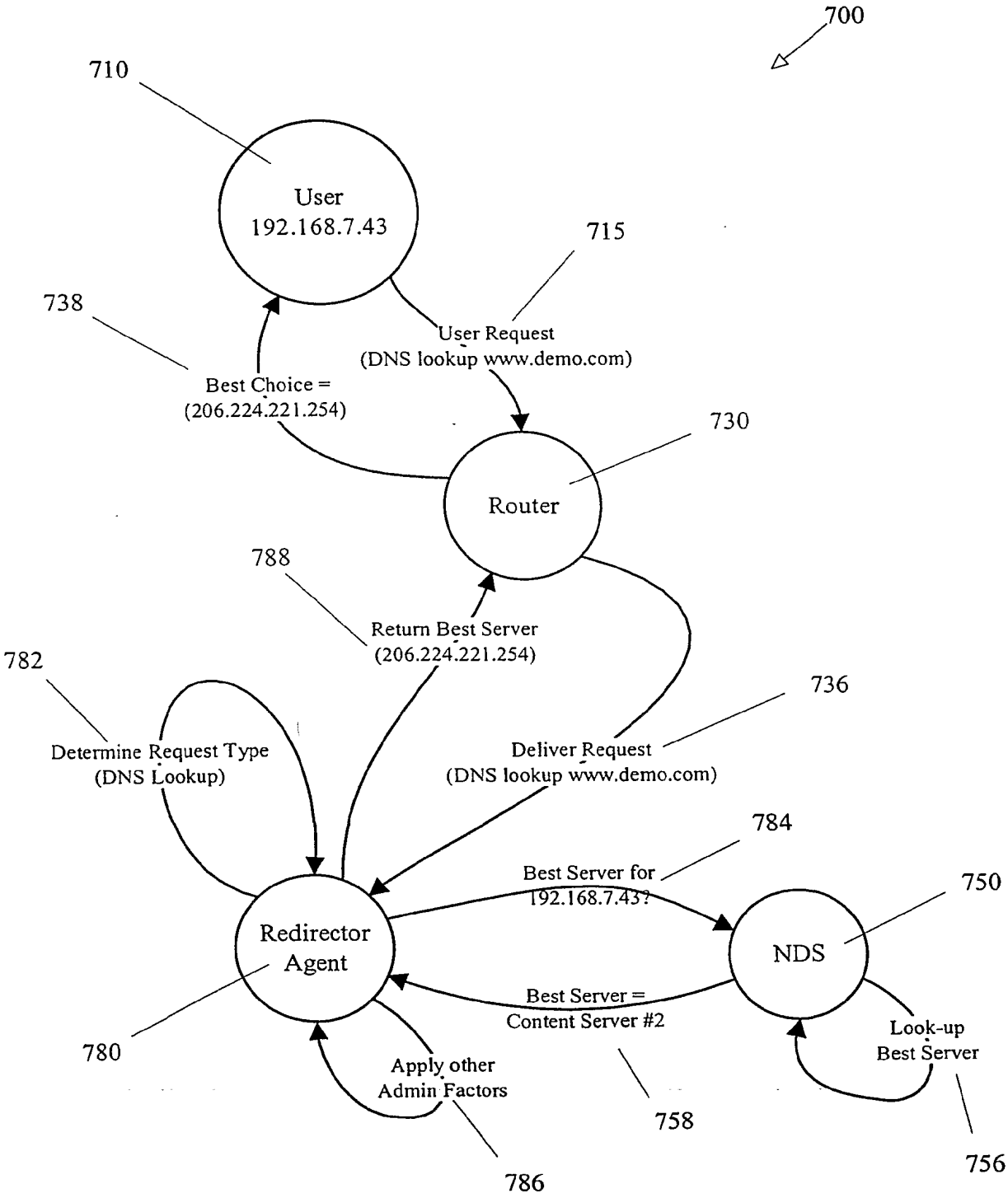

700
710
User
192.168.7.43
715
738
User Request
(DNS lookup www.demo.com)
Best Choice =
(206.224.221.254)
730
Router
788
Return Best Server
(206.224.221.254)
782
Determine Request Type
(DNS Lookup)
736
Deliver Request
(DNS lookup www.demo.com)
784
Best Server for
192.168.7.43?
750
Redirector
Agent
NDS
Best Server =
Content Server #2
780
Apply other
Admin Factors
Look-up
Best Server
758
786
756

Fig.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/29524

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 15/16, 13/14, 13/00
US CL : 709/203, 217, 219, 224, 229; 710/33; 395/725
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/203, 217, 219, 224, 229; 710/33; 395/725

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 6,286,029 B1 (DELPH) 04 September 2001, abstract, figure 1, col. 1 lines 57-col. 2 lines 7, col. 2 lines 57-col. 3 lines 30, col. 4 lines 67-col. 6 lines 5, col. 8 lines 25-47.	1-9
Y, P	US 6,233,607 B1 (TAYLOR et al) 15 May 2001, abstract, col. 1 lines 45-col. 2 lines 7, col. col. 4 lines 59-col. 5 lines 9.	1-9
Y, P	US 6,182,122 B1 (BERSTIS) 30 January 2001, abstract, figures 5, 6, 8, col. 1 lines 47-54, col. 2 lines 27-42, col. 2 lines 56-col. 3 lines 15, col. 7 lines 8-39.	1-9

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 05 NOVEMBER 2001	Date of mailing of the international search report 28 DEC 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer AYAZ R. SHEIKH Telephone No. (703) 305-9648

Form PCT/ISA/210 (second sheet) (July 1998)★

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 6,173,322 B1 (HU) 09 January 2001, abstract, figures 1, 9, col. 2 lines 27-col. 3 lines 25, col. 7 lines 53-col. 8 lines 59, col. 9 lines 66-col. 10 lines 64, col. 11 lines 60-col. 12 lines 65, col. 16 lines 25-col. 17 lines 47.	1-9
Y	US 6,108,706 A (BIRDWELL et al) 22 August 2000, abstract, figures 1, 3, 4, col. 1 lines 20-col. 2 lines 32, col. 2 lines 50-col. 3 lines 9, col. 4 lines 40-54, col. 6 lines 52-col. 7 lines 3, col. 7 lines 50-col. 8 lines 39.	1-9
Y	US 6,016,520 A (FACQ et al) 18 January 2000, abstract, col. 1 lines 55-col. 3 lines 7, col. 7 lines 45-col. 8 lines 16, col. 16 lines 27-49.	1-9
Y	US 5,418,967 A (SIMCOE et al) 23 May 1995, abstract, figures 3, 5, col. 1 lines 34-45, col. 18 lines 12-col. 19 lines 19.	1-9

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

East, West
Search terms: client/server, remote data processing, accessing a remote server, remote client/ terminal, content servers, request type, client/server connection.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
DURBIN, GREGORY P

POLSINELLI PC 900 W. 48TH PLACE SUITE 900 KANSAS CITY MISSOURI 64112 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 0447-WO-01	Date of mailing *(day/month/year)* 23 May 2014 (23.05.2014) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2013/074824**	International filing date *(day/month/year)* **12 December 2013 (12.12.2013)**

Applicant
LEVEL 3 COMMUNICATIONS, LLC

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 , 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-5875

Form PCT/ISA/220 (July 2010)

JUN 03 2014

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for six months(expire date : 2014.11.26) from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : 6XB97375

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants

Homepage: http://www.ipkcenter.com

Email: ipkc@ipkcenter.com

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0447-WO-01	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2013/074824	International filing date (day/month/year) 11 December 2013 (11.12.2013)	(Earliest) Priority Date (day/month/year) 13 December 2012 (13.12.2012)

Applicant

LEVEL 3 COMMUNICATIONS, LLC

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report
   a. With regard to the language, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
   b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).
   c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.
2. ☐ Certain claims were found unsearchable (See Box No. II)
3. ☒ Unity of invention is lacking (See Box No. III)
4. With regard to the title,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the abstract,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the drawings to be published with the abstract is Figure No. 18
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/074824

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/074824

A. CLASSIFICATION OF SUBJECT MATTER

G06F 17/30(2006.01)i, G06F 15/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F 17/00; G06F 15/16, G06F 15/173, G06F 17/30, G06F 12/00, G06F 12/02, G06F 13/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: content delivery, invalidation, collector, conference, adapter, redirect, node type, select node, pseudo IP, redefine group, provisioning, termination, trunk, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012-0215779 A1 (LEPSOIR, LAURENT F.) 23 August 2012 See paragraphs [0028], [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 15; and figures 1-2,	44-45,47-50,52
Y		58,60,65-66
A		1-43,46,51,53-57,59,61-64,67-115
X	US 2012-0166576 A1 (CHILDERS, ERIC SVEN-JOHAN et al.) 28 June 2012 See paragraphs [0039], [0041]-[0044], [0048]-[0049], and [0051]; and figure 4,	46,53,55,59
Y		60
X	US 2005-0192985 A1 (LI, WEN-SYAN et al.) 01 September 2005 See paragraphs [0043] and [0052]-[0054]; and figure 6.	51
Y	US 2012-0198048 A1 (BESTLER, LIHUA et al.) 02 August 2012 See paragraphs [0042]-[0043], [0045]-[0046], and [0048]; and figure 3,	58
X	US 2008-0215735 A1 (FARBER, DAVID A. et al.) 04 September 2008 See paragraphs [0249], [0253]-[0254], and [0256]; and claim 1.	61-64
Y		65-66

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 May 2014 (23.05.2014)	23 May 2014 (23.05.2014)

Name and mailing address of the ISA/KR	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	NHO, Il Myung Telephone No. +82-42-481-5925

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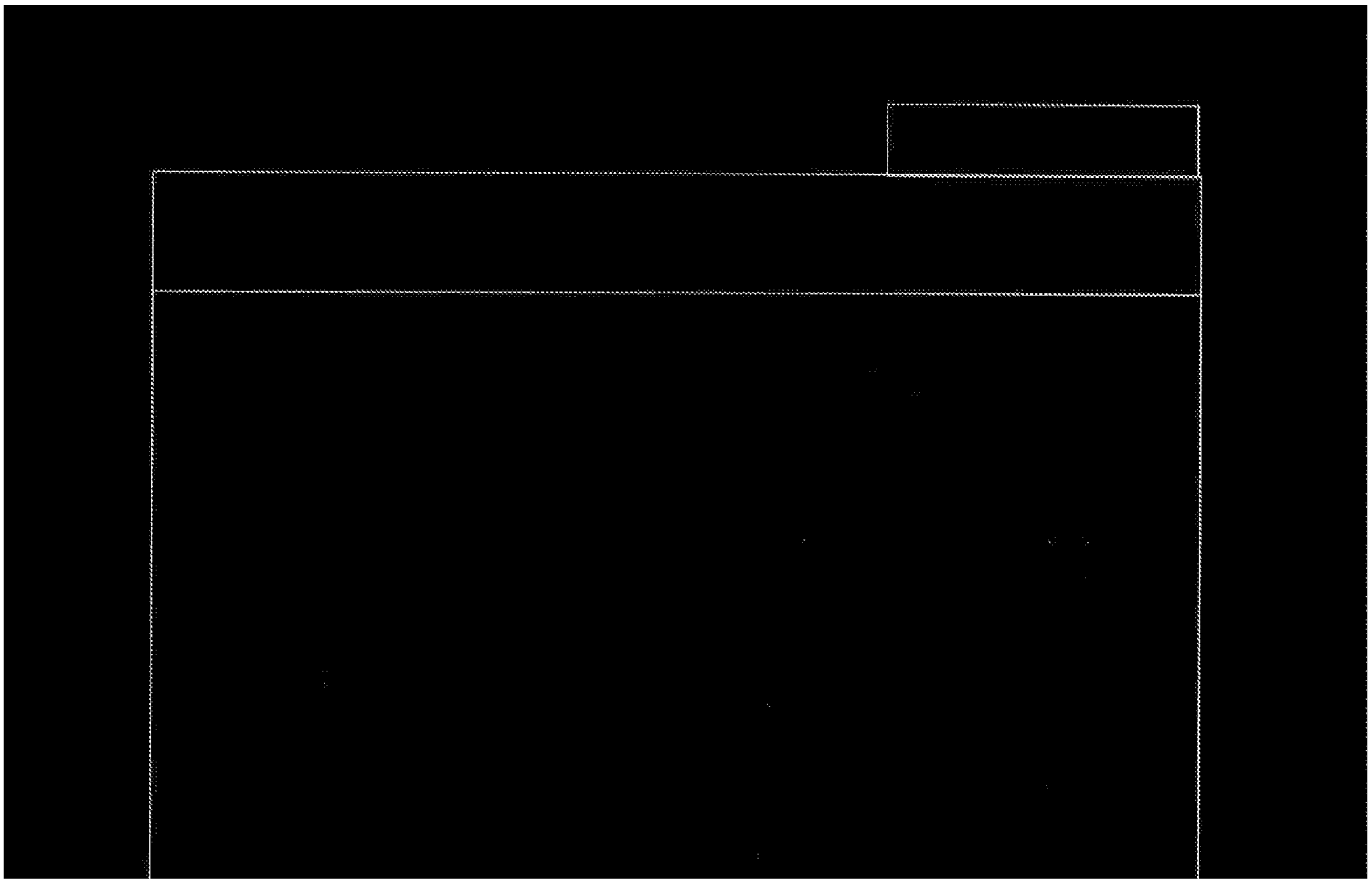
INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/074824

C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002-0161823 A1 (CASATI, FABIO et al.) 31 October 2002 See paragraphs [0018], [0045], and [0048]; claim 8; and figures 2 and 4;	70-76
Y		114,2(1),115
X	US 2010-0281224 A1 (BO, WESLEY JANKINS et al.) 04 November 2010 See paragraphs [0020] and [0024]-[0025]; claims 1 and 15; and figures 3-4;	86-87
Y	WO 02-25463 A1 (OSKION CORPORATION) 28 March 2002 See page 7 line 8 - page 8, line 10; claims 1-5; and figure 1;	114,2(1),115
A	WO 02-15014 A1 (IP DYNAMICS, INC.) 21 February 2002 See claims 1-3 and figure 5. Note: The second claim 2 in the page 882 is considered to be claim 2(1).	70-82

Form PCT/ISA/210 (continuation of second sheet) (July 2009)



ERROR: undefined
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STACK:

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
DURBIN, GREGORY P

FOLSOM ELLI PC 900 W. 48TH PLACE SUITE 900
KANSAS CITY MISSOURI 64112 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year)	23 May 2014 (23.05.2014)
Applicant's or agent's file reference: 0447-WO-01	FOR FURTHER ACTION: See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2013/074824	12 December 2013 (12.12.2013)	13 December 2012 (13.12.2012)

International Patent Classification (IPC) or both national classification and IPC

G06F 17/40(2006.01)i, G06F 15/16(2006.01)i

Applicant:
LEVEL 3 COMMUNICATIONS, LLC

1. This opinion contains indications relating to the following items:

- [X] Box No. I: Basis of the opinion
- [ ] Box No. II: Priority
- [ ] Box No. III: Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [X] Box No. IV: Lack of unity of invention
- [X] Box No. V: Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI: Certain documents cited
- [X] Box No. VII: Certain defects in the international application
- [X] Box No. VIII: Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea	23 May 2014 (23.05.2014)	NHO, Il Myung
Facsimile No. +82-42-472-7140		Telephone No. +82-42-481-8628

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/074824

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

a. (means)

☐ on paper

☐ in electronic form

b. (time)

☐ in the international application as filed.

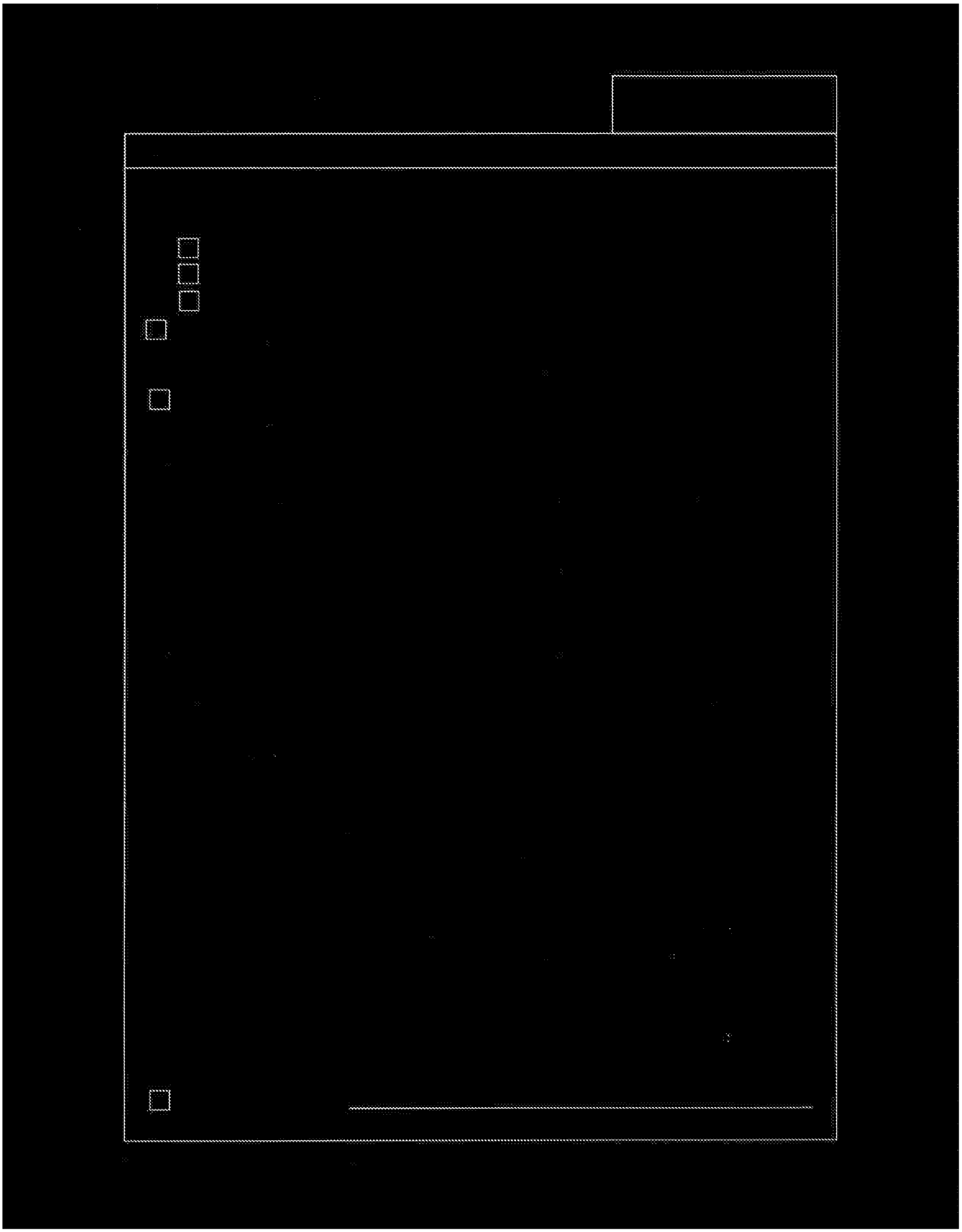
☐ together with the international application in electronic form.

☐ subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Form PCT/ISA/237 (Box No. I) (July 2011)



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Electronic Acknowledgement Receipt

EFS ID:	19491302
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	03-JUL-2014
Filing Date:	14-DEC-2012
Time Stamp:	14:08:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	51774 eda290ab765087ef19da04aadfd0fa3c1018421b	no	9

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	38147 3d507d2bc1c7c6ec568de934136c427a49550890	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	WO0215014A1.pdf	1504528 18b31a81de3760770c93b3ec390d99d415743e9a	no	34
Warnings:					
Information:					
4	Foreign Reference	WO0225463A1.pdf	1133225 081cbd0d4333c8487ac8bf7a9ad2fcbf53dcec64	no	28
Warnings:					
Information:					
5	Other Reference-Patent/App/Search documents	PCTUS13074824_ISR_23May14_447WO.pdf	824980 37ab6c88edade4ab7cef0833e9fdee4ee295d43b	no	8
Warnings:					
Information:					
6	Other Reference-Patent/App/Search documents	PCTUS13074824_WrtOp_23May14_447WO.pdf	258824 84f960e407b0016ab93cb535b30b183a43585c89	no	4
Warnings:					
Information:					
		Total Files Size (in bytes):	3811478		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2447
Filed	:	December 24, 2012	Examiner	:	Joon H. Hwang
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
STATEMENT OF RELATEDNESS (Under M.P.E.P. § 2001.06(b))

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and in accordance with M.P.E.P. § 2001.06(b), the Examiner is respectfully requested to consider the following pending applications (listed in the attached IDS document) which are owned by the Applicant of the present application. The following pending applications may include subject matter similar to that of the present application:

Application No.	Patent No./Status	Title
14/302,865	Pending	REQUEST-RESPONSE PROCESSING IN A CONTENT DELIVERY NETWORK
14/302,944	Pending	CUSTOMER-SPECIFIC REQUEST-RESPONSE PROCESSING IN A CONTENT DELIVERY NETWORK
13/714,411	Pending	CONTENT DELIVERY NETWORK

Application No.	Patent No./Status	Title
13/714,412	Pending	CONTENT DELIVERY FRAMEWORK
14/307,411	Pending	CONTENT DELIVERY FRAMEWORK HAVING FILL SERVICES
14/307,423	Pending	CONTENT DELIVERY FRAMEWORK HAVING STORAGE SERVICES
14/307,429	Pending	CONTENT DELIVERY FRAMEWORK HAVING ORIGIN SERVICES
14/307,404	Pending	GEOGRAPHIC LOCATION DETERMINATION IN A CONTENT DELIVERY FRAMEWORK
13/714,416	Pending	REQUEST PROCESSING IN A CONTENT DELIVERY NETWORK
13/837,216	Pending	CONTENT DELIVERY FRAMEWORK WITH DYNAMIC SERVICE NETWORK TOPOLOGY
13/714,417	Pending	CONTENT DELIVERY FRAMEWORK WITH DYNAMIC SERVICE NETWORK TOPOLOGIES
13/714,475	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH REDUCER SERVICES NETWORK
13/714,489	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH COLLECTOR SERVICES NETWORK
13/714,510	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES NETWORK
13/714,537	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES NETWORK
13/714,711	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH HYBRID CONTENT DELVIERY SERVICES
13/714,760	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH CONTENT DELVIERY SERVICES
13/837,821	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH CONTENT DELIVERY SERVICES
13/714,956	Pending	FRAMEWORK SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,109	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,270	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES
13/715,304	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH PROVISIONING
13/715,345	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/838,414	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH

Application No.	Patent No./Status	Title
		FEEDBACK
13/839,400	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK
13/715,466	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH ADAPTATION SERVICES WITH FEEDBACK FROM HEALTH SERVICES
13/715,590	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,650	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,683	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES HAVING DYNAMICALLY CONFIGURABLE LOG INFORMATION
13/715,730	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH DELIVERY SERVICES
13/715,747	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH RENDEZVOUS SERVICES
13/715,780	Pending	DEVICES AND METHODS SUPPORTING CONTENT DELIVERY WITH REDUCER SERVICES
13/802,051	Pending	INVALIDATION SYSTEMS, METHODS, AND DEVICES
13/802,093	Pending	SYSTEMS, METHODS, AND DEVICES FOR GRADUAL INVALIDATION OF RESOURCES
14/307,374	Pending	INVALIDATION SEQUENCING IN A CONTENT DELIVERY FRAMEWORK
13/802,143	Pending	MAINTAINING INVALIDATION INFORMATION
13/802,291	Pending	RESPONSIBILITY-BASED REQUEST PROCESSING
14/307,380	Pending	AUTOMATED LEARNING OF PEERING POLICIES FOR POPULARITY DRIVEN REPLICATION IN CONTENT DELIVERY
13/802,335	Pending	RESPONSIBILITY-BASED PEERING
13/802,366	Pending	RESPONSIBILITY-BASED CACHE PEERING
13/802,406	Pending	RENDEZVOUS SYSTEMS, METHODS, AND DEVICES

Application No.	Patent No./Status	Title
13/802,440	Pending	EVENT STREAM COLLECTOR SYSTEMS, METHODS, AND DEVICES
14/303,314	Pending	COLLECTOR MECHANISMS IN A CONTENT DELIVERY NETWORK
14/303,389	Pending	COLLECTOR MECHANISMS IN A CONTENT DELIVERY NETWORK
13/802,470	Pending	LAYERED REQUEST PROCESSING IN A CONTENT DELIVERY NETWORK (CDN)
13/802,489	Pending	LAYERED REQUEST PROCESSING WITH REDIRECTION AND DELEGATION IN A CONTENT DELIVERY NETWORK (CDN)
13/841,023	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
13/841,134	Pending	CONFIGURING A CONTENT DELIVERY NETWORK (CDN)
14/094,868	Pending	TRACKING INVALIDATION COMPLETION IN A CONTENT DELIVERY FRAMEWORK
14/088,362	Pending	INVALIDATION IN A CONTENT DELIVERY FRAMEWORK
14/095,079	Pending	DYNAMIC TOPOLOGY TRANSITIONS IN A CONTENT DELIVERY FRAMEWORK
14/105,981	Pending	CONTENT DELIVERY FRAMEWORK WITH AUTONOMOUS CDN PARTITIONED INTO MULTIPLE VIRTUAL CDNs
14/307,399	Pending	BEACON SERVICES IN A CONTENT DELIVERY FRAMEWORK
14/088,358	Pending	VERIFICATION AND AUDITING IN A CONTENT DELIVERY FRAMEWORK
14/088,367	Pending	RENDEZVOUS OPTIMIZATION IN A CONTENT DELIVERY FRAMEWORK
14/105,915	Pending	CONTENT DELIVERY FRAMEWORK HAVING AUTONOMOUS CDN INTERCONNECTION, DELEGATION, AND FEDERATION
14/088,542	Pending	SELECTIVE WARM UP AND WIND DOWN STRATEGIES IN A CONTENT DELIVERY NETWORK
14/307,389	Pending	ORIGIN SERVER-SIDE CHANNEL IN A CONTENT DELIVERY FRAMEWORK
14/088,356	Pending	CONFIGURATION AND CONTROL IN CONTENT DELIVERY FRAMEWORK

As the related U.S. patent applications are stored electronically at the PTO, no copies are being provided herewith. If the Examiner requires copies of any of these applications or any

additional information regarding any of the documents cited herein, the Examiner is respectfully requested to contact the undersigned at the number provided.

VI
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VII
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: July 3, 2014

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Content Delivery Network

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/714,410

filed on December 14, 2012.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Maksim YEVMENKIN Date (Optional): 3/8/2013

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	20024859
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	Brian Siritzky
Filer Authorized By:	
Attorney Docket Number:	0394-US-U1
Receipt Date:	02-SEP-2014
Filing Date:	14-DEC-2012
Time Stamp:	17:40:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	Yevemenkin_Declaration_0394-US-U01__US_13714410.pdf	117061 067a314958e8ca8fb733608909bc8bef5e2b52f8	no	1

Warnings:	
Information:	

Total Files Size (in bytes):	117061

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PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 13/714,410 filed on December 14, 2012.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

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LEGAL NAME OF INVENTOR

Inventor: Maksim YEVMENKIN Date (Optional): 9/8/2013

Signature: [signature]

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Electronic Acknowledgement Receipt

EFS ID:	20083630
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	09-SEP-2014
Filing Date:	14-DEC-2012
Time Stamp:	11:55:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	394USU1_oathYevmenkin.pdf	670162 741b23daac9a608f7a4dcc9599cf841ddcdb519c	no	1

Warnings:	
Information:	

Total Files Size (in bytes):	670162

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 83579

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☐ The address associated with Customer Number:

OR

☐	Firm or Individual Name			
	Address			
	City		State	Zip
	Country			
	Telephone		Email	

Assignee Name and Address: LEVEL 3 COMMUNICATIONS, LLC
1025 Eldorado Blvd.
Broomfield, CO 80021

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	/David D. Wier/	Date	September 16, 2014
Name	David D. Wier	Telephone	720-888-3539
Title	VP Patent Counsel		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office;U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of1995, no persons arerequired to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Level 3 Communications, LLC

Application No./Patent No.: 13/714410 Filed/Issue Date: December 14, 2012

Titled: CONTENT DELIVERY NETWORK

Level 3 Communications, LLC, a Limited Liability Company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Newton, Christopher et al. To: Level 3 Communications, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 032776, Frame 0198, or for which a copy thereof is attached.

2. From: Yevmenkin, Maksim To: Level 3 Communications, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 033697, Frame 0653, or for which a copy thereof is attached.

This collection of information is required by37 CFR3.73(b). The information is required toobtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentialityis governed by35 U.S.C. 122and 37 CFR1.11 and1.14. Thiscollection is estimated to take 12 minutes to complete, including gathering, preparing, and submittingthe completed application form to the USPTO.Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent tothe Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS.**SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/David D. Wier/	September 16, 2014
Signature	Date
David D. Wier	48,229
Printed or Typed Name	Title or Registration Number

[Page 2 of 2]

Privacy Act Statement

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the informationin order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an InternationalApplication filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, arecord may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from thissystem of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	20153085
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	16-SEP-2014
Filing Date:	14-DEC-2012
Time Stamp:	15:27:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POAc.pdf	80605 318e631073e09a912fb093c52c1b014491a5656e	no	2

Warnings:	
Information:	

2	Assignee showing of ownership per 37 CFR 3.73.	394USU1_373c.pdf	120067 4cf5986cb98c4d6e710c154b8b806bdefeb00a40	no	3

Warnings:	
Information:	
Total Files Size (in bytes):	200672

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/714,410	12/14/2012	Christopher Newton	0394-US-U1

CONFIRMATION NO. 9250

83579
LEVEL 3 COMMUNICATIONS, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

POA ACCEPTANCE LETTER

OC000000070902740

Date Mailed: 09/24/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/16/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hteffera/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	1	of	1

Complete if Known	
Application Number	13/714,410
Filing Date	December 14, 2012
First Named Inventor	NEWTON
Art Unit	2445
Examiner Name	Da T. Ton
Attorney Docket No: 0394-US-U1	

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		International Search Report, dated May 23, 2014, Int'l Appl. No. PCT/US13/074824, Int'l Filing Date December 12, 2013; Dkt. No. 0447-WO-01, 9 pgs.	
		Written Opinion of the International Searching Authority, dated May 23, 2014, Int'l Appl. No. PCT/US13/074824, Int'l Filing Date December 12, 2013; Dkt. No. 0447-WO-01, 43 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
DURBIN, GREGORY P

POLSINELLI PC 900 W. 48TH PLACE SUITE 900 KANSAS CITY MISSOURI 64112 USA

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	23 May 2014 (23.05.2014)
Applicant's or agent's file reference 0447-WO-01	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2013/074824**	International filing date *(day/month/year)* **12 December 2013 (12.12.2013)**
Applicant **LEVEL 3 COMMUNICATIONS, LLC**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.
In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-5875

Form PCT/ISA/220 (July 2010)

JUN 03 2014

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for six months(expire date : **2014.11.26**) from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **6XR97J75**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com

Email: ipkc@ipkcenter.com

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0447-WO-01	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2013/074824**	International filing date *(day/month/year)* **12 December 2013 (12.12.2013)**	(Earliest) Priority Date *(day/month/year)* 13 December 2012 (13.12.2012)

Applicant

LEVEL 3 COMMUNICATIONS, LLC

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☒ **Unity of invention is lacking** (See Box No. III)

4. With regard to the **title,**

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   ☒ the text is approved as submitted by the applicant.

   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 1E

   ☒ as suggested by the applicant.

   ☐ as selected by this Authority, because the applicant failed to suggest a figure.

   ☐ as selected by this Authority, because this figure better characterizes the invention.

   b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/074824

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box

1. ☒ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of any additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☒ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/074824

A. CLASSIFICATION OF SUBJECT MATTER

G06F 17/00(2006.01)i, G06F 15/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F 17/00; G06F 15/16; G06F 15/173; G06F 17/30; G06F 12/00; G06F 12/08; G06F 13/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: content delivery, invalidation, collector, rendezvous, adaptor, reducer, node type, select node, pseudo IP, redefine group, provisioning, termination, track, and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012-0215779 A1 (LIPSTONE, LAURENCE R.) 23 August 2012 See paragraphs [0028], [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2.	44-45,47-50,52
Y		56,60,65-66
A		1-43,46,51,53-55,57-59,61-64,67-115
X	US 2012-0166589 A1 (SWILDENS, ERIC SVEN-JOHAN et al.) 28 June 2012 See paragraphs [0039], [0041]-[0044], [0048]-[0049], and [0099]; and figure 2.	46,53,55,59
Y		60
X	US 2005-0192995 A1 (LI, WEN-SYAN et al.) 01 September 2005 See paragraphs [0048] and [0052]-[0053] and figure 6.	51
Y	US 2012-0198043 A1 (HESKETH, GIFFORD et al.) 02 August 2012 See paragraphs [0042]-[0043], [0045]-[0046], and [0049] and figure 3.	56
X	US 2008-0215735 A1 (FARBER, DAVID A. et al.) 04 September 2008 See paragraphs [0249], [0253]-[0254], and [0256] and claim 1.	61-64
Y		65-66

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 May 2014 (23.05.2014)	**23 May 2014 (23.05.2014)**

Name and mailing address of the ISA/KR	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea	NHO, Ji Myong
Facsimile No. +82-42-472-7140	Telephone No. +82-42-481-8528

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/074824

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002-0161823 A1 (CASATI, FABIO et al.) 31 October 2002 See paragraphs [0016], [0045], and [0048]; claim 8; and figures 2 and 4.	70-76
Y		114,2(1),115
X	US 2010-0281224 A1 (HO, WESLEY JANMING et al.) 04 November 2010 See paragraphs [0020] and [0024]-[0025]; claims 1 and 15; and figures 3-4.	86-87
Y	WO 02-25463 A1 (CONXION CORPORATION) 28 March 2002 See page 7 line 8 - page 8, line 16; claims 1-5; and figure 1.	114,2(1),115
A	WO 02-15014 A1 (IP DYNAMICS, INC.) 21 February 2002 See claims 1-3 and figure 5.	70-82
	Note: The second claim 2 in the page 862 is considered to be claim 2(1).	

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2013/074824

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2012-0215779 A1	23/08/2012	CA 2827572 A1	30/08/2012
		EP 2678773 A1	01/01/2014
		WO 2012-116078 A1	30/08/2012
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		US 2001-0056500 A1	27/12/2001
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		US 2005-0198334 A1	08/09/2005
		US 2006-0218265 A1	28/09/2006
		US 2007-0233705 A1	04/10/2007
		US 2007-0233706 A1	04/10/2007
		US 2007-0233846 A1	04/10/2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2007-0233884 A1	04/10/2007
		US 2008-0104268 A1	01/05/2008
		US 2008-0140800 A1	12/06/2008
		US 2008-0215750 A1	04/09/2008
		US 2008-0215755 A1	04/09/2008
		US 6185598 B1	06/02/2001
		US 6185598 B2	06/02/2001
		US 6654807 B2	25/11/2003
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		WO 02-15014 A1	21/02/2002

In case the space in any of the proceeding boxes is not sufficient.
Continuation of: Box No. III

I. Claims 8-9, 44, 47-50, 56-60, and 92-107 are directed to a system, a content delivery system, a device, and a computer-implemented method for obtaining state information from content delivery services and providing control information or service configuration information based at least on the state information.

II. Claims 1-7, 10-12, 40-43, and 45 are directed to a system, a content delivery network or system, a device, method, and a computer program product for running at least one content delivery service supported by reducer services.

III. Claims 13-39, 46, and 52-55 are directed to a device, a computer-implemented method, a computer program product for running at least two content delivery services of a plurality of content delivery services supported by adaption services for provisioning and configuring content delivery services on a device in accordance with a device configuration.

IV. Claims 51, 61-69, and 88-89 are directed to a computer-implemented method, system, and computer program product for providing information about invalidating in a collector system.

V. Claims 70-77 and 114-115 are directed to a computer-implemented method and a system for defining and/or redefining a group.

VI. Claim 78 is directed to a computer-implemented method for terminating a particular service.

VII. Claims 79-82 are directed to a computer-implemented method for determining a pseudo client IP and associating the pseudo client with a resolver IP.

VIII. Claims 83-85 are directed to a computer-implemented method for tracking first and second informations and reconciling the first information with the second information.

IX. Claims 86-87 are directed to a computer-implemented method for performing one or more warm-up strategies.

X. Claims 90-91 are directed to a computer-implemented method for causing at least some of first request to be processed using second request environment.

XI. Claims 108-109 are directed to a computer-implemented method and a device for attempting to process a request in accordance with at least one kind of responsibility assigned to a node for requests relating to a particular resource.

XII. Claims 110-111 are directed to a computer-implemented method for using maintained invalidation information to prevent subsequent use a version of information not currently stored on a service.

XIII. Claims 112-113 are directed to a computer-implemented method and device for receiving a request for a content delivery network service of a particular type and processing the request.

XIV. Claims 114-115 are directed to a computer-implemented method and system for dynamically determining a service type of a request and selecting one or more nodes in a group to be responsible for processing the request.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
DURBIN, GREGORY P

POLSINELLI PC 900 W. 48TH PLACE SUITE 900
KANSAS CITY MISSOURI 64112 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**23 May 2014 (23.05.2014)**
Applicant's or agent's file reference 0447-WO-01	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/074824	**12 December 2013 (12.12.2013)**	13 December 2012 (13.12.2012)

International Patent Classification (IPC) or both national classification and IPC
G06F 17/00(2006.01)i, G06F 15/16(2006.01)i

Applicant
LEVEL 3 COMMUNICATIONS, LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	23 May 2014 (23.05.2014)	NHO, Ji Myong Telephone No. +82-42-481-8528

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/074824

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

   ☐ on paper

   ☐ in electronic form

   b. (time)

   ☐ in the international application as filed.

   ☐ together with the international application in electronic form.

   ☐ subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/074824

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has, within the applicable time limit:
   - ☒ paid additional fees
   - ☐ paid additional fees under protest and, where applicable, the protest fee
   - ☐ paid additional fees under protest but the applicable protest fee was not paid
   - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
   - ☐ complied with
   - ☒ not complied with for the following reasons:

I. Claims 8-9, 44, 47-50, 56-60, and 92-107 are directed to a system, a content delivery system, a device, and a computer implemented method for obtaining state information from content delivery services and providing control information or service configuration information based at least on the state information.

II. Claims 1-7, 10-12, 40-43, and 45 are directed to a system, a content delivery network or system, a device, method, and a computer program product for running at least one content delivery service supported by reducer services.

III. Claims 13-39, 46, and 52-55 are directed to a device, a computer-implemented method, a computer program product for running at least two content delivery services of a plurality of content delivery services supported by adaption services for provisioning and configuring content delivery services on a device in accordance with a device configuration.

IV. Claims 51, 61-69, and 88-89 are directed to a computer-implemented method, system, and computer program product for providing information about invalidating in a collector system.

V. Claims 70-77 and 114-115 are directed to a computer-implemented method and a system for defining and/or redefining a group.

VI. Claim 78 is directed to a computer-implemented method for terminating a particular service.

VII. Claims 79-82 are directed to a computer-implemented method for determining a pseudo client IP and associating the pseudo client with a resolver IP.

VIII. Claims 83-85 are directed to a computer-implemented method for tracking first and second informations and reconciling the first information with the second information.

Continued on Supplemental Box

4. Consequently, this opinion has been established in respect of the following parts of the international application :
   - ☒ all parts.
   - ☐ the parts relating to claims Nos. _____

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/074824

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-115,2(1)	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-43,54,57-58,67-69,77-85,88-113	YES
	Claims	44-53,55-56,59-66,70-76,86-87,114-115,2(1)	NO
Industrial applicability (IA)	Claims	1-115,2(1)	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:
D1: US 2012-0215779 A1 (LIPSTONE, LAURENCE R.) 23 August 2012
D2: US 2012-0166589 A1 (SWILDENS, ERIC SVEN-JOHAN et al.) 28 June 2012
D3: US 2005-0192995 A1 (LI, WEN-SYAN et al.) 01 September 2005
D4: US 2012-0198043 A1 (HESKETH, GIFFORD et al.) 02 August 2012
D5: US 2008-0215735 A1 (FARBER, DAVID A. et al.) 04 September 2008
D6: US 2002-0161823 A1 (CASATI, FABIO et al.) 31 October 2002
D7: US 2010-0281224 A1 (HO, WESLEY JANMING et al.) 04 November 2010
D8: WO 02-25463 A1 (CONXION CORPORATION) 28 March 2002
D9: WO 02-15014 A1 (IP DYNAMICS, INC.) 21 February 2002

2.1 Novelty and Inventive Step

2.1.1 Concerning Claims 1-2

The subject matter of **claim 1** differs from the disclosures of these available prior art documents in that the collector services network of claim 1 provides state information to control services, said state information being based on an event input from a reducer services network and provides state information to other content delivery (CD) services of a plurality of CD services; at least some of said control services provide control information to said CD services, at least some of said control information being based on state information from the collector services network; and at least some of said CD services obtain control information from said control services and are controlled and configured based on the control information received from said control services, wherein at least some of the control information used to control and configure the CD services was based on specific event information produced by at least one of the plurality of CD services. Accordingly, claim 1 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 1 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 2 is dependent on claim 1 and therefore meets the requirements of PCT Article 33(2) and (3).

Continued on Supplemental Box

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/074824

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims of this application are not numbered consecutively in Arabic numbers, since claim 2 is found twice (PCT Rule 6.1(b)). Therefore, the claim 2(1) is renumbered by this authority.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/074824

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 2(1)(see Box No. VII) is unclear because claim 1 relates to a system, but claim 2(1) referring to claim 1 relates to a method, and because "the request" and "the selected one or more nodes in the group" in claim 2(1) have not been previously defined. Therefore, claim 2(1) does not meet the requirement of PCT Article 6.
(Note : Referring to claims and the description, it is understood that "the request" and "the selected one or more nodes in the group" used in claim 2(1) relate to "a request" and "selecting one or more nodes in a group" respectively in claim 114. Accordingly, the international search report and the written opinion have been established on the assumption that claim 2(1) refers to claim 114.)

The expression "(F) at least some of said control services" in claims 8-9 seem to be a typographical errors for "(G) at least some of said control services". Therefore, claims 8-9 do not meet the requirement of PCT Article 6.

The phrase "said second service controls said service" in claim 21 is unclear because "said service" does not clearly indicate which one of services previously defined. Therefore, claim 21 does not meet the requirement of PCT Article 6.

Claims 33, 38, and 42 include the following phrases twice: "wherein said CD services include collector services, and control services" and "wherein at least a first some of said plurality of computer ··· at least some of said control information being based on state information from the collector system, and wherein". Therefore, claims 33, 38, and 42 do not meet the requirement of PCT Article 6.

The phrase "services of type T comprises: control services, reducer services, rendezvous services, delivery services, and/or reducer services" in claim 56 comprises "reducer services" twice. Therefore, claim 56 does not meet the requirement of PCT Article 6.

Claim 97 is unclear because claim 98 relates to the device, but claim 97 referring to claim 98 relates to the CD system, and because "said one or more devices" in claim 97 have not been previously defined. Therefore, claim 97 does not meet the requirement of PCT Article 6.
(Note : Referring to claims and the description, it is understood that "said one or more devices" used in claim 97 relate to " a plurality of devices" in claim 96. Accordingly, this written opinion has been established on the assumption that claim 97 refers to claim 96.)

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Box No. IV

IX. Claims 86-87 are directed to a computer-implemented method for performing one or more warm-up strategies.

X. Claims 90-91 are directed to a computer-implemented method for causing at least some of first request to be processed using second request environment.

XI. Claims 108-109 are directed to a computer-implemented method and device for attempting to process a request in accordance with kind responsibility assigned to a node for requests relating to a particular resource.

XII. Claims 110-111 are directed to a computer-implemented method for using maintained invalidation information to prevent subsequent use a version of information not currently stored on a service.

XIII. Claims 112-113 are directed to a computer-implemented method and device for receiving a request for a content delivery network service of a particular type and processing the request.

XIV. Claims 114-115 are directed to a computer-implemented method and system for dynamically determining a service type of a request and selecting one or more nodes in a group to be responsible for processing the request.

Since the above mentioned groups of claims do not share any of the technical features identified, a technically special relationship between the inventions, as defined in PCT Rule 13.2, does not exist. Accordingly, the claims do not relate to one invention or to a single inventive concept under PCT Rule 13.1.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of : Box No. V

2.1.2 Concerning Claim 3

The subject matter of claim 3 differs from the disclosures of these available prior art documents in that the collector services network of claim 3 provides state information to control services, said state information being based on an event input from a reducer services network and provides state information to other CD services of a plurality of CD services; at least some of control services of claim 3 provide control information to said CD services, at least some of control information being based on state information from the collector services network; at least some of said CD services obtain control information from said control services and are controlled and configured based on the control information received from said control services; and at least some of said CD services obtain state information from said collector services network and are controlled and configured based on the state information received from said collector services network. Accordingly, claim 3 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 3 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.3 Concerning Claims 4-5

The subject matter of claim 4 differs from the disclosures of these available prior art documents in that the collector services network of claim 4 provides state information to control services, said state information being based on an event input from a reducer services network and provides state information to other CD services of a plurality of CD services; at least some of control services provide control information to said CD services, at least some of said control information being based on state information from the collector services network; and at least some of the CD services obtain control information from said control services and are controlled and configured based on the control information received from the control services, wherein at least some of the control information used to control and configure the CD services was based on specific event information produced by at least one of said plurality of CD services. Accordingly, claim 4 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 4 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 5 is dependent on claim 4 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.4 Concerning Claims 6-7

Continued on The Next Page

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Previous Page

The subject matter of **claim 6** differs from the disclosures of these available prior art documents in that the collector services network of claim 6 provides state information to control services, said state information being based on an event input from a reducer services network and provides state information to other CD services of a plurality of CD services; at least some of said control services provide control information to the CD services, at least some of said control information being based on state information from the collector services network; at least some of said CD services obtain control information from the control services and are controlled and configured based on the control information received from the control services; and at least some of said CD services obtain state information from the collector services network and are controlled and configured based on the state information received from said collector services network. Accordingly, claim 6 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 6 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 7 is dependent on claim 6 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.5 Concerning Claim 8

The subject matter of **claim 8** differs from the disclosures of these available prior art documents in that the collector services network of claim 8 provides state information to control services, said state information being based on an event input from a reducer services network and provides state information to other CD services of a plurality of CD services; at least some of control services provide control information to the CD services, at least some of said control information being based on state information from the collector services network; and at least some of the CD services obtain control information from the control services and are controlled and configured based on the control information received from the control services, wherein at least some of the control information used to control and configure the CD services was based on specific event information produced by at least one of the plurality of CD services. Accordingly, claim 8 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 8 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.6 Concerning Claim 9

The subject matter of **claim 9** differs from the disclosures of these available prior art documents in that a collector services network provides state information to control services,

Continued on The Next Page

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Previous Page

state information being based on an event input from a reducer services network and provides state information to other CD services of a plurality of CD services; at least some of control services provide control information to the CD services, at least some of control information being based on state information from the collector services network; at least some of the CD services obtain control information from the control services and are controlled and configured based on the control information received from the control services; and at least some of the CD services obtain state information from the collector services network and are controlled and configured based on the state information received from the collector services network. Accordingly, claim 9 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 9 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.7 Concerning Claims 10-11

The subject matter of **claim 10** differs from the disclosures of these available prior art documents in that at least some of collector services of claim 10 produce state information, the state information being based on an event input from one or more CD services, provide at least some of said state information to control services, and provide at least some of information to the CD services to control operation or configuration of the CD services; and at least some of the control services of claim 10 obtain state information from the collector services as their respective state input, produce control information based on the state information from the collector services, and provide at least some of the control information to the CD services to control operation or configuration of said CD services, wherein at least some of the control information to control operation or configuration of the CD services was determined using specific event information produced by one or more CD services. Accordingly, claim 10 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 10 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 11 is dependent on claim 10 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.8 Concerning Claim 12

The subject matter of **claim 12** differs from the disclosures of these available prior art documents in that the collector services network of claim 12 provides state information to control services, said state information being based on an event input from a reducer services network and provides state information to other CD services of a plurality of CD services; at least some of control services provide control information to said CD services, at least some of

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said control information being based on state information from the collector services network; and at least some of the CD services obtain control information from said control services and are controlled and configured based on the control information received from the control services, wherein at least some of the control information used to control and configure the CD services was based on specific event information produced by at least one of the plurality of CD services. Accordingly, claim 12 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 12 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.9 Concerning Claims 13-14

The subject matter of **claim 13** differs from the disclosures of these available prior art documents in that the collector services network of claim 13 provides state information to control services, said state information being based on an event input from CD services; and at least some of control services provide control information to said CD services, at least some of said control information being based on state information from the collector services network. Accordingly, claim 13 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 13 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 14 is dependent on claim 13 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.10 Concerning Claims 15-16

The subject matter of **claim 15** differs from the disclosures of these available prior art documents in that the collector services network of claim 15 provides state information to control services, said state information being based on an event input from CD services, and at least some of said control services provide control information to said CD services, at least some of said control information being based on state information from the collector services network. Accordingly, claim 15 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 15 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 16 is dependent on claim 15 and therefore meets the requirements of PCT Article 33(2) and (3).

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2.1.11 Concerning Claims 17-18

The subject matter of **claim 17** differs from the disclosures of these available prior art documents in that the collector services network of claim 17 provides state information to control services, said state information being based on an event input from CD services; and at least some of said control services provide control information to the CD services, at least some of said control information being based on state information from the collector services network. Accordingly, claim 17 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 17 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 18 is dependent on claim 17 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.12 Concerning Claims 19-20

The subject matter of **claim 19** differs from the disclosures of these available prior art documents in that the collector services network of claim 19 provides state information to control services, said state information being based on an event input from CD services; and at least some of said control services provide control information to the CD services, at least some of control information being based on state information from the collector services network. Accordingly, claim 19 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 19 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 20 is dependent on claim 19 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.13 Concerning Claims 21-22

The subject matter of **claim 21** differs from the disclosures of these available prior art documents in that the collector services network of claim 21 provides state information to control services, said state information being based on an event input from CD services; and at least some of control services provide control information to the CD services, at least some of said control information being based on state information from the collector services network. Accordingly, claim 21 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 21 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

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Claim 22 is dependent on claim 21 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.14 Concerning Claims 23-24

The subject matter of **claim 23** differs from the disclosures of these available prior art documents in that the collector system of claim 23 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to a collector system from one or more CD services in the CD system; the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 23 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 23 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 24 is dependent on claim 23 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.15 Concerning Claims 25-26

The subject matter of **claim 25** differs from the disclosures of these available prior art documents in that the collector system of claim 25 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system of claim 25 provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 25 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 25 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 26 is dependent on claim 25 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.16 Concerning Claim 27

The subject matter of **claim 27** differs from the disclosures of these available prior art documents in that the collector system of claim 27 provides state information to a control system and to CD services in a CD system, said state information being based on an event

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information input to the collector system from one or more CD services in the CD system; the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 27 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 27 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.17 Concerning Claim 28

The subject matter of **claim 28** differs from the disclosures of these available prior art documents in that the collector system of claim 28 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of control information being based on state information from the collector system, wherein the CD services further include rendezvous services, at least one CD service on a device is a rendezvous service configured to provide rendezvous service on behalf of the CD system, and information relating to operation of the rendezvous service includes information about requests made of the rendezvous service. Accordingly, claim 28 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 28 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.18 Concerning Claim 29

The subject matter of **claim 29** differs from the disclosures of these available prior art documents in that the collector system of claim 29 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system, wherein the CD services further include rendezvous services, at least one CD service on a device is a rendezvous service configured to provide rendezvous service on behalf of the CD system, and information relating to operation of the rendezvous service includes information about requests made of the rendezvous service. Accordingly, claim 29 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 29 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

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2.1.19 Concerning Claims 30-31

The subject matter of **claim 30** differs from the disclosures of these available prior art documents in that the collector system of claim 30 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of the control information being based on state information from the collector system, wherein the CD services further include rendezvous services, at least one CD service on a device is a rendezvous service configured to provide rendezvous service on behalf of the CD system, and information relating to operation of the rendezvous service includes information about requests made of the rendezvous service. Accordingly, claim 30 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 30 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 31 is dependent on claim 30 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.20 Concerning Claim 32

The subject matter of **claim 32** differs from the disclosures of these available prior art documents in that the collector system of claim 32 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 32 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 32 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.21 Concerning Claim 33

The subject matter of **claim 33** differs from the disclosures of these available prior art documents in that the collector system of claim 33 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 33 is not anticipated by any one of the documents, nor is it obvious to a

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person skilled in the art by the documents taken alone or in combination. Therefore, claim 33 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.22 Concerning Claims 34-35

The subject matter of **claim 34** differs from the disclosures of these available prior art documents in that the collector system of claim 35 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system, wherein first information obtained from other CD services in the CD system comprises control information from the control system and/or state information from the collector system. Accordingly, claim 34 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 34 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 35 is dependent on claim 34 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.23 Concerning Claims 36-37

The subject matter of **claim 36** differs from the disclosures of these available prior art documents in that the collector system of claim 36 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system, wherein first information obtained from other CD services in the CD system comprises control information from the control system and/or state information from the collector system. Accordingly, claim 36 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 36 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 37 is dependent on claim 36 and therefore meets the requirements of PCT Article 33(2) and (3).

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2.1.24 Concerning Claim 38

The subject matter of claim 38 differs from the disclosures of these available prior art documents in that the collector system of claim 38 provides state information to a control system and to CD services in the CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system, wherein at least one of a computer is a device comprising a rendezvous service is configured to: generate information relating to operation of the rendezvous service, provide at least some of the information as event information to at least one other CD service, obtain first information from other CD services in the CD system, and base operation of the rendezvous service on the first information. Accordingly, claim 38 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 38 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.25 Concerning Claim 39

The subject matter of claim 39 differs from the disclosures of these available prior art documents in that the collector system of claim 39 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to a collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system; and the method of claim 39 comprises, by a rendezvous service running on a hardware, generating information relating to operation of the rendezvous service, providing at least some of the information as event information to at least one other CD service, obtaining first information from other CD services in the CD system, and basing operation of the rendezvous service on the first information. Accordingly, claim 39 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 39 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.26 Concerning Claims 40-41

The subject matter of claim 40 differs from the disclosures of these available prior art documents in that the collector system of claim 40 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and

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the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 40 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 40 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 41 is dependent on claim 40 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.27 Concerning Claim 42

The subject matter of **claim 42** differs from the disclosures of these available prior art documents in that the collector system of claim 42 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 42 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 42 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.28 Concerning Claim 43

The subject matter of **claim 43** differs from the disclosures of these available prior art documents in that the collector system of claim 43 provides state information to a control system and to CD services in a CD system, the state information being based on an event information input to the collector system from one or more CD services in the CD system; and the control system provides control information to CD services in the CD system, at least some of said control information being based on state information from the collector system. Accordingly, claim 43 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 43 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.29 Concerning Claim 44

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 44, discloses a system comprising:

at least one collector module operable to collect analytics associated with requests for content in a content delivery network (CDN) (see paragraphs [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

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The subject matter of **claim 44** differs from the system of D1 in that each device of the plurality of devices of claim 44 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D1 considering that edge collectors 1010 can also perform computations, calculations, normalizations, comparisons, and other analyses of data collected (see paragraph [0101]). Accordingly, claim 44 would have been obvious to a person skilled in the art over D1. Therefore, claim 44 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.30 Concerning Claim 45

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 45, discloses a system comprising:

a plurality of edge servers 1102 located at or near an edge of a content delivery network to achieve one or more performance objectives such as, for example, reducing load on intercon necting networks, freeing up capacity, providing scalability, increasing speed and quality of content delivery, lowering delivery costs, and so on (see paragraphs [0028], [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

The subject matter of **claim 45** differs from the system of D1 in that each device of the plurality of devices of claim 45 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D1, considering that an edge server computer 202 includes a media streaming server 206, a media streaming broker 208, a stream caching module 210 and a content cache 212 (see paragraph [0041]). Accordingly, claim 45 would have been obvious to a person skilled in the art over D1. Therefore, claim 45 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.31 Concerning Claim 46

D2, which is considered to represent the most relevant state of the art to the subject matter of claim 46, discloses a system comprising:

a provisioning manager for performing provisioning either manually or automatically in a plurality of content delivery network (CDN) (see paragraphs [0039], [0041]-[0044], [0048]-[0049], and [0099]; and figure 2).

The subject matter of **claim 46** differs from the system of D2 in that each device of the plurality of devices of claim 46 comprises hardware including memory and at least one

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processor. However, the difference can be easily conceived from the feature of D2 considering that a provisioning manager 207 takes information received from a load-balancing manager 204A-204B and uses information as well as policies derived from customer service agreement of a customer whose application program is being distributed to make a provisioning decision (see paragraph [0044]). Accordingly, claim 46 would have been obvious to a person skilled in the art over D2. Therefore, claim 46 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.32 Concerning Claim 47

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 47, discloses a system comprising:

an aggregator 1014 for providing access to configuration information and management control of an analytics system 1000 of the content delivery network (see paragraphs [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

The subject matter of claim 47 differs from the system of D1 in that each device of the plurality of devices of claim 47 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D1, considering that an aggregator 1014 can also buffer data and provide monitoring, management and redundancy (see paragraphs [0107]-[0108]). Accordingly, claim 47 would have been obvious to a person skilled in the art over D1. Therefore, claim 47 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.33 Concerning Claim 48

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 48, discloses a system comprising:

a content delivery network configurator (CDNC) 1044 that performs service management for a caching network of the content delivery network (see paragraphs [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

The subject matter of claim 48 differs from the system of D1 in that each device of the plurality of devices of claim 48 comprises hardware including memory and at least one processor. However the difference can be easily conceived from the feature of D1, considering that CDNC 1044 further provides configuration support for an analytics system and manages per-subscriber and per-coserver options (see paragraph [0115]). Accordingly, claim 48 would have been obvious to a person skilled in the art over D1. Therefore, claim 48 is novel under

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PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.34 Concerning Claims 49-50

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 49, discloses a system comprising:

a content delivery network (CDN) comprising a portal server for providing access for devices 1020 such as, for example, computers, servers, workstations, customer reporting server 1028, customer reporting workstation 1030, CDN management workstation 1032, etc., and at least one collector module operable to collect analytics associated with requests for content (see paragraphs [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

2.1.34.1 Independent Claim 49

The subject matter of **claim 49** differs from system of D1 in that each device of the plurality of devices of claim 49 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D1 considering that edge collectors 1010 can also perform computations, calculations, normalizations, comparisons, and other analyses of data collected (see paragraph [0101]). Accordingly, claim 49 would have been obvious to a person skilled in the art over D1. Therefore, claim 49 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.34.2 Dependent Claim 50

The additional feature of **claim 50**, dependent on claim 49, can be easily derived from the feature of D1 considering that the CDN comprises at least one collector module, a plurality of edge servers, an aggregator, and a portal server, etc. (see claims 1 and 16). Accordingly, claim 50 would have been obvious to a person skilled in the art over D1. Therefore, claim 50 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.35 Concerning Claim 51

D3, which is considered to represent the most relevant state of the art to the subject matter of claim 51, discloses a system comprising:

an invalidation module 6-14 for identifying queries to be invalidated, monitoring database update logs, and polling the DBMS 5-22 to obtain information used for invalidation determinations in a content delivery system (see paragraphs [0048] and [0052]-[0053]; and figure 6).

The subject matter of **claim 51** differs from the system of D3 in that each device of the

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plurality of claim 51 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D3, considering that an invalidation module monitors database update logs and polls DBMS 5-22 to obtain information used for invalidation determinations in a content delivery system (see paragraph [0053]). Accordingly, claim 51 would have been obvious to a person skilled in the art over D3. Therefore, claim 51 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.36 Concerning Claim 52

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 52, discloses a system comprising:

a content delivery network (CDN) comprising a portal server for providing access for devices 1020 such as, for example, computers, servers, workstations, customer reporting server 1028, customer reporting workstation 1030, CDN management workstation 1032, etc. (see paragraphs [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

The subject matter of claim 52 differs from the system of D1 in that each device of the plurality of claim 52 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D1 considering that a portal 1006 can further provide both GUI controls and file exports (e.g., PDF, CSV, and the like) (see paragraph [0112]). Accordingly, claim 52 would have been obvious to a person skilled in the art over D1.

Therefore, claim 52 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.37 Concerning Claim 53

D2, which is considered to represent the most relevant state of the art to the subject matter of claim 53, discloses a system comprising:

a provisioning manager for performing provisioning either manually or automatically in a plurality of CDN, wherein the provisioning manager factors some or all of the following parameters to select a server for provisioning:

application software availability from the server;
resource (system, CPU, memory, disk space, etc.) availability from the server;
provisioning expenses for the server;
deployment expense for the server;

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cache hit and miss predictions based on adding new POPs and servers; and

the network latency of the POP for the application client and the network latency of the POP for the application communication with other software applications such as database servers at the origin site (see paragraphs [0039], [0041]-[0044], [0048]-[0049], and [0099]; and figure 2).

The subject matter of **claim 53** differs from the system of D2 in that each device of the plurality of claim 53 comprises hardware including memory and at least one processor. However, the difference can be easily conceived from the feature of D2, considering that a provisioning manager 207 takes information received from a load-balancing manager 204A-204B and uses information as well as policies derived from customer service agreement of a customer whose application program is being distributed to make a provisioning decision (see paragraph [0044]). Accordingly, claim 53 would have been obvious to a person skilled in the art over D2. Therefore, claim 53 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.38 Concerning Claim 54

The subject matter of **claim 54** differs from the disclosures of these available prior art documents in that the adaptation service of claim 54 is configured to determine, using configuration information from control services, whether an adaptation service needs updating if it is determined that the adaptation service needs updating to update the adaptation service, and to provision CD services on a device according to a first service configuration. Accordingly, claim 54 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 54 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.39 Concerning Claim 55

D2, which is considered to represent the most relevant state of the art to the subject matter of claim 55, discloses a system comprising:

a plurality of content delivery network (CDN) servers comprising cache servers that cache content (see paragraphs [0039], [0041]-[0044], [0048]-[0049], and [0099]; and figure 2).

The subject matter of **claim 55** differs from the system of D2 in that the adaptation service of claim 55 is configured to obtain service configuration information from control services and control CD services on a device based on monitored information of each CD service on a device and service configuration information obtained by an adaptation service at the device from the control services.

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However, the difference can be easily conceived from the feature of D2 considering that a provisioning manager 207 takes information received from a load-balancing manager 204A-204B and uses the information as well as policies derived from the customer service agreement of the customer whose application program is being distributed to make a provisioning decision and then performs provisioning either manually or automatically, wherein the provisioning manager 207 factors some or all of the following parameters to select a server for provisioning: application software availability from the server; resource (system, CPU, memory, disk space, etc.) availability from the server; provisioning expenses for the server; deployment expense for the server; cache hit and miss predictions based on adding new POPs and servers; and the network latency of the POP for the application client and the network latency of the POP for the application communication with other software applications such as database servers at the origin site (see paragraphs [0039], [0041], and [0049]). Accordingly, claim 55 would have been obvious to a person skilled in the art over D2. Therefore, claim 55 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.40 Concerning Claim 56

D1, which is considered to represent the most relevant state of the art to the subject matter of claim 56, discloses a system comprising:

a content delivery network (CDN) comprising at least one collector module, a plurality of edge servers, an aggregator, and a portal server, etc. (see paragraphs [0041]-[0042], [0045], [0095], [0097]-[0101], [0107]-[0108], [0112], and [0115]-[0116]; claims 1 and 16; and figures 1-2).

The subject matter of **claim 56** differs from the system of D1 in that the services of type T of claim 56 comprise rendezvous services. However, the difference is merely a variation of the disclosure of D4 considering that a content delivery networks (CDN) 110 also includes other components (collectively denoted 114 in FIG. 2) such as, e.g., components for control, administration, rendezvous, operation, measurement, etc.(see paragraph [0042]). Accordingly, it would be obvious to a person skilled in the art to apply said feature of D4 to the system of D1 to arrive at the subject matter of claim 56. Therefore, claim 56 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.41 Concerning Claims 57-58

The subject matter of **claim 57** differs from the disclosures of these available prior art documents in that the method of claim 57 comprises generating a template, the generating using an evaluated configuration object and second external resource inputs; and rendering the

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template with a set of actual parameter values to produce a localized control resource, the rendering using third external resource inputs. Accordingly, claim 57 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 57 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 58 is dependent on claim 57 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.42 Concerning Claims 59-60

D2, which is considered to represent the most relevant state of the art to the subject matter of claim 59, discloses a method comprising:

taking information received from a load-balancing manager 204A-204B by a provisioning manager (see paragraphs [0039], [0041]-[0044], [0048]-[0049], and [0099]; and figure 2).

2.1.42.1 Independent Claim 59

The subject matter of **claim** 59 differs from the method of D2 in that the method of claim 59 comprises operating in accordance with information in a localized control resource, wherein the localized control resource was formed by rendering a template with a set of actual parameter values, wherein the rendering used local external resource inputs.

However, the difference can be easily conceived from the feature of D2 considering that a provisioning manager 207 uses the information as well as policies derived from customer service agreement of a customer whose application program is being distributed to make a provisioning decision and then performs provisioning either manually or automatically, wherein the provisioning manager 207 factors some or all of the following parameters to select a server for provisioning: application software availability from the server; resource (system, CPU, memory, disk space, etc.) availability from the server; provisioning expenses for the server; deployment expense for the server; cache hit and miss predictions based on adding new POPs and servers; and the network latency of the POP for the application client and the network latency of the POP for the application communication with other software applications such as database servers at the origin site (see paragraphs [0039], [0041], and [0049]). Accordingly, claim 59 would have been obvious to a person skilled in the art over D2.

Therefore, claim 59 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

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2.1.42.2 Dependent Claim 60

The additional feature of **claim 60** is not disclosed in D2, but can be easily derived from the feature of D1 considering that the CDNC 1044 further provides configuration support for the analytics system (see paragraph [0115]). Accordingly, it would be obvious to a person skilled in the art to apply said feature of D1 to the method of D2 to arrive at the subject matter of claim 60. Therefore, claim 60 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.43 Concerning Claims 61-62

D5, which is considered to represent the most relevant state of the art to the subject matter of claim 61, discloses a method comprising:

broadcasting a "phase 1" invalidation request to all repeaters indicating resources and regular expressions describing sets of resources to be invalidated; and

invalidating each match by marking it stale and optionally removing it from a cache (see paragraphs [0249], [0253]-[0254], and [0256] and claim 1).

2.1.43.1 Independent Claim 61

The subject matter of **claim 61** differs from the method of D5 in that the method of claim 61 comprises providing first information about invalidating to a collector system. However the difference can be easily conceived from the feature of D5 considering that when the repeater has completed the invalidation, it returns an acknowledgment to the master (see paragraph [0254]). Accordingly, claim 61 would have been obvious to a person skilled in the art over D5. Therefore, claim 61 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.43.2 Dependent Claim 62

The additional feature of **claim 62** is merely a variation of D5 considering that the method comprises broadcasting a "phase 1" invalidation request to all repeaters indicating the resources and regular expressions describing sets of resources to be invalidated; invalidating each match by marking it stale and optionally removing it from a cache; and returning an acknowledgment to the master when the repeater has completed the invalidation (see paragraphs [0249], [0253]-[0254]). Accordingly, claim 62 would have been obvious to a person skilled in the art over D5. Therefore, claim 62 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

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2.1.44 Concerning Claims 63-64

D5, which is considered to represent the most relevant state of the art to the subject matter of claim 63, discloses a method comprising:

broadcasting a "phase 1" invalidation request to all repeaters indicating resources and regular expressions describing sets of resources to be invalidated; and

invalidating each match by marking it stale and optionally removing it from a cache (see paragraphs [0249], [0253]-[0254], and [0256] and claim 1).

2.1.44.1 Independent Claim 63

The subject matter of **claim 63** differs from the mathod of D5 in that the method of claim 63 comprises providing first information about said invalidating to a collector system. However, the difference can be easily conceived from the feature of D5 considering that when the repeater has completed the invalidation, it returns an acknowledgment to the master (see paragraph [0254]). Accordingly, claim 63 would have been obvious to a person skilled in the art over D5. Therefore, claim 63 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.44.2 Dependent Claim 64

The additional feature of **claim 64** is easily derived from the feature of D5 considering that when the repeater has completed the invalidation, it returns an acknowledgment to the master (see paragraph [0254]). Accordingly, claim 64 would have been obvious to a person skilled in the art over D5. Therefore, claim 64 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.45 Concerning Claim 65

D5, which is considered to represent the most relevant state of the art to the subject matter of claim 65, discloses a method comprising:

broadcasting a "phase 2" invalidation request to all repeaters (see paragraphs [0249], [0253]-[0254], and [0256] and claim 1).

The subject matter of **claim 65** differs from the method of D5 in that the method of claim 65 comprises obtaining completion tracking information from a collector system, the completion information comprising an indication about invalidation of said at least one resource by at least some of the plurality of services.

However, the difference can be easily conceived from the combination of the feature of D5 considering that a master could keep a log of all invalidations performed, sorted by date, and

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flush only files invalidated since the last time the reconnecting repeater successfully completed an invalidation (see paragraph [0256]); and the feature of D1 considering that a system includes a collector for collecting analytics associated with requests for content in CDN (see paragraph [0100]). Accordingly, it would be obvious to a person skilled in the art to apply said feature of D1 to the method of D5 to arrive at the subject matter of claim 65. Therefore, claim 65 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.46 Concerning Claim 66

D5, which is considered to represent the most relevant state of the art to the subject matter of claim 66, discloses a method comprising:

keeping a log of all invalidations performed, sorted by date, and flush only files invalidated since the last time the reconnecting repeater successfully completed an invalidation by a master (see paragraphs [0249], [0253]-[0254], and [0256] and claim 1).

The subject matter of **claim 66** differs from the method of D5 in that the method of claim 66 comprises the step of determining a completion status for the invalidation information based on the completion tracking information obtained at a collector service. However, the different feature of determining a completion status can be easily conceived from the feature of D5 considering that the master waits until all repeaters have acknowledged the invalidation request (see paragraph [0254]). Moreover, the different feature of the collector service is disclosed in D1 as follows: a system includes a collector for collecting analytics associated with requests for content in CDN. Accordingly, it would be obvious to a person skilled in the art to apply said feature of D1 to the method of D5 to arrive at the subject matter of claim 66. Therefore, claim 66 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.47 Concerning Claims 67-68 and 88-89

2.1.47.1 Independent Claims 67 and 88-89

Claim 67 differs from the disclosures of these available prior art documents in that the method of claim 67 comprises controlling receipt of invalidation information relating to first set of resources based on first amount of space in a memory. Accordingly, claim 67 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination.

Claim 88 relates to a system comprising hardware including memory and at least one processor, and a service running on the hardware, wherein said service is configured to: perform the method of any one of claims 67-69. Accordingly, the same reasoning as in claim 67 could be applied to claim 88.

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Claim 89 relates to a computer program product having computer readable instructions stored on non-transitory computer readable media, the computer readable instructions including instructions for implementing a computer-implemented method corresponding to the method of any one of claims 67-69. Accordingly, the same reasoning as in claim 67 could be applied to claim 89.

Therefore, claims 67 and 88-89 meet the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.47.2 Dependent Claim 68

Claim 68 is dependent on claim 67 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.48 Concerning Claim 69

Claim 69 differs from the disclosures of these available prior art documents in that the method of claim 69 comprises controlling receipt of invalidation information relating to first property based on first amount of space in a memory. claim 69 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 69 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.49 Concerning Claim 70

D6, which is considered to represent the most relevant state of the art to the subject matter of claim 70, discloses a method comprising:

executing work nodes in a group such that workflow process can be dynamically composed and modified (see paragraphs [0016] and [0048]; claim 8; and figures 2 and 4).

The subject matter of claim 70 differs from the method of D6 in that the method of claim 70 comprises defining a group from an arbitrary set of nodes comprising service instances across multiple service endpoints, wherein each node in the group assumes one or more discrete responsibilities involved in processing of a request across the group, wherein, in response to a request made at a node of the group, one or more nodes in the group is selected to be responsible for processing of the request.

However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a

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node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, claim 70 would have been obvious to a person skilled in the art over D6. Therefore, claim 70 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.50 Concerning Claim 71

D6, which is considered to represent the most relevant state of the art to the subject matter of claim 71, discloses a method comprising:

adding or removing work nodes from the node group (see paragraphs [0016] and [0048]; claim 8; and figures 2 and 4).

The subject matter of **claim 71** differs from the method of D6 in that the method of claim 71 comprises defining a group from an arbitrary set of nodes comprising service instances across the machines of the multiple service endpoints, wherein each node in the group assumes one or more discrete responsibilities involved in processing of a request across the group, wherein, in response to a request made at a node of the group, one or more nodes in the group is selected to be responsible for processing of the request.

However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, claim 71 would have been obvious to a person skilled in the art over D6. Therefore, claim 71 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.51 Concerning Claims 72-73

D6, which is considered to represent the most relevant state of the art to the subject matter of claim 72, discloses a method comprising:

adding or removing work nodes from the node group (see paragraphs [0016] and [0048]; claim 8; and figures 2 and 4).

2.1.51.1 Independent Claim 72

The subject matter of **claim 72** differs from the method of D6 in that the method of claim 72 comprises defining a group from an arbitrary set of nodes comprising service instances across the machines of the multiple service endpoints, wherein each node in the group assumes one

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or more discrete responsibilities involved in processing of a request across the group, wherein, in response to a request made at a node of the group, one or more nodes in the group is selected to be responsible for processing of the request.

However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, claim 72 would have been obvious to a person skilled in the art over D6. Therefore, claim 72 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.51.2 Dependent Claim 73

The additional feature of **claim 73** is easily derived from the feature of D6 considering that the method comprises adding or removing work nodes from the node group (see paragraphs [0016] and [0045]). Accordingly, claim 73 would have been obvious to a person skilled in the art over D6. Therefore, claim 73 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.52 Concerning Claim 74

D6, which is considered to represent the most relevant state of the art to the subject matter of claim 74, discloses a method comprising:

adding or removing work nodes from the node group (see paragraphs [0016] and [0048]; claim 8; and figures 2 and 4).

The subject matter of **claim 74** differs from the method of D6 in that the method of claim 74 comprises defining a group from an arbitrary set of nodes comprising service instances across the machines of the multiple service endpoints, wherein each node in the group assumes one or more discrete responsibilities involved in processing of a request across the group, wherein, in response to a request made at a node of the group, one or more nodes in the group is selected to be responsible for processing of the request.

However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, claim 74

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would have been obvious to a person skilled in the art over D6. Therefore, claim 74 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.53 Concerning Claim 75

D6, which is considered to represent the most relevant state of the art to the subject matter of claim 75, discloses a method comprising:

adding or removing work nodes from the node group (see paragraphs [0016] and [0048]; claim 8; and figures 2 and 4).

The subject matter of **claim 75** differs from the method of D6 in that the method of claim 75 comprises defining a group from an arbitrary set of nodes comprising service instances across the machines of the one or more sub-cluster, wherein each node in the group assumes one or more discrete responsibilities involved in processing of a request across the group, wherein, in response to a request made at a node of the group, one or more nodes in the group is selected to be responsible for processing of the request.

However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, claim 75 would have been obvious to a person skilled in the art over D6. Therefore, claim 75 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.54 Concerning Claim 76

D6, which is considered to represent the most relevant state of the art to the subject matter of claim 76, discloses a method comprising:

adding or removing work nodes from the node group (see paragraphs [0016] and [0048]; claim 8; and figures 2 and 4).

The subject matter of **claim 76** differs from the method of D6 in that the method of claim 76 comprises defining a group from an arbitrary set of nodes comprising service instances across the machines of the one or more sub-cluster, wherein each node in the group assumes one or more discrete responsibilities involved in processing of a request across the group, wherein, in response to a request made at a node of the group, one or more nodes in the group is selected to be responsible for processing of the request.

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However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, claim 76 would have been obvious to a person skilled in the art over D6. Therefore, claim 76 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.55 Concerning Claim 77

Claim 77 differs from the disclosures of these available prior art documents in that the method of claim 77 comprises defining a second group from an arbitrary set of nodes comprising service instances across machines of one or more sub-clusters and transitioning request processing from a first group to the second group over a time period based on a responsibility adaptation policy. Accordingly, claim 77 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 77 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.56 Concerning Claim 78

Claim 78 differs from the disclosures of these available prior art documents in that the method of claim 78 comprises determining whether to perform hard stop of a particular service, or wind down the particular service; when it is determined to wind down the particular service, winding down the particular service, wherein the winding down of the particular service comprises one or more wind down acts selected from: stopping acceptance of requests at the particular service, and flushing a cache of the particular service, and finishing current processing of the particular service; and terminating the particular service. Accordingly, claim 78 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 78 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.57 Concerning Claim 79

Claim 79 differs from the disclosures of these available prior art documents in that the method of claim 79 comprises receiving a second request, the second request including a client IP address associated with a client; generating second log information about the second request, the second log information including a client IP address; determining a pseudo client IP address using first log information and the second log information; and associating the pseudo client IP address with the resolver IP address. Accordingly, claim 79 is not anticipated by any

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one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 79 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.58 Concerning Claim 80

Claim 80 differs from the disclosures of these available prior art documents in that the method of claim 80 comprises receiving second log information from a second service endpoint of multiple service endpoints, the second log information including a client IP address; determining a pseudo client IP address using first log information and the second log information; and associating the pseudo client IP address with the resolver IP address. Accordingly, claim 80 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 80 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.59 Concerning Claim 81

Claim 81 differs from the disclosures of these available prior art documents in that the method of claim 81 comprises receiving second log information from a second multiple service endpoints, the second log information including a client IP address; and making an association between at least one pseudo client IP address and at least one of the at least one resolver IP address, wherein the at least one pseudo client IP address was determined using first log information and the second log information. Accordingly, claim 81 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 81 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.60 Concerning Claim 82

Claim 82 differs from the disclosures of these available prior art documents in that the method of claim 82 comprises responding to a first at least one first request with at least one probe IP address, the at least one probe IP address, at least one probe IP address corresponding to at least one prove service; and responding to a second at least one first request with at least one service address. Accordingly, claim 82 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 82 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

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2.1.61 Concerning Claims 83-84

Claim 83 differs from the disclosures of these available prior art documents in that the method of claim 83 comprises tracking second information from a second collection of services about requests supposedly processed by the second collection of services; and reconciling a first information with the second information. Accordingly, claim 83 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 83 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 84 is dependent on claim 83 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.62 Concerning Claim 85

Claim 85 differs from the disclosures of these available prior art documents in that the method of claim 85 comprises tracking second information from a second CDN about requests supposedly processed by the second CDN; and reconciling a first information with the second information. Accordingly, claim 85 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 85 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.63 Concerning Claims 86-87

D7, which is considered to represent the most relevant state of the art to the subject matter of claim 86, discloses a method comprising:

prefetching content of one or more resource links (see paragraphs [0020] and [0024]-[0025]; claims 1 and 15; and figures 3-4).

2.1.63.1 Independent Claim 86

The subject matter of **claim 86** differs from the method of D7 in that the method of claim 86 comprises obtaining a global configuration object and obtaining at least some customer data. However, the difference can be easily conceived from the feature of D7 considering that the method comprises receiving, at a computer, an incoming message; and scanning the incoming message for one or more resource links, wherein the incoming message may be any message, such as an email, instant message, system notification, etc. (see paragraph [0020] and claims 1, 15). Accordingly, claim 86 would have been obvious to a person skilled in the art over D7. Therefore, claim 86 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

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2.1.63.2 Dependent Claim 87

The additional feature of **claim** 87 is easily derived from the feature of D7 considering that the method comprises receiving, at a computer, an incoming message; and scanning the incoming message for one or more resource links, wherein the incoming message may be any message, such as an email, instant message, system notification, etc. (see paragraph [0020] and claims 1, 15). Accordingly, claim 87 would have been obvious to a person skilled in the art over D7. Therefore, claim 87 is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.1.64 Concerning Claim 90

Claim 90 differs from the disclosures of these available prior art documents in that the method of claim 90 comprises determining a second request environment using a first request environment and information from sources other than the first request, the second request environment being distinct from the first request environment; and attempting to process the first request using the second request environment. Accordingly, claim 90 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 90 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.65 Concerning Claim 91

Claim 91 differs from the disclosures of these available prior art documents in that the method of claim 91 comprises determining a second request environment using a first request environment and information from sources other than the first request, the second request environment being distinct from the first request environment; and causing at least some of the first request to be processed using the second request environment. Accordingly, claim 91 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 91 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.66 Concerning Claims 92-93

Claim 92 differs from the disclosures of these available prior art documents in that the system of claim 92 comprises at least some of CD services produce, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 92 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 92

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meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 93 is dependent on claim 92 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.67 Concerning Claim 94

Claim 94 differs from the disclosures of these available prior art documents in that the device of claim 94 comprises at least some of CD services configured to: produce, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 94 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 94 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.68 Concerning Claim 95

Claim 95 differs from the disclosures of these available prior art documents in that the method of claim 95 comprises, by at least some of CD services, producing, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 95 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 95 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.69 Concerning Claims 96-97

Claim 96 differs from the disclosures of these available prior art documents in that the system of claim 96 comprises, by at least some of CD services, producing, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 96 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 96 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

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Claim 97 is dependent on claim 96 and therefore meets the requirements of PCT Article 33(2) and (3).

2.1.70 Concerning Claim 98

Claim 98 differs from the disclosures of these available prior art documents in that the device of claim 98 comprises at least some of CD services configured to: produce, as their respective state output, state information being based on an event input from one or more CD services; obtain state information from the CD services; and modify the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 98 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 98 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.71 Concerning Claim 99

Claim 99 differs from the disclosures of these available prior art documents in that the method of claim 99 comprises, by at least some of CD services, producing, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 99 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 99 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.72 Concerning Claims 100-101

Claim 100 differs from the disclosures of these available prior art documents in that the at least some of CD services of claim 100 produce, as their respective state output, state information being based on an event input from one or more CD services; obtain state information from the CD services; and modify the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 100 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 100 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 101 is dependent on claim 100 and therefore meets the requirements of PCT Article 33(2) and (3).

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2.1.73 Concerning Claim 102

Claim 102 differs from the disclosures of these available prior art documents in that the device of claim 102 comprises at least some of CD services configured to: produce, as their respective state output, state information being based on an event input from one or more CD services; obtain state information from the CD services; and modify the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 102 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 102 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.74 Concerning Claim 103

Claim 103 differs from the disclosures of these available prior art documents in that the method of claim 103 comprises, by at least some of CD services, producing, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 103 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 103 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.75 Concerning Claims 104-105

Claim 104 differs from the disclosures of these available prior art documents in that the at least some of CD services of claim 104 produce, as their respective state output, state information being based on an event input from one or more CD services; obtain state information from the CD services; and modify the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 104 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 104 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

Claim 105 is dependent on claim 104 and therefore meets the requirements of PCT Article 33(2) and (3).

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2.1.76 Concerning Claim 106

Claim 106 differs from the disclosures of these available prior art documents in that the device of claim 106 comprises at least some of CD services configured to produce, as their respective state output, state information being based on an event input from one or more CD services; obtain state information from the CD services; and modify the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 106 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 106 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.77 Concerning Claim 107

Claim 107 differs from the disclosures of these available prior art documents in that the method of claim 107 comprises, by at least some of CD services, producing, as their respective state output, state information being based on an event input from one or more CD services; obtaining state information from the CD services; and modifying the service configuration information to produce modified service configuration information based at least on the state information. Accordingly, claim 107 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 107 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.78 Concerning Claim 108

Claim 108 differs from the disclosures of these available prior art documents in that the method of claim 108 comprises determining what kind of responsibility a node has for the request, the determining being based on at least one kind responsibility assigned to the node for requests relating to a particular resource; and based on the determining, attempting to process the request in accordance with kind responsibility assigned to the node for requests relating to the particular resource. Accordingly, claim 108 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 108 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.79 Concerning Claim 109

Claim 109 differs from the disclosures of these available prior art documents in that the device of claim 109 comprises a service configured to: determine what kind of responsibility a node has for the request, the determining being based on at least one kind responsibility assigned to the node for requests relating to a particular resource; and based on the determining,

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attempt to process the request in accordance with kind responsibility assigned to the node for requests relating to the particular resource. Accordingly, claim 109 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 109 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.80 Concerning Claim 110

Claim 110 differs from the disclosures of these available prior art documents in that the method of claim 110 comprises maintaining on a service at least some of invalidation information, when the invalidation information relates to information not currently stored on the service; and using the maintained invalidation information to prevent subsequent use a version of information not currently stored on the service. Accordingly, claim 110 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 110 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.81 Concerning Claim 111

Claim 111 differs from the disclosures of these available prior art documents in that the method of claim 111 comprises maintaining on a service at least some of invalidation information, when the invalidation information relates to information not currently stored on the service; and using the maintained invalidation information to prevent subsequent use of at least one resource not currently stored on the service. Accordingly, claim 111 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination. Therefore, claim 111 meets the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.82 Concerning Claims 112-113

Claim 112 differs from the disclosures of these available prior art documents in that the method of claim 112 comprises processing a request, starting at a first layer, said processing being based on a modifiable runtime environment, said processing continuing conditionally through each of the layers in turn until either the request is terminated by one of the layers or the last layer processes the request. Accordingly, claim 112 is not anticipated by any one of the documents, nor is it obvious to a person skilled in the art by the documents taken alone or in combination.

Claim 113 relates to a device comprising hardware including memory and at least one processor, and a service running on the hardware, wherein the service is configured to perform

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operations corresponding to the method of claim 112. Accordingly, the same reasoning as in claim 112 could be applied to claim 113.

Therefore, claims 112-113 meet the requirements of PCT Article 33(2) and (3) with respect to novelty and inventive step.

2.1.83 Concerning Claims 114, 2(1), and 115

D8, which is considered to represent the most relevant state of the art to the subject matter of claim 114, discloses a method comprising:

receiving a request from a remote user terminal;

determining a request type based upon said request data; and

comparing said request type to content server selection criteria contained in a network status data table; choosing an optimal content server based upon said request type and said content server selection criteria (see page 7 line 8 - page 8, line 16; claims 1-5; and figure 1).

2.1.83.1 Independent Claims 114 and 115

The subject matter of **claim 114** differs from the method of D8 in that the method of claim 114 comprises defining a group from an arbitrary set of nodes comprising service instances across the machines of the one or more sub-clusters, wherein each node in the group assumes one or more discrete responsibilities involved in processing of a request across the group.

However, the difference can be easily conceived from the feature of D6 considering that the method comprises storing a group of work nodes corresponding to the generic node in a node group database, wherein the node group database stores a plurality of groups of work nodes; and accessing the node group database for the group of work nodes when the generic node is to be executed (see paragraphs [0016] and [0048]; and claim 8). Accordingly, it would be obvious to a person skilled in the art to apply said features of D6 to the method of D8 to arrive at the subject matter of claim 114.

Claim 115 relates to a system comprising hardware including memory and at least one processor, and a service running on the hardware, wherein the service is configured to perform operations corresponding to the method of claim 114. Accordingly, the same reasoning as in claim 114 could be applied to claim 115.

Therefore, claims 114 and 115 are novel under PCT Article 33(2), but lack an inventive step under PCT Article 33(3).

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2.1.83.2 Dependent Claim 2(1)

The additional feature of **claim 2(1)**, dependent on claim 114, can be easily derived from the feature of communicating information defining a optimal content server to a remote user terminal in D8 (see claim 1). Accordingly, it would have been obvious to a person skilled in the art over D8 in view of D6. Therefore, claim 2(1) is novel under PCT Article 33(2), but lacks an inventive step under PCT Article 33(3).

2.2 Industrial Applicability

Claims 1-115 are industrially applicable under PCT Article 33(4).

Electronic Acknowledgement Receipt

EFS ID:	20311122
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	02-OCT-2014
Filing Date:	14-DEC-2012
Time Stamp:	13:58:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	35850 590fddc3beedf83dff45b50bfd3957900dce8abd	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	27542 930f004cc53ec27f05c014fc6e27d129cfb50805	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Other Reference-Patent/App/Search documents	PCTUS13074824_ISR_23May14_447.pdf	474308 ad81a4a0f6b6d5187c69209d878f9cb4fc2816fe	no	9
Warnings:					
Information:					
4	Other Reference-Patent/App/Search documents	PCTUS13074824_WrtOp_23May14_447.pdf	2949887 e7207468d3ec38010db2b5b5f79f518e8cd81ac8	no	43
Warnings:					
Information:					
		Total Files Size (in bytes):	3487587		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant

to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: October 2, 2014

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
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Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20070156966	Jul 5, 2007	Sundarrajan, Prabakar et al.	
		20080256299	Oct 16, 2008	Iyengar, Arun K., et al.	
		20080313267	Dec 18, 2008	Desai, Vikram A., et al.	
		6757708	Jun 29, 2004	Craig, Ronald E., et al.	
		7076608	Jul 11, 2006	Arunagirinathan, Senthilnathan et al.	
		7461206	Dec 2, 2008	Bhanoo, Hemant M., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	20704918
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	14-NOV-2014
Filing Date:	14-DEC-2012
Time Stamp:	16:52:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37304 e6e31c8c128d29e16e06193c4dbd7b6c33b553a0	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	29196 6e747832b2063370a4486c01dfc7026562ea56a2	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	66500

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant

to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: November 14, 2014

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20050160429	Jul 21, 2005	Hameleers, Heino et al.	
		20090125758	May 14, 2009	Anuszczyk, Jeffrey J., et al.	
		20140047085	Feb 13, 2014	Peters, Robert J., et al.	
		20140344391	Nov 20, 2014	Varney, Lewis R., et al.	
		20140344399	Nov 20, 2014	Lipstone, Laurence R., et al.	
		20140344400	Nov 20, 2014	Varney, Lewis R., et al.	
		20140344401	Nov 20, 2014	Varney, Lewis R., et al.	
		20140344413	Nov 20, 2014	Lipstone, Laurence R., et al.	
		20140344425	Nov 20, 2014	Varney, Lewis R., et al.	
		20140344452	Nov 20, 2014	Lipstone, Laurence R., et al.	
		20140344453	Nov 20, 2014	Varney, Lewis R., et al.	
		5951694	Sep 14, 1999	Choquier, Philippe et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	20886065
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	06-DEC-2014
Filing Date:	14-DEC-2012
Time Stamp:	16:06:11
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37295 73db5aed7cd5c534cebc2d926c9337554816abbb	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	29831 ffd25df8d9042763121b98cdc2245fcaca4006ca	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	67126

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application

under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant

to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: December 6, 2014

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		LIPSTONE, et al., U.S. Application No. 14/578,402, filed December 20, 2014, "Automatic Network Formation and Role Determination in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/579,640, filed December 22, 2014, "Dynamic Fill Target Selection in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/580,038, filed December 22, 2014, "Multi-Level Peering in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/580,086, filed December 22, 2014, "Multi-Level Peering in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/583,718, filed December 28, 2014, "Role-Specific Sub-Networks in a Content Delivery Framework"	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	21126413
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	06-JAN-2015
Filing Date:	14-DEC-2012
Time Stamp:	10:28:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	64227 d0520db310772c93ccd40ddaedc004cbf4aba1f7	no	6

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	29331 e496e3448d6a775707037600926d8c43cc791e08	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	93558

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98 and STATEMENT OF RELATEDNESS (Under M.P.E.P. § 2001.06(b))

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
STATEMENT OF RELATEDNESS (Under M.P.E.P. § 2001.06(b))

In satisfaction of the duty of disclosure under 37 C.F.R. § 1.56, and in accordance with M.P.E.P. § 2001.06(b), the Examiner is respectfully requested to consider the following pending applications (listed in the attached IDS document) which are owned by the Applicant of the present application. The pending applications may include subject matter similar to that of the present application. As the related U.S. patent applications are stored electronically at the PTO,

no copies are being provided herewith. If the Examiner requires copies of any of these applications or any additional information regarding any of the documents cited herein, the Examiner is respectfully requested to contact the undersigned at the number provided.

APPLICATION NO.	DATE FILED	INVENTOR
14/578,402	Dec 20, 2014	LIPSTONE, et al.
14/583,718	Dec 28, 2014	VARNEY, et al.
14/579,640	Dec 22, 2014	VARNEY, et al.
14/580,038	Dec 22, 2014	VARNEY, et al.
14/580,086	Dec 22, 2014	VARNEY, et al.

VI
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VII
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: January 6, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020174227	Nov 21, 2002	Hartsell, Neal D., et al.	
		20050177600	Aug 11, 2005	Eilam, Tamar et al.	
		20100083281	Apr 1, 2010	Malladi, Sastry K., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	21176759
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	10-JAN-2015
Filing Date:	14-DEC-2012
Time Stamp:	16:47:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37096 4a4f65a6923f7a1d1750b37441c002baaa1e1c85	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	28567 6f809402d2200fe3f6e686d6040080a6cf46a9b1	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	65663

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: January 9, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20110138064	Jun 9, 2011	Rieger, Remi et al.	
		20120163203	Jun 28, 2012	Wilkinson, Robert T., et al.	
		20130103791	Apr 25, 2013	Gottdenker, Yair et al.	
		6484143	Nov 19, 2002	Swildens, E. S., et al.	
		7523181	Apr 21, 2009	Swildens, Eric et al.	
		7840667	Nov 23, 2010	Weller, Timothy N., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	21356794
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	30-JAN-2015
Filing Date:	14-DEC-2012
Time Stamp:	13:42:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37069 37f81ca81af4b604a1526e44d15a0cc5d5d9853b	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_SB08.pdf	29157 1bf81d8c6275d41f60b0c3ee666f7c4cbb3f2a83	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	66226

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: January 30, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20080209036	Aug 28, 2008	Sakamoto, Takuya et al.	
		20080301470	Dec 4, 2008	Green, Tammy A., et al.	
		20110112909	May 12, 2011	Singh, Jitender et al.	
		7136649	Nov 14, 2006	Ying, Chun et al.	
		7512707	Mar 31, 2009	Manapragada, Srinivas et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	21504334
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	14-FEB-2015
Filing Date:	14-DEC-2012
Time Stamp:	17:22:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37077 d3c50930e0a7e6d6064b8ae74b6d26e15f8cccbe	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	29072 ad62279dea5ab2081c906af81d3c1942ecd891cb	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	66149

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: February 13, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number..

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20060233310	Oct 19, 2006	Adams, Frank P., et al.	
		20060233311	Oct 19, 2006	Adams, Frank P., et al.	
		8321556	Nov 27, 2012	Chatterjee, Manjirnath et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	21971655
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	04-APR-2015
Filing Date:	14-DEC-2012
Time Stamp:	15:05:59
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37062 093e24cefe61013b320c000b13fb42fdb1b9610d	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	28520 54c5511638786 1da289dc865bd43565e877528ec	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	65582

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: April 4, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

PTO/AIA/122 (08-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

CHANGE OF CORRESPONDENCE ADDRESS
Application

Address to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	13/714410
Filing Date	12/14/2012
First Named Inventor	NEWTON
Art Unit	2445
Examiner Name	D. T. TON
Attorney Docket Number	0394-US-U1

Please change the Correspondence Address for the above-identified patent application to:

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Signature	/David D. Wier/
Typed or Printed Name	David D. Wier
Date April 10, 2015	Telephone 720-888-3539

NOTE: This form must be signed in accordnace with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Level 3 Communications, LLC

Application No./Patent No.: 13/714410 Filed/Issue Date: 12/14/2012

Titled: CONTENT DELIVERY NETWORK

Level 3 Communications, LLC, a Limited Liability Company

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Newton et al. To: Level 3 Communications, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 032776, Frame 0198, or for which a copy thereof is attached.

2. From: Yevmenkin, Maksim To: Level 3 Communications, LLC

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☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/David D. Wier/	April 10, 2015
Signature	Date
David D. Wier	48,229
Printed or Typed Name	Title or Registration Number

[Page 2 of 2]

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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Electronic Acknowledgement Receipt

EFS ID:	22020249
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	83579
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	09-APR-2015
Filing Date:	14-DEC-2012
Time Stamp:	17:23:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Change of Address	394U1_chng.pdf	248540 cab0c9cab21c802613a1b075387ec55df3e1af61	no	2

Warnings:	
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2	Assignee showing of ownership per 37 CFR 3.73	394U1_373c.pdf	120555 989497cfc9ec62ada503c91ebea48d964b93844e	no	3

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020116583	Aug 22, 2002	Copeland, George P., et al.	
		20030115283	Jun 19, 2003	Barbir, Abdulkadev et al.	
		20030200283	Oct 23, 2003	Suryanarayana, Lalitha et al.	
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		7512702	Mar 31, 2009	Srivastava, Sunil K., et al.	
		8281035	Oct 2, 2012	Farber, David A., et al.	
		8296396	Oct 23, 2012	Farber, David A., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]
		WO-2011115471A1	Sep 22, 2011	Ramanathan, Thilai Raj et al.		

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Non-Final Office Action, dated April 16, 201", Application No. 13/802,489, filed March 13, 2013; Dkt. No. 0447-US-U31 , 35 pgs.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	2	of	2	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Oracle Solaris Cluster Geographic Edition System Administration Guide, Oracle, Part No: E25231 , 144 pgs.	

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10 November 2010 (10.11.2010)

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(71) Applicant *(for all designated States except US)*: **MIMOS BERHAD** [MY/MY]; Technology Park of Malaysia, Bukit Jalil, 57000 Kuala Lumpur (MY).

(72) Inventors; and

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(74) Agent: **MOHAN, K.**; Adastra Intellectual Property Sdn Bhd, A-28-10, Menara UOA Bangsar Utama 1, No. 5, Jalan Bangsar utama 1, 59000 Kuala Lumpur (MY).

(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, 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, IS, JP, KE, KG, KM, 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, PE, PG, PH, PL, PT, RO, RS, RU, 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.

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Published:

— *with international search report (Art. 21(3))*

[Continued on next page]

(54) **Title**: INTEGRATED SERVICE DELIVERY PLATFORM SYSTEM AND METHOD THEREOF

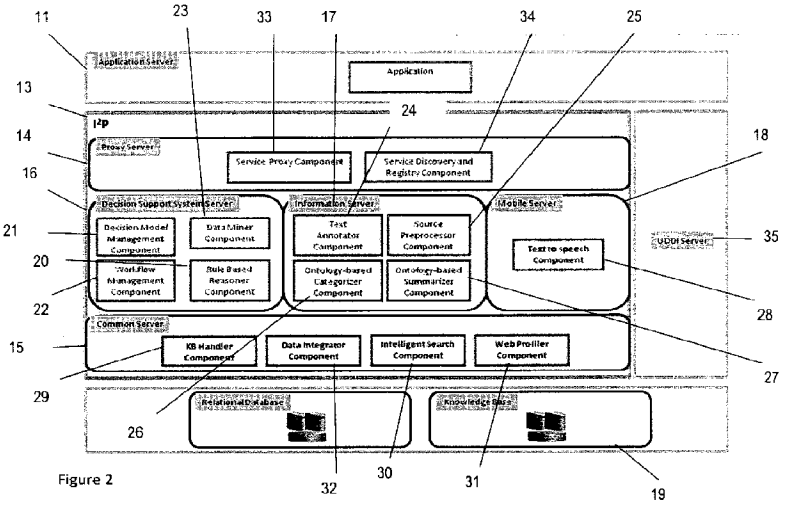


Figure 2

(57) **Abstract**: A system (10) for providing integrated service delivery platform for multiple domains comprises of an integrated platform (13) having components operable to provide functions, the components are mapped into a plurality of servers according to their functional areas which include analytics functional server (16) which involves in decision making activities, information retrieval functional server (17) which involves processing information from the Web, tracking functional server (18) which provides verbal interfaces, and at least one shared functional server (14, 15) which provides common functions among all domains, and an application server (11) providing access communication of communication devices (12) with the integrated platform (13) to perform requested functions.

WO 2011/115471 A1

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Integrated Service Delivery Platform System and Method Thereof

Field of Invention

The present invention relates to an architecture for integrated service delivery platform, more particularly relates to the integration of components into various servers according to their functional areas for easy deployment.

Background of Invention

A service delivery platform is generally used to deliver the services to devices used by users that are based on network or service provider resources used in services provided by the service provider or by a third party that uses these features to extend their applications. As the number of services offered by various network providers continues to increase, there is a corresponding increase in the number of systems, devices and components that process and store information for the end users.

In telecommunication, service providers not only have to deal with the services and platform but also support business processes to

provide services to their customers. Existing systems do not provide a solution which enables easy deployment of platform for multiple domains based on its functional areas. Most of the current platform deployment involves deployment of all the components in the platform which in turn results in redundancy. Deployment of additional components might be substantially unrelated and not easily aggregated.

Therefore there is a need of the present invention to provide a system which packaging components into various servers according to their functionalities. Selective servers deployment are made possible as the Proxy server is used to manage the service providers' servers in the present invention.

Other objects of this invention will become apparent on the reading of this entire disclosure.

Summary of Invention

In one aspect of the present invention, a system for providing integrated service delivery platform for multiple domains is disclosed. The system comprises of an integrated platform having

components operable to provide functions, the components are mapped into a plurality of servers according to their functional areas which include analytics functional server which involves in decision making activities, information retrieval functional server which involves processing information from the Web, tracking functional server which provides verbal interfaces, and at least one shared functional server which provides common functions among all domains, and an application server providing access communication of communication devices with the integrated platform to perform requested functions.

In another aspect of the present invention, a method for providing integrated service delivery platform for multiple domains is disclosed. The method comprising the steps of identifying the required servers for running a requested application, provoking the identified servers, registering the identified servers to the UDDI sever by the triggered servlet, and executing the integrated platform to perform the requested application.

Brief Description of the Drawings

Other objects, features, and advantages of the invention will be apparent from the following description when read with reference to the accompanying drawings. In the drawings, wherein like reference numerals denote corresponding parts throughout the several views:

Figure 1 depicts a block diagram of an integrated service delivery platform system of the present invention;

Figure 2 shows an architecture of the integrated platform of the present invention;

Figure 3 is a flowchart of the method for an integrated platform of the present invention;

Figure 4 is a flowchart for execution of the integrated platform;

Figure 5 illustrates a block diagram showing example of the system used by Public Complaints Bureau (PCB);

Figure 6 is a flowchart of the method for figure 5;

Figure 7 shows a flowchart for execution of the integrated platform for PCB in summarizing text;

Figure 8 shows a flowchart for execution of the integrated platform for PCB in categorizing text;

Figure 9 depicts a block diagram showing example of the system used by i-Logistic;

Figure 10 is a flowchart of the method for figure 9;

Figure 11 shows a flowchart for execution of the integrated platform for i-Logistic in profiling order;

Figure 12 shows a flowchart for execution of the integrated platform for i-Logistic in optimizing order; and

Figure 13 shows a flowchart for execution of the integrated platform for i-Logistic in updating order pool.

Detailed Description of the Preferred Embodiments

In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the invention. However, it will be understood by those of ordinary skill in the art that the invention may be practiced without these specific details. In other instances, well-known methods, procedures and/or components have not been described in detail so as not to obscure the invention. Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

A system (10) in accordance to the present invention provides an integration of components into various servers based on their functional areas for easy deployment in multiple domains. The functional areas categorization being identified include but not limited to analytical, information retrieval and tracking. Beside the components for these functional areas, there is also a shared functional area which contains components that are common among all domains. The architecture enables efficient and rapid deployment of applications by service providers who seek to provide services to users. A service delivery platform substantially

automates sales, order management, provisioning, billing and operations management. The service delivery platform of the present invention relies on a functionality-based components in various servers that maximizes flexible deployment

Referring now to the drawing, figure 1 is a block diagram of architecture of an integrated service delivery platform system (10) of the present invention. The system (10) includes an application server (11) which defines an interface for communication and data transfer between users with communication devices (12) such as mobile phones, PDAs, laptops, computers etc and an integrated platform (13) of the present invention. The integrated platform (13) comprising a proxy server (14) used to manage the service provides' servers and a common server (15) where both proxy (14) and common (15) servers contain respective components that are common among all domains and these servers (14, 15) are mapped into a common sub-platform in the shared functional area. They are in the shared functional area as the components in the common (15) and proxy (14) servers are not only used by the external clients but also can be used by components within the integrated platform (13).

The integrated platform (13) also includes a decision support system (DSS) server (16) that provides set of service-based components that can be consumed by any DSS application in decision making process, an information server (17) which consists of components that enables users to obtain information from the world wide web and at the same time perform some processing on these data to make it more meaningful for the user, and a mobile server (18) which comprises component that provides verbal interface. The DSS server (16) is mapped into a decision support system sub-platform in the analytic functional area, whereas information server (17) is mapped into an information sub-platform in the information retrieval functional area and the mobile server (18) is mapped into a mobile sub-platform in the tracking functional area. The core of the information required by the integrated platform (13) resides in a knowledge database (19) which can be stored in multiple triple-stores.

The decision support system (DSS) server (16) which supports business decision making activities includes service-based components such as but not limited to Rule-Based Reasoner (RBR) component (20), decision model management (DMM) component (21), workflow management (WFM) component (22) and data miner component

(23) as shown in Figure 2. The DSS application developers may integrate DSS components with their DSS application which will then reduce their development process as DSS server provides components for all the major parts of decision making process.

In the Rule-based reasoner (RBR) component (20), it provides service to infer a conclusion regarding a problem that cannot be observed directly such as a particular type of reasoning which uses "if-then-else" rule statements and the rules are simply patterns and knowledge engine searches for patterns in the rules that match patterns in the data. Whereas in the DMM component (21), that includes at least one decision model which is an axiomatic system that contains at least one action axiom. Preferably, there are several models of decision making in the DMM component (21) and each decision model is based on different set of assumptions and offered unique insight into the decision-making process. The DMM component (21) helps to simplify the building of decision models and execution of decision models by offering the functionalities of model builder service and model executor service.

In the workflow (WFM) component (22), it provides service to automate the entire decision making process and acts as a backbone

in connecting all the DSS components together to make a decision. Therefore it simplifies the defining decision-making process and integrating other components of DSS package. And lastly the data miner component (23) in the DSS server (16) provides service to analyze data in the database and produces a regression formula based on the given input and output table fields.

The information server (17) which stores and manages business information with a web interface, includes components such as but not limited to text annotator component (24), source preprocessor component (25), ontology-based categorizer (OBC) component (26) and ontology-based summarizer (OBS) component (27).

In the text annotator component (24), it provides services for the extraction of domain-specific (ontology driven) relations from documents. The need for text annotator is driven by need to annotate using GATE API by building a component. The text annotator component will take a natural language document or corpus as the input and it will map the gazetteer lists to ontology classes and load it to ANNIE pipeline with the required JAPE rules. The document or corpus will be processed by the ANNIE. It will then return the annotations with the relations and since the text annotator is a

web service enabled component, all receiving and sending operations must follow simple object access protocol (SOAP) for exchanging information in the over the web.

While on the contrary, the source preprocessor component (25) provides service to extract plain text from a PDF or HTML file as most information from the web is provided in different type of documents, such as HTML and PDF documents. There is a need to extract plain text from HTML and PDF documents for further text processing. The source preprocessor component (25) takes a URL that links to a HTML or a PDF file and extracts plain text from the file. The plain text is then uploaded to a file server. After that, the component (25) returns URL of the extracted text document which will be stored in the file server and since the source preprocessor component (25) is a web service enabled component, all receiving and sending operations will follow the SOAP architecture too.

In the ontology-based categorizer (OBC) component (26), it provides service to determine the category of a document and categorizes the document into that determined category. This categorizer component (26) will get the feature vector of a document and will label the document a respective category.

Whereas, ontology-based summarizer (OBS) component (27) provides service to extract key points from a plain text document and create a summary based on it. The OBS component (27) takes the URL of the plain text file and generates a summary based on it. The summary is then stored in a file server and the component (27) returns the URL of the summarized text document.

The mobile server (18) which includes text to speech (TTS) component (28) designed to provide software with a verbal interface. Other than reading the text, user has alternative to listen to the text audio on the device. When an application talks more like a real human voice, the application making it easier for the user to understand and promoting retention of the contents. TTS component (28) will be invoked after the content aggregator finished collecting contents from the Web. This component will provide text-to-audio conversion and store the audio file into the database.

The common server (15) which contains components that are common among all domains includes but not limited to KB handler component (29), intelligent search component (30), web profiler component (31) and data integrator (DIR) component (32). Basically, the

common server (15) provides create, read, update and delete (CRUD) function on the knowledge database (19).

The KB handler component (29) deals with all interfaces to the knowledge database (19) and provides the functionality of adding, editing and deleting data from the knowledge database (19). On the other hand, the intelligent search component (30) allows user to query the knowledge database (19) using natural language and the input to the service will include free text questions, e.g questions that start with the 'what' questions. In the web profiler component (31), it allows for retrieval of information from the knowledge database (19) according to the profile of the user and a profile ontology will be used together with this service. And lastly in the data integrator (DIR) component (32), it provides services to combine data residing at different sources and providing users with the unified view of these data. The objective of this component (32) is to address the problem of integrating data retrieved from multiple heterogeneous data sources and the focus of data integrator component (32) is theoretical work and numerous open problems to be solved.

The Proxy server (14) includes components that are common among all domains namely service proxy component (33) and service discovery and registry (SDAR) component (34). The service proxy component (33) provides a single point of contact for the web service client to access web services in the integrated platform (13). User of the platform (13) accesses the components through the service proxy (33) which will locate the components from the Universal Description Discovery and Integration (UDDI) server (35) using SDAR (34).

Figure 3 illustrates the flowchart for the integrated platform (13) deployment. To begin for the deployment, the necessary service providers for the identified domain are first identified (41). Then, the servers for the identified service providers are started (42) and during the startup of the servers, the servlet will be triggered which will then register (43) itself to the UDDI server (35). The system then continues with the platform execution as shown in Figure 4.

User requests for the application using the communication devices (12) such as notebooks, desktop, mobile phones, pda, etc through the application server (11). Upon processing the request, the

application server (11) then requests services from the integrated platform (13) through the Proxy server (14). After the Proxy server (14) received request (44) from the application server (11), the service proxy component (33) will request SDAR component (34) in the Proxy server (14) to search for the requested function (45). Then the SDAR component (34) will look up (46) the requested service from the UDDI server (35). If the service exists (47), the Proxy server (14) will direct the request to the relevant server of service provider where the UDDI server (35) returns (48) the identified server address to the SDAR component (34), followed by the SDAR component (34) returns (49) to the Service proxy component (33) to request (50) function from the identified server. The identified server executes (51) the requested function and returns results (52) to the application server (11) via the Proxy server (14).

The architecture of the integrated platform (13) as shown in Figure 5 and flowchart as shown in Figures 6, 7 and 8 show example on how the service has been used by the Public Complaint Bureau (PCB) to retrieve and classify the information from online news, web sites, blogs, etc. User may request for the application to summarize text (53) and categorize text (54) where the steps are shown in detailed

in figure 7 and 8 respectively. This summarizing text function is done by the information server (17) using the ontology-based summarizer (OBS) component (27) and the categorizing text function is done by the information server (17) using the ontology-based categorizer (OBC) component (26).

The architecture of the integrated platform (13) as shown in Figure 9 and flowchart as shown in Figures 10, 11, 12 and 13 show an example on how the service has been used by i-Logistic enterprise management system to analyze and propose suitable vehicle for every order shipment. User may request for the application to profile the order (55), then optimize the order (56) by merging orders and recommending vehicles and lastly update orders pool (57) as shown in Figure 10 where the steps are shown in detailed in figures 11, 12 and 13 respectively. The profiling order, optimizing order and updating order pool functions are done by the DSS server (16) using the workflow management (WFM) component (22).

As will be readily apparent to those skilled in the art, the present invention may easily be produced in other specific forms without departing from its essential characteristics. The present embodiments is, therefore, to be considered as merely illustrative

and not restrictive, the scope of the invention being indicated by the claims rather than the foregoing description, and all changes which come within therefore intended to be embraced therein.

Claims

1. A system (10) for providing integrated service delivery platform for multiple domains comprising:

an integrated platform (13) having components operable to provide functions, said components are mapped into a plurality of servers according to their functional areas which include:

analytics functional server (16) which involves in decision making activities;

information retrieval functional server (17) which involves processing information from the Web;

tracking functional server (18) which provides verbal interfaces; and

at least one shared functional server (14, 15) which provides common functions among all domains; and

an application server (11) providing access communication of communication devices (12) with said integrated platform (13) to perform requested functions.

2. The system (10) as claimed in claim 1, wherein said analytics functional server (16) is a decision support system (DSS) server which includes service-based components such as but not limited

to rule-based reasoner (RBR) component (20), decision model management (DMM) component (21), workflow management (WFM) component (22) and data miner component (23).

3. The system (10) as claimed in claim 2, wherein said rule-based reasoner (RBR) component (20) includes in performing function to infer a conclusion regarding a problem that cannot be observed directly.

4. The system (10) as claimed in claim 2, wherein said decision model management (DMM) component (21) includes at least one decision model which is based on different set of assumptions and offered unique insight into the decision making processes.

5. The system (10) as claimed in claim 2, wherein said workflow management (WFM) component (22) includes an application to automate the entire decision making process and connecting all the DSS components together for decision making.

6. The system (10) as claimed in claim 2, wherein said data miner component (23) includes an application to analyze data in the

database and the regression formula based on the given input and output table fields.

7. The system (10) as claimed in claim 1, wherein said information retrieval functional server (17) is an information server which includes components such as but not limited to text annotator component (24), source preprocessor component (25), ontology-based categorizer (OBC) component (26) and ontology-based summarizer (OBS) component (27).

8. The system (10) as claimed in claim 7, wherein said text annotator component (24) includes an application for extraction of domain-specific relations from documents.

9. The system (10) as claimed in claim 7, wherein said source preprocessor component (25) includes an application for extraction plain text from a PDF or HTML files.

10. The system (10) as claimed in claim 7, wherein said ontology-based categorizer (OBC) component (26) includes an application to determine the category of a document and categorize the document into the determined category.

11. The system (10) as claimed in claim 7, wherein said ontology-based summarizer (OBS) component (27) includes an application to extract key points from a plain text document and create a summary based on it.

12. The system (10) as claimed in claim 1, wherein said tracking functional server (18) is a mobile server which includes text to speech (TTS) component (28).

13. The system (10) as claimed in claim 12, wherein said text to speech (TTS) component (28) includes an application to provide text-to-audio conversion and stores the audio file into the database.

14. The system (10) as claimed in claim 1, wherein said shared functional servers (14, 15) are Proxy server and common server respectively.

15. The system (10) as claimed in claim 14, wherein said common server (15) includes components such as but not limited to KB handler component (29), intelligent search component (30), web profiler component (31) and data integrator (DIR) component (32).

16. The system (10) as claimed in claim 15, wherein said KB handler component (29) includes an application for dealing with all interfaces to the knowledge database (19) and provides the functionality of adding, editing and deleting data from the knowledge database (19).

17. The system (10) as claimed in claim 15, wherein said intelligent search component (30) includes an application to allow user to query the knowledge database (19) by using natural language.

18. The system (10) as claimed in claim 15, wherein said web profiler component (31) includes an application which allows for retrieval of information from the knowledge database.

19. The system (10) as claimed in claim 15, wherein said data integrator (DIR) component (32) includes an application to combine data residing at different sources and provides users with the unified view of these data.

20. The system (10) as claimed in claim 14, wherein said Proxy server (14) includes components such as but not limited to service

proxy component (33) and service discovery and registry (SDAR) component (34).

21. The system (10) as claimed in claim 20, wherein said service proxy component (33) includes an application that provides a single point of contact for the web service client to access web services.

22. The system (10) as claimed in claim 20, wherein said service discovery and registry (SDAR) component (34) includes an application to locate the components from the UDDI server (35).

23. A method for providing integrated service delivery platform for multiple domains, said method comprising the steps of:

identifying (41) the required servers for running a requested application;

provoking (42) the identified servers;

registering (43) said identified servers to the UDDI sever (35) by the triggered servlet; and

executing the integrated platform (13) to perform said requested application.

24. The method as claimed in claim 23, wherein said step of executing the integrated platform (13) further comprising the steps of:

receiving request (44) by a Proxy server (14) from an application server (11);

locating servers (45) for performing the requested functions by said Proxy server (14);

connecting (47) to the servers of where the functions reside in;

executing said requested functions by said identified servers; and

returning results (52) to said application server (11) by said identified servers via said Proxy server (14).

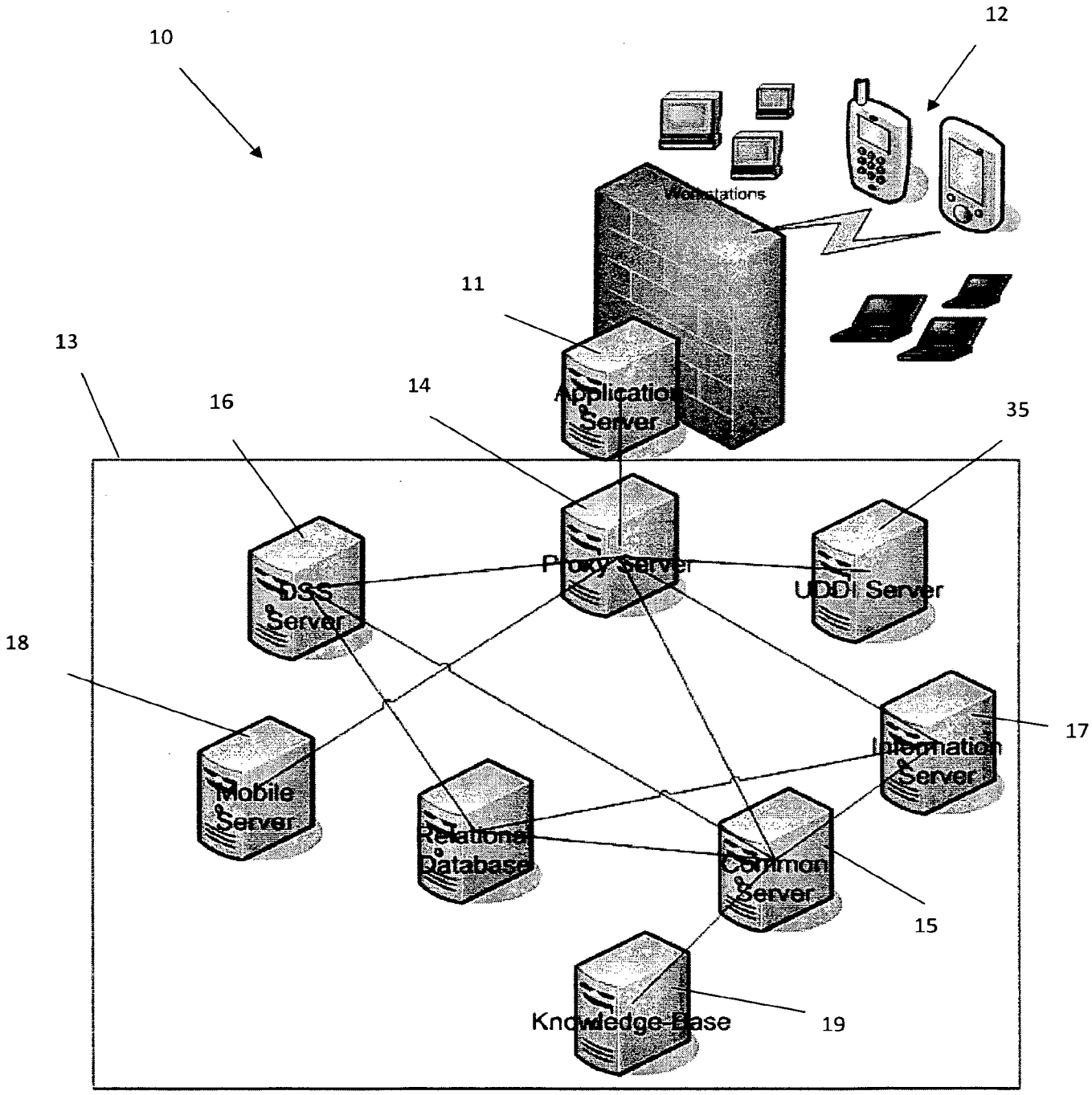

10
12
11
13
14
16
35
18
17
15
19
Workstations
Application Server
Proxy Server
DSS Server
UDDI Server
Mobile Server
Information Server
Relational Database
Common Server
Knowledge Base

Figure 1

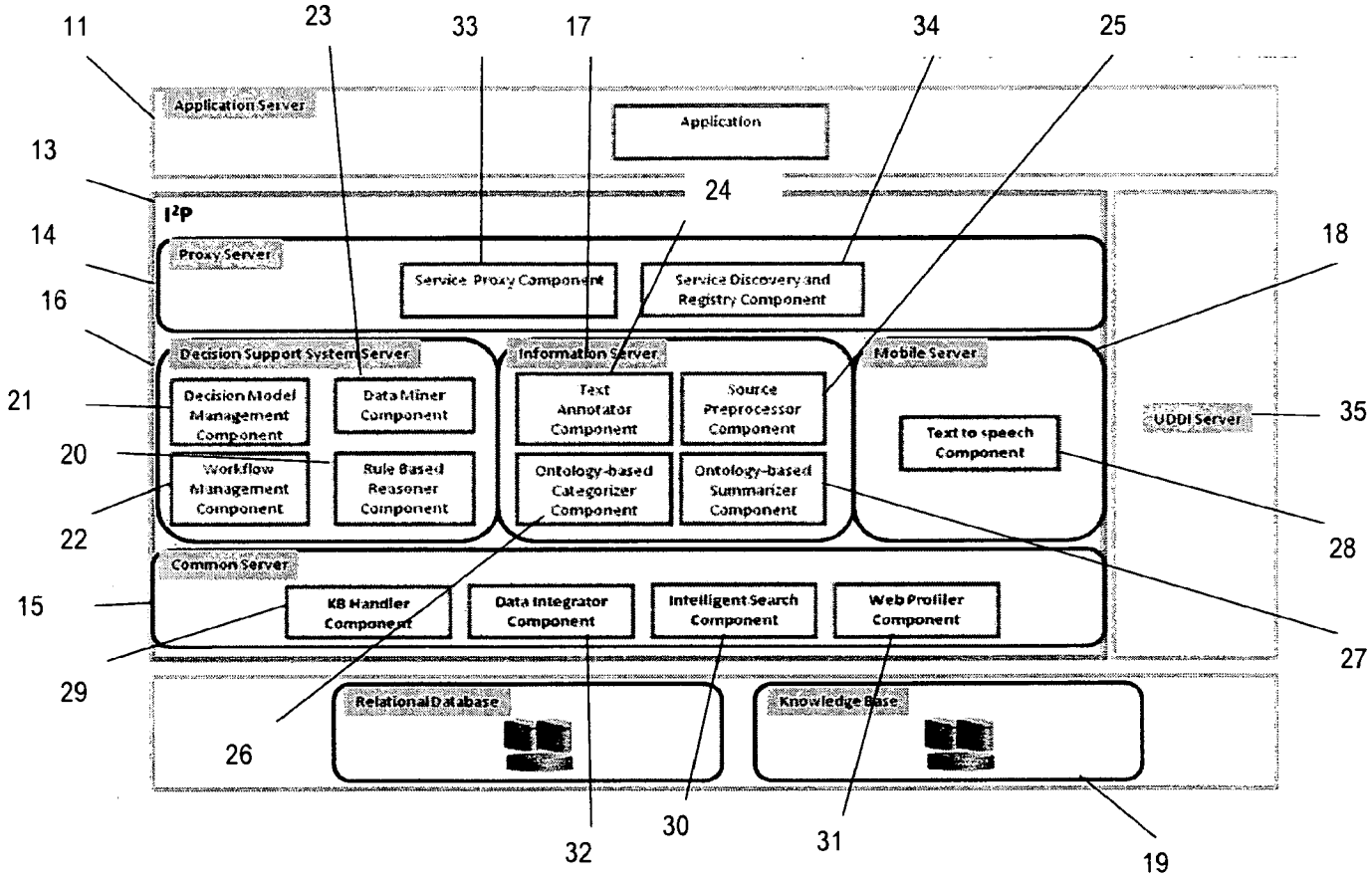

11
23
33
17
34
25
Application Server
Application
13
I²P
24
14
Proxy Server
Service Proxy Component
Service Discovery and Registry Component
18
16
Decision Support System Server
Information Server
Mobile Server
21
Decision Model Management Component
Data Miner Component
Text Annotator Component
Source Preprocessor Component
UDDI Server
35
20
Workflow Management Component
Rule Based Reasoner Component
Ontology-based Categorizer Component
Ontology-based Summarizer Component
Text to speech Component
22
28
Common Server
15
KB Handler Component
Data Integrator Component
Intelligent Search Component
Web Profiler Component
27
29
Relational Database
Knowledge Base
26
30
31
32
19

Figure 2

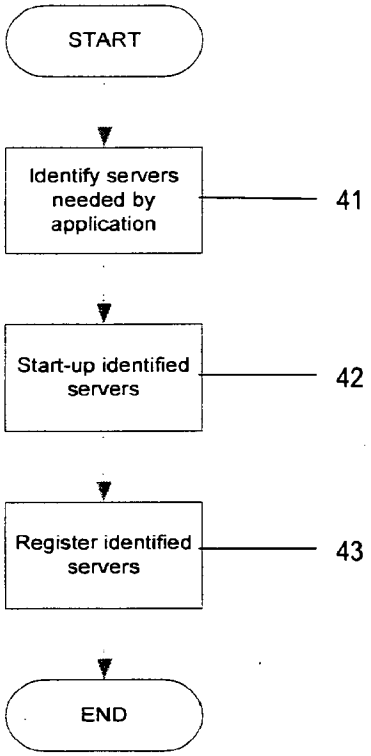

START
Identify servers needed by application
41
Start-up identified servers
42
Register identified servers
43
END

Figure 3

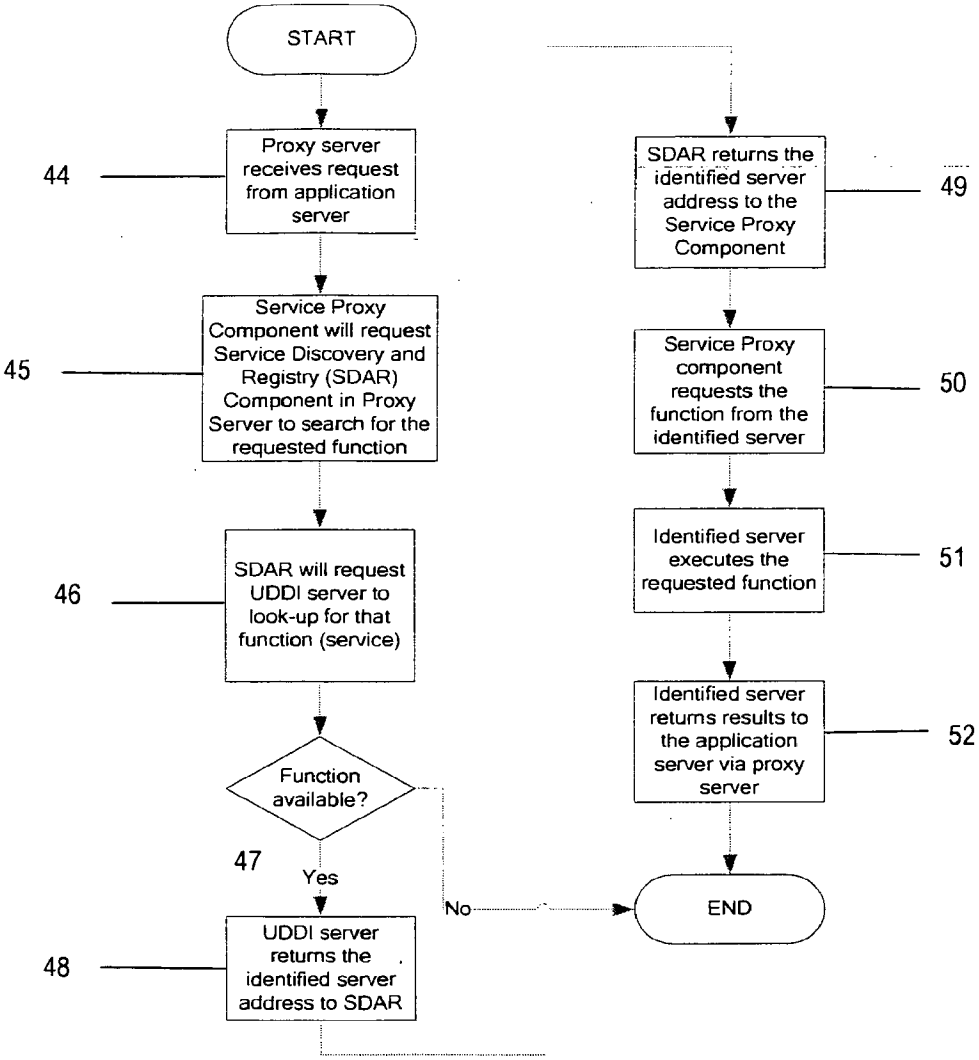

START
Proxy server receives request from application server
44
Service Proxy Component will request Service Discovery and Registry (SDAR) Component in Proxy Server to search for the requested function
45
SDAR will request UDDI server to look-up for that function (service)
46
Function available?
47
Yes
No
UDDI server returns the identified server address to SDAR
48
SDAR returns the identified server address to the Service Proxy Component
49
Service Proxy component requests the function from the identified server
50
Identified server executes the requested function
51
Identified server returns results to the application server via proxy server
52
END

Figure 4

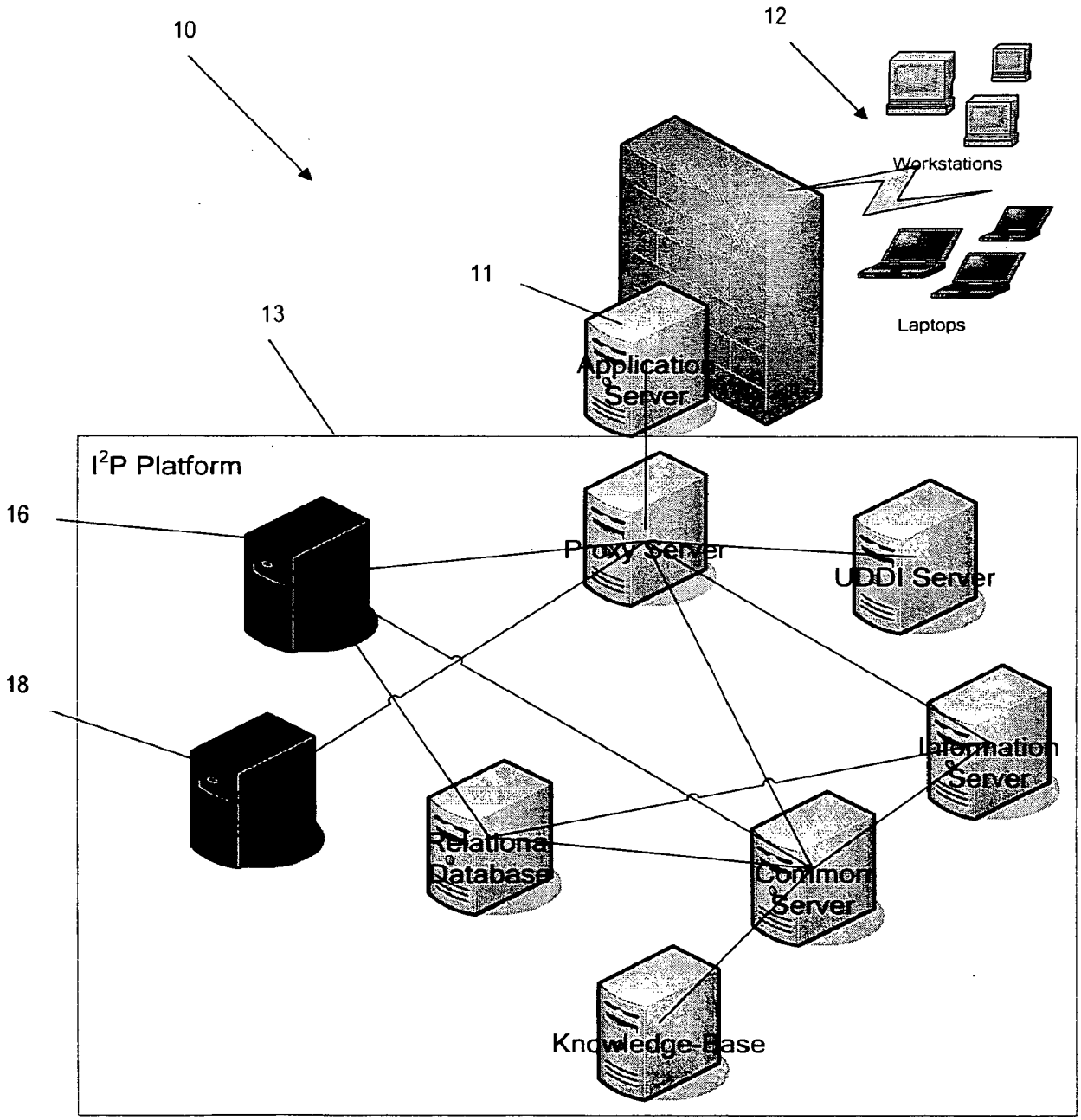

10
12
Workstations
Laptops
11
13
Application Server
I²P Platform
16
Proxy Server
UDDI Server
18
Information Server
Relational Database
Common Server
Knowledge Base

Figure 5

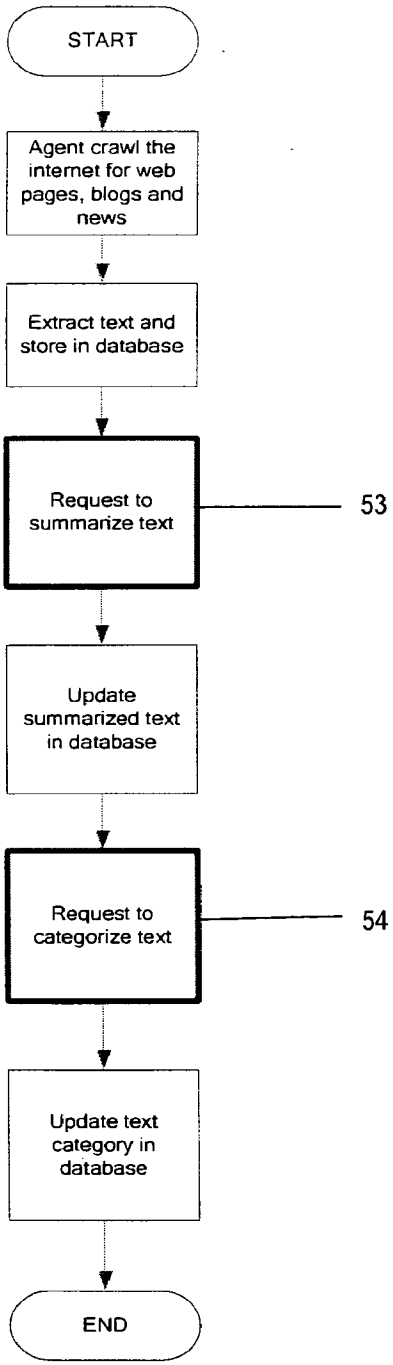

START
Agent crawl the internet for web pages, blogs and news
Extract text and store in database
Request to summarize text
53
Update summarized text in database
Request to categorize text
54
Update text category in database
END

Figure 6

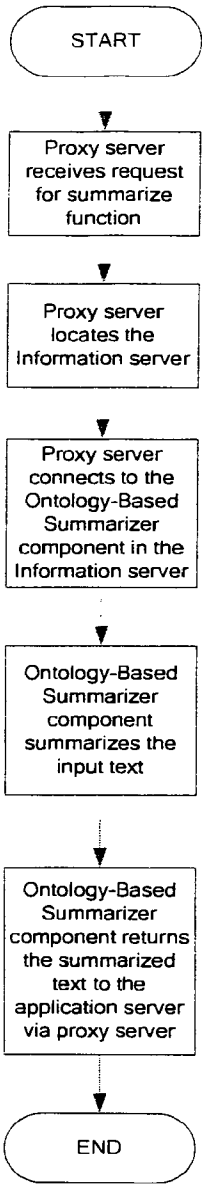

START
Proxy server receives request for summarize function
Proxy server locates the Information server
Proxy server connects to the Ontology-Based Summarizer component in the Information server
Ontology-Based Summarizer component summarizes the input text
Ontology-Based Summarizer component returns the summarized text to the application server via proxy server
END

Figure 7

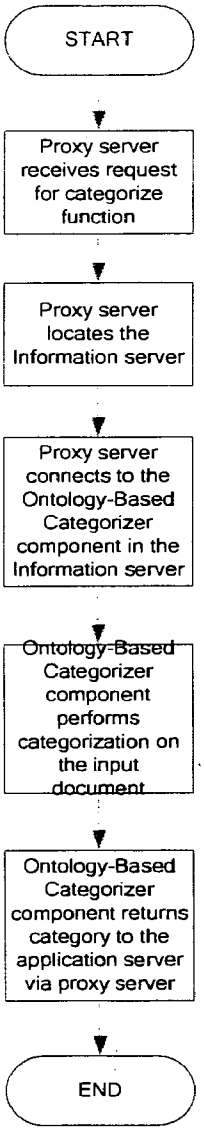

START
Proxy server receives request for categorize function
Proxy server locates the Information server
Proxy server connects to the Ontology-Based Categorizer component in the Information server
Ontology-Based Categorizer component performs categorization on the input document
Ontology-Based Categorizer component returns category to the application server via proxy server
END

Figure 8

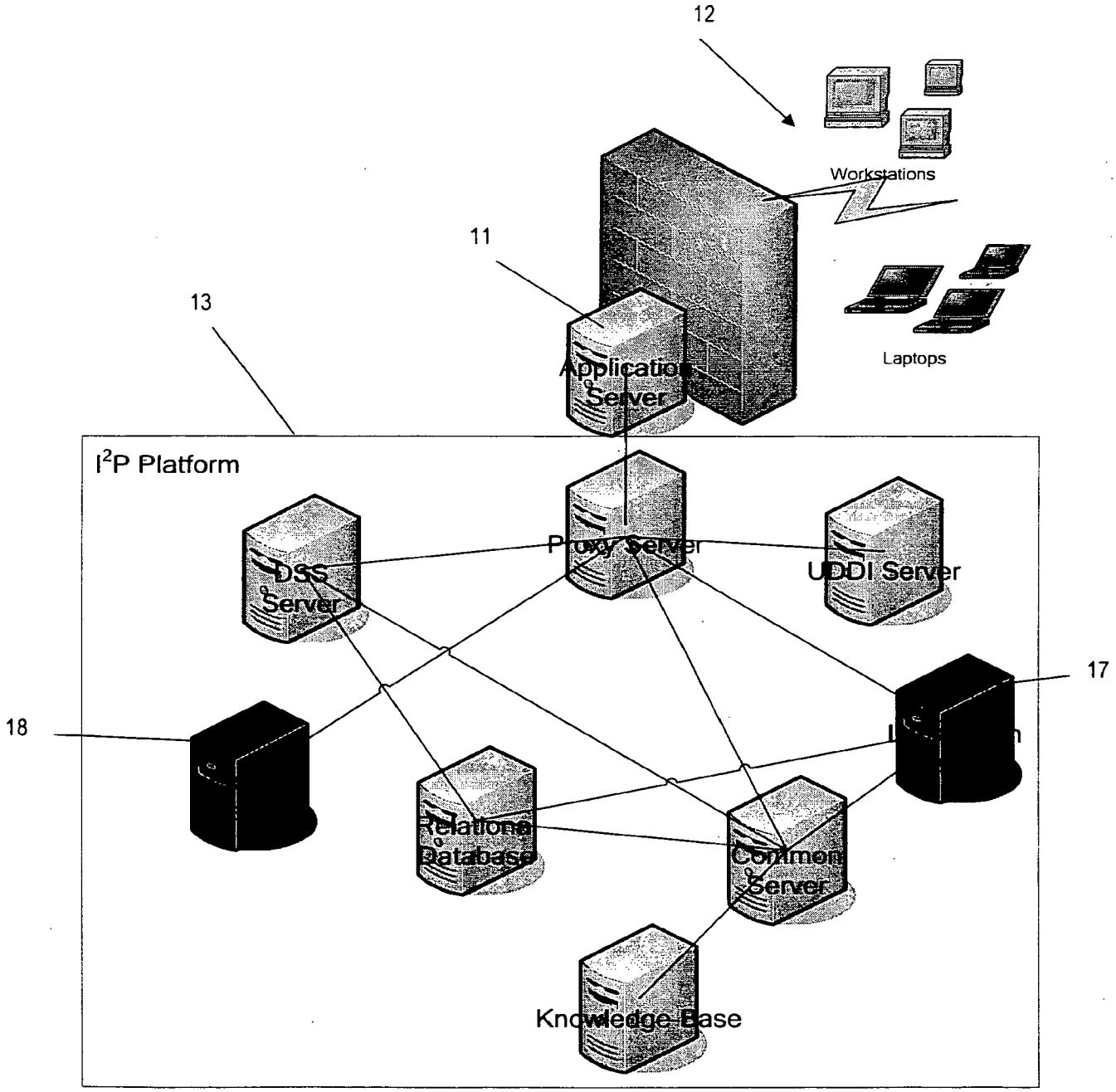

12
Workstations
11
13
Laptops
Application Server
I²P Platform
Proxy Server
DSS Server
UDDI Server
17
18
Relational Database
Common Server
Knowledge Base

Figure 9

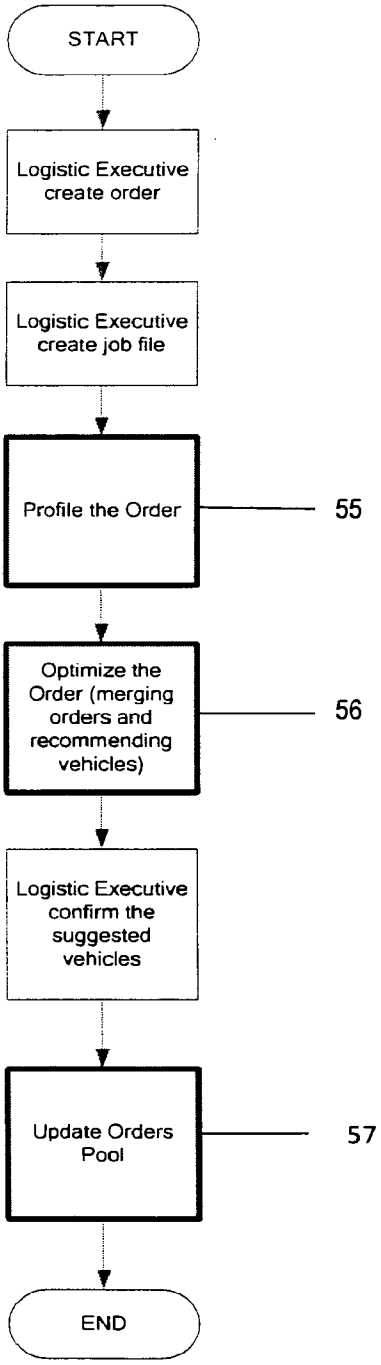

START
Logistic Executive create order
Logistic Executive create job file
Profile the Order
55
Optimize the Order (merging orders and recommending vehicles)
56
Logistic Executive confirm the suggested vehicles
Update Orders Pool
57
END

Figure 10

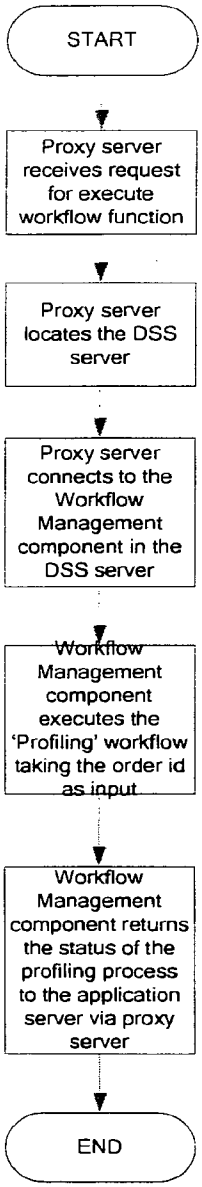

START
Proxy server receives request for execute workflow function
Proxy server locates the DSS server
Proxy server connects to the Workflow Management component in the DSS server
Workflow Management component executes the 'Profiling' workflow taking the order id as input
Workflow Management component returns the status of the profiling process to the application server via proxy server
END

Figure 11

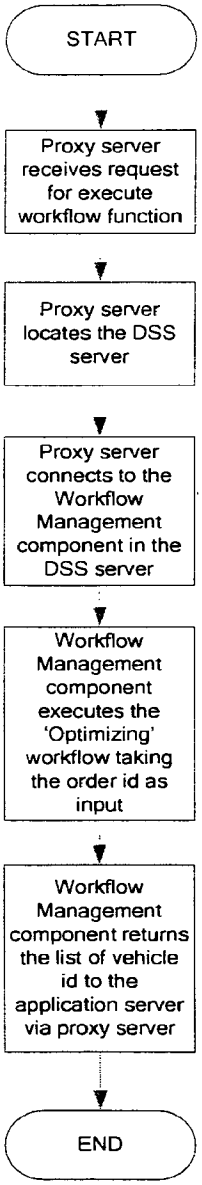

START
Proxy server receives request for execute workflow function
Proxy server locates the DSS server
Proxy server connects to the Workflow Management component in the DSS server
Workflow Management component executes the 'Optimizing' workflow taking the order id as input
Workflow Management component returns the list of vehicle id to the application server via proxy server
END

Figure 12

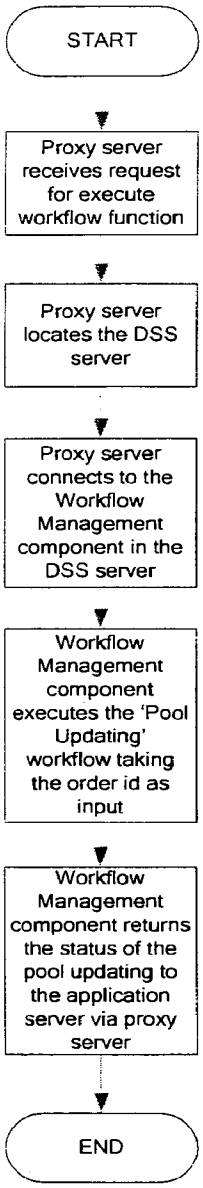

START
Proxy server receives request for execute workflow function
Proxy server locates the DSS server
Proxy server connects to the Workflow Management component in the DSS server
Workflow Management component executes the 'Pool Updating' workflow taking the order id as input
Workflow Management component returns the status of the pool updating to the application server via proxy server
END

Figure 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/MY2010/000262

A. CLASSIFICATION OF SUBJECT MATTER

G06F 15/16(2006.01)i, G06F 9/44(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06F 15/16; G06F 17/30; H04Q 7/20

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: service, delievery, platform, UDDI, component

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2004-0215711 A1 (MARTIN BRUCE K. et al.) 28 October 2004 See the abstract, figs.3-4, paras.[0023]-[0026].	1-24
A	US 2008-0140759 A1 (CONNER PETER A. et al.) 12 June 2008 See the abstract, figs. 4A-4B, paras.[0052]-[0054].	1-24
A	US 2007-0150480 A1 (HANS HWANG et al.) 28 June 2007 See the abstract, fig.3, paras.[0043]-[0047].	1-24
A	US 2005-0164704 A1 (GERALD WINSOR) 28 July 2005 See the abstract, figs.7-8, paras.[0054]-[0055].	1-24

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 AUGUST 2011 (30.08.2011)	**30 AUGUST 2011 (30.08.2011)**

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsa-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Park Ji Eun

Telephone No. 82-42-481-5696

Form PCT/ISA/210 (second sheet) (July 2009)

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004-0215711 A1	28.10.2004	EP 1345456 A2	17.09.2003
		EP 1345456 A3	04.05.2005
US 2008-0140759 A1	12.06.2008	US 2007-0011126 A1	11.01.2007
		US 2008-0140760 A1	12.06.2008
		US 2008-0140857 A1	12.06.2008
US 2007-0150480 A1	28.06.2007	None	
US 2005-0164704 A1	28.07.2005	EP 1557996 A1	27.07.2005
		EP 1596555 A2	16.11.2005
		EP 1596555 A3	01.03.2006
		EP 1596556 A2	16.11.2005
		EP 1596556 A3	01.03.2006
		JP 2005-209194 A	04.08.2005

Electronic Acknowledgement Receipt

EFS ID:	22350597
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	14-MAY-2015
Filing Date:	14-DEC-2012
Time Stamp:	16:12:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37069 4ad57cf766408128520f77a21a7faabd084c35ae	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	38147 3affe4b5e32b7dd85a626d037b7e591c1e48c9e2	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	WO2011115471A1.pdf	1264875 a6935549e0c991627dc8246a530b07c6bfbf8675	no	41
Warnings:					
Information:					
4	Other Reference-Patent/App/Search documents	US13802489_ctnf_16Apr2015_447USU31.pdf	1541380 2c07dfa267715223b00a7694e27de576b3b15219	no	35
Warnings:					
Information:					
5	Non Patent Literature	Oracle_2012_Oracle_Solaris_Cluster.pdf	5562280 e7f5aea2f46371921cf90ff8b0dbd50c333f53ff	no	144
Warnings:					
Information:					
		Total Files Size (in bytes):	8443751		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: May 14, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20080066073	Mar 13, 2008	Sen, Siddhartha	
		20090276842	Nov 5, 2009	Yevmenkin, Maksim et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	22434001
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	24-MAY-2015
Filing Date:	14-DEC-2012
Time Stamp:	13:56:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37069 ce79c08175aaa16edf89a69c552e13ca516d84ee	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	28387 bc188dd979f139a82f8cbc02be3818d0f87de28f	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	65456

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: May 24, 2015

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20030028594	Feb 6, 2003	Laschkewitsch, Clinton G., et al.	
		20030115421	Jun 19, 2003	McHenry, Stephen T., et al.	
		20040068622	Apr 8, 2004	Van Doren, Stephen R., et al.	
		20070156876	Jul 5, 2007	Sundarrajan, Prabakar et al.	
		5511208	Apr 23, 1996	Boyles, Ray W., et al.	
		6587928	Jul 1, 2003	Periyannan, Alagu S., et al.	
		8856865	Oct 7, 2014	Martini, Paul M.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	22618429
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	12-JUN-2015
Filing Date:	14-DEC-2012
Time Stamp:	15:19:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37062 9403818e504d33e999da6d2952984250f7d07d83	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	29430 3bf30a429bb02ec644afcb7d67efd1ff3b123b6c	no	1

Warnings:	
Information:	
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2445
Filed	:	December 24, 2012	Examiner	:	Da T. Ton
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: June 12, 2015

/JCS/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 06/29/2015

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Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	

ART UNIT	PAPER NUMBER
2448	

NOTIFICATION DATE	DELIVERY MODE
06/29/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

cdnpatents@level3.com

Office Action Summary	Application No. 13/714,410	Applicant(s) NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2448	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/14/12*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-50* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-50* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *12/14/12* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

1. The present application is being examined under the pre-AIA first to invent provisions.

Double Patenting

2. Claims 1-50 of this application is patentably indistinct from claims 1-46 and 48-51 of Application No. 13/714,411. Pursuant to 37 CFR 1.78(f) or pre-AIA 37 CFR 1.78(b), when two or more applications filed by the same applicant contain patentably indistinct claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. Applicant is required to either cancel the patentably indistinct claims from all but one application or maintain a clear line of demarcation between the applications. See MPEP § 822.

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application

claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about

eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

4. Claims 1-50 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-46 and 48-51 of copending Application No. 13/714,411. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims of the instant application are directed to a plurality of devices, the devices conforming to the device described in Application No. 13/714,411, and a method, the method conforming to the method of the computer program product described in Application No. 13/714,411.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

5. As to claim 1, the claim corresponds to claim 1 of Application No. 13/714,411. The instant claim is directed to a network comprising a plurality of servers constructed and adapted to perform a particular set of actions. Claim 1 of Application No. 13/714,411 is directed to a server constructed and adapted to perform the same particular set of actions. A plurality of servers is not patentably distinct from a singular server wherein all of the servers are configured in the same manner.

6. As to claims 2-26, the claims correspond to claims 2-26 of Application No. 13/714,411.

7. As to claim 27, the claim corresponds to claim 27 of Application No. 13/714,411. The instant claim is directed to a method. Claim 27 of Application No. 13/714,410 is directed to a computer program product for implementing the same method. A computer program product for implementing a method is not patentably distinct from the method itself.

8. As to claims 28-50, the claims correspond to claims 28-46 and 48-51 of Application No. 13/714,411.

Claim Rejections - 35 USC § 112

9. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 15 and 41 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim

the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

11. As to claim 15, lines 2-3, the meaning of the phrase "one or more locations in selected from…" is unclear to the examiner. It appears the phrase is missing a word or words after "in" to indicate in what the one or more locations are located. For example, line 1 contains the phrase "one or more locations in the CDN." It also possible the phrase is intended to read "one or more locations selected from…" and the inclusion of the word "in" is unintended.

12. As to claim 41, line 3, the meaning of the phrase "one or more locations in selected from…" is unclear to the examiner. It appears the phrase is missing a word or words after "in" to indicate in what the one or more locations are located. For example, lines 1-2 contain the phrase "one or more locations in the CDN." It also possible the phrase is intended to read "one or more locations selected from…" and the inclusion of the word "in" is unintended.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1-3, 6, 9-16, 18, 21-25, 27-29, 32, 35-42, 44, and 47-50 are rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated by Lewin et al. (Lewin), U.S. Patent No. 7,010,578 B1.

15. As to claim 1, Lewin discloses a content delivery network (CDN) (Abstract) comprising:

(a) a control core (Col. 3, ln. 43 – Col. 4, ln. 7, wherein dedicated registration servers configure the cache for operation in the content delivery network and are therefore a control core); and

(b) a plurality of cache servers (Col. 3, ln. 24-34), each particular cache server of said plurality of cache servers being constructed and adapted to:

(b)(1) upon joining the CDN,

(b)(1)(1) obtain global configuration data from the control core (Col. 3, ln. 43 – Col. 4, ln. 7, wherein dedicated registration servers configure the cache for operation in the content delivery network); and

(b)(2) having joined the CDN,

(b)(2)(1) obtain updated global configuration data, if needed (Col. 3, ln. 66 – Col. 4, ln. 1, wherein a cache may receive software updates after being deployed; Col. 5, ln. 35-36, wherein the cache may need to re-register to keep itself current); and

(b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN (Col. 7, ln. 24-28, wherein a cache must possess at least configuration information such as a delivery address for the customer in order to deliver cached content to the customer);

(b)(2)(3) serve a particular resource associated with a particular customer of the CDN in accordance with (i) the global configuration data, and (ii) customer configuration information obtained in (b)(2)(2) and associated with the particular customer (Col. 3, ln. 43 – Col. 4, ln. 7; Col. 7, ln. 24-28).

16. As to claim 2, Lewin discloses the CDN of claim 1 wherein each particular cache server of said plurality of cache servers is constructed and adapted to, upon joining the CDN,

(b)(1)(2) obtain data from one or more other locations in the CDN (Col. 6, ln. 24-27).

17. As to claim 3, Lewin discloses the CDN of claim 1 wherein processing by a cache server in (b)(2)(2) to obtain customer configuration information associated with a specific

customer occurs upon receipt of a request for content associated with the specific customer (Col. 7, ln. 24-28, wherein a cache must possess at least configuration information such as a delivery address for the customer in order to deliver cached content to the customer and this information is served in the received request such as in a source address of a header in the request).

18. As to claim 6, Lewin discloses the CDN of claim 1 wherein the customer configuration information comprises at least one CDN resource (Col. 7, ln. 24-28, wherein a cache must possess at least configuration information such as an identification of the requested content in order to deliver cached content to the customer).

19. As to claim 9, Lewin discloses the CDN of claim 1 wherein the global configuration data comprises at least one CDN resource (Col. 5, ln. 48-57).

20. As to claim 10, the claim is rejected for reasons similar to claim 9 above.

21. As to claim 11, Lewin discloses the CDN of claim 2 wherein the one or more other locations in the CDN comprise at least one location selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site (Col. 7, ln. 6,

wherein the citation indicates that preventing a cache from accessing another cache is only "typically performed" which indicates that atypical instances occur where the cache does access another cache for the content).

22. As to claim 12, the claim is rejected for reasons similar to claim 11 above.

23. As to claim 13, Lewin discloses the CDN of claim 2 wherein the particular cache server determines said one or more other locations using said information in said global configuration data (Col. 6, ln. 24-27, 42-47, and 55-58).

24. As to claim 14, the CDN of claim 1 wherein said particular cache server obtains said updated global configuration data from one or more locations in the CDN (Col. 3, ln. 66 – Col. 4, ln. 1, wherein a cache may receive software updates after being deployed; Col. 5, ln. 35-36, wherein the cache may need to re-register to keep itself current).

25. As to claim 15, Lewin discloses the CDN of claim 14 wherein the one or more locations in the CDN comprise one or more locations selected from: (i) the control core (Col. 3, ln. 66 – Col. 4, ln. 1, wherein a cache may receive software updates after being deployed; Col. 5, ln. 35-36, wherein the cache may need to re-register to keep itself current); and (ii)

one or more locations in selected from: a cache server, a cache server mechanism site, a region of cache server mechanisms, a cache cluster, and a cache cluster site (Col. 7, ln. 6, wherein the citation indicates that preventing a cache from accessing another cache is only "typically performed" which indicates that atypical instances occur where the cache does access another cache for the content).

26. As to claim 16, Lewin discloses the CDN of claim 1 wherein the control core comprises a distributed system consisting of a plurality of machines (Fig. 3, wherein 303a-n consists of a plurality of registration servers; Col. 3, ln. 53-58).

27. As to claim 18, Lewin discloses the CDN of claim 1 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

determine validity of a version of global configuration data stored on said particular cache server, and wherein said particular cache server obtains updated global configuration data in (b)(2)(1) when said particular cache server determines that said version of said global configuration data stored on said particular cache server is invalid (Col. 3, ln. 66 – Col. 4, ln. 1, wherein a cache may receive software updates after being deployed; Col. 5, ln. 35-36, wherein the cache may need to re-register to keep itself current).

28. As to claim 21, Lewin discloses the CDN of claim 1 further comprising:

(c) at least one rendezvous mechanism (Col. 5, ln. 36-45, wherein the log recipient, log frequency, RT statistics recipient, and RT statistics frequency are a mechanism for identifying where and when logs and RT statistics should be sent).

29. As to claim 22, Lewin discloses the CDN of claim 1 further comprising:

(d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to:

(d)(1) obtain information from at least one cache server mechanism (Col. 5, ln. 36-45, wherein logs and real-time statistics are collected from the cache).

30. As to claim 23, the claim is rejected for reasons similar to claim 22 above.

31. As to claim 24, Lewin discloses the CDN of claim 23 wherein each particular cache server of said plurality of cache servers provides at least some of said generated information in (b)(4) by streaming said at least some of said generated information to one or more collector mechanisms in said collector system (Col. 5, ln. 36-45, wherein real-time statistics are collected from the cache and the statistics being sent in real-time from the cache indicates they are streamed).

32. As to claim 25, Lewin discloses the CDN of claim 1 wherein the CDN has customer configuration information associated therewith, and wherein each particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN (Col. 3, ln. 43 – Col. 4, ln. 7; Col. 7, ln. 24-28).

33. As to claims 27-29, the claims are rejected for reasons similar to claims 1-3, respectively, above.

34. As to claim 32, the claim is rejected for reasons similar to claim 6 above.

35. As to claims 35-42, the claims are rejected for reasons similar to claims 9-16, respectively, above.

36. As to claim 44, the claim is rejected for reasons similar to claim 18 above.

37. As to claim 47, the claim is rejected for reasons similar to the combination of claims 22 and 23 above.

38. As to claim 48, the claim is rejected for reasons similar to claim 24 above.

39. As to claim 49, the claim is rejected for reasons similar to claim 1 above.

40. As to claim 50, the claim is rejected for reasons similar to claim 25 above.

Claim Rejections - 35 USC § 103

41. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

42. This application currently names joint inventors. In considering patentability of the claims under pre-AIA 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the

applicability of pre-AIA 35 U.S.C. 103(c) and potential pre-AIA 35 U.S.C. 102(e), (f) or (g) prior art under pre-AIA 35 U.S.C. 103(a).

43. Claims 4, 5, 7, 8, 17, 19, 20, 26, 30, 31, 33, 34, 43, 45, and 46 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lewin, in view of Official Notice (See MPEP § 2144.03).

44. As to claims 4, 5, 7, 8, 17, 19, 20, and 26, Lewin discloses the parent claims, but is silent on the particulars of the aforementioned claims such as obtaining customer configuration information prior to receipt of a request, the use of scripting, specifying customer-specific processing requirements for content, the use of an algorithm for consensus in a distributed system, obtaining customer information when it is determined existing customer information is invalid, and an executive system supporting concurrent processing of tasks.

However, the aforementioned concepts were well known in the art at the time of the invention. The use of customer configuration information, scripting, distributed systems, and concurrent processing are all standard concepts in the computer networking field.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Lewin in the aforementioned manner in order to make

use of well-known concepts such as the utilization of valid customer configuration information, scripting, distributed systems, and concurrent processing for purposes such as tailoring content to customer configuration information and ensuring said information is valid, automating actions through scripting, increasing processing power by utilizing distributed systems, and increasing the speed of processing through the use of concurrent processing.

45. As to claims 30, 31, 33, 34, 43, 45, and 46, the claims are rejected for reasons similar to claims 4, 5, 7, 8, 17, 19, 20, and 26 above.

Conclusion

46. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See the Notice of References Cited (PTO-892).

47. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Whipple whose telephone number is (571)270-1244. The examiner can normally be reached on Mon-Fri (8:30 AM to 5:00 PM EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn D. Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Brian P. Whipple
/Brian P. Whipple/
Primary Examiner, Art Unit 2448
6/23/15

Notice of References Cited	Application/Control No. 13/714,410	Applicant(s)/Patent Under Reexamination NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2448	Page 1 of 1

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*	B	US-2013/0041972 A1	02-2013	Field et al.	709/213
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

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	O					
	P					
	Q					
	R					
	S					
	T					

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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

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Art Unit	2447
Examiner Name	Joon H. Hwang

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Examiner Name	Da T. Ton

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

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		International Search Report, dated May 23, 2014, Int'l Appl. No. PCT/US13/074824, Int'l Filing Date December 12, 2013; Dkt. No. 0447-WO-01 , 9 pgs.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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				Complete if Known
				Application Number 13/714,410
				Filing Date Dec 14, 2012
				First Named Inventor Christopher Newton
				Art Unit 2447
				Examiner Name Joon H. Hwang
Sheet	2	of	2	Attorney Docket No: 0394-US-U1

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First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	2	of	4	Attorney Docket No: 0394-US-U1

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	3	of	4	Attorney Docket No: 0394-US-U1

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Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Joon H. Hwang

Sheet	4	of	4	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
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Application Number	13/714,410
Filing Date	December 14, 2012
First Named Inventor	NEWTON
Art Unit	2445
Examiner Name	Da T. Ton

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear

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OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		LIPSTONE, et al., U.S. Application No. 14/578,402, filed December 20, 2014, "Automatic Network Formation and Role Determination in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/579,640, filed December 22, 2014, "Dynamic Fill Target Selection in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/580,038, filed December 22, 2014, "Multi-Level Peering in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/580,086, filed December 22, 2014, "Multi-Level Peering in a Content Delivery Framework"	
		VARNEY, et al., U.S. Application No. 14/583,718, filed December 28, 2014, "Role-Specific Sub-Networks in a Content Delivery Framework"	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 06/23/2015

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 9250

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/714,410	12/14/2012	709	2448	0394-US-U1

APPLICANTS

LEVEL 3 COMMUNICATIONS, LLC, Broomfield, CO

INVENTORS

Christopher Newton, Westlake Village, CA;
Laurence R. Lipstone, Calabasas, CA;
William Crowder, Camarillo, CA;
Jeffrey G. Koller, Oxnard, CA;
David Fullagar, Boulder, CO;
Maksim Yevmenkin, Thousand Oaks, CA;

**** CONTINUING DATA ***************************

This appln claims benefit of 61/570,448 12/14/2011
and claims benefit of 61/570,486 12/14/2011

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

01/14/2013

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /BRIAN P WHIPPLE/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		CA	43	50	2

ADDRESS

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021
UNITED STATES

TITLE

CONTENT DELIVERY NETWORK

FILING FEE RECEIVED		
3250	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	Art Unit
	BRIAN P WHIPPLE	2448

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search history attached	6/23/15	BPW
Double name search conducted	6/23/15	BPW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2448

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	12925328	@AD<"20111214" OR @RLAD<"20111214"	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L2	176371	H04L.CPC. OR "709".CLAS.	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L3	160936	L1 L2	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L4	3	content ADJ delivery ADJ network WITH cache WITH join$3	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L5	1	L3 L4	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L6	1	"20120215779".DID.	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L7	1	"20050192995".DID.	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L8	7	CDN WITH cache WITH join$3	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L9	2	L3 L8	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
L10	2	L9 configur$5	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
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L13	0	L11 (another WITH cache)	US-PGPUB;	AND	ON	2015/06/23 11:05

			USPAT; EPO			
L14	255	((Christopher) near2 (Newton)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2015/06/23 11:05
L15	84	((Laurence) near2 (Lipstone)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2015/06/23 11:05
L16	92	((William) near2 (Crowder)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2015/06/23 11:05
L17	34	((Jeffrey) near2 (Koller)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2015/06/23 11:05
L18	34	((David) near2 (Fullagar)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2015/06/23 11:05
L19	21	((Maksim) near2 (Yevmenkin)).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2015/06/23 11:05
L20	4	L14 L15 L16 L17 L18 L19	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:05
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		"20020161823" | "20140344400" | "20140344425" | "20020174227" | "20090276842" | "20070156876" | "5511208").PN.				
L22	72281	global.CLM.	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:09
L23	5	21 22	US-PGPUB; USPAT; EPO	AND	ON	2015/06/23 11:09

EAST Search History (Interference)

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6/23/2015 11:09:32 AM
C:\Users\bwhipple\Documents\EAST\Workspaces\13714410.wsp

PTO/SB/08a (01-08)
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2447
Examiner Name	Not Yet Assigned

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020010798	Jan 24, 2002	Ben-Shaul, Israel et al.	
		20020174168	Nov 21, 2002	Beukema, Bruce L., et al.	
		20020184357	Dec 5, 2002	Traversat, Bernard A., et al.	
		20030140111	Jul 24, 2003	Pace, Charles P., et al.	
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		20060112176	May 25, 2006	Liu, Zaide E., et al.	
		20100257258	Oct 7, 2010	Liu, Zaide et al.	
		20110099290	Apr 28, 2011	Swildens, Eric S., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		International Search Report, dated February 20, 2013, Int'l Appl. No. PCT/US12/069712, Int'l Filing Date December 14, 2012, Dkt. No. 0394-WO-01, 4 pgs.	
		Written Opinion, dated February 20, 2013, Int'l Appl. No. PCT/US12/069712, Int'l Filing Date December 14, 2012, Dkt. No. 0394-WO-01, 6 pgs.	
		KOSTADINOVA, R. , "Peer-to-Peer Video Streaming", [online; retrieved on 25 Jan 2013]; Retrieved from the Internet <URL: http://www.ee.kth.se/php/modules/publications/reports/2008/XR-EE-LCN_2008_004.pdf>, especially section 5.4.1 2008 , 1-53	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 06/23/2015

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020120717	Aug 29, 2002	Giotta, Paul	
		20030135509	Jul 17, 2003	Davis, Andrew T., et al.	
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		8819283	Aug 26, 2014	Richardson, David R., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

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EXAMINER **DATE CONSIDERED**

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	2	of	2	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Extended European Search Report, dated June 8, 2015, Application No. 12857282.3, filed December 14, 2012; Dkt. No. 0394-EP-01 , 13 pgs.	
		"NetServ Framework Design and Implementation 1.0", XML File, retrieved from Internet 2015-05-29 at http://academiccommons.columbia.edu/download/fedora_content/show_pretty/ac:135426/CONTENT/ac135426_description.xml?data=meta 2011-11-16 , 4 pgs.	
		LEE, JAE W. et al., "NetServ Framework Design and Implementation 1.0", Columbia University Computer Science Technical Reports retrieved from Internet on 2015-05-29 11/16/12 , pp. 1-15	
		YIN, HAO et al., "Design and Deployment of a Hybrid CDN-P2P System for Live Video Streaming: Experiences with LiveSky", Proceedings of the Seventeen ACM International Conference on Multimedia 1 Jan 2009 , pp. 25-34	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
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Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	23249499
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	19-AUG-2015
Filing Date:	14-DEC-2012
Time Stamp:	12:58:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	9403
Deposit Account	505063
Authorized User	SIEKMANN, JONATHAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37110 8a02e45095d150fe3a9195794c82905d7051d149	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	40139 779e26e23be455b3598306b1ea3861076a253bda	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Other Reference-Patent/App/Search documents	EP_128572823_EESR_8Jun15_394EP01.pdf	478908 2eeffce8e00a8304b8f0a224b33e24fe148a318e	no	13
Warnings:					
Information:					
4	Non Patent Literature	Lee_JW_etal_NetServ_Framework_Design.pdf	2877349 41093ec27fdb0a4cd34246a2a9f62397dcc313dc	no	15
Warnings:					
Information:					
5	Non Patent Literature	NetServ_Framework_Design_Implementation_XML_File.pdf	377023 ee9aaf6eeadd8530d2243e3abc77db959ec8de4b	no	4
Warnings:					
Information:					
6	Non Patent Literature	Yin_etal_Design_Deployment_Hybrid_CDNP2P.pdf	2016112 b638a39f9b76f30a0a8688823c6bfcb7a85e541f	no	10
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Information:					
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Warnings:					
Information:					
		Total Files Size (in bytes):	5857277		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☐ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☒ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☐ No fee is due.

☒ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☒ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: August 19, 2015

/JCS/

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20030154090	Aug 14, 2003	Bernstein, Steve L., et al.	
		20050086386	Apr 21, 2005	Shen, Bo et al.	
		20050289388	Dec 29, 2005	Black-Ziegelbein, Elizabeth A., et al.	
		20070162434	Jul 12, 2007	Alessi, Marzio et al.	
		20090165115	Jun 25, 2009	Toumura, Kunihiko et al.	
		20110022812	Jan 27, 2011	van der Linden, Rob et al.	
		20120284384	Nov 8, 2012	Shi, Ju Wei et al.	
		20130191499	Jul 25, 2013	Ludin, Stephen L., et al.	
		8255557	Aug 28, 2012	Raciborski, Nathan F., et al.	
		8577827	Nov 5, 2013	Sehn, Timothy M., et al.	
		8626878	Jan 7, 2014	Wolber, Andreas et al.	
		8645517	Feb 4, 2014	Stolorz, Paul E., et al.	
		8949533	Feb 3, 2015	Puthalath, Hareesh et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	24087442
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	16-NOV-2015
Filing Date:	14-DEC-2012
Time Stamp:	11:04:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	9893
Deposit Account	505063
Authorized User	SIEKMANN, JONATHAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37111 44131b6bc831f76768fb4035f08fe07dea549ede	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	30654 8680ce2785cd0caebf9c5c08d3ae4dc46c8c6dfc	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Fee Worksheet (SB06)	fee-info.pdf	30636 5ca1761245c1dd0d53b21529057f9baeba6084cd	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	98401		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☐ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☒ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☐ No fee is due.

☒ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☒ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: November 16, 2015

/JCS/

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Broomfield, Colorado 80021
Tel: 720-888-2140

In the United States Patent & Trademark Office

In re PATENT Application of: NEWTON, et al.	Confirmation No.: 9250
Appl. S.N.: 13/714,410	Docket: 0394-US-U1
Filing Date: 12-14-2012	Group Art Unit: 2448
Title: CONTENT DELIVERY NETWORK	Examiner WHIPPLE, BRIAN P

RESPONSE AFTER NON-FINAL ACTION

Hon. Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the non-final office action of June 29, 2015, please amend the above-identified application as follows:

A **Petition for Extension of Time** is on page 2 hereof.

Amendments to the Claims are reflected in the listing of claims that begins on page 3 hereof.

Remarks begin on page 13 of this paper.

An **Interview Summary** begins on 13 hereof.

A **Terminal Disclaimer** is being filed herewith.

PETITION FOR EXTENSION OF TIME

Petition is hereby made to extend the original due date to cover the date this response/paper is filed. Please charge the present and any missing or inadequate fee for this petition to our Deposit Account No. **506253**, Our Order No. **0394-US-U1**.

In the Claims

Please amend the claims as follows:

1. (Currently amended) A content delivery network (CDN), the CDN serving resources on behalf of one or more customers of the CDN, the CDN comprising:

(a) a control core; and

(b) a plurality of cache servers, each particular cache server of said plurality of cache servers being constructed and adapted to:

(b)(1) upon joining the CDN,

(b)(1)(1) obtain global configuration data from the control core; and

(b)(2) having joined the CDN,

(b)(2)(1) obtain updated global configuration data, if needed; and

(b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN;

(b)(2)(3) serve to a client a particular resource associated with a particular customer of the CDN in accordance with (i) the global configuration data, and (ii) customer configuration information obtained in (b)(2)(2) and associated with the particular customer.

2. (Original) The CDN of claim 1 wherein each particular cache server of said plurality of cache servers is constructed and adapted to, upon joining the CDN,

(b)(1)(2) obtain data from one or more other locations in the CDN.

3. (Original) The CDN of claim 1 wherein processing by a cache server in (b)(2)(2) to obtain customer configuration information associated with a specific customer occurs upon receipt of a request for a resource associated with the specific customer.

4. (Original) The CDN of claim 1 wherein processing by a cache server in (b)(2)(2) to obtain customer configuration information associated with a specific customer occurs prior to receipt of a request for a resource associated with the specific customer.

5. (Original) The CDN of claim 1 wherein customer configuration information associated with the particular customer comprises one or more scripts to be used by the particular cache server to process requests for resources associated with the particular customer.

6. (Original) The CDN of claim 1 wherein the customer configuration information comprises at least one CDN resource.

7. (Original) The CDN of claim 1 wherein the customer configuration information associated with the particular customer comprises at least one customer configuration script (CCS) associated with the particular customer.

8. (Original) The CDN of claim 1 wherein the customer configuration information associated with the particular customer specifies customer-specific processing requirements for resources served on behalf of that customer.

9. (Original) The CDN of claim 1 wherein the global configuration data comprises at least one CDN resource.

10. (Original) The CDN of claim 9 wherein the global configuration data comprises global configuration object (GCO).

11. (Original) The CDN of claim 2 wherein the one or more other locations in the CDN comprise at least one location selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

12. (Original) The CDN of claim 11 wherein the one or more other locations in the CDN comprise at least one peer location.

13. (Original) The CDN of claim 2 wherein the particular cache server determines said one or more other locations using said information in said global configuration data.

14. (Original) The CDN of claim 1 wherein said particular cache server obtains said updated global configuration data from one or more locations in the CDN.

15. (Currently amended) The CDN of claim 14 wherein the one or more locations in the CDN comprise one or more locations selected from: (i) the control core; and (ii) one or more locations [[in]] selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

16. (Original) The CDN of claim 1 wherein the control core comprises a distributed system consisting of a plurality of machines.

17. (Original) The CDN of claim 16 wherein the control core uses a distributed consensus algorithm to achieve consensus among the plurality of machines.

18. (Original) The CDN of claim 1 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

determine validity of a version of global configuration data stored on said particular cache server, and wherein said particular cache server obtains updated global configuration data in (b)(2)(1) when said particular cache server determines that said version of said global configuration data stored on said particular cache server is invalid.

19. (Original) The CDN of claim 1 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

determine validity of a version of particular customer configuration information associated with a particular customer and stored on said particular cache server, and wherein said particular cache server obtains customer configuration information in (b)(2)(2) when said particular cache server determines that said version of said particular customer configuration information stored on said particular cache server is invalid.

20. (Original) The CDN of claim 19 wherein said particular cache server is constructed and adapted to determine said validity of said version of particular

customer configuration information stored on said particular cache server in response to a request to serve content associated with said particular customer.

21. (Original) The CDN of claim 1 further comprising:

(c) at least one rendezvous mechanism.

22. (Original) The CDN of claim 1 further comprising:

(d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to:

(d)(1) obtain information from at least one cache server.

23. (Original) The CDN of claim 22 wherein each particular cache server of said plurality of cache servers is further constructed and adapted to:

(b)(3) generate information; and

(b)(4) provide at least some of said generated information to said collector system.

24. (Original) The CDN of claim 21 wherein each particular cache server of said plurality of cache servers provides at least some of said generated information in (b)(4) by streaming said at least some of said generated information to one or more collector mechanisms in said collector system.

25. (Original) The CDN of claim 1 wherein the CDN has customer configuration information associated therewith, and wherein each particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN.

26. (Original) The CDN of claim 1 wherein at least one cache server of said plurality of cache servers comprises an executive system supporting concurrent processing of tasks on said at least one cache server.

27. (Currently amended) A computer-implemented method, operable in a content delivery network (CDN) comprising: (a) a control core; and (b) a plurality of cache servers, the CDN serving resources on behalf of one or more customers of the CDN, the method comprising, by hardware and software on a particular cache server of said plurality of cache servers:

(A) obtaining global configuration data from the control core;

(B) selectively obtaining updated global configuration data; and

(C) obtaining customer configuration information associated with a particular customer of the CDN;

(D) serving, to a client, a particular resource associated with the particular customer in accordance with (i) the global configuration data; and (ii) the customer configuration information associated with the particular customer.

28. (Original) The method of claim 27 further comprising:

(A)(2) obtaining data from one or more other locations in the CDN.

29. (Original) The method of claim 27 wherein the obtaining of said customer configuration information in (C) occurs upon receipt of a request of said particular cache server for a resource associated with the particular customer.

30. (Original) The method of claim 27 wherein the obtaining of said customer configuration information in (C) occurs prior to receipt of a request of said particular cache server for a resource associated with the particular customer.

31. (Original) The method of claim 27 wherein the customer configuration information comprises one or more scripts to be used by the particular cache server to process requests for resources associated with the particular customer.

32. (Original) The method of claim 27 wherein the customer configuration information comprises at least one CDN resource.

33. (Original) The method of claim 27 wherein the customer configuration information comprises at least one customer configuration script (CCS) associated with the particular customer.

34. (Original) The method of claim 27 wherein the customer configuration information associated with the particular customer specifies customer-specific processing for resources served on behalf of that customer.

35. (Original) The method of claim 27 wherein the global configuration data comprises at least one CDN resource.

36. (Original) The method of claim 35 wherein the global configuration data comprises global configuration object (GCO).

37. (Original) The method of claim 28 wherein the one or more other locations in the CDN comprise at least one location selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

38. (Original) The method of claim 37 wherein the one or more other locations in the CDN comprise at least one peer location.

39. (Original) The method of claim 28 wherein the particular cache server determines said one or more other locations using said information in said global configuration data.

40. (Original) The method of claim 27 wherein said particular cache server obtains said updated global configuration data in (B) from one or more locations in the CDN.

41. (Currently amended) The method of claim 40 wherein the one or more locations in the CDN comprise one or more locations selected from: (i) the control core; and (ii) one or more locations [[in]] selected from: a cache server, a cache server site, a region of cache servers, a cache cluster, and a cache cluster site.

42. (Original) The method of claim 27 wherein the control core comprises a distributed system consisting of a plurality of machines.

43. (Original) The method of claim 42 wherein the control core uses a distributed consensus algorithm to achieve needed consensus among the plurality of machines.

44. (Original) The method of claim 27 further comprising, by said particular cache server:

(F) determining validity of a version of global configuration data stored on said particular cache server, and wherein said particular cache server obtains

updated global configuration data in (B) when said particular cache server determines that said version of said global configuration data stored on said particular cache server is invalid.

45. (Original) The method of claim 27 further comprising, by said particular cache server:

(G) determining validity of a version of particular customer configuration information associated with the particular customer and stored on said particular cache server, and wherein said particular cache server obtains customer configuration information in (C) when said particular cache server determines that said version of said particular customer configuration information stored on said particular cache server is invalid.

46. (Original) The method of claim 45 wherein said particular cache server determines validity of said version of particular customer configuration information in (G) in response to a request to serve content associated with said particular customer.

47. (Original) The method of claim 27 wherein the CDN further comprises: (d) a collector system comprising one or more collector mechanisms, each of said collector mechanisms being constructed and adapted to obtain information from at least one cache server, the method further comprising, by said particular cache server:

(E) generating information; and

(F) providing at least some of said generated information to said collector system.

48. (Original) The method of claim 47 wherein said providing in (F) comprises:

(F)(1) streaming said at least some of said generated information to one or more collector mechanisms in said collector system.

49. (Original) The method of claim 27 further comprising, by said particular cache server of said plurality of cache servers:

(E) obtaining second customer configuration information associated with a second customer of the CDN, said second customer being distinct from said particular customer; and

(F) serving a second particular resource associated with the second customer in accordance with (i) the global configuration data, and (ii) the second customer configuration information associated with the second customer.

50. (Original) The method of claim 27 wherein the CDN has customer configuration information associated therewith, and wherein the particular cache server serves CDN resources in accordance with the global configuration data and the customer configuration information associated with the CDN.

Remarks

Reconsideration and allowance of this application are respectfully requested in view of the above amendments and the following remarks.

By this Amendment, claims 1, 15, 27, and 41 have been amended. No new matter has been added by this amendment.

Claims 1-50 are pending in this application.

It should be appreciated that the Applicant has not invoked 35 U.S.C. §112 (pre-AIA), paragraph 6 or 35 U.S.C. §112(f) (post-AIA) with respect to any term in any claim of the present application. It should further be appreciated that the words "first," "second", and so on in the claims are used to distinguish or identify within a claim, and not to show a serial or numerical limitation or ordering. Similarly, words such as "particular," "specific," "certain," and "given" if used, are to distinguish or identify within a claim and are not intended to be otherwise limiting. Furthermore, letter labels (e.g., "(B)", "(C)", "(D)", and so on, or "(a)", "(b)", and so on) and/or numbers (e.g., "(i)", "(ii)", and so on) if in the claims, are used to assist in readability, and are not intended to be otherwise limiting or to impose any serial or numerical limitations or orderings.

INTERVIEW SUMMARY

On Wednesday, November 25, 2015, the undersigned conducted a personal interview with the Examiner regarding this application and U.S. Application No. 13/714,411. Applicant thanks the Examiner for the courtesy extended the undersigned during the interview and in the telephone calls setting up the interview.

During the interview the undersigned explained the terms "client" and "customer" as used in the presently claimed invention. The undersigned also showed the Examiner the claim amendments to the claims to clarify that the "CDN serv[es] resources on behalf of one or more customers of the CDN," and that a

particular resource is "serve[d] to a client." The undersigned pointed out that the claims refer to "customer configuration information associated with at least one customer of the CDN" and that a "resource associated with a particular customer of the CDN [is served to a client] in accordance with (i) the global configuration data, and (ii) customer configuration information … associated with the particular customer."

The Examiner agreed that these features are not shown in Lewin.

DOUBLE PATENTING

The Examiner rejected claims 1-50 for double patenting over claims 1-50 of Application No. 13/714,411.

Withdrawal of this rejection is respectfully requested in view of the terminal disclaimer filed herewith.

CLAIM REJECTIONS - 35 USC§ 112

The Examiner rejected claims 15 and 41 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite.

In view of the above amendments to claims 15 and 41, withdrawal of this rejection of those claims is respectfully requested.

CLAIM REJECTIONS - 35 USC§ 102

The Examiner rejected claims 1-3, 6, 9-16, 18, 21-25, 27-29, 32, 35-42, 44, and 47-50 under pre- AIA 35 U.S.C. §102(b) as being anticipated by Lewin et al. (Lewin), U.S. Patent No. 7,010,578 Bl.

The grounds for this rejection are respectfully requested.

In some aspects, e.g., as recited in **claim 1**, this invention is a content delivery network (CDN) *serving resources on behalf of one or more customers* of the CDN. As recited in claim 1, the CDN includes a control core; and a plurality of cache servers, "each particular cache server of said plurality of cache servers

being constructed and adapted to: (b)(1) upon joining the CDN, (b)(1)(1) obtain global configuration data from the control core; and

(b)(2) having joined the CDN,
(b)(2)(1) obtain updated global configuration data, if needed; and
(b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN;
(b)(2)(3) serve to a client a particular resource associated with a particular customer of the CDN in accordance with (i) the global configuration data, and (ii) customer configuration information obtained in (b)(2)(2) and associated with the particular customer."

The Examiner relies on Lewin, supposedly to anticipate claim 1. According to the Examiner, Lewin teaches the claimed "(b)(2)(2) obtain customer configuration information associated with at least one customer of the CDN (Col. 7, ln. 24-28, wherein a cache must possess at least configuration *information such as a delivery address for the customer* ***in order to deliver cached content to the customer***)" (emphasis added). However, Lewin does not deliver cached content **to** a customer (as claimed). Lewin delivers content **to** an end user **on behalf of** what Lewin refers to as a client (see, e.g., Lewin's Figure 2).[1]

As claimed, the "customer" is not the entity to which content is served ("the CDN serving resources on behalf of one or more customers of the CDN").[2] As claimed, the particular resource being served is served "**to a client**," and is a "**resource associated with a particular customer of the CDN**," and that resource is served "in accordance with … customer configuration information obtained … and associated with the particular customer." This feature is not taught or in any way suggested by Lewin.

---

[1] Lewin refers to the entity being served as a "client" (e.g., *Lewin*, col. 2, line 55, col. 4, line 40, col. 6, lines 9 and 52, col. 7, line 27, and in the table at the bottom of col. 10). Lewin also refers to "client's servers" 200 in Figure 2 as "the content provider's web servers 200." *Id.* col. 3, line 17.

[2] As noted in the application, at ¶0093, "The customer may be an external entity such as, *e.g.*, a subscriber to the CDN, or the customer may be another CDN component."

A delivery address of the entity **to which** content is being served is not the claimed "customer configuration information," as the Examiner would have it.

Since Lewin lacks any teaching or suggestion of at least one element of claim 1, Lewin does not and cannot anticipate claim 1 or its dependents.

Similar arguments apply to claim 27 and its dependents.

In view of the above, withdrawal of this rejection under §102 is respectfully requested.

CLAIM REJECTIONS - 35 USC§ 103

The Examiner rejected claims 4, 5, 7, 8, 17, 19, 20, 26, 30, 31, 33, 34, 43, and 45-47 under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Lewin in view of Official Notice (See MPEP § 2144.03).

The grounds of this rejection are respectfully traversed.

Claims 4, 5, 7, 8, 17, 19, 20, 26, 30, 31, 33, 34, 43, and 45-47 depend from claims 1 or 27 that, as shown above, are patentable over Lewin. The so-called "Official Notice" does not overcome the deficiencies in Lewin.

In view of the above, withdrawal of this rejection under §103 is respectfully requested.

CONCLUSION

Applicant respectfully submits that this application is in condition for allowance and an action to that effect is earnestly solicited.

The Examiner is kindly requested to contact the undersigned at the number provided to resolve any outstanding issues in this application.

CHARGE STATEMENT: Deposit Account No. 506253 Docket No. 0394-US-U1
The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 (missing or insufficiencies only) now or hereafter relative to this application and the resulting Official Document under Rule 20, or credit any overpayment, to our Accounting/Order Nos. shown above. **This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal sheet is filed.**

Respectfully submitted,

Dated: November 25, 2015

/Brian Siritzky/Reg. No. 37,497

By: Brian Siritzky, Ph.D.
Registration No.: 37,497
SIRITZKY LAW, PLLC
8300 Greensboro Drive, Suite 800
McLean, Virginia 22102-3661
703.260.7390

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	Brian Siritzky
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Extension - 2 months with $0 paid	1252	1	600	600
Miscellaneous:				
Statutory or Terminal Disclaimer	1814	1	160	160
		Total in USD ($)		**760**

Electronic Acknowledgement Receipt

EFS ID:	24200260
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	Brian Siritzky
Filer Authorized By:	
Attorney Docket Number:	0394-US-U1
Receipt Date:	25-NOV-2015
Filing Date:	14-DEC-2012
Time Stamp:	23:57:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$760
RAM confirmation Number	28605
Deposit Account	506253
Authorized User	SIRITZKY, BRIAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer Filed	0394-US-U01-Terminal-Disclaimer-aia0025.pdf	246680 04bdec89a297de6141703e02521be231cc1e1798	no	2
Warnings:					
Information:					
2		0394-US-U01-PA-Response-after-NFOA-11-25-2015.pdf	202199 bca101676292ae22023af7ca5867f2bc306225c4	yes	17

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Extension of Time	2	2
Claims	3	12
Applicant Arguments/Remarks Made in an Amendment	13	17

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32405 32a3814dc34736761a6ed93f6abd3c74bea0e24e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	481284		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

PTO/AIA/25 (04-13)
Approved for use through 04/30/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION	Docket Number (Optional) 0394-US-U1

In re Application of: NEWTON, et al.

Application No.: 13/714,410

Filed: 12-14-2012

For: CONTENT DELIVERY NETWORK

The applicant, LEVEL 3 COMMUNICATIONS, LLC, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 13/714,411, filed, 12-14-2012, as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said **reference** application, "as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application," in the event that: any such patent granted on the pending **reference** application expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 37,497

/Brian Siritzky/	November 25, 2015
Signature	Date
Brian Siritzky	
Typed or printed name	
Patent Attorney	703.260.7390
Title	Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) is included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 12/02/2015

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	

ART UNIT	PAPER NUMBER
2448	

NOTIFICATION DATE	DELIVERY MODE
12/02/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent.docketing@level3.com

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	13/714,410	NEWTON ET AL.	
	Examiner	Art Unit	
	Brian P. Whipple	2448	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Brian P. Whipple*. (3)_____.

(2) *Brian Siritzky*. (4)_____.

Date of Interview: *25 November 2015*.

Type: ☐ Telephonic ☐ Video Conference
☒ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☒102 ☐103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1*.

Identification of prior art discussed: *Lewin et al., U.S. Patent No. 7,010,578 B1*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Mr. Siritzky met with Examiner Whipple to discuss proposed claim amendments. Initially, Mr. Siritzky explained the invention generally and the order of steps and by which entities the steps are performed. Mr. Siritzky proposed amendments to clarify the role of the customer(s) and the role of the client(s). Examiner Whipple agreed the proposed amendments appeared to overcome the prior art, but further search and/or consideration will be required.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/Brian P. Whipple/ Primary Examiner, Art Unit 2448	

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	13/714,410	NEWTON ET AL.	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 11/25/15	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

ANDRE ROBINSON

U.S. Patent and Trademark Office

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20050190775	Sep 1, 2005	Tonnby, Ingmar et al.	
		20060244818	Nov 2, 2006	Majors, Kenneth D., et al.	
		20070192486	Aug 16, 2007	Wilson, Brian B., et al.	
		20080108360	May 8, 2008	Baarman, Matthew A., et al.	
		20080228864	Sep 18, 2008	Plamondon, Robert	
		20090171752	Jul 2, 2009	Galvin, Brian et al.	
		20100142712	Jun 10, 2010	Tang, Lawrence W., et al.	
		20100158236	Jun 24, 2010	Chang, Yi et al.	
		20100246797	Sep 30, 2010	Chavez, David L., et al.	
		20110072073	Mar 24, 2011	Curtis, Sean	
		20110194681	Aug 11, 2011	Fedorov, Sergey et al.	
		20110247084	Oct 6, 2011	Kolbert, Matthew et al.	
		20120221767	Aug 30, 2012	Post, Daniel J., et al.	
		20130046664	Feb 21, 2013	Kazerani, Alexander A., et al.	
		20130173769	Jul 4, 2013	Seastrom, Robert E., et al.	
		20150088634	Mar 26, 2015	Greenzeiger, Michael	
		5805837	Sep 8, 1998	Hoover, Russell D., et al.	
		6212178	Apr 3, 2001	Beck, Christopher et al.	
		6279032	Aug 21, 2001	Short, Robert T., et al.	
		7206841	Apr 17, 2007	Traversat, Bernard A., et al.	
		8396970	Mar 12, 2013	Black, Bryan et al.	
		8458290	Jun 4, 2013	Black, Bryan et al.	
		8478858	Jul 2, 2013	Dunbar, Neil et al.	
		8521813	Aug 27, 2013	Black, Bryan et al.	
		8615577	Dec 24, 2013	Black, Bryan et al.	
		9098464	Aug 4, 2015	Hajiaghayi, Mohammad T., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	24567846
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	08-JAN-2016
Filing Date:	14-DEC-2012
Time Stamp:	12:04:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37107 36879e0eb644e2e86f39f9124c975bf3bb2a9b15	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394USU1_sb08.pdf	31386 8be82f7ed8eb88547b118fd6c82aea8bc9b4fbfb	no	1

Warnings:	
Information:	
This is not an USPTO supplied IDS fillable form	
Total Files Size (in bytes):	68493

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☐ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☒ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☐ No fee is due.

☒ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☒ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: January 8, 2016

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt

EFS ID:	24567874
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	08-JAN-2016
Filing Date:	14-DEC-2012
Time Stamp:	12:05:24
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	9193
Deposit Account	505063
Authorized User	SIEKMANN, JONATHAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	30636 125415921010496 68a7af5a44fae0f80fcb4e52a	no	2

Warnings:

Information:

Total Files Size (in bytes):	30636

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21398 7590 01/12/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2448	

DATE MAILED: 01/12/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	04/12/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21398 7590 01/12/2016
Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	04/12/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WHIPPLE, BRIAN P	2448	709-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 01/12/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2448	

DATE MAILED: 01/12/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice Requiring Inventor's Oath or Declaration	Application No. 13/714,410	Applicant(s) Christopher Newton	
	Examiner WHIPPLE, BRIAN P	Art Unit 2448	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) MUST be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

A properly executed inventor's oath to declaration has not been received for the following inventor(s):

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

INFORMAL ACTION PROBLEMS

- A properly executed inventor's oath or declaration has not been received for the following inventor(s): **Christopher Newton** , **Laurence R. Lipstone**, **William Crowder**, **Jeffrey G. Koller**, **David Fullagar**, and **Maksim Yevmenkin**.
  Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/714,410	Applicant(s) NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2448	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the response filed on 11/25/15*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-50*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Brian P. Whipple/
Primary Examiner, Art Unit 2448

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20030154090	Aug 14, 2003	Bernstein, Steve L., et al.	
		20050086386	Apr 21, 2005	Shen, Bo et al.	
		20050289388	Dec 29, 2005	Black-Ziegelbein, Elizabeth A., et al.	
		20070162434	Jul 12, 2007	Alessi, Marzio et al.	
		20090165115	Jun 25, 2009	Toumura, Kunihiko et al.	
		20110022812	Jan 27, 2011	van der Linden, Rob et al.	
		20120284384	Nov 8, 2012	Shi, Ju Wei et al.	
		20130191499	Jul 25, 2013	Ludin, Stephen L., et al.	
		8255557	Aug 28, 2012	Raciborski, Nathan F., et al.	
		8577827	Nov 5, 2013	Sehn, Timothy M., et al.	
		8626878	Jan 7, 2014	Wolber, Andreas et al.	
		8645517	Feb 4, 2014	Stolorz, Paul E., et al.	
		8949533	Feb 3, 2015	Puthalath, Hareesh et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 12/29/2015

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020120717	Aug 29, 2002	Giotta, Paul	
		20030135509	Jul 17, 2003	Davis, Andrew T., et al.	
		20050188073	Aug 25, 2005	Nakamichi, Koji et al.	
		20060212524	Sep 21, 2006	Wu, David T., et al.	
		20070271385	Nov 22, 2007	Davis, Andrew T., et al.	
		20100228874	Sep 9, 2010	Rajan, Rajeev B.	
		20110161513	Jun 30, 2011	Viers, Jack C.	
		20120002717	Jan 5, 2012	Ma, Kevin J., et al.	
		20130046883	Feb 21, 2013	Lientz, Andrew et al.	
		20130104173	Apr 25, 2013	Tjio, Lee et al.	
		20130144727	Jun 6, 2013	Morot-Gaudry, Jean M., et al.	
		20140095537	Apr 3, 2014	Park, Hoyong et al.	
		20140101736	Apr 10, 2014	Mays, David et al.	
		20140122725	May 1, 2014	Batrouni, Marwan et al.	
		20150067185	Mar 5, 2015	Tamblin, Shaun H., et al.	
		5870559	Feb 9, 1999	Leshem, E. et al.	
		6173322	Jan 9, 2001	Hu, Wei-Ming	
		8296296	Oct 23, 2012	Keith Jr., Robert O.	
		8412823	Apr 2, 2013	Richardson, David R., et al.	
		8511208	Aug 20, 2013	Frazer, Spencer	
		8543702	Sep 24, 2013	Marshall, Bradley E., et al.	
		8626876	Jan 7, 2014	Kokal, Mohan I., et al.	
		8788671	Jul 22, 2014	Richardson, David R., et al.	
		8819283	Aug 26, 2014	Richardson, David R., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 12/29/2015

Substitute Disclosure Statement Form (PTO-1449)

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	2	of	2	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Extended European Search Report, dated June 8, 2015, Application No. 12857282.3, filed December 14, 2012; Dkt. No. 0394-EP-01 , 13 pgs.	
		"NetServ Framework Design and Implementation 1.0", XML File, retrieved from Internet 2015-05-29 at http://academiccommons.columbia.edu/download/fedora_content/show_pretty/ac:135426/CONTENT/ac135426_description.xml?data=meta 2011-11-16 , 4 pgs.	
		LEE, JAE W. et al., "NetServ Framework Design and Implementation 1.0", Columbia University Computer Science Technical Reports retrieved from Internet on 2015-05-29 11/16/12 , pp. 1-15	
		YIN, HAO et al., "Design and Deployment of a Hybrid CDN-P2P System for Live Video Streaming: Experiences with LiveSky", Proceedings of the Seventeen ACM International Conference on Multimedia 1 Jan 2009 , pp. 25-34	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 12/29/2015

Substitute Disclosure Statement Form (PTO-1449)

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2448

CPC						
Symbol					**Type**	**Version**
H04L		67	/	32	F	2013-01-01
H04L		67	/	26	I	2013-01-01
H04L		67	/	2852	I	2013-01-01
H04L		63	/	166	A	2013-01-01
H04L		41	/	0893	I	2013-01-01
H04L		67	/	42	I	2013-01-01
H04L		41	/	0856	I	2013-01-01
H04L		41	/	5064	I	2013-01-01
H04L		41	/	509	I	2013-01-01
H04L		67	/	34	I	2013-01-01
H04L		67	/	2842	I	2013-01-01
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			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2448	12/29/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2448

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		G	0	6	F	15 / 16 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2448	12/29/2015	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2448

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33		49								
	2		18		34		50								
	3		19		35										
	4		20		36										
	5		21		37										
	6		22		38										
	7		23		39										
	8		24		40										
	9		25		41										
	10		26		42										
	11		27		43										
	12		28		44										
	13		29		45										
	14		30		46										
	15		31		47										
	16		32		48										

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2448 (Primary Examiner)	12/29/2015 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	273	((Christopher) near2 (Newton)).INV.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37
L2	89	((Laurence) near2 (Lipstone)).INV.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37
L3	91	((William) near2 (Crowder)).INV.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37
L4	41	((Jeffrey) near2 (Koller)).INV.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37
L5	38	((David) near2 (Fullagar)).INV.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37
L6	23	((Maksim) near2 (Yevmenkin)).INV.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37
L7	4	1 3 4 5 6 2	US-PGPUB; USPAT	AND	ON	2015/12/29 16:37

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	15683	(H04L67/32 or H04L67/42 or H04L41/0893 or H04L67/26).cpc.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:34
S2	2	content ADJ delivery ADJ network.CLM. global ADJ configuration ADJ data.CLM.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:34
S3	2	S1 S2	US-PGPUB; USPAT	AND	ON	2015/12/29 16:34
S4	2029	content ADJ delivery ADJ network.CLM. OR CDN.CLM.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:35
S5	25	S4 WITH global	US-PGPUB; USPAT	AND	ON	2015/12/29 16:35
S6	7	S1 S5	US-PGPUB; USPAT	AND	ON	2015/12/29 16:35
S7	40	CDN NEAR3 customer.CLM.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:35
S8	7	S1 S7	US-PGPUB; USPAT	AND	ON	2015/12/29 16:35
S9	102	CDN NEAR3 cach$3.CLM.	US-PGPUB; USPAT	AND	ON	2015/12/29 16:36

S10	9	S1 S9	US-PGPUB; USPAT	AND	ON	2015/12/29 16:36

12/29/2015 4:38:11 PM
C:\Users\bwhipple\Documents\EAST\Workspaces\13714410.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	Art Unit
	BRIAN P WHIPPLE	2448

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search history attached	6/23/15	BPW
Double patenting search conducted	6/23/15	BPW
Updated search (EAST search history attached)	12/29/15	BPW
Inventor name search conducted	12/29/15	BPW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04L	67/32	12/29/15	BPW
H04L	67/42	12/29/15	BPW
H04L	41/0893	12/29/15	BPW
H04L	67/26	12/29/15	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2448

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2454	
NOTIFICATION DATE	DELIVERY MODE
01/22/2016	ELECTRONIC

7590 01/22/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

Letter Withdrawing a Notice Requiring Inventor's Oath or Declaration

The Notice Requiring Inventor's Oath or Declaration mailed on 1/12/16 was sent in error, and is hereby withdrawn. The time period set forth in the Notice of Allowance and Fee(s) Due to file a reply and pay the required fees continues to run from the mailing date of the Notice of Allowance and Fee(s) Due. Any time period set forth in the Notice of Allowability continues to run from the mailing date of the Notice of Allowability.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

/ Latanya Bryson /

(571)-272-4200 or 1(888)-786-0101
Patent Publication Branch
Office of Data Management

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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 02/02/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	

ART UNIT	PAPER NUMBER
2454	

NOTIFICATION DATE	DELIVERY MODE
02/02/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent.docketing@level3.com

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
Address : COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
13/714,410	14 December, 2012	NEWTON ET AL.	0394-US-U1

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
Brian P. Whipple	
ART UNIT	PAPER
2454	20160127

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

The information disclosure statement filed on 1/8/16 has been considered.

/Brian P. Whipple/
Primary Examiner, Art Unit 2454

PTO-90C (Rev.04-03)

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20050190775	Sep 1, 2005	Tonnby, Ingmar et al.	
		20060244818	Nov 2, 2006	Majors, Kenneth D., et al.	
		20070192486	Aug 16, 2007	Wilson, Brian B., et al.	
		20080108360	May 8, 2008	Baarman, Matthew A., et al.	
		20080228864	Sep 18, 2008	Plamondon, Robert	
		20090171752	Jul 2, 2009	Galvin, Brian et al.	
		20100142712	Jun 10, 2010	Tang, Lawrence W., et al.	
		20100158236	Jun 24, 2010	Chang, Yi et al.	
		20100246797	Sep 30, 2010	Chavez, David L., et al.	
		20110072073	Mar 24, 2011	Curtis, Sean	
		20110194681	Aug 11, 2011	Fedorov, Sergey et al.	
		20110247084	Oct 6, 2011	Kolbert, Matthew et al.	
		20120221767	Aug 30, 2012	Post, Daniel J., et al.	
		20130046664	Feb 21, 2013	Kazerani, Alexander A., et al.	
		20130173769	Jul 4, 2013	Seastrom, Robert E., et al.	
		20150088634	Mar 26, 2015	Greenzeiger, Michael	
		5805837	Sep 8, 1998	Hoover, Russell D., et al.	
		6212178	Apr 3, 2001	Beck, Christopher et al.	
		6279032	Aug 21, 2001	Short, Robert T., et al.	
		7206841	Apr 17, 2007	Traversat, Bernard A., et al.	
		8396970	Mar 12, 2013	Black, Bryan et al.	
		8458290	Jun 4, 2013	Black, Bryan et al.	
		8478858	Jul 2, 2013	Dunbar, Neil et al.	
		8521813	Aug 27, 2013	Black, Bryan et al.	
		8615577	Dec 24, 2013	Black, Bryan et al.	
		9098464	Aug 4, 2015	Hajiaghayi, Mohammad T., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 01/27/2016

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13714410	Filing Date	2012-12-14	Docket Number (if applicable)	0394-US-U1	Art Unit	2448
First Named Inventor	NEWTON, Christopher			Examiner Name	WHIPPLE, Brian		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.
☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 505063

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/JCS/	Date (YYYY-MM-DD)	2016-02-14
Name	Jonathan C. Siekmann	Registration Number	58259

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: February 14, 2016

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	10	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020165727	Nov 7, 2002	Greene, William S., et al.	
		20060047751	Mar 2, 2006	Chen, Chung-Min et al.	
		20060167704	Jul 27, 2006	Nicholls, Charles M., et al.	
		20070156845	Jul 5, 2007	Devanneaux, Thomas P., et al.	
		20070156965	Jul 5, 2007	Sundarrajan, Prabakar et al.	
		20070198678	Aug 23, 2007	Dieberger, Andreas et al.	
		20090019228	Jan 15, 2009	Brown, Jeffrey D., et al.	
		20090150319	Jun 11, 2009	Matson, Mark et al.	
		20100042734	Feb 18, 2010	Olafsson, Atli et al.	
		20100228962	Sep 9, 2010	Simon, Daniel R., et al.	
		20100274765	Oct 28, 2010	Murphy, Elissa E., et al.	
		20110238488	Sep 29, 2011	Hahn, Christopher et al.	
		20110276679	Nov 10, 2011	Newton, Christopher et al.	
		20120089664	Apr 12, 2012	Igelka, Or	
		20120159558	Jun 21, 2012	Whyte, Volnie et al.	
		20120209952	Aug 16, 2012	Lotfalla, Osama et al.	
		6226694	May 1, 2001	Constant, Steven J., et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Advisory Action, dated January 13, 2016, Application No. 13/715,466, filed December 14, 2012; Dkt. No. 0447-US-U15, 3 pgs.	
		Advisory Action, dated January 8, 2016, Application No. 13/802,291, filed March 13, 2013; Dkt. No. 0447-US-U25, 3 pgs.	
		Final Office Action, dated December 15, 2015, Application No. 13/802,366, filed March 13, 2013; Dkt. No. 0447-US-U27, 31 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
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Substitute for form 1449A/PTO

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(Use as many sheets as necessary)

Sheet	2	of	10	Attorney Docket No: 0394-US-U1

Complete if Known

Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Final Office Action, dated December 15, 2015, Application No. 13/802,489, filed March 13, 2013; Dkt. No. 0447-US-U31, 28 pgs.	
		Final Office Action, dated December 21, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 10 pgs.	
		Final Office Action, dated December 21, 2015, Application No. 13/715,747, filed December 14, 2012; Dkt. No. 0447-US-U20, 6 pgs.	
		Final Office Action, dated January 30, 2014, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Final Office Action, dated July 10, 2015, Application No. 13/802,470, filed March 13, 2013; Dkt. No. 0447-US-U30, 30 pgs.	
		Final Office Action, dated June 23, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 9 pgs.	
		Final Office Action, dated June 25, 2015, Application No. 13/715,466, filed December 14, 2012; Dkt. No. 0447-US-U15, 9 pgs.	
		Final Office Action, dated June 29, 2015, Application No. 13/715,345, filed December 14, 2012; Dkt. No. 0447-US-U14, 31 pgs.	
		Final Office Action, dated May 22, 2015, Application No. 13/841,023, filed March 15, 2013; Dkt. No. 0447-US-U32, 7 pgs.	
		Final Office Action, dated November 17, 2015, Application No. 13/802,291, filed March 13, 2013; Dkt. No. 0447-US-U25, 29 pgs.	
		Final Office Action, dated November 25, 2015, Application No. 13/715,466, filed December 14, 2012; Dkt. No. 0447-US-U15, 8 pgs.	
		Final Office Action, dated October 1, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 10 pgs.	
		Final Office Action, dated October 22, 2015, Application No. 13/802,335, filed March 13, 2013; Dkt. No. 0447-US-U26, 26 pgs.	
		Final Office Action, dated October 30, 2015, Application No. 13/802,051, filed March 13, 2013; Dkt. No. 0447-US-U22, 13 pgs.	
		Final Office Action, dated September 11, 2015, Application No. 13/802,143, filed March 13, 2013; Dkt. No. 0447-US-U24, 33 pgs.	
		Final Office Action, dated February 1, 2016, Application No. 14/579,640, filed December 22, 2014; Dkt. No. 0447-US-U25-C1, 24 pgs.	
		Non-Final Office Action, dated April 1, 2015, Application No. 13/714,412, filed December 14, 2012; Dkt. No. 0447-US-U1, 11 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
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Examiner Name	Brian P. Whipple

Sheet	3	of	10	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Non-Final Office Action, dated August 14, 2015, Application No. 14/088,362, filed November 23, 2013; Dkt. No. 0447-US-U35, 29 pgs.	
		Non-Final Office Action, dated December 10, 2015, Application No. 14/105,981, filed December 13, 2013; Dkt. No. 0447-US-U37, 17 pgs.	
		Non-Final Office Action, dated December 19, 2014, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 6 pgs.	
		Non-Final Office Action, dated December 23, 2015, Application No. 13/802,143, filed March 13, 2013; Dkt. No. 0447-US-U24, 33 pgs.	
		Non-Final Office Action, dated December 3, 2015, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 9 pgs.	
		Non-Final Office Action, dated December 4, 2014, Application No. 13/715,345, filed December 14, 2012; Dkt. No. 0447-US-U14, 30 pgs.	
		Non-Final Office Action, dated December 4, 2014, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 8 pgs.	
		Non-Final Office Action, dated December 5, 2014, Application No. 13/839,400, filed March 15, 2013; Dkt. No. 0447-US-U14-C2, 20 pgs.	
		Non-Final Office Action, dated February 12, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 7 pgs.	
		Non-Final Office Action, dated February 13, 2015, Application No. 13/841,023, filed March 15, 2013; Dkt. No. 0447-US-U32, 6 pgs.	
		Non-Final Office Action, dated February 26, 2015, Application No. 13/714,760, filed December 14, 2012; Dkt. No. 0447-US-U9, 10 pgs.	
		Non-Final Office Action, dated January 11, 2016, Application No. 14/088,542, filed November 25, 2013; Dkt. No. 0447-US-U42, 30 pgs.	
		Non-Final Office Action, dated January 15, 2016, Application No. 13/802,093, filed March 13, 2013; Dkt. No. 0447-US-U23, 11 pgs.	
		Non-Final Office Action, dated January 15, 2016, Application No. 14/307,374, filed June 17, 2014; Dkt. No. 0447-US-U23-I1, 22 pgs.	
		Non-Final Office Action, dated January 22, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 8 pgs.	
		Non-Final Office Action, dated January 22, 2016, Application No. 13/715,345, filed December 14, 2012; Dkt. No. 0447-US-U14, 22 pgs.	
		Non-Final Office Action, dated January 26, 2015, Application No. 13/714,416, filed December 14, 2012; Dkt. No. 0447-US-U2, 14 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	4	of	10	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Non-Final Office Action, dated January 27, 2015, Application No. 13/715,455, filed December 14, 2012; Dkt. No. 0447-US-U15, 10 pgs.	
		Non-Final Office Action, dated January 4, 2016, Application No. 14/303,389, filed June 12, 2014; Dkt. No. 0447-US-U29-C2, 17 pgs.	
		Non-Final Office Action, dated January 5, 2015, Application No. 13/715,304, filed December 14, 2012; Dkt. No. 0447-US-U13, 6 pgs.	
		Non-Final Office Action, dated January 5, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 6 pgs.	
		Non-Final Office Action, dated January 5, 2016, Application No. 14/088,358, filed November 23, 2013; Dkt. No. 0447-US-U38, 18 pgs.	
		Non-Final Office Action, dated January 5, 2016, Application No. 14/088,367, filed November 23, 2013; Dkt. No. 0447-US-U39, 27 pgs.	
		Non-Final Office Action, dated January 6, 2016, Application No. 13/802,335, filed March 13, 2013; Dkt. No. 0447-US-U26, 26 pgs.	
		Non-Final Office Action, dated January 7, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 6 pgs.	
		Non-Final Office Action, dated January 7, 2015, Application No. 13/802,470, filed March 13, 2013; Dkt. No. 0447-US-U30, 37 pgs.	
		Non-Final Office Action, dated July 10, 2015, Application No. 13/714,417, filed December 14, 2012; Dkt. No. 0447-US-U3, 7 pgs.	
		Non-Final Office Action, dated July 17, 2015, Application No. 13/802,440, March 13, 2013; Dkt. No. 0447-US-U29, 22 pgs.	
		Non-Final Office Action, dated July 20, 2015, Application No. 13/715,747, filed December 14, 2012; Dkt. No. 0447-US-U20, 10 pgs.	
		Non-Final Office Action, dated July 31, 2015, Application No. 14/580,086, filed December 22, 2014; Dkt. No. 0447-US-U27-C2, 23 pgs.	
		Non-Final Office Action, dated July 8, 2015, Application No. 14/579,640, filed December 22, 2014; Dkt. No. 0447-US-U25-C1, 26 pgs.	
		Non-Final Office Action, dated June 19, 2015, Application No. 14/580,038, filed December 22, 2014; Dkt. No. 0447-US-U27-C1, 21 pgs.	
		Non-Final Office Action, dated June 2, 2015, Application No. 13/802,051, filed March 13, 2013; Dkt. No. 0447-US-U22, 11 pgs.	
		Non-Final Office Action, dated June 25, 2015, Application No. 13/839,400, filed March 15, 2013; Dkt. No. 0447-US-U14-C2, 19 pgs.	

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	5	of	10	Attorney Docket No: 0394-US-U1

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

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		Non-Final Office Action, dated June 26, 2015, Application No. 13/714,411, filed December 14, 2012; Dkt. No. 0394-US-U2, 19 pgs.	
		Non-Final Office Action, dated June 29, 2015, Application No. 13/714,410, filed December 14, 2012; Dkt. No. 0394-US-U1, 19 pgs.	
		Non-Final Office Action, dated June 4, 2015, Application No. 13/802,366, filed March 13, 2013; Dkt. No. 0447-US-U27, 27 pgs.	
		Non-Final Office Action, dated May 12, 2015, Application No. 13/802,291, filed March 13, 2013; Dkt. No. 0447-US-U25, 25 pgs.	
		Non-Final Office Action, dated May 21, 2015, Application No. 13/802,335, filed March 13, 2013; Dkt. No. 0447-US-U26, 34 pgs.	
		Non-Final Office Action, dated May 6, 2015, Application No. 13/802,143, filed March 13, 2013; Dkt. No. 0447-US-U24, 32 pgs.	
		Non-Final Office Action, dated May 7, 2015, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 7 pgs.	
		Non-Final Office Action, dated November 15, 2015, Application No. 13/715,780, filed December 14, 2012; Dkt. No. 0447-US-U21, 9 pgs.	
		Non-Final Office Action, dated November 20, 2014, Application No. 13/715730, filed December 14, 2012; Dkt. No. 0447-US-U19, 6 pgs.	
		Non-Final Office Action, dated November 25, 2015, Application No. 13/714,760, filed December 14, 2012; Dkt. No. 0447-US-U9, 8 pgs.	
		Non-Final Office Action, dated November 5, 2015, Application No. 14/088,356, filed November 23, 2013; Dkt. No. 0447-US-U43, 28 pgs.	
		Non-Final Office Action, dated October 31, 2014, Application No. 13/802,051, filed March 13, 2013; Dkt. No. 0447-US-U22, 12 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,956, filed December 14, 2012; Dkt. No. 0447-US-U10, 5 pgs.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	6	of	10	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Non-Final Office Action, dated September 14, 2015, Application No. 13/802,406, filed March 13, 2013; Dkt. No. 0447-US-U28, 17 pgs.	
		Non-Final Office Action, dated September 18, 2014, Application No. 13/715,109, filed December 14, 2012; Dkt. No. 0447-US-U11, 5 pgs.	
		Non-Final Office Action, dated September 25, 2015, Application No. 14/094,868, filed December 3, 2013; Dkt. No. 0447-US-U34, 17 pgs.	
		Non-Final Office Action, dated February 2, 2016, Application No. 14/303,314, filed June 12, 2014; Dkt. No. 0447-US-U29-C1, 18 pgs.	
		Non-Final Office Action, dated February 2, 2016, Application No. 14/307,380, filed June 17, 2014; Dkt. No. 0447-US-U25-I1, 21 pgs.	
		Notice of Allowance, dated April 10, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 11 pgs.	
		Notice of Allowance, dated April 10, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 8 pgs.	
		Notice of Allowance, dated April 14, 2015, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 12 pgs.	
		Notice of Allowance, dated April 15, 2015, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 11 pgs.	
		Notice of Allowance, dated April 15, 2015, Application No. 13/714,956, filed December 14, 2012; Dkt. No. 0447-US-U10, 11 pgs.	
		Notice of Allowance, dated April 15, 2015, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 9 pgs.	
		Notice of Allowance, dated April 2, 2014, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 17 pgs.	
		Notice of Allowance, dated April 22, 2014, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Notice of Allowance, dated April 24, 2015, Application No. 13/715,109, filed December 14, 2012; Dkt. No. 0447-US-U11, 10 pgs.	
		Notice of Allowance, dated April 28, 2015, Application No. 13/715,304, filed December 14, 2012; Dkt. No. 0447-US-U13, 9 pgs.	
		Notice of Allowance, dated August 14, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated August 27, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 4 pgs.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	7	of	10	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
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		Notice of Allowance, dated August 28, 2015, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 11 pgs.	
		Notice of Allowance, dated August 3, 2015, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 11 pgs.	
		Notice of Allowance, dated August 6, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 8 pgs.	
		Notice of Allowance, dated December 10, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 11 pgs.	
		Notice of Allowance, dated December 16, 2015, Application No. 13/714,412, filed December 14, 2012; Dkt. No. 0447-US-U1, 5 pgs.	
		Notice of Allowance, dated December 16, 2015, Application No. 13/714,416, filed December 14, 2012; Dkt. No. 0447-US-U2, 7 pgs.	
		Notice of Allowance, dated December 16, 2015, Application No. 13/715,109, filed December 14, 2012; Dkt. No. 0447-US-U11, 10 pgs.	
		Notice of Allowance, dated December 16, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 5 pgs.	
		Notice of Allowance, dated December 18, 2015, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 11 pgs.	
		Notice of Allowance, dated December 21, 2015, Application No. 13/715,304, filed December 14, 2012; Dkt. No. 0447-US-U13, 5 pgs.	
		Notice of Allowance, dated December 23, 2015, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 12 pgs.	
		Notice of Allowance, dated December 3, 2015, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 5 pgs.	
		Notice of Allowance, dated December 30, 2015, Application No. 13/841,023, filed March 15, 2013; Dkt. No. 0447-US-U32, 9 pgs.	
		Notice of Allowance, dated December 4, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 5 pgs.	
		Notice of Allowance, dated December 4, 2015, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Notice of Allowance, dated December 4, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 8 pgs.	
		Notice of Allowance, dated December 7, 2015, Application No. 13/714,956, filed December 14, 2012; Dkt. No. 0447-US-U10, 11 pgs.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	8	of	10	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
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		Notice of Allowance, dated December 9, 2015, Application No. 13/715,730, filed December 14, 2012; Dkt. No. 0447-US-U19, 5 pgs.	
		Notice of Allowance, dated January 12, 2015, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Notice of Allowance, dated January 12, 2016, Application No. 13/714,410, filed December 14, 2012; Dkt. No. 0394-US-U1, 6 pgs.	
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		Notice of Allowance, dated January 21, 2016, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated January 22, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 6 pgs.	
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		Notice of Allowance, dated July 17, 2015, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 5 pgs.	
		Notice of Allowance, dated July 6, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 5 pgs.	
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		Notice of Allowance, dated June 19, 2015, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 11 pgs.	
		Notice of Allowance, dated June 19, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 5 pgs.	
		Notice of Allowance, dated June 19, 2015, Application No. 13/715,730, filed December 14, 2012; Dkt. No. 0447-US-U19, 5 pgs.	
		Notice of Allowance, dated June 22, 2015, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 11 pgs.	

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Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	9	of	10	Attorney Docket No: 0394-US-U1

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		Notice of Allowance, dated June 5, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 5 pgs.	
		Notice of Allowance, dated May 1, 2015, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 11 pgs.	
		Notice of Allowance, dated May 13, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 10 pgs.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet	10	of	10	Attorney Docket No: 0394-US-U1

Complete if Known	
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Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

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		Notice of Allowance, dated September 28, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated September 30, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 11 pgs.	
		Notice of Allowance, dated September 4, 2015, Application No. 13/714,416, filed December 14, 2012; Dkt. No. 0447-US-U2, 14 pgs.	
		Notice of Allowance, dated September 5, 2014, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 9 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
Request for Continued Examination	1801	1	1200	1200
		Total in USD ($)		**1200**

Electronic Acknowledgement Receipt

EFS ID:	24910363
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	14-FEB-2016
Filing Date:	14-DEC-2012
Time Stamp:	14:15:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1200
RAM confirmation Number	7322
Deposit Account	505063
Authorized User	SIEKMANN, JONATHAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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Information:					
2	Transmittal Letter	394U1_IDS.pdf	37098 d1321c9b09b2a3aad83c5877f758af29cec7d8a5	no	5
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3	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	105497 7c83d1fc62f26bfd1bb8af369bef6bae4efaa1b5	no	10
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45	Other Reference-Patent/App/Search documents	13714760_ctnf_2015Feb26_U9_10p.pdf	296095 27f94e813907be63dea11f844ea347425bdb31e8	no	10
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46	Other Reference-Patent/App/Search documents	13714760_ctnf_2015Nov25_U9_8p.pdf	254556 b112bcd6369bd4b09c21c00515eff9043767d641	no	8
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49	Other Reference-Patent/App/Search documents	13714956_noar_2015Dec07_U10_11p.pdf	537774 6ee815af25a9ced768ddd98c9257bacc5dcc87ca	no	11
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50	Other Reference-Patent/App/Search documents	13714956_noar_2015Jun22_U10_11p.pdf	550884 975d60bdbd76d98c5d12ddfcb44d5c2dbedd8aa5	no	11
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51	Other Reference-Patent/App/Search documents	13714956_noar_2015Sep18_U10_11p.pdf	557002 9a51d7394f28cc44d4cf2c5a1556b4ce0e389878	no	11
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52	Other Reference-Patent/App/Search documents	13715109_ctnf_2014Sep18_U11_5p.pdf	179921 60e04177d4b0ef6c33eee001cb239087db8cb6f9	no	5
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New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

Electronic Acknowledgement Receipt

EFS ID:	24910370
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	14-FEB-2016
Filing Date:	14-DEC-2012
Time Stamp:	14:29:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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30	Other Reference-Patent/App/Search documents	13715683_noar_2015Sep14_U18_5p.pdf	353388 234466ac29b13e04022dab93007c9421784bf001	no	5
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33	Other Reference-Patent/App/Search documents	13715730_noar_2015Jun19_U19_5p.pdf	351090 c10e2f9769016b975c0729d67d1642e0b95066f0	no	5
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34	Other Reference-Patent/App/Search documents	13715730_noar_2015May06_U19_9p.pdf	453570 0df87a4fdba1dd3c008e894539d825313fcb5ae1	no	9
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36	Other Reference-Patent/App/Search documents	13715747_ctfr_2015Dec21_U20_6p.pdf	175559 f92e4b96f07443c95ad75b92b283cc950d287dfb	no	6
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38	Other Reference-Patent/App/Search documents	13715780_ctnf_2015Nov15_U21_9p.pdf	289497 54e2d82ac5e788969a7f108cc22f8a3e698c148d	no	9
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39	Other Reference-Patent/App/Search documents	13802051_ctfr_2015Oct30_U22_13p.pdf	488097 6b9b0d4c25b5f17526e4989151d4d883a63d7de8	no	13
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40	Other Reference-Patent/App/Search documents	13802051_ctnf_2014Oct31_U22_12p.pdf	452726 ca02a2b64296d4c8a7ecf1654a3159c43fe3b55b	no	12
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Information:					
41	Other Reference-Patent/App/Search documents	13802051_ctnf_2015Jun02_U22_11p.pdf	387757 b23767323e13e63202b40e626569275425c1c5d7	no	11
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42	Other Reference-Patent/App/Search documents	13802093_ctnf_2016Jan15_U23_11p.pdf	390666 811c21ca9960ca147a66a08b8b8a54cb3473722d	no	11
Warnings:					
Information:					
43	Other Reference-Patent/App/Search documents	13802143_ctfr_2015Sep11_U24_33p.pdf	1294237 bad11176529e51ab01e1d4e846804257f16ae01f	no	33
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44	Other Reference-Patent/App/Search documents	13802143_ctnf_2015Dec23_U24_33p.pdf	1309729 e298e0b9cd1af34a680d2f95c993accadd8ded69	no	33
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46	Other Reference-Patent/App/Search documents	13802291_ctav_2016Jan08_U25_3p.pdf	138345 79081fc67c3ef50bdc9c26038ed02eaf6a79c8a1	no	3
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47	Other Reference-Patent/App/Search documents	13802291_ctfr_2015Nov17_U25_29p.pdf	1156248 14a19681a41e12461b987e745389e4271d9594cc	no	29
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48	Other Reference-Patent/App/Search documents	13802291_ctnf_2015May12_U25_25p.pdf	965614 9e2c64d9420b5acec900e2066335dfaf549a9e43	no	25
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49	Other Reference-Patent/App/Search documents	13802335_ctfr_2015Oct22_U26_26p.pdf	1012945 fbf3656fa87e775bba8e8a261d658471ffb38592	no	26
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Information:					
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55	Other Reference-Patent/App/Search documents	13802440_ctnf_2015Jul17_U29_22p.pdf	867315 4fbc97ffe8ade09559da24ba05c8904980513527	no	22
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56	Other Reference-Patent/App/Search documents	13802470_ctfr_2015Jul10_U30_30p.pdf	1084233 50e098ef401430bfe1c517274bfbd956ac637dfc	no	30
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57	Other Reference-Patent/App/Search documents	13802470_ctnf_2015Jan07_U30_37p.pdf	1337730 5f52cb9d2060a39da5ae653f7c92ae32422e5007	no	37
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58	Other Reference-Patent/App/Search documents	13802489_ctfr_2015Dec15_U31_28p.pdf	1092005 0a876b84924e1c43a2eae88a19551f68cafb8ef4	no	28
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59	Other Reference-Patent/App/Search documents	13837821_ctfr_2014Jan30_U9C1_7p.pdf	222758 27c3cd2761e32ab1daa2e045ecbd1d60312bf0b6	no	7
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60	Other Reference-Patent/App/Search documents	13837821_noar_2014Apr22_U9C1_7p.pdf	399296 fa6c6cd11299addce92a2fad47939fd9addaa6c9	no	7
Warnings:					
Information:					
		Total Files Size (in bytes):	33077319		

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New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

Electronic Acknowledgement Receipt

EFS ID:	24910375
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	14-FEB-2016
Filing Date:	14-DEC-2012
Time Stamp:	14:40:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Other Reference-Patent/App/Search documents	13837821_noar_2014Nov24_U9C1_7p.pdf	412513 3a25185ea363551468780 9cd2a7407d1115b8bc8	no	7

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2	Other Reference-Patent/App/Search documents	13837821_noar_2014Sep5_U9C1_9p.pdf	433029 967feb4fe1667a8b228e9134b4513f4e8f26168f	no	9
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3	Other Reference-Patent/App/Search documents	13837821_noar_2015Dec04_U9C1_7p.pdf	403611 6eff02d17a55575cb371dec4f663abab6b4a49ce	no	7
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4	Other Reference-Patent/App/Search documents	13837821_noar_2015Jan12_U9C1_7p.pdf	412826 99935e785de8f4f6c747397f50ba829a94cd933f	no	7
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5	Other Reference-Patent/App/Search documents	13837821_noar_2015Sep18_U9C1_8p.pdf	406901 d406b1c363ad7b827830ecee8666657ed05b9037	no	8
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6	Other Reference-Patent/App/Search documents	13838414_ctnf_2014Dec04_U14C1_8p.pdf	317561 b9e1391f1ebbe69143903acdc0a5967c8b8f917a	no	8
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7	Other Reference-Patent/App/Search documents	13838414_ctnf_2015Dec03_U14C1_9p.pdf	354619 1a568de4f16304944e1ff058a21701118b95712a	no	9
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8	Other Reference-Patent/App/Search documents	13838414_ctnf_2015May07_U14C1_7p.pdf	226727 7d6b964c73dac1eb126365c58a8ba30ef7e79bf3	no	7
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9	Other Reference-Patent/App/Search documents	13838414_noar_2014Apr02_U14C1_17p.pdf	798606 30e531b003d97661d4e78d49342111a159079e61	no	17
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10	Other Reference-Patent/App/Search documents	13838414_noar_2015Oct22_U14C1_7p.pdf	409125 6059bb5e279ca7d8ef944add12e013f88b1d8ca0	no	7
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11	Other Reference-Patent/App/Search documents	13839400_ctnf_2014Dec05_U14C2_20p.pdf	757744 8f0da81c456b0c87355e77bde8bacf1901a44390	no	20
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12	Other Reference-Patent/App/Search documents	13839400_ctnf_2015Jun25_U14C2_19p.pdf	708347 cba1df7e6435659ad8be750e1e2cc942bb738883	no	19
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13	Other Reference-Patent/App/Search documents	13841023_ctfr_2015May22_U32_7p.pdf	208955 a5949c8d948234d0ae5729a71f8d8ca827b8b6ab	no	7
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14	Other Reference-Patent/App/Search documents	13841023_ctnf_2015Feb13_U32_6p.pdf	196696 8e241441c9c14613c031b88e7f9576e136c6e123	no	6
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15	Other Reference-Patent/App/Search documents	13841023_noar_2015Dec30_U32_9p.pdf	458711 52586bd8ae50b92fbbef3e9fa1ec306fbe70bc77	no	9
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16	Other Reference-Patent/App/Search documents	13841023_noar_2015Nov09_U32_9p.pdf	464475 28d8fe675cefdd7127385b929e70c372d350e133	no	9
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17	Other Reference-Patent/App/Search documents	13841134_ctnf_2015Feb12_U33_7p.pdf	196970 57ab9d6de782d18271f2222705bd065affd64301	no	7
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18	Other Reference-Patent/App/Search documents	13841134_noar_2015Apr10_U33_8p.pdf	434488 8bf7c824a7cf3e177d0fd8573b18700e20d08d01	no	8
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19	Other Reference-Patent/App/Search documents	13841134_noar_2015Aug06_U33_8p.pdf	865782 0ae294e688e29340708063480b6e9072967bb768	no	16
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22	Other Reference-Patent/App/Search documents	14088356_ctnf_2015Nov05_U43_28p.pdf	995043 f1a16bbe106d505fa248228752b7d3a93798b421	no	28
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23	Other Reference-Patent/App/Search documents	14088358_ctnf_2016Jan05_U38_18p.pdf	622547 14bae5cf1295f6dd525b341e9b42455c5c9c9f01	no	18
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24	Other Reference-Patent/App/Search documents	14088362_ctnf_2015Aug14_U35_29p.pdf	1325832 d7b6fba7d6245088df353fa0889d14f452e4e731	no	29
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26	Other Reference-Patent/App/Search documents	14088542_ctnf_2016Jan11_U42_30p.pdf	1097248 8a8f194ed9f7aa4b16c0d067d62c4bfc74f0bffb	no	30
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28	Other Reference-Patent/App/Search documents	14105981_ctnf_2015Dec10_U37_17p.pdf	638779 bbe29c7e84d6ca994b5246f4e35fa5cf111664c6	no	17
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29	Other Reference-Patent/App/Search documents	14303314_ctnf_2016Feb02_U29C1_18p.pdf	683348 3addc989d5243c030000cb978ccf5e59f6f38aff	no	18
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31	Other Reference-Patent/App/Search documents	14307374_ctnf_2016Jan15_U23I1_22p.pdf	749670 ac7c4f953a12d48b4377ce776de80cdf62ce01e7	no	22
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32	Other Reference-Patent/App/Search documents	14307380_ctnf_2016Feb02_U25I1_21p.pdf	730949 c5a4855d393c997f63db22c22f90a8354a9be57d	no	21
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New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20040073596	Apr 15, 2004	Kloninger, John J., et al.	
		20070250468	Oct 25, 2007	Pieper, Keith M.	
		20110153724	Jun 23, 2011	Raja, Murali et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Final Office Action, dated February 26, 2016, Application No. 14/088,362, filed November 23, 2013; Dkt. No. 0447-US-U35, 31 pgs.	
		Final Office Action, dated February 26, 2016; Application No. 14/307,404, filed June 17, 2014; Dkt. No. 0447-US-U1-I4; 17 pgs.	
		Non-Final Office Action, dated February 26, 2016, Application No. 14/580,086, filed December 22, 2014; Dkt. No. 0447-US-U27-C2, 27 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Electronic Acknowledgement Receipt

EFS ID:	25076158
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	02-MAR-2016
Filing Date:	14-DEC-2012
Time Stamp:	13:22:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	394U1_IDS.pdf	37089 7c136cd5aa0e94e2f28a57857d858df6aec07207	no	5

Warnings:	
Information:	

2	Information Disclosure Statement (IDS) Form (SB08)	394USU1_sb08.pdf	29925 3827f00bd2cfa438dadace9715938dcb68abaaaa	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Other Reference-Patent/App/Search documents	14088362_ctfr_2016Feb26_U35_31p.pdf	1452704 7517d23ea7e21ea2239bb4f7fb50b50cad8a5af9	no	31
Warnings:					
Information:					
4	Other Reference-Patent/App/Search documents	14307404_ctnf_2016Feb26_U1I4_17p.pdf	534231 18f3b6298f0662663efe4595fa63184c304412f8	no	17
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5	Other Reference-Patent/App/Search documents	14580086_ctfr_2016Feb26_U27C2_27p.pdf	1027804 325162c6b96f3d5c225c998a5d46a53540128eb6	no	27
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		Total Files Size (in bytes):	3081753		

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New International Application Filed with the USPTO as a Receiving Office

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: March 2, 2016

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21398 7590 03/14/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 03/14/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	06/14/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21398 7590 03/14/2016
Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	06/14/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WHIPPLE, BRIAN P	2454	709-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 03/14/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 03/14/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/714,410	Applicant(s) NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2454	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the request for continued examination filed on 2/14/16*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-50*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Brian P. Whipple/
Primary Examiner, Art Unit 2454

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2448

CPC						
Symbol					**Type**	**Version**
H04L		67	/	32	F	2013-01-01
H04L		67	/	26	I	2013-01-01
H04L		67	/	2852	I	2013-01-01
H04L		63	/	166	A	2013-01-01
H04L		41	/	0893	I	2013-01-01
H04L		67	/	42	I	2013-01-01
H04L		41	/	0856	I	2013-01-01
H04L		41	/	5064	I	2013-01-01
H04L		41	/	509	I	2013-01-01
H04L		67	/	34	I	2013-01-01
H04L		67	/	2842	I	2013-01-01
			/			
			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	02/29/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No. 20160229

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2448

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		G	0	6	F	15 / 16 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	02/29/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2448

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33		49								
	2		18		34		50								
	3		19		35										
	4		20		36										
	5		21		37										
	6		22		38										
	7		23		39										
	8		24		40										
	9		25		41										
	10		26		42										
	11		27		43										
	12		28		44										
	13		29		45										
	14		30		46										
	15		31		47										
	16		32		48										

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454 (Primary Examiner)	02/29/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	10	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020165727	Nov 7, 2002	Greene, William S., et al.	
		20060047751	Mar 2, 2006	Chen, Chung-Min et al.	
		20060167704	Jul 27, 2006	Nicholls, Charles M., et al.	
		20070156845	Jul 5, 2007	Devanneaux, Thomas P., et al.	
		20070156965	Jul 5, 2007	Sundarrajan, Prabakar et al.	
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		20090019228	Jan 15, 2009	Brown, Jeffrey D., et al.	
		20090150319	Jun 11, 2009	Matson, Mark et al.	
		20100042734	Feb 18, 2010	Olafsson, Atli et al.	
		20100228962	Sep 9, 2010	Simon, Daniel R., et al.	
		20100274765	Oct 28, 2010	Murphy, Elissa E., et al.	
		20110238488	Sep 29, 2011	Hahn, Christopher et al.	
		20110276679	Nov 10, 2011	Newton, Christopher et al.	
		20120089664	Apr 12, 2012	Igelka, Or	
		20120159558	Jun 21, 2012	Whyte, Volnie et al.	
		20120209952	Aug 16, 2012	Lotfalla, Osama et al.	
		6226694	May 1, 2001	Constant, Steven J., et al.	

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Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

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		Advisory Action, dated January 13, 2016, Application No. 13/715,466, filed December 14, 2012; Dkt. No. 0447-US-U15, 3 pgs.	
		Advisory Action, dated January 8, 2016, Application No. 13/802,291, filed March 13, 2013; Dkt. No. 0447-US-U25, 3 pgs.	
		Final Office Action, dated December 15, 2015, Application No. 13/802,366, filed March 13, 2013; Dkt. No. 0447-US-U27, 31 pgs.	

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	2	of	10	Attorney Docket No: 0394-US-U1

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		Final Office Action, dated December 15, 2015, Application No. 13/802,489, filed March 13, 2013; Dkt. No. 0447-US-U31, 28 pgs.	
		Final Office Action, dated December 21, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 10 pgs.	
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		Final Office Action, dated January 30, 2014, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Final Office Action, dated July 10, 2015, Application No. 13/802,470, filed March 13, 2013; Dkt. No. 0447-US-U30, 30 pgs.	
		Final Office Action, dated June 23, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 9 pgs.	
		Final Office Action, dated June 25, 2015, Application No. 13/715,466, filed December 14, 2012; Dkt. No. 0447-US-U15, 9 pgs.	
		Final Office Action, dated June 29, 2015, Application No. 13/715,345, filed December 14, 2012; Dkt. No. 0447-US-U14, 31 pgs.	
		Final Office Action, dated May 22, 2015, Application No. 13/841,023, filed March 15, 2013; Dkt. No. 0447-US-U32, 7 pgs.	
		Final Office Action, dated November 17, 2015, Application No. 13/802,291, filed March 13, 2013; Dkt. No. 0447-US-U25, 29 pgs.	
		Final Office Action, dated November 25, 2015, Application No. 13/715,466, filed December 14, 2012; Dkt. No. 0447-US-U15, 8 pgs.	
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		Final Office Action, dated October 30, 2015, Application No. 13/802,051, filed March 13, 2013; Dkt. No. 0447-US-U22, 13 pgs.	
		Final Office Action, dated September 11, 2015, Application No. 13/802,143, filed March 13, 2013; Dkt. No. 0447-US-U24, 33 pgs.	
		Final Office Action, dated February 1, 2016, Application No. 14/579,640, filed December 22, 2014; Dkt. No. 0447-US-U25-C1, 24 pgs.	
		Non-Final Office Action, dated April 1, 2015, Application No. 13/714,412, filed December 14, 2012; Dkt. No. 0447-US-U1, 11 pgs.	

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First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	3	of	10	Attorney Docket No: 0394-US-U1

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		Non-Final Office Action, dated August 14, 2015, Application No. 14/088,362, filed November 23, 2013; Dkt. No. 0447-US-U35, 29 pgs.	
		Non-Final Office Action, dated December 10, 2015, Application No. 14/105,981, filed December 13, 2013; Dkt. No. 0447-US-U37, 17 pgs.	
		Non-Final Office Action, dated December 19, 2014, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 6 pgs.	
		Non-Final Office Action, dated December 23, 2015, Application No. 13/802,143, filed March 13, 2013; Dkt. No. 0447-US-U24, 33 pgs.	
		Non-Final Office Action, dated December 3, 2015, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 9 pgs.	
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		Non-Final Office Action, dated December 5, 2014, Application No. 13/839,400, filed March 15, 2013; Dkt. No. 0447-US-U14-C2, 20 pgs.	
		Non-Final Office Action, dated February 12, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 7 pgs.	
		Non-Final Office Action, dated February 13, 2015, Application No. 13/841,023, filed March 15, 2013; Dkt. No. 0447-US-U32, 6 pgs.	
		Non-Final Office Action, dated February 26, 2015, Application No. 13/714,760, filed December 14, 2012; Dkt. No. 0447-US-U9, 10 pgs.	
		Non-Final Office Action, dated January 11, 2016, Application No. 14/088,542, filed November 25, 2013; Dkt. No. 0447-US-U42, 30 pgs.	
		Non-Final Office Action, dated January 15, 2016, Application No. 13/802,093, filed March 13, 2013; Dkt. No. 0447-US-U23, 11 pgs.	
		Non-Final Office Action, dated January 15, 2016, Application No. 14/307,374, filed June 17, 2014; Dkt. No. 0447-US-U23-I1, 22 pgs.	
		Non-Final Office Action, dated January 22, 2015, Application No. 13/715,590, filed December 14, 2012; Dkt. No. 0447-US-U16, 8 pgs.	
		Non-Final Office Action, dated January 22, 2016, Application No. 13/715,345, filed December 14, 2012; Dkt. No. 0447-US-U14, 22 pgs.	
		Non-Final Office Action, dated January 26, 2015, Application No. 13/714,416, filed December 14, 2012; Dkt. No. 0447-US-U2, 14 pgs.	

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	4	of	10	Attorney Docket No: 0394-US-U1

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		Non-Final Office Action, dated January 27, 2015, Application No. 13/715,455, filed December 14, 2012; Dkt. No. 0447-US-U15, 10 pgs.	
		Non-Final Office Action, dated January 4, 2016, Application No. 14/303,389, filed June 12, 2014; Dkt. No. 0447-US-U29-C2, 17 pgs.	
		Non-Final Office Action, dated January 5, 2015, Application No. 13/715,304, filed December 14, 2012; Dkt. No. 0447-US-U13, 6 pgs.	
		Non-Final Office Action, dated January 5, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 6 pgs.	
		Non-Final Office Action, dated January 5, 2016, Application No. 14/088,358, filed November 23, 2013; Dkt. No. 0447-US-U38, 18 pgs.	
		Non-Final Office Action, dated January 5, 2016, Application No. 14/088,367, filed November 23, 2013; Dkt. No. 0447-US-U39, 27 pgs.	
		Non-Final Office Action, dated January 6, 2016, Application No. 13/802,335, filed March 13, 2013; Dkt. No. 0447-US-U26, 26 pgs.	
		Non-Final Office Action, dated January 7, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 6 pgs.	
		Non-Final Office Action, dated January 7, 2015, Application No. 13/802,470, filed March 13, 2013; Dkt. No. 0447-US-U30, 37 pgs.	
		Non-Final Office Action, dated July 10, 2015, Application No. 13/714,417, filed December 14, 2012; Dkt. No. 0447-US-U3, 7 pgs.	
		Non-Final Office Action, dated July 17, 2015, Application No. 13/802,440, March 13, 2013; Dkt. No. 0447-US-U29, 22 pgs.	
		Non-Final Office Action, dated July 20, 2015, Application No. 13/715,747, filed December 14, 2012; Dkt. No. 0447-US-U20, 10 pgs.	
		Non-Final Office Action, dated July 31, 2015, Application No. 14/580,086, filed December 22, 2014; Dkt. No. 0447-US-U27-C2, 23 pgs.	
		Non-Final Office Action, dated July 8, 2015, Application No. 14/579,640, filed December 22, 2014; Dkt. No. 0447-US-U25-C1, 26 pgs.	
		Non-Final Office Action, dated June 19, 2015, Application No. 14/580,038, filed December 22, 2014; Dkt. No. 0447-US-U27-C1, 21 pgs.	
		Non-Final Office Action, dated June 2, 2015, Application No. 13/802,051, filed March 13, 2013; Dkt. No. 0447-US-U22, 11 pgs.	
		Non-Final Office Action, dated June 25, 2015, Application No. 13/839,400, filed March 15, 2013; Dkt. No. 0447-US-U14-C2, 19 pgs.	

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	5	of	10	Attorney Docket No: 0394-US-U1

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		Non-Final Office Action, dated June 26, 2015, Application No. 13/714,411, filed December 14, 2012; Dkt. No. 0394-US-U2, 19 pgs.	
		Non-Final Office Action, dated June 29, 2015, Application No. 13/714,410, filed December 14, 2012; Dkt. No. 0394-US-U1, 19 pgs.	
		Non-Final Office Action, dated June 4, 2015, Application No. 13/802,366, filed March 13, 2013; Dkt. No. 0447-US-U27, 27 pgs.	
		Non-Final Office Action, dated May 12, 2015, Application No. 13/802,291, filed March 13, 2013; Dkt. No. 0447-US-U25, 25 pgs.	
		Non-Final Office Action, dated May 21, 2015, Application No. 13/802,335, filed March 13, 2013; Dkt. No. 0447-US-U26, 34 pgs.	
		Non-Final Office Action, dated May 6, 2015, Application No. 13/802,143, filed March 13, 2013; Dkt. No. 0447-US-U24, 32 pgs.	
		Non-Final Office Action, dated May 7, 2015, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 7 pgs.	
		Non-Final Office Action, dated November 15, 2015, Application No. 13/715,780, filed December 14, 2012; Dkt. No. 0447-US-U21, 9 pgs.	
		Non-Final Office Action, dated November 20, 2014, Application No. 13/715730, filed December 14, 2012; Dkt. No. 0447-US-U19, 6 pgs.	
		Non-Final Office Action, dated November 25, 2015, Application No. 13/714,760, filed December 14, 2012; Dkt. No. 0447-US-U9, 8 pgs.	
		Non-Final Office Action, dated November 5, 2015, Application No. 14/088,356, filed November 23, 2013; Dkt. No. 0447-US-U43, 28 pgs.	
		Non-Final Office Action, dated October 31, 2014, Application No. 13/802,051, filed March 13, 2013; Dkt. No. 0447-US-U22, 12 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 5 pgs.	
		Non-Final Office Action, dated September 12, 2014, Application No. 13/714,956, filed December 14, 2012; Dkt. No. 0447-US-U10, 5 pgs.	

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Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	6	of	10

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		Non-Final Office Action, dated September 14, 2015, Application No. 13/802,406, filed March 13, 2013; Dkt. No. 0447-US-U28, 17 pgs.	
		Non-Final Office Action, dated September 18, 2014, Application No. 13/715,109, filed December 14, 2012; Dkt. No. 0447-US-U11, 5 pgs.	
		Non-Final Office Action, dated September 25, 2015, Application No. 14/094,868, filed December 3, 2013; Dkt. No. 0447-US-U34, 17 pgs.	
		Non-Final Office Action, dated February 2, 2016, Application No. 14/303,314, filed June 12, 2014; Dkt. No. 0447-US-U29-C1, 18 pgs.	
		Non-Final Office Action, dated February 2, 2016, Application No. 14/307,380, filed June 17, 2014; Dkt. No. 0447-US-U25-I1, 21 pgs.	
		Notice of Allowance, dated April 10, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 11 pgs.	
		Notice of Allowance, dated April 10, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 8 pgs.	
		Notice of Allowance, dated April 14, 2015, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 12 pgs.	
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		Notice of Allowance, dated August 14, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated August 27, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 4 pgs.	

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		Notice of Allowance, dated December 10, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 11 pgs.	
		Notice of Allowance, dated December 16, 2015, Application No. 13/714,412, filed December 14, 2012; Dkt. No. 0447-US-U1, 5 pgs.	
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Substitute Disclosure Statement Form (PTO-1449)
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	8	of	10	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Notice of Allowance, dated December 9, 2015, Application No. 13/715,730, filed December 14, 2012; Dkt. No. 0447-US-U19, 5 pgs.	
		Notice of Allowance, dated January 12, 2015, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Notice of Allowance, dated January 12, 2016, Application No. 13/714,410, filed December 14, 2012; Dkt. No. 0394-US-U1, 6 pgs.	
		Notice of Allowance, dated January 13, 2016, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 11 pgs.	
		Notice of Allowance, dated January 13, 2016, Application No. 13/714,411, filed December 14, 2012; Dkt. No. 0394-US-U2, 5 pgs.	
		Notice of Allowance, dated January 21, 2016, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated January 22, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 6 pgs.	
		Notice of Allowance, dated July 10, 2015, Application No. 13/715,109, filed December 14, 2012; Dkt. No. 0447-US-U11, 9 pgs.	
		Notice of Allowance, dated July 17, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 11 pgs.	
		Notice of Allowance, dated July 17, 2015, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 5 pgs.	
		Notice of Allowance, dated July 6, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 5 pgs.	
		Notice of Allowance, dated June 11, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated June 18, 2015, Application No. 13/715,304, filed December 14, 2012; Dkt. No. 0447-US-U13, 5 pgs.	
		Notice of Allowance, dated June 19, 2015, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 11 pgs.	
		Notice of Allowance, dated June 19, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 5 pgs.	
		Notice of Allowance, dated June 19, 2015, Application No. 13/715,730, filed December 14, 2012; Dkt. No. 0447-US-U19, 5 pgs.	
		Notice of Allowance, dated June 22, 2015, Application No. 13/714,489, filed December 14, 2012; Dkt. No. 0447-US-U5, 11 pgs.	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 02/29/2016

Substitute Disclosure Statement Form (PTO-1449)

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	9	of	10	Attorney Docket No: 0394-US-U1

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		Notice of Allowance, dated June 22, 2015, Application No. 13/714,956, filed December 14, 2012; Dkt. No. 0447-US-U10, 11 pgs.	
		Notice of Allowance, dated June 5, 2015, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 11 pgs.	
		Notice of Allowance, dated June 5, 2015, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 5 pgs.	
		Notice of Allowance, dated June 5, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 5 pgs.	
		Notice of Allowance, dated May 1, 2015, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 11 pgs.	
		Notice of Allowance, dated May 13, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 10 pgs.	
		Notice of Allowance, dated May 5, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 9 pgs.	
		Notice of Allowance, dated May 6, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 9 pgs.	
		Notice of Allowance, dated May 6, 2015, Application No. 13/715,730, filed December 14, 2012; Dkt. No. 0447-US-U19, 9 pgs.	
		Notice of Allowance, dated November 21, 2014, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 6 pgs.	
		Notice of Allowance, dated November 24, 2014, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 7 pgs.	
		Notice of Allowance, dated November 24, 2015, Application No. 13/714,417, filed December 14, 2012; Dkt. No. 0447-US-U3, 5 pgs.	
		Notice of Allowance, dated November 9, 2015, Application No. 13/841,023, filed March 15, 2013; Dkt. No. 0447-US-U32, 9 pgs.	
		Notice of Allowance, dated November 9, 2015, Application No. 13/841,134, filed March 15, 2013; Dkt. No. 0447-US-U33, 8 pgs.	
		Notice of Allowance, dated October 22, 2015, Application No. 13/838,414, filed March 15, 2013; Dkt. No. 0447-US-U14-C1, 7 pgs.	
		Notice of Allowance, dated September 12, 2014, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 10 pgs.	
		Notice of Allowance, dated September 14, 2015, Application No. 13/715,270, filed December 14, 2012; Dkt. No. 0447-US-U12, 5 pgs.	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 02/29/2016

Substitute Disclosure Statement Form (PTO-1449)

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Substitute for form 1449A/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** *(Use as many sheets as necessary)*				*Complete if Known*	
				Application Number	13/714,410
				Filing Date	Dec 14, 2012
				First Named Inventor	Christopher Newton
				Art Unit	2448
				Examiner Name	Brian P. Whipple
Sheet	10	of	10	Attorney Docket No: 0394-US-U1	

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Notice of Allowance, dated September 14, 2015, Application No. 13/715,304, filed December 14, 2012; Dkt. No. 0447-US-U13, 5 pgs.	
		Notice of Allowance, dated September 14, 2015, Application No. 13/715,683, filed December 14, 2012; Dkt. No. 0447-US-U18, 5 pgs.	
		Notice of Allowance, dated September 14, 2015, Application No. 13/715,730, filed December 14, 2012; Dkt. No. 0447-US-U19, 5 pgs.	
		Notice of Allowance, dated September 16, 2015, Application No. 13/714,475, filed December 14, 2012; Dkt. No. 0447-US-U4, 10 pgs.	
		Notice of Allowance, dated September 17, 2015, Application No. 13/714,412, filed December 14, 2012; Dkt. No. 0447-US-U1, 5 pgs.	
		Notice of Allowance, dated September 17, 2015, Application No. 13/714,537, filed December 14, 2012; Dkt. No. 0447-US-U7, 11 pgs.	
		Notice of Allowance, dated September 18, 2015, Application No. 13/714,956, filed December 14, 2012; Dkt. No. 0447-US-U10, 11 pgs.	
		Notice of Allowance, dated September 18, 2015, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 8 pgs.	
		Notice of Allowance, dated September 22, 2015, Application No. 13/715,109, filed December 14, 2012; Dkt. No. 0447-US-U11, 10 pgs.	
		Notice of Allowance, dated September 25, 2015, Application No. 13/715,650, filed December 14, 2012; Dkt. No. 0447-US-U17, 5 pgs.	
		Notice of Allowance, dated September 28, 2015, Application No. 13/714,510, filed December 14, 2012; Dkt. No. 0447-US-U6, 10 pgs.	
		Notice of Allowance, dated September 30, 2015, Application No. 13/714,711, filed December 14, 2012; Dkt. No. 0447-US-U8, 11 pgs.	
		Notice of Allowance, dated September 4, 2015, Application No. 13/714,416, filed December 14, 2012; Dkt. No. 0447-US-U2, 14 pgs.	
		Notice of Allowance, dated September 5, 2014, Application No. 13/837,821, filed March 15, 2013; Dkt. No. 0447-US-U9-C1, 9 pgs.	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 02/29/2016

Substitute Disclosure Statement Form (PTO-1449)
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20040073596	Apr 15, 2004	Kloninger, John J., et al.	
		20070250468	Oct 25, 2007	Pieper, Keith M.	
		20110153724	Jun 23, 2011	Raja, Murali et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Final Office Action, dated February 26, 2016, Application No. 14/088,362, filed November 23, 2013; Dkt. No. 0447-US-U35, 31 pgs.	
		Final Office Action, dated February 26, 2016; Application No. 14/307,404, filed June 17, 2014; Dkt. No. 0447-US-U1-I4; 17 pgs.	
		Non-Final Office Action, dated February 26, 2016, Application No. 14/580,086, filed December 22, 2014; Dkt. No. 0447-US-U27-C2, 27 pgs.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 03/07/2016

Substitute Disclosure Statement Form (PTO-1449)
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	17	("20020165727" | "20060047751" | "20060167704" | "20070156845" | "20070156965" | "20070198678" | "20090019228" | "20090150319" | "20100042734" | "20100228962" | "20100274765" | "20110238488" | "20110276679" | "20120089664" | "20120159558" | "20120209952" | "6226694").PN.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 09:58
L2	276	((Christopher) near2 (Newton)).INV.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:00
L3	89	((Laurence) near2 (Lipstone)).INV.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:00
L4	91	((William) near2 (Crowder)).INV.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:00
L5	42	((Jeffrey) near2 (Koller)).INV.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:00
L6	39	((David) near2 (Fullagar)).INV.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:00
L7	23	((Maksim) near2 (Yevmenkin)).INV.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:00
L8	348	2 OR 3 OR 4 OR 5 OR 6 OR 7	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:01
L9	0	Level ADJ 3.AS.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:01
L10	5157	content ADJ delivery.CLM.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:05
L11	83	8 10	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:05
L12	1812	content ADJ delivery ADJ network.CLM.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:05
L13	61	8 12	US-	AND	ON	2016/02/29

			PGPUB; USPAT; EPO			10:05
L14	77735	global.clm.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:08
L15	3	13 14	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:08
L16	16516	H04L67/32.CPC. OR H04L67/42.CPC. OR H04L41/0893.CPC. OR H04L67/26.CPC.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:09
L17	64	content ADJ delivery ADJ network.CLM. global.CLM.	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:10
L18	9	16 17	US-PGPUB; USPAT; EPO	AND	ON	2016/02/29 10:10

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L19	16516	H04L67/32.CPC. OR H04L67/42.CPC. OR H04L41/0893.CPC. OR H04L67/26.CPC.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:12
L20	64	content ADJ delivery ADJ network.CLM. global.CLM.	US-PGPUB; USPAT	AND	ON	2016/02/29 10:12
L21	9	19 20	US-PGPUB; USPAT	AND	ON	2016/02/29 10:12

2/ 29/ 2016 10:12:22 AM
C:\ Users\ bwhipple\ Documents\ EAST\ Workspaces\ 13714410.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	Art Unit
	BRIAN P WHIPPLE	2454

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search history attached	6/23/15	BPW
Double patenting search conducted	6/23/15	BPW
Updated search (EAST search history attached)	12/29/15	BPW
Inventor name search conducted	12/29/15	BPW
Updated search (EAST search history attached)	2/29/16	BPW
Double patenting search conducted	2/29/16	BPW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04L	67/32	12/29/15	BPW
H04L	67/42	12/29/15	BPW
H04L	41/0893	12/29/15	BPW
H04L	67/26	12/29/15	BPW
H04L	67/32	2/29/16	BPW
H04L	67/42	2/29/16	BPW
H04L	41/0893	2/29/16	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
H04L	67/26	2/29/16	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13714410	Filing Date	2012-12-14	Docket Number (if applicable)	0394-US-U1	Art Unit	2448
First Named Inventor	NEWTON, Christopher			Examiner Name	WHIPPLE, Brian		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 505063

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/JCS/	Date (YYYY-MM-DD)	2016-03-29
Name	Jonathan C. Siekmann	Registration Number	58259

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: March 29, 2016

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020091801	Jul 11, 2002	Lewin, Daniel M.	
		20040215757	Oct 28, 2004	Butler, Mark H.	
		20040230797	Nov 18, 2004	Ofek, Yoram	
		20090125413	May 14, 2009	Le Chevalier, Vincent	
		20090210528	Aug 20, 2009	Swildens, Eric S.	
		20100088405	Apr 8, 2010	Huang, Cheng	
		20100114857	May 6, 2010	Edwards, John	
		20100217869	Aug 26, 2010	Esteban, Jairo O.	
		20110022471	Jan 27, 2011	Brueck, David F.	
		20110116376	May 19, 2011	Pacella, Dante J.	
		20110219108	Sep 8, 2011	Lisiecki, Philip A.	
		20110219109	Sep 8, 2011	Zehavi, Ronni	
		20110295983	Dec 1, 2011	Medved, Jan	
		20110296053	Dec 1, 2011	Medved, Jan	
		20120030341	Feb 2, 2012	Jensen, Brian W.	
		20120113893	May 10, 2012	Damola, Ayodele	
		20120191862	Jul 26, 2012	Kovvali, Surya K., et al.	
		20120226734	Sep 6, 2012	Poese, Ingmar	
		20130094445	Apr 18, 2013	De Foy, Xavier	
		20130152187	Jun 13, 2013	Strebe, Matthew	
		20140108671	Apr 17, 2014	Watson, Mark	
		20140126370	May 8, 2014	Xie, Haiyong	
		20150288647	Oct 8, 2015	Chhabra, Parminder	
		7797426	Sep 14, 2010	Lyon, Barrett G.	
		8868772	Oct 21, 2014	Major, R. D.	
		9246965	Jan 26, 2016	Stoica, Ion	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	2	of	2	Attorney Docket No: 0394-US-U1

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Non-Final Office Action, dated March 14, 2016, Application No. 14/105,915, filed December 13, 2013; Dkt. No. 0447-US-U40, 27 pgs.	
		Non-Final Office Action, dated March 16, 2016, Application No. 13/839,400, filed March 15, 2013; Dkt. No. 0447-US-U14-C2, 21 pgs.	
		Non-Final Office Action, dated March 24, 2016, Application No. 14/302,944, filed June 12, 2014; Dkt. No. 0394-US-U1-C2, 7 pgs.	
		"Overview of recent changes in the IP interconnection ecosystem", Analysys Mason May 2011 , 47 pgs.	
		"What Every Service Provider Should Know About Federated CDNs", Skytide IP Video Management Analytics Jun 19 2011 , 12 pgs.	
		"Wholesale Content Delivery Networks: Unlocking New Revenue Streams and Content Relationships", Cisco - White Paper, Cisco and/or its affiliates 2012 , pp. 1-16	
		BARTOLINI, N. et al., "A Walk Through Content Delivery Networks", MASCOTS 2003, LNCS 2965 2004 , pp. 1-25	
		BUYYA, R. et al., "Content Delivery Networks", Springer-Verlag Berlin Heidelberg; ISBN:978-3-540-77886-8 2008 , 429 pgs.	
		PATHAN, A-M K. et al., "A Taxonomy and Survey of Content Delivery Networks", 2011 , pp. 1-44	
		PUOPOLO, S. et al., "Content Delivery Network (CDN) Federations: How SPs Can Win the Battle for Content-Hungry Consumers", Cisco Internet Business Solutions Group (IBSG); Point of View 2011 , 9 pgs.	
		SUN, P. et al., "Identifying Performance Bottlenecks in CDNs through TCP-Level Monitoring", Dept. of Computer Science, Princeton University Aug 19 2011 , 6 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
RCE- 2nd and Subsequent Request	1820	1	1700	1700
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt

EFS ID:	25333110
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	29-MAR-2016
Filing Date:	14-DEC-2012
Time Stamp:	15:13:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	394U1_rce.pdf	1349875 2a1cc34022d5ddf2fb9a8b8b1b93e4d48f932059	no	3

Warnings:	
Information:	

2	Transmittal Letter	394U1_IDS.pdf	37090 3e488ae7be24bef5e4e75ffb8c15d8b261066287	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	41022 827f0a8954a2e2bc5ffe2c28c4a1e2086d4fee1f	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Other Reference-Patent/App/Search documents	13839400_ctnf_2016Mar16_U14C2_21p.pdf	869490 e70b1c57d2cb22b3079e09402e7c375d563ba6ad	no	21
Warnings:					
Information:					
5	Other Reference-Patent/App/Search documents	14105915_ctnf_2016Mar14_U40_27p.pdf	941713 3278da5d941a07b1f3a7f59fe99126e354ae5e9c	no	27
Warnings:					
Information:					
6	Other Reference-Patent/App/Search documents	14302944_ctnf_24Mar16_394U1C2_7p.pdf	192057 45881684d57ec92ee3d8c7acd36031322f59c554	no	7
Warnings:					
Information:					
7	Non Patent Literature	AnalysysMason_2011_Overview_of_recent_changes.pdf	3049160 d739e9bb49d5247527ea0fb44082cfc5bd21d44c	no	47
Warnings:					
Information:					
8	Non Patent Literature	Bartolini_etal_2004_Walk_through_content_delivery.pdf	1421737 b1ae0f720ec9c500edce0312f84a1689acb33f7b	no	25
Warnings:					
Information:					
9	Non Patent Literature	Buyya_etal_2008_Content_Delivery_Networks.pdf	21216821 eab98604a01f16a77317a8c8b970de737e99813e	no	429
Warnings:					
Information:					
10	Non Patent Literature	Cisco_2012_Wholesale_Content.pdf	1246621 4e88bd97666b2e704c3c6d02c735c08400350478	no	16

Warnings:					
Information:					
11	Non Patent Literature	Pathan_etal_2011_Taxonomy.pdf	3828588 6789c74ae9689ebc8b66e32a5c6a4a4d005d9846	no	44
Warnings:					
Information:					
12	Non Patent Literature	Puopolo_etal_2011_Content_Delivery_Network.pdf	642018 65d9807825c7f8140ca5411b93f2a5a131ed65f5	no	9
Warnings:					
Information:					
13	Non Patent Literature	Skytide_2011_What_Every_Service_Provider.pdf	5118073 315d2b7b2d58d5915c1a9c4a9a4525350e055411	no	12
Warnings:					
Information:					
14	Non Patent Literature	Sun_etal_2011_Identifying_Performance_Bottlenecks.pdf	521421 4de04d16985200649775d59fba0e01015cdb654b	no	6
Warnings:					
Information:					
15	Fee Worksheet (SB06)	fee-info.pdf	30338 7d7a87efe6cd14efa503b9ec90a3fff375504430	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	40506024	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
RCE- 2nd and Subsequent Request	1820	1	1700	1700
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt

EFS ID:	25340085
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	30-MAR-2016
Filing Date:	14-DEC-2012
Time Stamp:	08:23:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1700
RAM confirmation Number	22088
Deposit Account	505063
Authorized User	SIEKMANN, JONATHAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	30338 22e263132b69e8ecd0dfe82b0510f9dae65b9fed	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	30338

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21398 7590 05/05/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER
WHIPPLE, BRIAN P

ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 05/05/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	08/05/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21398 7590 05/05/2016
Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	08/05/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WHIPPLE, BRIAN P	2454	709-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 05/05/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	**PAPER NUMBER**
2454	

DATE MAILED: 05/05/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/714,410	Applicant(s) NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2454	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the request for continued examination filed on 3/29/16*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-50*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Brian P. Whipple/
Primary Examiner, Art Unit 2454

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	25	("20020091801" | "20030030341" | "20040215757" | "20040230797" | "20090125413" | "20090210528" | "20100114857" | "20100217869" | "20110022471" | "20110116376" | "20110219108" | "20110219109" | "20110295983" | "20110296053" | "20120113893" | "20120191862" | "20120226734" | "20130094445" | "20130152187" | "20140108671" | "20140126370" | "20150288647" | "7797426" | "8868772" | "9246965").PN.	US-PGPUB; USPAT; EPO	AND	ON	2016/04/25 09:04
L6	2136	content ADJ delivery ADJ network.CLM. OR CDN.CLM.	US-PGPUB; USPAT; EPO	AND	ON	2016/04/25 09:23
L7	67	6 global.CLM.	US-PGPUB; USPAT; EPO	AND	ON	2016/04/25 09:23
L8	1	1 7	US-PGPUB; USPAT; EPO	AND	ON	2016/04/25 09:23
L12	282	((Christopher) near2 (Newton)).INV.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L13	89	((Laurence) near2 (Lipstone)).INV.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L14	91	((William) near2 (Crowder)).INV.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L15	42	((Jeffrey) near2 (Koller)).INV.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L16	40	((David) near2 (Fullagar)).INV.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L17	23	((Maksim) near2 (Yevmenkin)).INV.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L18	233	("LEVEL 3 COMMUNICATIONS, LLC").AANM.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:42
L19	355	13 or 14 or 15 or 16 or 17 or 12	US-PGPUB; USPAT	AND	ON	2016/04/25 09:44

L20	565	(level ADJ "3").as.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:45
L21	619	18 or 20	US-PGPUB; USPAT	AND	ON	2016/04/25 09:45
L22	103	19 21	US-PGPUB; USPAT	AND	ON	2016/04/25 09:45
L23	6	22 global.clm.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:45

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	17205	H04L67/32.CPC. OR H04L67/42.CPC. OR H04L41/0893.CPC. OR H04L67/26.CPC.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:23
L4	64	content ADJ delivery ADJ network.CLM. global.CLM.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:23
L5	9	3 4	US-PGPUB; USPAT	AND	ON	2016/04/25 09:23
L9	29	CDN.CLM. global.CLM.	US-PGPUB; USPAT	AND	ON	2016/04/25 09:24
L10	9	3 9	US-PGPUB; USPAT	AND	ON	2016/04/25 09:24
L11	0	10 NOT 5	US-PGPUB; USPAT	AND	ON	2016/04/25 09:24

4/25/2016 9:50:27 AM
C:\Users\bwhipple\Documents\EAST\Workspaces\13714410.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

CPC						
Symbol					**Type**	**Version**
H04L		67	/	32	F	2013-01-01
H04L		67	/	26	I	2013-01-01
H04L		67	/	2852	I	2013-01-01
H04L		63	/	166	A	2013-01-01
H04L		41	/	0893	I	2013-01-01
H04L		67	/	42	I	2013-01-01
H04L		41	/	0856	I	2013-01-01
H04L		41	/	5064	I	2013-01-01
H04L		41	/	509	I	2013-01-01
H04L		67	/	34	I	2013-01-01
H04L		67	/	2842	I	2013-01-01
			/			
			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	04/25/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No. 20160425

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		G	0	6	F	15 / 16 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	04/25/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33		49								
	2		18		34		50								
	3		19		35										
	4		20		36										
	5		21		37										
	6		22		38										
	7		23		39										
	8		24		40										
	9		25		41										
	10		26		42										
	11		27		43										
	12		28		44										
	13		29		45										
	14		30		46										
	15		31		47										
	16		32		48										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	04/25/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No. 20160425

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	Art Unit
	BRIAN P WHIPPLE	2454

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search history attached	6/23/15	BPW
Double patenting search conducted	6/23/15	BPW
Updated search (EAST search history attached)	12/29/15	BPW
Inventor name search conducted	12/29/15	BPW
Updated search (EAST search history attached)	2/29/16	BPW
Double patenting search conducted	2/29/16	BPW
Updated search (EAST search history attached)	4/25/16	BPW
Double patenting search conducted	4/25/16	BPW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04L	67/32	12/29/15	BPW
H04L	67/42	12/29/15	BPW
H04L	41/0893	12/29/15	BPW
H04L	67/26	12/29/15	BPW
H04L	67/32	2/29/16	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
H04L	67/42	2/29/16	BPW
H04L	41/0893	2/29/16	BPW
H04L	67/26	2/29/16	BPW
H04L	67/32	4/25/16	BPW
H04L	67/42	4/25/16	BPW
H04L	41/0893	4/25/16	BPW
H04L	67/26	4/25/16	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	2	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20020091801	Jul 11, 2002	Lewin, Daniel M.	
		20040215757	Oct 28, 2004	Butler, Mark H.	
		20040230797	Nov 18, 2004	Ofek, Yoram	
		20090125413	May 14, 2009	Le Chevalier, Vincent	
		20090210528	Aug 20, 2009	Swildens, Eric S.	
		20100088405	Apr 8, 2010	Huang, Cheng	
		20100114857	May 6, 2010	Edwards, John	
		20100217869	Aug 26, 2010	Esteban, Jairo O.	
		20110022471	Jan 27, 2011	Brueck, David F.	
		20110116376	May 19, 2011	Pacella, Dante J.	
		20110219108	Sep 8, 2011	Lisiecki, Philip A.	
		20110219109	Sep 8, 2011	Zehavi, Ronni	
		20110295983	Dec 1, 2011	Medved, Jan	
		20110296053	Dec 1, 2011	Medved, Jan	
		20120030341	Feb 2, 2012	Jensen, Brian W.	
		20120113893	May 10, 2012	Damola, Ayodele	
		20120191862	Jul 26, 2012	Kovvali, Surya K., et al.	
		20120226734	Sep 6, 2012	Poese, Ingmar	
		20130094445	Apr 18, 2013	De Foy, Xavier	
		20130152187	Jun 13, 2013	Strebe, Matthew	
		20140108671	Apr 17, 2014	Watson, Mark	
		20140126370	May 8, 2014	Xie, Haiyong	
		20150288647	Oct 8, 2015	Chhabra, Parminder	
		7797426	Sep 14, 2010	Lyon, Barrett G.	
		8868772	Oct 21, 2014	Major, R. D.	
		9246965	Jan 26, 2016	Stoica, Ion	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 04/25/2016

Substitute Disclosure Statement Form (PTO-1449)

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet	2	of	2	Attorney Docket No: 0394-US-U1

Complete if Known

Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	**Cite No [1]**	**Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.**	**T[2]**
		Non-Final Office Action, dated March 14, 2016, Application No. 14/105,915, filed December 13, 2013; Dkt. No. 0447-US-U40, 27 pgs.	
		Non-Final Office Action, dated March 16, 2016, Application No. 13/839,400, filed March 15, 2013; Dkt. No. 0447-US-U14-C2, 21 pgs.	
		Non-Final Office Action, dated March 24, 2016, Application No. 14/302,944, filed June 12, 2014; Dkt. No. 0394-US-U1-C2, 7 pgs.	
		"Overview of recent changes in the IP interconnection ecosystem", Analysys Mason May 2011 , 47 pgs.	
		"What Every Service Provider Should Know About Federated CDNs", Skytide IP Video Management Analytics Jun 19 2011 , 12 pgs.	
		"Wholesale Content Delivery Networks: Unlocking New Revenue Streams and Content Relationships", Cisco - White Paper, Cisco and/or its affiliates 2012 , pp. 1-16	
		BARTOLINI, N. et al., "A Walk Through Content Delivery Networks", MASCOTS 2003, LNCS 2965 2004 , pp. 1-25	
		BUYYA, R. et al., "Content Delivery Networks", Springer-Verlag Berlin Heidelberg; ISBN:978-3-540-77886-8 2008 , 429 pgs.	
		PATHAN, A-M K. et al., "A Taxonomy and Survey of Content Delivery Networks", 2011 , pp. 1-44	
		PUOPOLO, S. et al., "Content Delivery Network (CDN) Federations: How SPs Can Win the Battle for Content-Hungry Consumers", Cisco Internet Business Solutions Group (IBSG); Point of View 2011 , 9 pgs.	
		SUN, P. et al., "Identifying Performance Bottlenecks in CDNs through TCP-Level Monitoring", Dept. of Computer Science, Princeton University Aug 19 2011 , 6 pgs.	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 04/25/2016

Substitute Disclosure Statement Form (PTO-1449)

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional) [2] Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.W./

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13714410	Filing Date	2012-12-14	Docket Number (if applicable)	0394-US-U1	Art Unit	2454
First Named Inventor	NEWTON, Christopher			Examiner Name	WHIPPLE, Brian P.		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 505063

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/JCS/	Date (YYYY-MM-DD)	2016-05-10
Name	Jonathan C. Siekmann	Registration Number	58259

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2448
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☒ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☒ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: May 10, 2016

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number..

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]
		CN-102047244A	May 4, 2011	Lipstone, Laurence et al.		

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Chinese Examination Report, dated February 24, 2016, Application No. 201280061712.3, filed December 14, 2012; Dkt. No. 0394-CN-01 , 40 pgs.	
		WANG, WEIWEI et al., "The Study Summarize for Distribution Technology of Streaming Media under the Basement of CDN", Computer Engineering and Application Vol. 40, No. 8 2004 , 7 pgs.	

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
RCE- 2nd and Subsequent Request	1820	1	1700	1700
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt

EFS ID:	25731425
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	10-MAY-2016
Filing Date:	14-DEC-2012
Time Stamp:	12:40:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1700
RAM confirmation Number	10082
Deposit Account	505063
Authorized User	SIEKMANN, JONATHAN

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	394U1_rce.pdf	1349880 84927f4331767ca0b2a5609bd87187b47f8dad905	no	3
Warnings:					
Information:					
2	Transmittal Letter	394U1_IDS.pdf	37159 fbeba0eef8eaf842c01c0bd3d9213a2b4858c2a3	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	29751 57a0e3e6bd7c62ff5f9b40cb63415c8bf03def97	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Fee Worksheet (SB06)	fee-info.pdf	30338 5df427eced1e521dee91f4aa6f70058da9b60b9f	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1447128		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 102047244 A
(43)申请公布日 2011.05.04

(21)申请号 200980120043.0
(22)申请日 2009.03.21
(30)优先权数据
61/042,412 2008.04.04 US
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WO2009/123868 EN 2009.10.08
(71)申请人 第三雷沃通讯有限责任公司
地址 美国科罗拉多
(72)发明人 L·利普斯顿 C·牛顿 D·富拉格
(74)专利代理机构 中国国际贸易促进委员会专利商标事务所 11038
代理人 李颖
(51)Int.Cl.
G06F 15/173(2006.01)

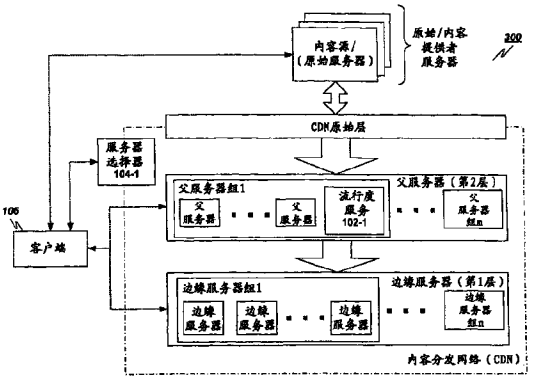
权利要求书 2 页 说明书 10 页 附图 6 页

(54)发明名称

在内容分发网络(CDN)中处理长尾内容

(57)摘要

内容分发网络至少具有第一层服务器。内容分发方法包括在第一层服务器的第一服务器，获得来自客户端的对资源的请求。如果所述资源在第一服务器或者在第一服务器的对等体处可用，则从第一服务器把所述资源提供给客户端。否则，确定所述资源是否流行，如果所述资源被确定为流行，则第一服务器获得所述资源，第一服务器把所述资源提供给所述客户端。如果所述资源被确定为不流行，则客户端被定向到不在第一层服务器中的第二服务器，第二服务器把所述资源提供给所述客户端。第二服务器可以在第二层服务器中，或者可以是原始服务器。



CN 102047244 A

1. 包含至少第一层服务器的内容分发网络中的内容分发方法，所述方法包括：

在所述第一层服务器的第一服务器，获得来自客户端的对资源的请求；

如果所述资源在所述第一服务器或者在所述第一服务器的对等体处可用，则把所述资源提供给所述客户端；

否则，如果所述资源在所述第一服务器或者在所述第一服务器的对等体处不可用，则确定所述资源是否流行，和

如果所述资源被确定为流行，则所述第一服务器获得所述资源，所述第一服务器把所述资源提供给所述客户端，否则，

如果所述资源被确定为不流行，则把所述客户端定向到第二服务器，所述第二服务器不在所述第一层服务器中，和

所述第二服务器把所述资源提供给所述客户端。

2. 按照权利要求 1 所述的方法，其中所述网络还包括不同于所述第一层服务器的第二层服务器，其中所述第二服务器在所述第二层服务器中。

3. 按照权利要求 1 所述的方法，其中第二服务器是内容提供者的原始服务器。

4. 按照权利要求 1 所述的方法，其中确定所述资源是否流行的步骤包括：

确定所述资源的当前流行度值是否超过第一预定流行度阈值。

5. 包含至少第一层服务器的内容分发网络中的内容分发方法，所述方法包括：

(A) 在所述第一层服务器的第一服务器，获得来自客户端的对资源的请求；

(B) 如果所述资源在所述第一服务器或者在所述第一服务器的对等体处不可用，则有选择地把来自所述客户端的所述请求重定向到网络中的第二服务器，所述第二服务器不同于所述第一层服务器，所述重定向至少部分基于所述资源的当前流行度值。

6. 按照权利要求 5 所述的方法，其中所述网络还包括第二层服务器，所述第二层中的所述服务器不同于所述第一层中的所述服务器，其中所述第二服务器在所述第二层服务器中。

7. 按照权利要求 5 所述的方法，其中所述网络还包括第二层服务器，所述第二层中的所述服务器不同于所述第一层中的所述服务器，其中所述第二服务器是原始服务器。

8. 一种内容分发架构，包括：

构成第一层服务器的多个边缘服务器；和

构成第二层服务器的多个父服务器，所述父服务器不同于所述边缘服务器；和

至少一种流行度服务，所述流行度服务被构造成并且适合于从至少一些所述边缘服务器获得与对内容的请求有关的信息，和向所述边缘服务器提供与哪一层的服务器应处理这些对内容的请求有关的信息，所述流行度服务至少部分根据所请求内容的流行度的量度来做出确定。

9. 包括多层服务器的内容分发网络中的内容分发方法，所述多层服务器至少包括第一层服务器和第二层服务器，所述方法包括：

(A) 在所述多层服务器中的一层中的第一服务器，获得来自客户端的对资源的请求；

(B) 如果所述资源在所述第一服务器或者在所述第一服务器的对等体处不可用，则有选择地把来自所述客户端的所述请求重定向到网络中的第二服务器，所述第二服务器在和包含所述第一服务器的所述一层不同的一层中，所述重定向至少部分基于所述资源的当前

流行度值。

10. 按照权利要求 9 所述的方法，其中所述第一层服务器包含多个边缘服务器，所述第二层服务器包含多个父服务器，其中所述第一服务器是所述第二层中的父服务器，所述第二服务器是所述第一层中的边缘服务器。

11. 按照权利要求 9 所述的方法，其中所述第一层服务器包含多个边缘服务器，所述第二层服务器包含多个父服务器，其中所述第一服务器是所述第一层中的边缘服务器，所述第二服务器是所述第二层中的父服务器。

12. 按照权利要求 9 所述的方法，其中所述第一层服务器包含多个边缘服务器，所述第二层服务器包含多个父服务器，其中所述多层服务器还包含原始层，其中所述第一服务器是所述第二层中的父服务器，所述第二服务器是所述原始层中的服务器。

在内容分发网络 (CDN) 中处理长尾内容

[0001] 相关申请

[0002] 本申请与下述共同所有的同时待审的专利申请有关，所有这些专利申请的内容均在此引为参考：

[0003]

申请号	申请日期
10/073938	2002 年 2 月 14 日
11/715316	2007 年 3 月 8 日
11/978656	2007 年 10 月 30 日
11/980672	2007 年 10 月 31 日
10/259497	2002 年 9 月 30 日
11/932162	2007 年 10 月 31 日
11/976648	2007 年 10 月 26 日

技术领域

[0004] 本发明涉及内容分发，内容分发网络 (CDN)，和利用 CDN 的架构和系统。

[0005] 目前优选的例证实施例的详细说明

[0006] 术语表

[0007] 除非另有说明，否则这里使用的下述术语或缩写具有下述含意：

[0008] 1. IP 意谓因特网协议。

[0009] 2. “IP 地址”意谓在因特网协议中用于识别诸如服务器之类电子设备的地址。

[0010] 3. HTTP 意谓超文本传送协议。

[0011] 4. URL 意谓统一资源定位符。

[0012] 5. DNS 意谓域名系统。

附图说明

[0013] 参考附图，能够更好地理解本发明。附图中的部件不一定是按比例绘制的，而是把重点放在清楚地图解说明本发明的原理上。此外，在各个视图中，相同的附图标记表示对应的部分。

[0014] 图 1 描述一般的分级的多层内容分发网络 (CDN)；

[0015] 图 2 表示 CDN 中成组或成群的服务器的逻辑组织；

[0016] 图 3 描述利用内容分发网络 (CDN) 的内容分发架构 ;

[0017] 图 4 描述网络分发架构中的两级内容分发网络的操作 ;

[0018] 图 5 是表示图 4 的 CDN 的广度服务的操作的流程图 ;和

[0019] 图 6 是保存特定的广度服务器的广度数据的例证结构数据。

[0020] 背景和概述

[0021] 因特网和所谓的万维网 (“WWW”) 已变得普遍存在。数以千计乃至数以万计的所谓内容提供者 (出版者) 现在使用因特网 (具体地,WWW) 向全世界的数以万计乃至数以十万计的客户端提供各种内容。

[0022] 为了卸载提供他们的一些或全部内容的作业,许多内容提供者现在预订 (subscribe) 所谓的内容分发网络 (CDN)。通过利用 CDN,能够从 CDN(即,从 CDN 中的一个或多个服务器),而不是从内容提供者的服务器向客户端提供内容提供者的一些 (乃至全部) 内容。在高速缓存 CDN 中,在被提供之前,或者响应对内容的特定请求,提供的内容也可被高速缓存在一些或者所有的 CDN 服务器上。

[0023] 这里使用的术语“内容”意谓任何形式的任何种类的数据,与其表现无关,并且与它代表什么无关。内容可包括 (但不限于) 静态和 / 或动态图像、文本、音频内容 (包括流式音频)、视频内容 (包括流式视频)、网页、计算机程序、文档、文件等等。一些内容可被嵌入其它内容中,例如利用诸如 HTML 和 XML 之类的置标语言。内容包括响应于特定请求而专门创作或者形成或者组成的内容。这里,术语“资源”有时被用于指内容。

[0024] 某些出版者具有大型内容库,其中只有一小部分的内容 (所谓的“短头”) 流行到足以受益于通过高速缓存 CDN 的内容提供,而大部分的内容 (所谓的“长尾”) 仅仅偶尔被访问,一般不值得高速缓存 (或者甚至从边缘服务器提供)。对具有大型音乐或视频库的内容出版者来说,这种情况应是典型的。一些音乐内容 - 流行内容 - 可能经常被请求,而其它音乐 - 不流行 (也称为不受欢迎) 的内容 - 可能很少被请求 (如果被请求过的话)。

[0025] 内容能够变得流行 (借助各种普及措施) 或者渐渐过渡到相对无名,从而不能够容易地明确划分内容库。CDN 改为跟踪某些内容的流行度,并在内容变得流行时,有选择地朝着边缘 (即,朝着第一层服务器) 迁移该内容。

[0026] CDN 可具有分级组织的一层或多层服务器。图 1 描述包括多层服务器的内容分发网络 100。具体地说,图 1 的 CDN 100 显示表示为第一层,第二层,第三层,...,第 j 层的 j 层服务器。每层服务器可包含组织成服务器组 (有时称为服务器群集) 的许多服务器。第一层服务器也被称为边缘服务器,第一层有时也被称为“边缘”或者“CDN 的边缘”。第二层服务器 (当存在于 CDN 中时) 也被称为父服务器。

[0027] 例如,在图 1 的 CDN 100 中,第一层具有 n 组服务器 (表示成“边缘服务器组 1”,“边缘服务器组 2”,...,“边缘服务器组 n”) ;第二层 (父服务器层) 具有 m 个服务器组 (第 i 组被表示成“父服务器组 i”) ;第三层具有 k 个服务器组,等等。最好每一层都具有相同数目的服务器组。

[0028] 图 2 表示在图 1 的 CDN 中,服务器的逻辑组织 / 分组。在图 2 的例证 CDN 中,每一层的服务器具有相同数目 (n) 的服务器组。当阅读本说明书时,本领域的技术人员知道并且了解,每个服务器组可以具有相同或不同数目的服务器。另外,服务器组中的服务器的数目可以动态变化。例如,可以向服务器组中增加另外的服务器,以处理该服务器组上不断增

加的负载。

[0029] 服务器组中的服务器可以是同质或异质的，服务器组中的每个服务器中可包含共享相同名称和 / 或网络地址的一群物理服务器。在同时待审并且共同拥有的专利申请 No. 61/064339(“Load-balancingcluster”，申请日 2008 年 2 月 28 日）中描述了这种群集的一个例子，该申请的整个内容在此引为参考。

[0030] 相同层和相同组中的服务器被称为对等体或对等服务器。

[0031] 典型的 CDN 只具有一层或两层的服务器。只有一层的 CDN 将只具有边缘服务器，而具有两层的 CDN 将具有边缘服务器和父服务器（最少，CDN 应具有至少一层的服务器 - 边缘服务器）。

[0032] 层中服务器的分组可以基于例如它们的物理位置或者地理位置。例如，特定的 CDN 可具有六组 - 四组服务器在美国，用于西海岸的组 1，用于中西部的组 2，用于东北部的组 3，和用于东南部的组 4 ；和分别用于欧洲和亚洲的各一组。

[0033] 特定的 CDN 服务器最好只在一个服务器组中。

[0034] 通常，每一层中的一些或者全部服务器能够与其它每一层中的一些或全部服务器交换数据。从而，一些或全部的父服务器能够与一些或全部的边缘服务器交换信息。为了简便起见，附图中，每一层的服务器被表示成操作上能够与其它每一层连接。不过在一些 CDN 中，最好特定层中的服务器只能够与相同组中的其它服务器（即，与对等服务器）和 / 或与不同层中的相同组中的其它服务器交换信息。例如，在一些 CDN 中，边缘服务器组 k 中的边缘服务器能够相互交换信息，并且能够与父服务器组 k 中的所有服务器交换信息，等等。

[0035] 内容提供者的 / 用户的一个（或多个）服务器也被称为原始服务器。内容提供者的原始服务器可由该内容提供者拥有和 / 或操纵，或者它们可以是由诸如托管提供者之类的第三方提供和 / 或操纵的服务器。特定内容提供者的托管提供者也可向该内容提供者提供 CDN 服务。

[0036] CDN 还可包括 CDN 原始 / 内容高速缓冲存储器层，它可被用于高速缓存来自 CDN 的订户（即，来自 CDN 订户的相应原始服务器）的内容。当阅读本说明书时，本领域的技术人员知道并且了解，CDN 能够支持一个或多个订户，即，CDN 能够起支持众多订户的共享基础结构的作用。CDN 原始层也可由许多服务器组成，这些服务器也可被（物理和逻辑地）组织成许多区域和 / 或组。CDN 原始层中的一个或多个服务器按需要（推送）或者预先（通过拉取）从订户的原始服务器获得内容。

[0037] 流行度服务 102（下面更详细说明）与一层或多层中的一个或多个服务器组关联。在一个目前优选的例证实施例中，一些父服务器组具有与之关联的流行度服务 102。尽管被表示成组的独立组件，不过流行度服务 102 可被集成到组中的服务器之一中。在一些情况下，流行度服务可以具有它自己的不同于任意 CDN 服务器的服务器。这里可互换地使用术语“流行度服务”和“流行度服务器”。

[0038] 操作上，当客户端请求将利用内容分发架构提供的内容时，可以从 CDN 中的一个服务器，或者在一些情况下，可从订户 / 用户的原始服务器向该客户端提供所述内容。

[0039] 通过利用任意种类的服务器选择器系统 104，可按照任意方式把客户端定向到 CDN 和 / 或定向到 CDN 中的服务器。本领域的技术人员明白，服务器选择器系统 104 通常把客户端的内容请求定向到适当的服务器，以使内容被提供给进行请求的客户端。适当的服

务器可以是接近于客户端（依据某种成本量度）的服务器，和/或负载不是过于沉重的服务器。所有各类条件可被应用于术语“适当的”，所有各类信息和测试（静态和动态的）可被用于确定适当的服务器。例如，服务器选择器系统 104 可包括或者完全或部分地在域名服务 (DNS) 服务器、独立设备或者它们的组合中工作。例如，服务器选择器系统 104 可包含单级的 DNS 服务器，该 DNS 服务器至少部分根据进行请求的客户端的位置和一些或全部 CDN 服务器上的负载的某种组合，选择适当的服务器。当阅读本说明书时，本领域的技术人员知道并且了解，客户端在诸如因特网之类网络中的位置有时可能只是粗略确定的，术语“客户端的位置”通常被视为是与客户端的网络服务提供者对应的网络位置。

[0040] 尽管在附图中被表示成一个组件，不过服务器选择器 104 可包含众多的组件。例如，一些或者全部的服务器选择可以基于选播 (anycast) 路由，服务器选择器 104 从而可包括路由器和关联的表。

[0041] 在一个目前优选的实施例中，服务器选择器 104 是比如在同时待审的美国专利申请 No.10/259497（申请日 2002 年 9 月 30 日），“Configurable Adaptive Global Traffic Control And Management”（公开为 US 2003-0065762A1）；和在美国专利申请 No.11/976648（申请日 2007 年 10 月 26 日），“Policy-based content delivery networkselection”（集体称为“ITM 申请”）中所述的智能流量管理器 (ITM)/ 自适应流量控制器 (ATC)，上述两件专利申请的全部内容将在此引为参考。在一些实施例中，服务器选择器 104 可包括比如在美国专利 No.6185598，“Optimized Network Resource Location”中公开的“最好”或者说“最佳”服务器选择器，该专利的全部内容在此引为参考。' 598 专利把 CDN 服务器称为所谓的转发器服务器，并描述所谓的“最佳转发器选择器 (BRS) 机构”。

[0042] 图 3 表示具有两级层次的 CDN 的内容分发架构 300，该 CDN 由一层边缘服务器（第一层）和一层父服务器（第二层）组成。一些或者全部的边缘服务器能够与一些或者全部的父服务器通信。边缘服务器被分成 n 个边缘服务器组，父服务器被分成 m 个父服务器组。在一个目前优选的实施例中，m 的值等于 n 的值，即，在该目前优选的实施例中，存在数目与父服务器组相同的边缘服务器组。CDN 原始 / 内容高速缓存层保存它从各个订户的原始服务器获得的订户内容。父服务器组中的至少一个（附图中，组 1）具有与之关联的流行度服务 102-1。可取的是多于一个的父服务器组具有关联的流行度服务，更可取的是每个父服务器组都具有关联的流行度服务。

[0043] 尽管被示于父代层中，不过流行度服务可以位于系统中的任何地方，包括位于边缘层中。

[0044] 流行度服务可被某些（尽管不一定是所有）内容使用。当只有某些内容使用流行度服务时，内容应被指定，以便使用流行度服务。

[0045] 组中的一些或全部边缘服务器可以使用流行度服务来管理各个订户的长尾内容。使用流行度服务的每个边缘服务器被称为绑定到该流行度服务。绑定到流行度服务的边缘服务器有时被称为“长尾协同服务器”(longtail coserver)。

[0046] 图 4 和 5 表示图 3 的 CDN 的流行度服务的操作。

[0047] 当客户端 106 请求内容（例如，利用 HTTP GET 请求）时，该请求被（例如，服务器选择器 104-1）定向到边缘服务器，以使内容被提供给该客户。对于某些指定的内容，在高速缓存操作的填充侧 (fill side) 中插入流行度检查。图 4 图解说明内容分发架构 300 中

消息和数据的流动，图 5 是表示图 4 的 CDN 的流行度服务的操作的流程图。为了该详细说明起见，假定客户端的请求已被定向到边缘服务器 108（当阅读本说明书时，本领域的技术人员知道并且了解，客户端的初始请求可被定向到 CDN 分层结构中的任意一层，例如包括定向到父代层）。通过利用与 CDN 关联的服务器选择机构 104-1，例如利用一个或多个 DNS 服务器，并根据诸如进行请求的客户端的位置、网络上的负载、网络流量状况、CDN 策略、订户策略之类的因素选择边缘服务器，来选择边缘服务器 108。

[0048] 客户端 106 向边缘服务器 108 请求内容（在图 5 的 500）。来自客户端 106 的请求到达边缘服务器 108（图 4 中的 S1）。边缘服务器 108 检查以了解对象是否存在（在本地或者在对等体上），并且是最新的（在 502）。如果是，那么通过从对等体获得该对象（如果需要的话），边缘服务器 108 从高速缓存把该对象提供给客户端 106（S2，504）。

[0049] 在一些实施例中，系统可区分网内和网外对等体和相同交换机的对等体。网内对等体是在相同主干网上的对等体；网外对等体是位于不同主干网上的对等体；相同交换机的对等体是直接连接到与进行检查的代理的相同交换机上的对等体。在一些实施例中，边缘服务器 108 可以只寻找在其一些对等体（例如，只在相同交换机的对等体）上的对象。

[0050] 如果在边缘服务器 108 上或者在对等体上不能获得对象，那么边缘服务器 108 确定是否根据对象的流行度，提供该对象（即，该对象是否已被指定，以致对象的流行度将被用于确定将从何处提供该对象）（在 506）。如果是，那么请求被发送给与边缘服务器 108 关联的流行度服务 102，这种情况下，被发送给用于该组的流行度服务器（S3a）。

[0051] 可至少部分根据用于请求对象的名称（主机名），确定该对象是否根据其流行度，被指定成从不同的位置提供（在 506）。

[0052] 可取的是允许边缘服务器的混合体，一些边缘服务器进行流行度检查（如上所述），而其它边缘服务器不进行流行度检查。对不运行流行度服务的那些边缘服务器来说，用于请求对象的名称（主机名）将解析成父服务器（该父服务器可以提供或者可以不提供流行度服务）。如果父服务器不提供流行度服务，那么内容将由边缘服务器从该父服务器获得，该内容将被提供给客户端。另一方面，如果该父服务器提供流行度服务，那么它能够根据例如边缘服务器的 IP（因特网协议）地址，确定该边缘服务器是否是长尾协同服务器。对于非协同服务器，父服务器可处理该请求，而没有任何流行度处理。

[0053] 内容请求可以是对对象的初始请求，或者可以是对对象的另一部分的请求，所述初始部分已被提供给客户端。如果所述请求是对对象的第一部分的请求（在 508），例如，所述请求包括对资源的第一字节的请求（即，它不是在文件的开头部分之后开始的范围请求），那么流行度服务 102 确定（如下所述）该对象目前是否流行。首先，当前时段的流行度计数被递增（在 510）。根据其确定结果，流行度服务 102 向边缘服务器 108 返回三种可能响应之一（S3b）：

[0054] 1. 如果对象未达到第一 / 最低水平的流行度（在 512）：那么流行度服务向边缘服务器发送把客户端的请求重定向到原始服务器（或者重定向到 CDN 原始高速缓存）的指令（如果允许原始层重定向的话）（在 514）。

[0055] 2. 如果对象的流行度超过了第一 / 最低水平的流行度，但是还未超过第二的中间层阈值（在 516）：那么流行度服务向边缘服务器发送把客户端的请求重定向到父服务器的指令（如果允许中间层重定向的话）（在 518）。

[0056] 3. 如果对象的流行度超过了中间层阈值（即，对象是流行的）：那么流行度服务向边缘服务器发送边缘服务器自己提供该内容的指令（在 520）。在一种目前优选的实现中，流行度服务向边缘服务器发送到原始服务器，或者到父代层（如果有父代层的话）的设有“follow me”标记的重定向 (HTTP 302)。

[0057] 如果边缘服务器 108 从流行度服务 102 收到未设有“follow me”标记的重定向（上面的情况 1 和 2），那么它只是把该重定向转发给客户端 106(S4a，522，524)。如果边缘服务器 108 收到“follow me”重定向，那么它获得并高速缓存资源（在 526），并把资源提供给客户端（在 528）。

[0058] 如果流行度服务 102 不能得到、无反响应、或者返回指示错误的状态码（不同于 HTTP 404），那么从该边缘的高速缓存服务器提供所述内容（并产生报警状态）。

[0059] 一旦内容已被高速缓存在边缘服务器，那么每当它获得对该内容的另一个请求时，边缘服务器将向流行度服务发送通知（例如，以再验证的形式）。例如，参考图 5 的流程图，如果边缘服务器 108 确定（在 502）它具有所请求的内容（或者能够从对等体获得所请求的内容），那么除了提供该内容之外（在 504），边缘服务器 108 还指令流行度服务器递增当前时段的对象流行度计数（在 530）。该处理使流行度服务器一直知道正在其区域中提供的内容的相对流行度的最新情况。

[0060] 在目前优选的实施例中，服务器选择机构 104 不使客户端集结到父服务器 / 高速缓存。换句话说，在这些实施例中，客户端请求最初总是被服务器选择机构定向到边缘服务器。在这些情况下，当资源请求到达父服务器 / 高速缓存时，最好应无条件地服务（和满足（如果需要的话））该请求（因为来自客户端的任何请求被认为是边缘服务器提供的重定向的结果）。

[0061] 在服务器选择器 104 能够把客户端请求直接定向到父服务器（或者定向到除边缘层外的任何层）的实施例中，获得客户端请求的服务器可以选择例如根据流行度，重定向该请求。不过，当阅读本说明书时，本领域的技术人员知道并且了解，明智的是跟踪请求的重定向，以避免循环重定向和 / 或无限重定向。避免这种问题的一种途径是限制重定向的级数（即，限制要遵从的重定向的数目）。在一种目前优选的实现中，如果在遵从例如 32 次重定向之后，没有选择任何最终服务器，那么发出出错消息。在一些实施例中，如果在预定数目的重定向之后，没有选择任何最终服务器，那么所到达的最后一个服务器可被用于提供内容。避免循环的一种途径是当重定向请求时，使用不同的服务器名称（别名）或者 IP 地址，以致收到请求的服务器能够断定该请求是否是重定向。当阅读本说明书时，本领域的技术人员知道并且了解，该信息可利用例如 HTTP 报头等，在服务器之间传送。

[0062] 当阅读本说明书时，本领域的技术人员知道并且了解，在多层 CDN 中，流行度服务可以位于任何一层，或者可在多于一层存在流行度服务。

[0063] 中间（父代）层是可选的。

[0064] 步骤 (4a) 可答复以内容（如果流行的话），或者答复以到父服务器或原始服务器的重定向（如果不流行的话），这种情况下，客户端将向该层发出另一个请求 (5a 或 5b)，以获得内容。

[0065] 如果请求是 HTTP GET 请求等，那么该请求被转发给流行度服务。HTTP POST 请求应该总是被直接转发给原始服务器，因为 HTTPPOST 请求需要在原始服务器被处理，并且对

POST 请求的响应不应被高速缓存。有时可取的是把 GET 请求定向到不同于 POST 请求的原始服务器。

[0066] 尽管关于 HTTP 协议说明了本发明，不过当阅读本说明书时，本领域的技术人员知道并且了解，可以使用不同的和 / 或其它协议，并且发明人预料了不同的和 / 或其它协议。在各种文档，例如 HypertextTransfer Protocol-HTTP/1.1，RFC 2616，Network Working Group 中描述了 HTTP，其全部内容在此引为参考。

[0067] 当阅读本说明书时，本领域的技术人员知道并且了解，对于 CDN 中的每一层，可以确定不同的阈值。此外，当阅读本说明书时，本领域的技术人员知道并且了解，每个内容项可具有与之关联的它自己的阈值。这样，系统能够检查所有内容的流行度，默认阈值为零。这样，每个请求将自动使流行度超过阈值，并使内容被高速缓存。

[0068] 通过区域性地（与父代高速缓存服务器配对地）布置流行度服务器，能够基于区域地独立管理流行度和高速缓存层。在一个区域 / 组中流行的内容在另一个区域 / 组中可能并不流行（尤其是如果每个区域 / 组对应于地理和 / 或政治区域的话）。

[0069] 我们认为理想的是到流行度服务器的集结把所谓的“区域性”接近区分优先次序，以致相同区域内的客户端往往会在该区域内投出他们的流行度“选票”，并且获得流行资源的一致处理。不过，如果存在可用的多个父代高速缓存服务器，那么一般将不存在把特定的客户端集结到特定的父服务器的尝试。

[0070] 定义 & 测量流行度

[0071] 在优选实施例中，根据在各个时间段中，对象 / 资源被请求的次数，测量对象 / 资源的流行度。图 6 是保存特定流行度服务器的流行度数据的例证数据结构。图 6 中的数据结构 600 是所谓的计数 (tally) 散列结构。

[0072] 在优选实施例中，一些或全部的边缘服务器与流行度服务器关联（或者绑定到流行度服务器）。绑定到流行度服务器的边缘服务器有时被称为绑定的长尾协同服务器。系统中的每个流行度服务器按绑定的长尾协同服务器，分配一个计数散列结构 800。配置提供要分配的资源（散列）时隙的数目。对一种目前优选的实现来说，散列时隙的数目约为每个协同服务器 1 亿个时隙的数量级。每个时隙被分成多个时间桶，最好 16 个时间桶，每个桶用例如 4 比特无符号整数表示。当阅读本说明书时，本领域的技术人员知道并且了解，每个时间桶中的值的大小的选择取决于与流行度阈值的约束，和使非常流行的资源保持在边缘的约束有关的策略决定。不过，所述大小严重受对紧致性的需要的影响。一个 8 字节字能够保存一个资源时隙的所有时间桶，于是，每种特性 (property) 需要 800MB，每个流行度服务器可以不分页地管理 5 ～ 8 种这样的特性。

[0073] 每个时间桶代表一个时间段，最好是若干秒。

[0074] 请求 / 内容到时隙的映射以对象名称，可能还有与对对象的请求关联的其它信息的某种函数为基础。可取的是，对象到时隙的映射以关于对象名称（最好包括查询串的某些部分）的散列或消息摘要函数（比如 MAD 等）为基础。于是，每个时隙可以代表一个或多个资源。每次查询 / 请求到达对象的流行度服务器时，都计算散列和确定（适当协同服务器的）表 800 中的时隙，使用该时隙中的计数。在散列冲突的情况下，于是有可能一个桶正在接收和代表多于一个的对象的计数。由于这种结果通常是不合需要的（因为它会导致不流行对象的高速缓存填充和边缘高速缓存），因此桶的数目应被选择成尽可能地大。

[0075] 当阅读本说明书时，本领域的技术人员知道并且了解，不同的和 / 或其它数据结构可被用于实现流行度计数。例如，由于在多数情况下，资源的总数预期远远超过流行资源的数目，因此，平衡 b-tree 可能优于散列表。另外，通过仅仅使用散列的某一部分，能够减小散列时隙的大小。不过，减少使用的散列的字节数会导致更多的名称冲突。

[0076] 尽管上面关于流行度进行了说明，不过，当阅读本说明书时，本领域的技术人员知道并且了解，可以和流行度一起（或者代替流行度）使用其它因素来确定是否重定向请求。规则库可被用于扩充和 / 或超越某些资源的流行度量度。规则库中的规则可以是静态或者动态的，可以由 CDN 管理员和 / 或订户设定。例如，订户可能不想为从边缘提供的某些内容支付费用，不论内容的流行度如何，从而可据此设定规则（通过对于该特定内容设定阈值，以防止该内容被高速缓存在边缘，也可获得该特定结果）。

[0077] 偶尔的日志挖掘可被用于寻找实际的订户内容库中的散列冲突，可按需要调整散列函数和桶大小。

[0078] 在每个时间桶边界，流行度服务都将逻辑“旋转”桶，并使每个对象的最陈旧的计数 (tally) 数据归零。

[0079] 每当协同服务器在流行度服务中的登记发生变化（增加或丢失，或者可能提示被改变），数据结构都要被更新。

[0080] 给定对象的流行度可被确定为其在连续时间段内的流行度的加权和。更近的时间段可被赋予较高的权重。

[0081] 为了确定哪个内容将由流行度服务管理，CDN 操作员和 / 或订户可以规定：

[0082] • 内容将受到管理的各个层 - 边缘层，中间层（即，父代层）或者原始层（订户层或者存储层）。为了有意义，应启用中间和原始服务至少之一。

[0083] • 要根据其流行度管理的、而不是仅仅总是从高速缓冲存储器提供的内容。

[0084] 出版者 / 订户不希望从高速缓存 CDN 服务提供所谓的“长尾”内容的原因有几个，例如：

[0085] • 如果从订户的原始服务器完成高速缓存填充，因而订户支付高速缓存填充带宽的费用，那么不流行资源的不必要填充会增大带宽成本，而不带来任何益处。

[0086] •通过 CDN 高速缓存提供不流行的资源会增大等待时间（归因于高速缓存填充），有实际上迫使流行资源离开高速缓存，可能导致系统抖动的危险。结果是效率低和服务恶化的风险。

[0087] 考虑到相关或者类似的原因，CDN 提供者通常也不希望从边缘高速缓冲存提供长尾内容：

[0088] • 如果从原始层存储器完成高速缓存填充，那么不必要的高速缓存填充消耗存储系统和高速缓存系统的带宽，增大（加倍）服务的内部成本。这将降低效率，因为为了向外部提供相同的内容，内部需要相对更多的带宽。

[0089] • 从 CDN 的观点来看，上面的第二个理由也适用 :CDN 操作员希望使等待时间以及系统抖动的风险降到最小，以便满足其所有订户。

[0090] 名称、地址 & 配置数据

[0091] 众所周知，网络中的每个服务器可借助一个或多个网络地址（例如，因特网协议地址或者说 IP 地址）被寻址。网络中的每个服务器也可因一个或多个名称（所谓的主机

名 - 完全限定域名）而众所周知。主机名可被映射到一个或多个 IP 地址。主机名可以对应于（从而解析到）多于一个服务器。

[0092] 诸如 ITM(在上面提及的 ITM 专利申请中描述的）之类的系统允许一种主机名（称为总名 (supername)）涉及多个服务器，并把该总名解析到附近的服务器。

[0093] 最好，服务器选择机构是 ITM，每个流行度服务器具有解析到附近的流行度服务器的总名。

[0094] 当流行度服务器与父服务器共享或者与父服务器共处一地时，父服务器可以使用依据其对该父服务器寻址的名称来确定是否把请求定向到流行度服务。即，提供流行度服务的父代高速缓存服务器可以识别使用专供流行度请求之用的别名之一的请求，并调入流行度服务，以如上所述作出填充 / 不填充决定，和返回重定向。

[0095] 如前所述，如果服务器选择器机构不向非边缘服务器发送初始请求，那么所有父代高速缓存服务器必须识别已被重定向的请求，并通过从原始层（或者另一层）填充所请求的资源（如果需要的话），提供所请求的资源。

[0096] 服务器主机名也被称作其别名。每个长尾协同服务器最好具有至少两个别名（如果使用父代高速缓存 / 服务器层的话，那么三个别名）：公布的总名，用于流行度服务请求的主机名，和（如果使用的话）用于父代高速缓存重定向的主机名。

[0097] 最好借助 ITM 总名与流行度服务器取得联系，ITM 将监控该组服务器内服务的可用性。应利用真实的 IP 地址，而不是虚拟 IP 与流行度服务器取得联系，在群集内，流行度服务器不一定是冗余的。通过每个总名具有多个服务器，可以提供冗余性。不过，最好不要尝试使流行度服务器上的流行度计数同步，预期的理想效果是基于“地区”地单独管理流行度，粒度由部署的流行度服务器的数目和分布确定。如果流行度服务器失败，那么当新的服务器对给定边缘位置变得有效时，这会导致流行度响应的不连续，不过通过周期性的背景刷新，可以减轻流行度响应的不连续（对于非常流行的资源来说）。

[0098] 关于资源和高速缓存策略的信息包括下述：

[0099] - 与该协同服务器关联的资源的预期总数。

[0100] - 用于保存每个资源的命中计数的桶的数目。

[0101] - 每个桶代表的秒数。每当该时间间隔过去时，最陈旧的桶中的计数被丢弃，从为零的计数开始新的桶。

[0102] - 当在任意流行度服务器上，给定资源的所有桶的总和达到该数字时，使用该服务器的父代高速缓冲存储器（如果有的话）将开始高速缓存该资源。

[0103] - 当在任意流行度服务器上，给定资源的所有桶的总和达到该数字时，使用该服务器的边缘高速缓存将开始高速缓存该资源。

[0104] - 要应用于资源名称的散列算法（可选）。如果未指定，那么将使用默认算法（例如，MD5）。

[0105] - 在任意给定时间，该协同服务器的应在位于边缘的高速缓存中的资源的最大数目。在一些实施例中可以忽略这个值。

[0106] - 在任意给定时间，该协同服务器的应在位于父代的高速缓存中的资源的最大数目。在一些实施例中可以忽略这个值。

[0107] 最好，在父代高速缓存服务器上，资源不应提前过期，因为这会导致对原始服务器

的不必要请求，或者对对等高速缓存的不必要查询。

[0108] 当阅读本说明书时，本领域的技术人员会知道和了解，仅仅基于流行度计数的在给定层提供服务的决定不考虑在该层提供服务的容量－以致这种方案可能使原始服务器或者父代层过载，如果它们不具有足够的容量的话。此外，如果关于请求数目的绝对阈值来测量流行度，并且如果内容库足够大，那么这会在父代层或边缘层导致高速缓存抖动。

[0109] 如果需要的话，那么对于原始高速缓存或服务器的验证应由从客户端收到初始请求的服务器进行。在被重定向的请求的处理期间。

[0110] 各种文献，包括专利和专利申请已在本申请中引为参考。如果发生引入的文献和本申请之间的任何冲突，那么将以本申请（包括其中的任何定义）为准。

[0111] 从而提供一种通过设计内容被置于 CDN 中的何处，和从 CDN 中的何处提供内容，从而允许 CDN 对内容的不断增加或降低的“流行度”作出响应的特征。

[0112] 出于举例说明的目的给出了上述说明。上述说明不是穷尽的，也并不意图把本发明限制于公开的具体形式。鉴于上述教导，可做出显而易见的各种修改或变化。选择和说明上面讨论的一个或多个实施例是为了更好地举例说明本发明的原理及其实际应用，从而使本领域的技术人员能够在各个实施例中，并且借助适合于预期的预定应用的各种修改利用本发明。所有这样的修改和变化都在当按照公平、合法地授予附加权利要求的广度解释附加权利要求时，由附加的权利要求限定的本发明的范围之内。

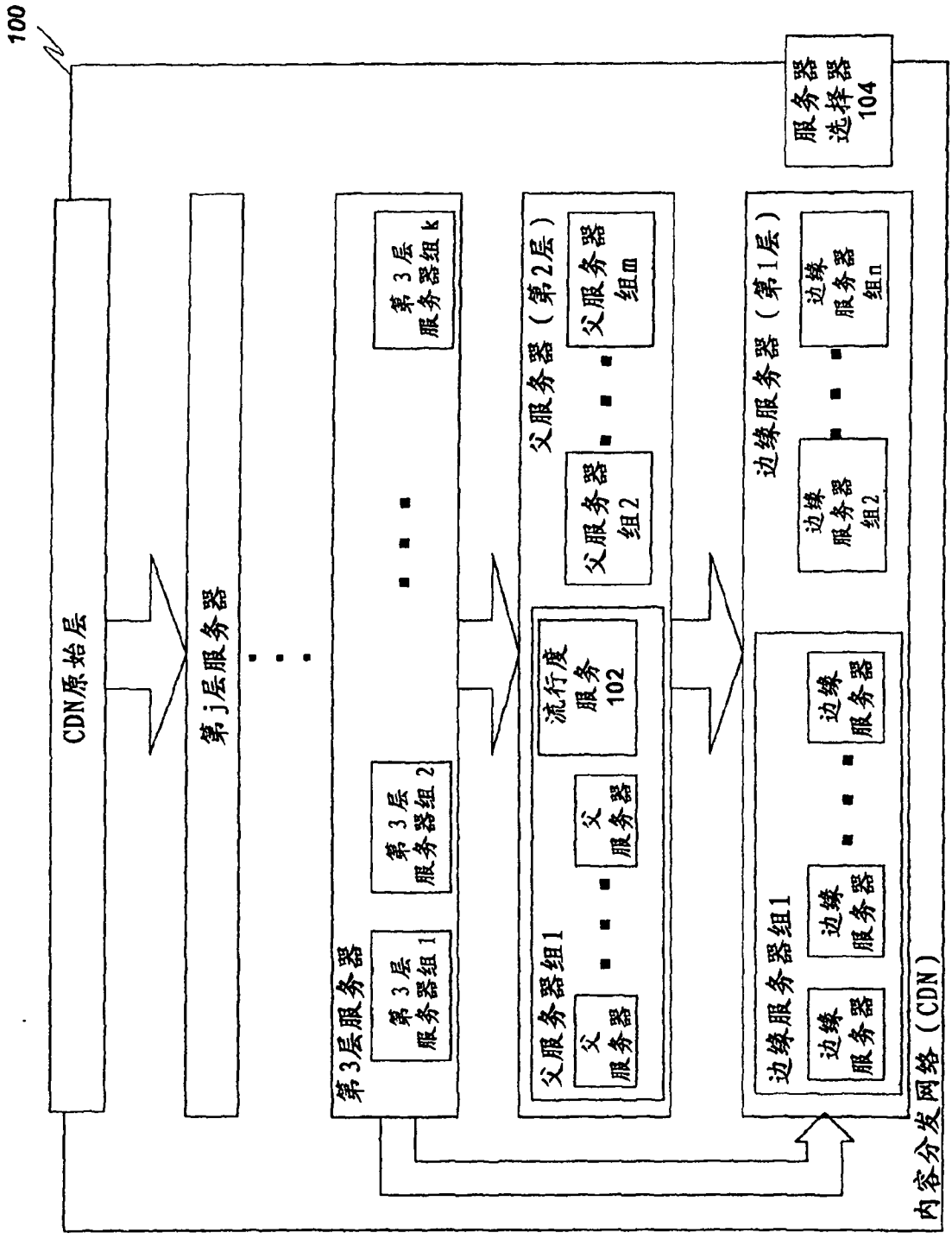

100
CDN原始层
第j层服务器
第3层服务器
第3层服务器组1
父
服务器
第3层服务器组2
第3层服务器组k
父服务器组1
父
服务器
流行度服务102
父服务器（第2层）
父服务器组2
父服务器组m
边缘服务器（第1层）
边缘服务器组1
边缘服务器
边缘服务器
边缘服务器
边缘服务器组2
边缘服务器组n
服务器选择器104
内容分发网络（CDN）

图 1

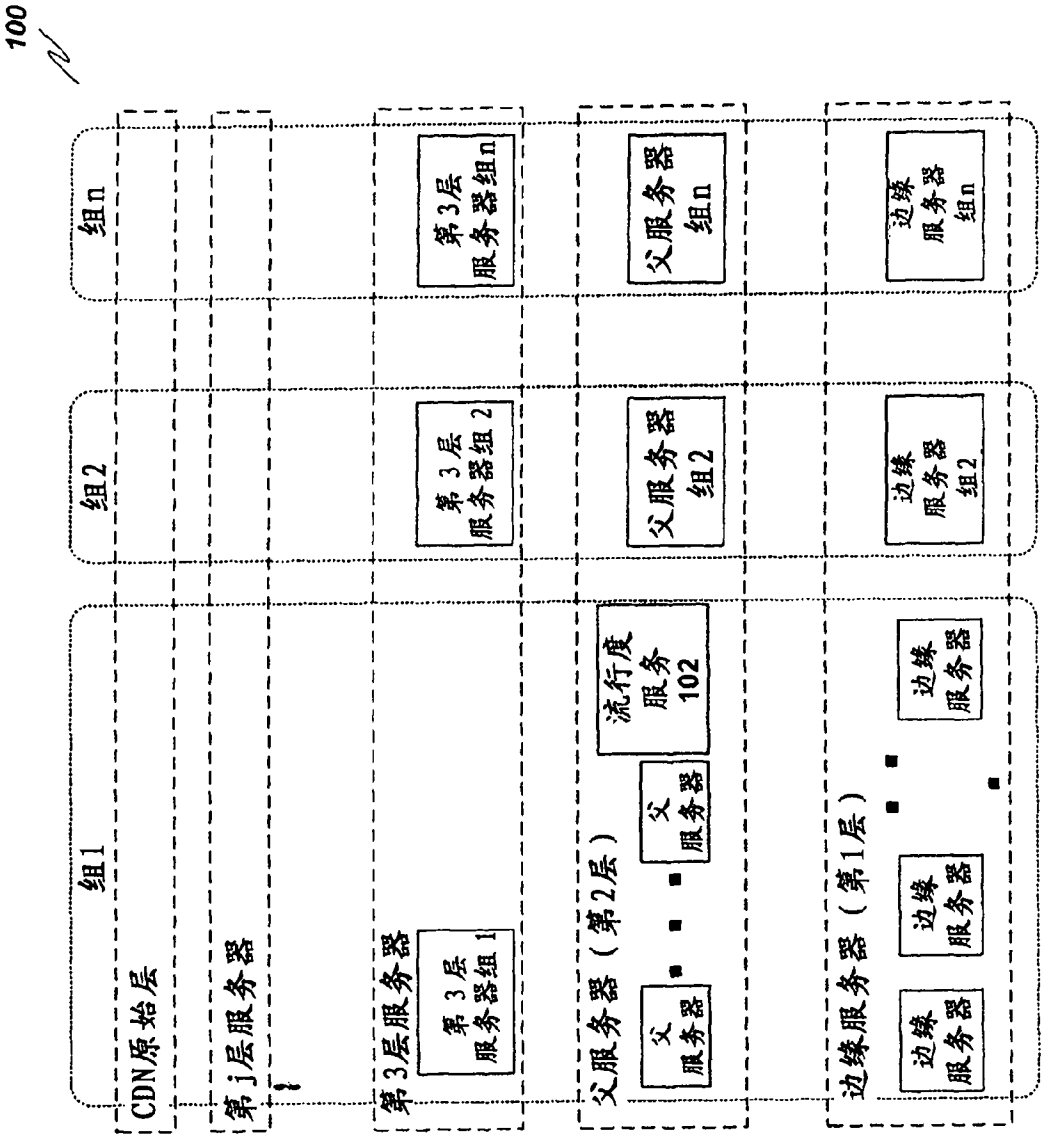

100
组1
组2
组n
CDN原始层
第1层服务器
第3层服务器
第3层服务器组1
第3层服务器组2
第3层服务器组n
父服务器（第2层）
父服务器
父服务器
流行度服务102
父服务器组2
父服务器组n
边缘服务器（第1层）
边缘服务器
边缘服务器
边缘服务器
边缘服务器组2
边缘服务器组n

图 2

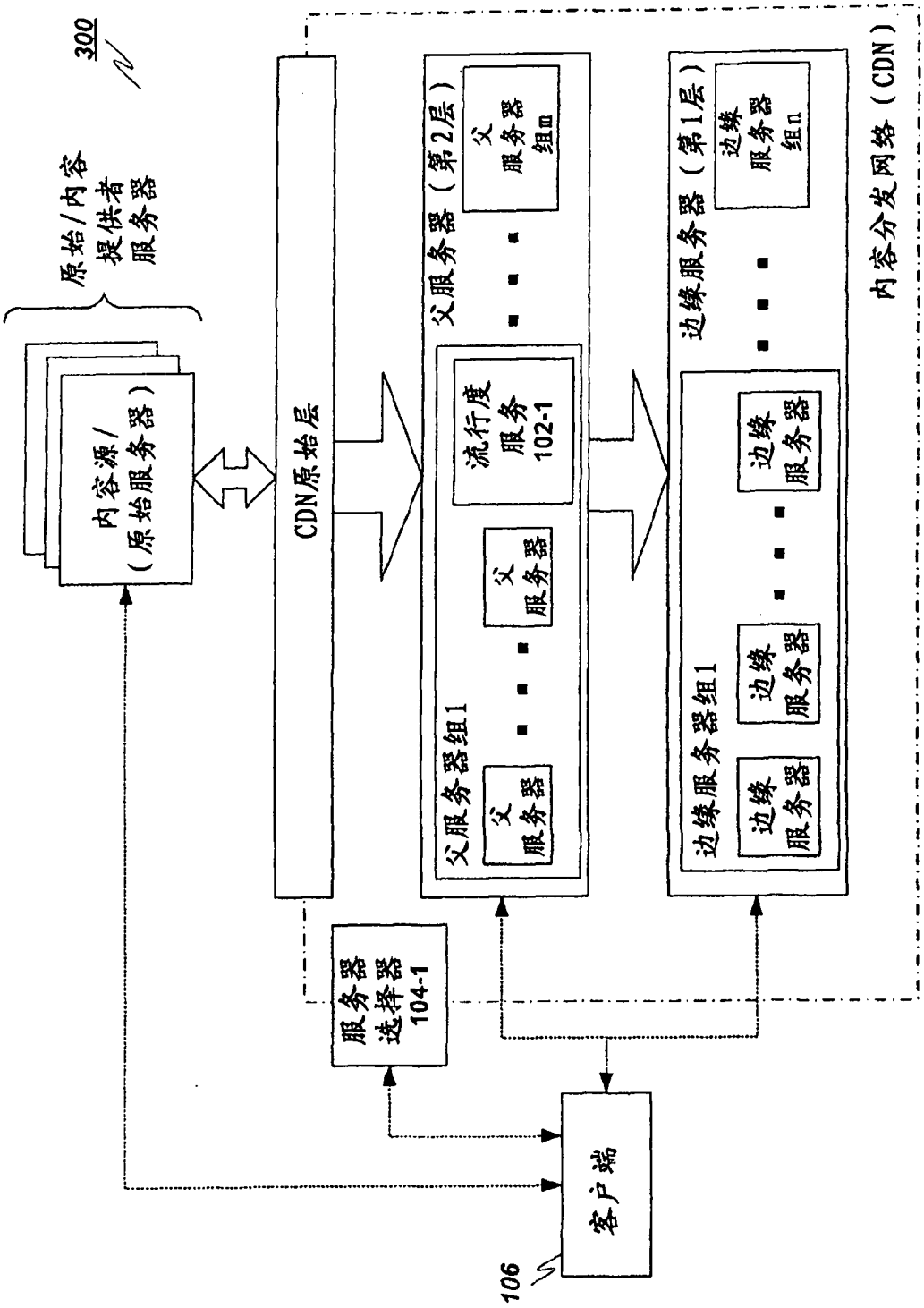

300
原始/内容提供者服务器
内容源/(原始服务器)
CDN原始层
父服务器(第2层)
父服务器组m
流行度服务102-1
父服务器
父服务器组1
父服务器
边缘服务器(第1层)
边缘服务器组n
边缘服务器
边缘服务器
边缘服务器组1
边缘服务器
边缘服务器
服务器选择器104-1
客户端
106
内容分发网络(CDN)

图 3

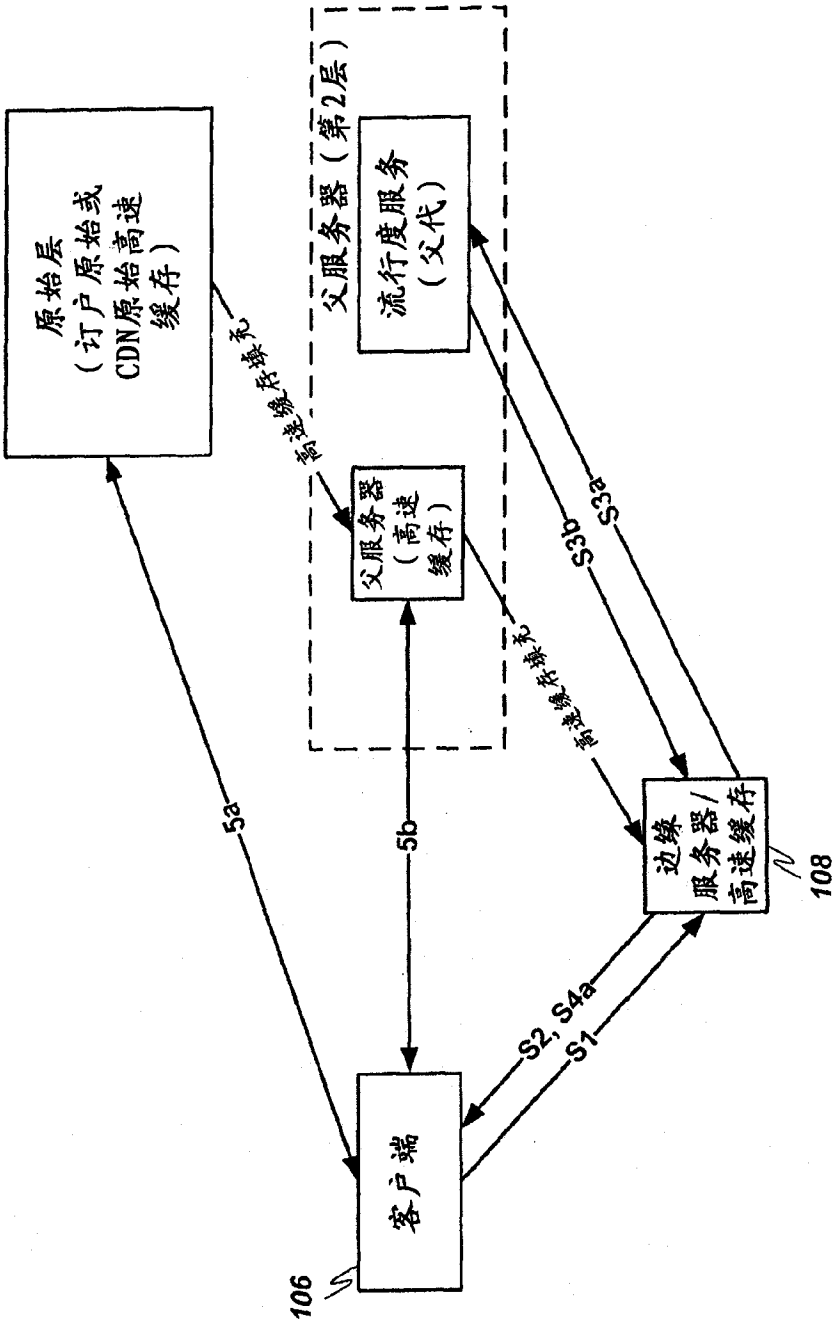

原始层
（订户原始或
CDN原始高速
缓存）
父服务器（第2层）
流行度服务
（父代）
父服务器
（高速
缓存）
高速缓存填充
高速缓存填充
S3a
S3b
5a
5b
边缘
服务器/
高速缓存
108
S2, S4a
S1
客户端
106

图 4

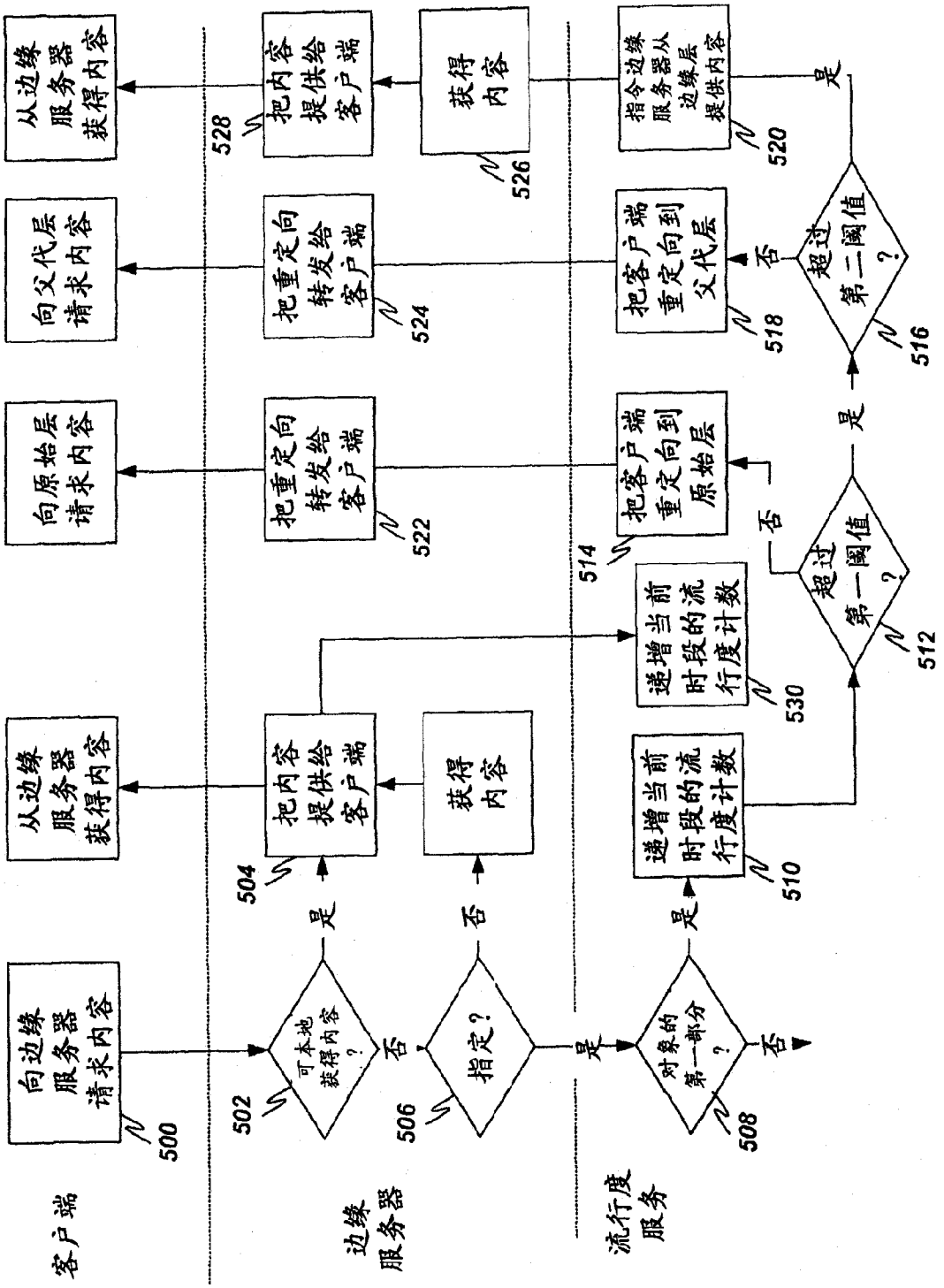

客户端
边缘服务器
流行度服务
向边缘服务器请求内容
500
可本地获得内容？
502
是
否
从边缘服务器获得内容
把内容提供给客户端
504
获得内容
指定？
506
是
否
递增当前时段的流行度计数
510
对象的第一部分？
508
是
否
从边缘服务器获得内容
把内容提供给客户端
528
获得内容
526
指令边缘服务器从边缘层提供内容
520
是
向父代层请求内容
把重定向转发给客户端
524
把客户端重定向到父代层
518
否
超过第二阈值？
516
是
向原始层请求内容
把重定向转发给客户端
522
把客户端重定向到原始层
514
否
递增当前时段的流行度计数
530
超过第一阈值？
512
是
否

图 5

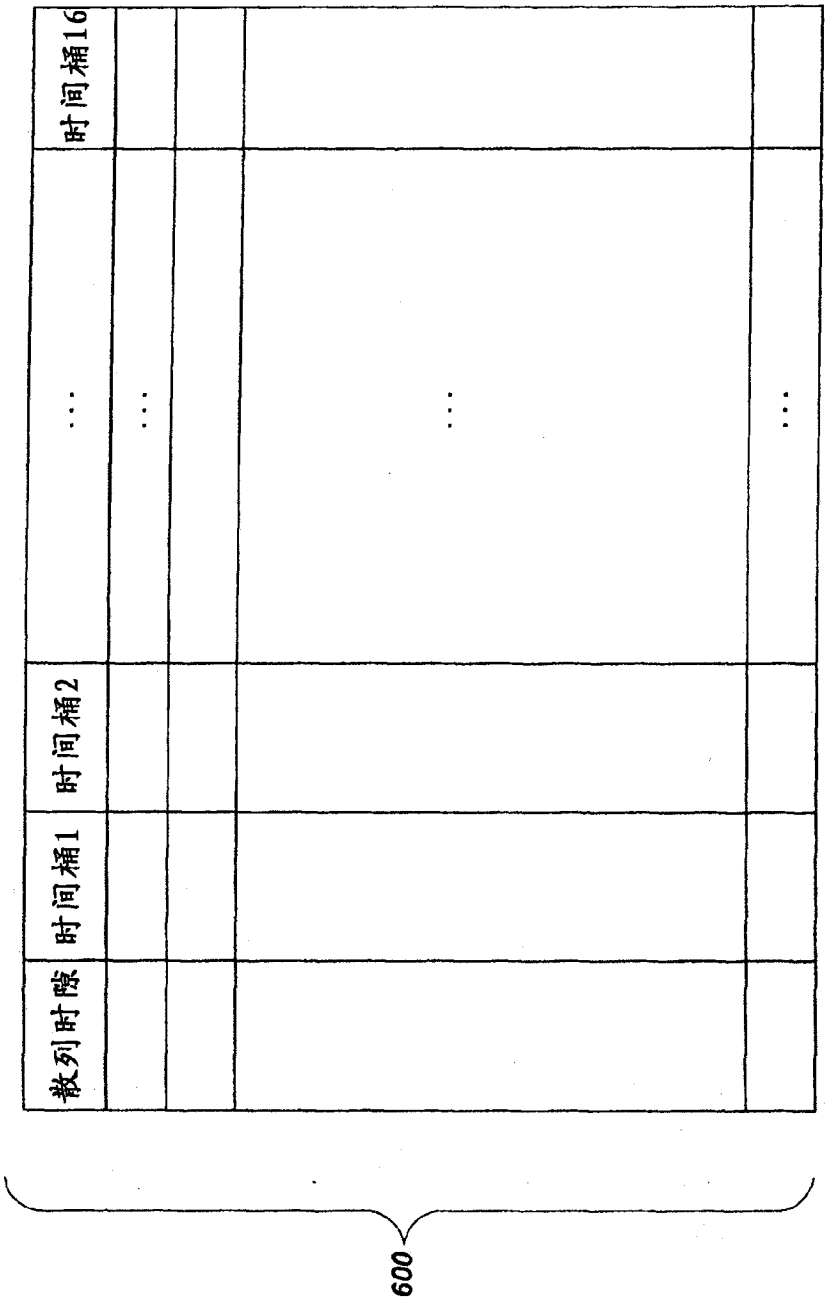


图 6

Electronic Acknowledgement Receipt

EFS ID:	25731604
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	10-MAY-2016
Filing Date:	14-DEC-2012
Time Stamp:	12:49:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	CN102047244A.pdf	2388036 2ff86f9c59b34e08bd109d6bf382471fd7247f67	no	19

Warnings:	
Information:	

2	Other Reference-Patent/App/Search documents	CN_2012800617123_ExRpt_24Feb16_394CN01.pdf	981096 f10711e098d55c9b63a35670b300dd90152fe915	no	40
Warnings:					
Information:					
3	Non Patent Literature	Wang_etal_2004_Study_Summarize_Distribution_Technology.pdf	586957 03be07656e6b6659b576fbe757aab43340e0fada	no	7
Warnings:					
Information:					
		Total Files Size (in bytes):	3956089		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21398 7590 05/25/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 05/25/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	08/25/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21398 7590 05/25/2016
Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	08/25/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WHIPPLE, BRIAN P	2454	709-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 05/25/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	**PAPER NUMBER**
2454	

DATE MAILED: 05/25/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/714,410	Applicant(s) NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2454	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the request for continued examination filed on 5/10/16*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-50*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Brian P. Whipple/
Primary Examiner, Art Unit 2454

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2448
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]
		CN-102047244A	May 4, 2011	Lipstone, Laurence et al.		

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Chinese Examination Report, dated February 24, 2016, Application No. 201280061712.3, filed December 14, 2012; Dkt. No. 0394-CN-01 , 40 pgs.	
		WANG, WEIWEI et al., "The Study Summarize for Distribution Technology of Streaming Media under the Basement of CDN", Computer Engineering and Application Vol. 40, No. 8 2004 , 7 pgs.	

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 05/16/2016

Substitute Disclosure Statement Form (PTO-1449)

* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.P.W./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

CPC						
Symbol					**Type**	**Version**
H04L		67	/	32	F	2013-01-01
H04L		67	/	26	I	2013-01-01
H04L		67	/	2852	I	2013-01-01
H04L		63	/	166	A	2013-01-01
H04L		41	/	0893	I	2013-01-01
H04L		67	/	42	I	2013-01-01
H04L		41	/	0856	I	2013-01-01
H04L		41	/	5064	I	2013-01-01
H04L		41	/	509	I	2013-01-01
H04L		67	/	34	I	2013-01-01
H04L		67	/	2842	I	2013-01-01
			/			
			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	05/16/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		G	0	6	F	15 / 16 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	05/16/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33		49								
	2		18		34		50								
	3		19		35										
	4		20		36										
	5		21		37										
	6		22		38										
	7		23		39										
	8		24		40										
	9		25		41										
	10		26		42										
	11		27		43										
	12		28		44										
	13		29		45										
	14		30		46										
	15		31		47										
	16		32		48										

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454 (Primary Examiner)	05/16/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office

Part of Paper No. 20160516

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	Art Unit
	BRIAN P WHIPPLE	2454

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search history attached	6/23/15	BPW
Double patenting search conducted	6/23/15	BPW
Updated search (EAST search history attached)	12/29/15	BPW
Inventor name search conducted	12/29/15	BPW
Updated search (EAST search history attached)	2/29/16	BPW
Double patenting search conducted	2/29/16	BPW
Updated search (EAST search history attached)	4/25/16	BPW
Double patenting search conducted	4/25/16	BPW
Updated search (EAST search history attached)	5/16/16	BPW
Double patenting search conducted	5/16/16	BPW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04L	67/32	12/29/15	BPW
H04L	67/42	12/29/15	BPW
H04L	41/0893	12/29/15	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
H04L	67/26	12/29/15	BPW
H04L	67/32	2/29/16	BPW
H04L	67/42	2/29/16	BPW
H04L	41/0893	2/29/16	BPW
H04L	67/26	2/29/16	BPW
H04L	67/32	4/25/16	BPW
H04L	67/42	4/25/16	BPW
H04L	41/0893	4/25/16	BPW
H04L	67/26	4/25/16	BPW
H04L	67/32	5/16/16	BPW
H04L	67/42	5/16/16	BPW
H04L	41/0893	5/16/16	BPW
H04L	67/26	5/16/16	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L7	37	(("LEVEL") near3 ("3") near3 ("COMMUNICATIONS") near3 ("LLC")).AANM.	USPAT	AND	ON	2016/05/16 12:28
L8	283	(("NEWTON") near3 ("Christopher")).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2016/05/16 12:28
L9	89	(("LIPSTONE") near3 ("Laurence")).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2016/05/16 12:28
L10	103	(("CROWDER") near3 ("William")).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2016/05/16 12:28
L11	42	(("KOLLER") near3 ("Jeffrey")).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2016/05/16 12:28
L12	40	(("FULLAGAR") near3 ("David")).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2016/05/16 12:28
L13	23	(("YEVMENKIN") near3 ("Maksim")).INV.	US-PGPUB; USPAT; USOCR	AND	ON	2016/05/16 12:28
L14	363	8 or 9 or 10 or 11 or 12 or 13	US-PGPUB; USPAT; EPO	AND	ON	2016/05/16 12:29
L15	3	7 14	US-PGPUB; USPAT; EPO	AND	ON	2016/05/16 12:29
L16	80461	CDN.CLM. or global.clm.	US-PGPUB; USPAT; EPO	AND	ON	2016/05/16 12:29
L17	54	14 16	US-PGPUB; USPAT; EPO	AND	ON	2016/05/16 12:29
L18	29	CDN.CLM. global.clm.	US-PGPUB; USPAT; EPO	AND	ON	2016/05/16 12:29
L19	3	14 18	US-PGPUB; USPAT; EPO	AND	ON	2016/05/16 12:29

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	17417	H04L67/32.CPC. OR H04L67/42.CPC. OR H04L41/0893.CPC. OR H04L67/26.CPC.	US-PGPUB; USPAT	AND	ON	2016/05/16 12:18
L2	64	content ADJ delivery ADJ network.CLM. global.CLM.	US-PGPUB; USPAT	AND	ON	2016/05/16 12:18
L3	9	1 2	US-PGPUB; USPAT	AND	ON	2016/05/16 12:18

L4	29	CDN.CLM. global.CLM.	US-PGPUB; USPAT	AND	ON	2016/05/16 12:19
L5	9	1 4	US-PGPUB; USPAT	AND	ON	2016/05/16 12:19
L6	9	3 5	US-PGPUB; USPAT	AND	ON	2016/05/16 12:19

5/16/2016 12:30:01 PM
C:\Users\bwhipple\Documents\EAST\Workspaces\13714410.wsp

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number..

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2454
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
		20050086348	Apr 21, 2005	Balassanian, Edward	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER **DATE CONSIDERED**

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier/Kathleen McInnish
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
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($)
Miscellaneous:				
RCE- 2nd and Subsequent Request	1820	1	1700	1700
		Total in USD ($)		**1700**

Electronic Acknowledgement Receipt

EFS ID:	26340592
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	13-JUL-2016
Filing Date:	14-DEC-2012
Time Stamp:	16:22:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1700
RAM confirmation Number	071416INTEFSW16231600
Deposit Account	2496
Authorized User	Kathleen McInnish

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	394U1_rce.pdf	1349884 56193720e0a48eae3b017258bcd472ed14f7a051	no	3
Warnings:					
Information:					
2	Transmittal Letter	394U1_IDS.pdf	37093 3c325a8305098a453271bee791a0e8959c9404b7	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	28499 00b208f21db24cdcf47cafa3b3397ede362bf84d	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Fee Worksheet (SB06)	fee-info.pdf	30338 97c94e98848038782 4d41343d57b75fc9293bc2c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1445814		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	13714410	Filing Date	2012-12-14	Docket Number (if applicable)	0394-US-U1	Art Unit	2454
First Named Inventor	NEWTON, Christopher			Examiner Name	WHIPPLE, Brian P.		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, to any international application that does not comply with the requirements of 35 U.S.C. 371, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV.

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 505063

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-14)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/JCS/	Date (YYYY-MM-DD)	2016-07-13
Name	Jonathan C. Siekmann	Registration Number	58259

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	13/714,410	Confirmation No.	:	9250
First Applicant	:	NEWTON et al.	Art Unit	:	2454
Filed	:	December 24, 2012	Examiner	:	Brian P. Whipple
Title	:	CONTENT DELIVERY NETWORK			
Docket No.	:	0394-US-U1			

Submitted Via EFS-Web

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT PURSUANT TO 37 C.F.R. §§ 1.56, 1.97, AND 1.98

Sir:

The Examiner is respectfully requested to consider the patents, patent applications, publications, or other information cataloged on the enclosed Form (e.g., PTO-1449, PTO-892, PTO/SB/08, etc.) during examination of the above-identified patent application. The order of presentation of the references should not be construed as an indication of importance. These references are submitted for the Examiner's consideration and are submitted pursuant to an Applicant's duty of disclosure under 37 C.F.R. § 1.56.

Copies of all of the cited documents:

☐ are enclosed unless otherwise indicated on the enclosed Form PTO/SB/08a.

☐ have been previously furnished to the Office in prior application No. _____, filed _____, which the present application relies upon for an earlier effective filing date under 35 U.S.C. § 120. Therefore, no copies of the cited documents are included herewith pursuant to 37 C.F.R. § 1.98(d); MPEP § 609(III)(A)(2).

☒ are enclosed unless they are U.S. patents or U.S. patent application publications pursuant to 37 C.F.R. § 1.98(a).

I
BASIS

This information disclosure statement is filed pursuant to

☒ 37 C.F.R. § 1.97(b).
This information disclosure statement is filed either (1) within three months of the filing date of a national application other than a continued prosecution application under 37 C.F.R. § 1.53(d); (2) within three months of the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in an international application; (3) before the mailing date of a first Office action on the merits; (4) concurrently with the filing of a request for continued examination under 37 C.F.R. § 1.114; or (5) before the mailing of a first Office action after the filing of a request for continued examination under 37 C.F.R. § 1.114, whichever event occurs last.

Accordingly, this information disclosure statement requires no fee and no certification.

☐ 37 C.F.R. § 1.97(c).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(b), but before the mailing date of any of (1) a final action under 37 C.F.R. § 1.113; (2) a notice of allowance under 37 C.F.R. § 1.311; or (3) an action that otherwise closes prosecution in the application.

Accordingly, this information disclosure statement requires either the fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c), or a statement under 37 C.F.R. § 1.97(e).

☐ 37 C.F.R. § 1.97(d).
This information disclosure statement is filed after the period specified in 37 C.F.R. § 1.97(c) since a:

☐ final action under 37 C.F.R. § 1.113

☐ notice of allowance under 37 C.F.R. § 1.311

was mailed to the Applicant on _____.

Accordingly, this information disclosure statement requires the fee set forth in 37 C.F.R. § 1.17(p) to consider an information disclosure statement under 37 C.F.R. § 1.97(d), and a statement under 37 C.F.R. § 1.97(e).

If this statement crosses in the mail with an Office action, or is otherwise not in the indicated category of 37 C.F.R. § 1.97, it is respectfully requested that this statement be treated in the next appropriate category and made of record. To the extent required, please treat this paper as a conditional petition for acceptance of the information disclosure statement.

II
FEES

Any required fee is being paid as indicated below:

☒ No fee is due.

☐ The $180 fee specified in 37 C.F.R. § 1.17(p) for submission of an information disclosure statement under 37 C.F.R. § 1.97(c) or (d) is due.

☐ This fee is paid by credit card.

☐ Please charge the required fee to Deposit Account No. 505063.

☒ The Commissioner is hereby authorized to charge any additional required fees or credit any overpayments associated with this information disclosure statement to the account.

III
CERTIFICATION

Pursuant to 37 C.F.R. § 1.97(e), I state as follows:

☒ No statement is necessary.

☐ Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(1).

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information contained in this information disclosure statement was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this information disclosure statement. 37 C.F.R. § 1.97(e)(2).

Pursuant to 37 C.F.R. § 1.704(d), I state as follows:

☐ Each item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart application, and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this information disclosure statement.

IV
FOREIGN LANGUAGE REFERENCES

Pursuant to 37 C.F.R. § 1.98(a)(3)(i), any information disclosure statement filed under 37 C.F.R. § 1.97 shall include a concise explanation of the relevance, as it is presently understood by the individual designated in § 1.56(c) most knowledgeable about the content of the information, of each patent, publication, or other information listed that is not in the English language. The concise explanation may be either separate from the specification or incorporated therein. In compliance with the rules, the Applicant states as follows:

☐ No concise explanation is required since all cited references are in English.

☐ A concise explanation of the relevance of one or more foreign language references is attached.

☐ According to the procedural policy adopted by the PTO with regard to disclosure requirements, the Applicant is satisfying the disclosure requirement pursuant to MPEP § 609.04(a)(III) by submitting herewith the following:

- ☐ English language versions of any non-English language documents.
- ☐ English language versions of one or more search reports or other actions by one or more foreign patent offices in one or more counterpart foreign applications, which indicate the degree of relevance found by the foreign office(s).
- ☐ Pursuant to 37 C.F.R. § 1.98(a)(3)(ii), a copy of a translation is not submitted herewith because a written English-language translation of a non-English-language document, or portion thereof, is not within the possession, custody, or control of, or is readily available to any individual designated in § 1.56(c).

The Applicant has not analyzed these documents and, therefore, declines to comment on their relevance at this time.

☐ One or more English language abstracts for the non-English language references are also enclosed.

V
REMARKS

It is respectfully requested that:

(1) The Examiner sign the enclosed Form to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

(2) The citations for the cited information be printed on any patent that issues from this application.

The submission of this information disclosure statement by the Applicant shall not be construed as a representation that a search has been performed or that no other material information under 37 C.F.R. § 1.56 exists. See 37 C.F.R. § 1.97(g).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, material to the patentability of one or more of the pending claims in this application pursuant to 37 C.F.R. § 1.56(b), unless specifically designated by the Applicant as such. See 37 C.F.R. § 1.97(h).

The submission of this information disclosure statement by the Applicant shall not be construed as an admission that any information cited or referred to herein is, or is considered to be, or even qualifies as "prior art" under 35 U.S.C. § 102 with respect to this invention, unless specifically designated by the Applicant as such.

Notwithstanding any statements by the Applicant, the Examiner is urged to form his or her own conclusion regarding the relevance of the cited information.

VI
CONCLUSION

The Examiner is encouraged to contact the undersigned attorney to discuss any questions concerning this information disclosure statement or any of the information cited or referred to herein.

Respectfully submitted,

Date: July 13, 2016

/JCS/

Jonathan C. Siekmann, Reg. No. 58,259
USPTO Customer No. 83579
Level 3 Communications, LLC
1025 Eldorado Blvd.
Broomfield, Colorado 80021
Tel: 720-888-2140

Electronic Acknowledgement Receipt

EFS ID:	26340592
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier/Kathleen McInnish
Filer Authorized By:	David Dewey Wier
Attorney Docket Number:	0394-US-U1
Receipt Date:	13-JUL-2016
Filing Date:	14-DEC-2012
Time Stamp:	16:22:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1700
RAM confirmation Number	071416INTEFSW16231600
Deposit Account	505063
Authorized User	Kathleen McInnish

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.17 (Patent application and reexamination processing fees)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	394U1_rce.pdf	1349884 56193720e0a48eae3b017258bcd472ed14f7a051	no	3
Warnings:					
Information:					
2	Transmittal Letter	394U1_IDS.pdf	37093 3c325a8305098a453271bee791a0e8959c9404b7	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	394U1_sb08.pdf	28499 00b208f21db24cdcf47cafa3b3397ede362bf84d	no	1
Warnings:					
This is not an USPTO supplied IDS fillable form					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30338 97c94e98848038782 4d41343d57b75fc9293bc2c	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1445814		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21398 7590 08/10/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 08/10/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	11/10/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21398 7590 08/10/2016
Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION: CONTENT DELIVERY NETWORK

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	11/10/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WHIPPLE, BRIAN P	2454	709-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	12/14/2012	Christopher Newton	0394-US-U1	9250

21398 7590 08/10/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

EXAMINER	
WHIPPLE, BRIAN P	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 08/10/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/714,410	Applicant(s) NEWTON ET AL.	
	Examiner Brian P. Whipple	Art Unit 2454	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the request for continued examination filed on 7/13/16*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-50*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Brian P. Whipple/
Primary Examiner, Art Unit 2454

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

	Complete if Known
Application Number	13/714,410
Filing Date	Dec 14, 2012
First Named Inventor	Christopher Newton
Art Unit	2454
Examiner Name	Brian P. Whipple

Sheet	1	of	1	Attorney Docket No: 0394-US-U1

US PATENT DOCUMENTS

Examiner Initial *	Cite No	Document Number	Publication Date	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear
/B.P.W./		20050086348	Apr 21, 2005	Balassanian, Edward	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No	Foreign Patent Document	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or RelevantFigures Appear	T[2]

OTHER DOCUMENTS -- NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]

EXAMINER /Brian P. Whipple/ **DATE CONSIDERED** 08/05/2016

Substitute Disclosure Statement Form (PTO-1449)
* EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional) 2 Applicant is to place a check mark here if English language Translation is attached

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	Art Unit
	BRIAN P WHIPPLE	2454

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search history attached	6/23/15	BPW
Double patenting search conducted	6/23/15	BPW
Updated search (EAST search history attached)	12/29/15	BPW
Inventor name search conducted	12/29/15	BPW
Updated search (EAST search history attached)	2/29/16	BPW
Double patenting search conducted	2/29/16	BPW
Updated search (EAST search history attached)	4/25/16	BPW
Double patenting search conducted	4/25/16	BPW
Updated search (EAST search history attached)	5/16/16	BPW
Double patenting search conducted	5/16/16	BPW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H04L	67/32	12/29/15	BPW
H04L	67/42	12/29/15	BPW
H04L	41/0893	12/29/15	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

INTERFERENCE SEARCH			
US Class/ CPC Symbol	**US Subclass / CPC Group**	**Date**	**Examiner**
H04L	67/26	12/29/15	BPW
H04L	67/32	2/29/16	BPW
H04L	67/42	2/29/16	BPW
H04L	41/0893	2/29/16	BPW
H04L	67/26	2/29/16	BPW
H04L	67/32	4/25/16	BPW
H04L	67/42	4/25/16	BPW
H04L	41/0893	4/25/16	BPW
H04L	67/26	4/25/16	BPW
H04L	67/32	5/16/16	BPW
H04L	67/42	5/16/16	BPW
H04L	41/0893	5/16/16	BPW
H04L	67/26	5/16/16	BPW
H04L	67/26	8/5/16	BPW
H04L	41/0893	8/5/16	BPW
H04L	67/42	8/5/16	BPW
H04L	67/32	8/5/16	BPW

	/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"20050086348".did.	US-PGPUB; USPAT; EPO	AND	ON	2016/08/05 10:57

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	18544	h04l67/32.cpc. or h04l67/42.cpc. or h04l41/0893.cpc. or h04l67/26.cpc.	US-PGPUB; USPAT	AND	ON	2016/08/05 10:58
L3	65	content adj delivery adj network.clm. global.clm.	US-PGPUB; USPAT	AND	ON	2016/08/05 10:58
L4	30	cdn.clm. global.clm.	US-PGPUB; USPAT	AND	ON	2016/08/05 10:58
L5	9	2 (3 or 4)	US-PGPUB; USPAT	AND	ON	2016/08/05 10:58

8/5/2016 10:58:44 AM
C:\Users\bwhipple\Documents\EAST\Workspaces\13714410.wsp

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

CPC						
Symbol					**Type**	**Version**
H04L		67	/	32	F	2013-01-01
H04L		67	/	26	I	2013-01-01
H04L		67	/	2852	I	2013-01-01
H04L		63	/	166	A	2013-01-01
H04L		41	/	0893	I	2013-01-01
H04L		67	/	42	I	2013-01-01
H04L		41	/	0856	I	2013-01-01
H04L		41	/	5064	I	2013-01-01
H04L		41	/	509	I	2013-01-01
H04L		67	/	34	I	2013-01-01
H04L		67	/	2842	I	2013-01-01
			/			
			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	08/05/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office

Part of Paper No. 20160805

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
		G	0	6	F	15 / 16 (2006.01.01)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454	08/05/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13714410	NEWTON ET AL.
	Examiner	**Art Unit**
	BRIAN P WHIPPLE	2454

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17		33		49								
	2		18		34		50								
	3		19		35										
	4		20		36										
	5		21		37										
	6		22		38										
	7		23		39										
	8		24		40										
	9		25		41										
	10		26		42										
	11		27		43										
	12		28		44										
	13		29		45										
	14		30		46										
	15		31		47										
	16		32		48										

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 50	
/BRIAN P WHIPPLE/ Primary Examiner.Art Unit 2454 (Primary Examiner)	08/05/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office

Part of Paper No. 20160805

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
13714410	14-Dec-2012	Christopher Newton	0394-US-U1	9250

TITLE OF INVENTION :

CONTENT DELIVERY NETWORK

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	Utility under 35 USC 111(a)	2454	219000	BRIAN WHIPPLE

Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
$960	$0	$960	10-Nov-2016	$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
21398 Level 3 Communications, LLC Attn: Patent Docketing 1025 Eldorado Blvd. Broomfield CO 80021 UNITED STATES 720-888-3381 patent.docketing@level3.com	
☐ Change of correspondence address requested, system generated AIA/122-EFS form attached	☐ Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

○ Applicant asserting small entity status. See 37 CFR 1.27.
Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

◉ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

☒ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number 505063 . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.**

4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed
For printing on the patent front page, list to be displayed as entered

1.

2.

3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
Level 3 Communications, LLC	Broomfield	COLORADO	united states	other

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/David Dewey Wier/	**Date**	08-17-2016
Name	David Dewey Wier	**Registration Number**	48229

Electronic Patent Application Fee Transmittal

Application Number:	13714410
Filing Date:	14-Dec-2012
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Filer:	David Dewey Wier
Attorney Docket Number:	0394-US-U1

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility Appl Issue Fee	1501	1	960	960
Publ. Fee- Early, Voluntary, or Normal	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**960**

Electronic Acknowledgement Receipt

EFS ID:	26671472
Application Number:	13714410
International Application Number:	
Confirmation Number:	9250
Title of Invention:	CONTENT DELIVERY NETWORK
First Named Inventor/Applicant Name:	Christopher Newton
Customer Number:	21398
Filer:	David Dewey Wier
Filer Authorized By:	
Attorney Docket Number:	0394-US-U1
Receipt Date:	17-AUG-2016
Filing Date:	14-DEC-2012
Time Stamp:	17:17:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$960
RAM confirmation Number	081816INTEFSW17173400
Deposit Account	2496
Authorized User	Kathleen McInnish

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	45835 1b1c01c35f618decba0a94fc6a7b890ad756985b	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32172 edbe2024a99e8934da3e124c066bdcba57634c46	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	78007		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
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.

National Stage of an International Application under 35 U.S.C. 371
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.

New International Application Filed with the USPTO as a Receiving Office
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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/714,410	09/27/2016	9456053	0394-US-U1	9250

21398 7590 09/07/2016

Level 3 Communications, LLC
Attn: Patent Docketing
1025 Eldorado Blvd.
Broomfield, CO 80021

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 455 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Christopher Newton, Westlake Village, CA;
Laurence R. Lipstone, Calabasas, CA;
William Crowder, Camarillo, CA;
Jeffrey G. Koller, Oxnard, CA;
David Fullagar, Boulder, CO;
Maksim Yevmenkin, Thousand Oaks, CA;
LEVEL 3 COMMUNICATIONS, LLC, Broomfield, CO

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PTO/AIA/81A (02-25)
Approved for use through 09/30/2025. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Patent Number	9,456,053
Issue Date	09/27/2016
First Named Inventor	Christopher Newton
Title	CONTENT DELIVERY NETWORK
Attorney Docket No.	

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

26111

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the:

☐ Applicant.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on _____.

SIGNATURE of Applicant or Patent Owner

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant or patent owner if the applicant or patent owner is a juristic entity (e.g., corporation, university).

Signature	/Mark Chen/	Date	July 17, 2025
Name	Mark Chen	Telephone	310-999-1337
Title and Company	Sandpiper CDN, LLC		

NOTE: Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.

☒ A total of 1 forms are submitted.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0035. Public burden for this form is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. If filing this completed form by mail, send to: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
13/714,410	**07/18/2025 05:17:26 PM Z ET**	**0394-US-U1**

Title of Invention

CONTENT DELIVERY NETWORK

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	9456053
CONFIRMATION #	9250	FILED BY	Julia Vang
PATENT CENTER #	71438121	FILING DATE	12/14/2012
CUSTOMER #	21398	FIRST NAMED INVENTOR	Christopher Newton
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Jason Eisenberg

Documents

TOTAL DOCUMENTS: 2

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
2025-07-18-POA-81A-9456053.pdf	1	Power of Attorney	210 KB
2025-07-18-373-Statement-9456053.pdf	2	Assignee showing of ownership per 37 CFR 3.73	176 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
2025-07-18-POA-81A-9456053.pdf	D02164CA3033134D2F6CF970A162D6076438374B82BE876B99A58E09189B64F31C9347A6745DBB98BD96296C77810DFB88644CBE96346AACFA131D65842FA228
2025-07-18-373-Statement-	E453A4493BA56FBC43215CAA9E1EE73A42095CF30C53DAB4

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for 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

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

PTO/AIA/96 (11-23)
Approved for use through 11/30/2027. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

First Named Inventor/Patent Owner: Christopher Newton

Application No./Patent No.: 9,456,053 Filed/Issue Date: 09/27/2016

Titled: CONTENT DELIVERY NETWORK

Sandpiper CDN, LLC, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached*.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Christopher Newton, Laurence R. Lipstone, William Crowder, Jeffrey G. Koller, David Fullagar To: LEVEL 3 COMMUNICATIONS, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 032776, Frame 0198, or for which a copy thereof is attached*.

2. From: Maksim Yevmenkin To: LEVEL 3 COMMUNICATIONS, LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 033697, Frame 0653, or for which a copy thereof is attached*.

A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995, unless the information collection has a currently valid OMB Control Number. The OMB Control Number for this information collection is 0651-0031. Public burden for this form is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments regarding this burden estimate or any other aspect of this information collection, including suggestions for reducing this burden to the Chief Administrative Officer, United States Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450 or email InformationCollection@uspto.gov. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (11-23)
Approved for use through 11/30/2027. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: LEVEL 3 COMMUNICATIONS, LLC To: Sandpiper CDN, LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 068256, Frame 0091, or for which a copy thereof is attached*.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached*.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached*.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached*.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ *As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Jason D. Eisenberg/	2025-07-18
Signature	Date
Jason D. Eisenberg	43,447
Printed or Typed Name	Title or Registration Number

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