in industry, it can be anticipated that virtualization will be an essential part of future networks as it allows leasing and sharing the physical (network) infrastructure. In this regard, an important challenge is the allocation of substrate resources to instantiate multiple virtual networks. In order to do so, three main steps can be identified in the so called *slice embedding problem*: resource discovery, virtual network mapping and allocation.

We outlined how these three tasks are tightly coupled, and how there exists a wide spectrum of solutions that either solve a particular task, or jointly solve multiple tasks along with the interactions between them. We then concluded with a few interesting research directions in this area.

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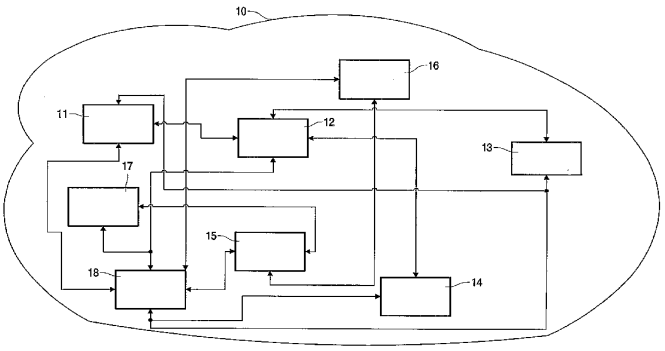
[Continued on next page]

(54) Title: PEER TO PEER TRANSFER OF CONTENT



(57) Abstract: This invention relates to a method, a device, a server and a system of / for peer to peer transfer of content. Said method includes the steps of receiving and transmitting, from a first device (11), a first request with a first selection criterion for a first content to a server (18) or to a second device (12); transferring the first content satisfying said first selection criterion to said first device from the server, when said server previously has acknowledged said first device as a legal recipient of said first content and in case said first content is available only on said server, and noting that said first device subsequently has the requested first content available for other devices (14 , 15 , 16, 17); or re-directing said first request to a third device (13) on which the server knows that the requested first content is still available and transferring said first content satisfying said first selection criterion to said first device from the third device; or transferring the first content satisfying said first selection criterion to said first device from the second device, when said first content is available on said second device, and informing the server that said first content has been transferred to said first device from said second device; and rewarding the one of said second or third device from which said first content was transferred to said first device, when content was transferred from one of these; and charging said first device for reception of said first content. This enables for download, upload and sharing of legally protected paid-for content.

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PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Peer to peer transfer of content

This invention relates to a method of peer to peer transfer of content.

The present invention also relates to a computer system for performing the method.

The present invention further relates to a computer program product for performing the method.

This invention further relates to a device on which parts of said method is executed.

This invention further relates to a server on which remaining parts (not run on the device) of said method is executed.

This invention further relates to a system on which said method is executed.

EP 1229443 discloses a system and a method for providing advertisements in a peer to peer networking environment. Each of the advertisements is defined as a structured, language neutral metadata structure. This is used to name, describe and publish an existence of a peer to peer platform resource, such as the peer itself, a pipe or a service. The advertisements are subsequently available to other peers in the networking environment.

From the art it is known that Peer-to-peer is a communications model in which each party (i.e. each peer) has the same capabilities and either party can initiate a communication session. Other models with which the pure Peer-to-peer communications model might be contrasted include the *client / server* model and the *master/slave* model, both also known in the art. In some cases, peer-to-peer communications is implemented by giving each communication node both server and client capabilities. In recent usage, peer-to-peer has come to describe applications in which users can use the Internet to download or upload multimedia content or simpler content in form of files with and to each other directly or through a mediating server.

On the Internet, peer-to-peer (referred to as P2P) is a type of transient Internet network that allows a group of computer users (peers) with the same networking program to connect with each other and directly access files from one another's hard drives. Napster and Gnutella are examples of this kind of peer-to-peer software.

When the Internet P2P is applied, it is known in the art that the user must first download and execute a peer-to-peer networking program, e.g. Gnutella-net is currently one of the most popular of these decentralized P2P programs because it allows users to exchange all types of files.

As discussed later, it is a problem that the files may represent a stolen property right, such as music, a movie, etc, and/or the files may have a poor quality and / or said files may contain virus.

After launching the program, the user enters the IP address of another computer belonging to the network, typically, the Web page where the user obtained the download will list several IP addresses as places to begin. Once the computer finds another network member on-line, it will connect to that user's connection, which has obtained their IP address from a connection of another user, and so on.

It is however, a problem especially for un-experienced, unaware users that downloadable content typically available in a peer-to-peer network may be legally protected and thus it is illegal do download it and use it, i.e. play back or view said content. In other words, many users – except for the few who know they are deliberately infringing rights of the owner of copy protected content when downloaded – prefer to apply a method and device where they are secure that downloaded content is legal so that they subsequently can play back or view being sure that no rightful proprietor (of said content) is being infringed.

It is a further problem for users that downloadable available 'for-free' (in fact stolen from a legal point of view) content can contain virus, i.e. when said content is subsequently played back or viewed on the user's device, the virus may also get life, i.e. it may be executed simultaneous with the playing back or viewing of content on the user's device. Said virus can then consequently harm the file or operating system of the device of the user thus making the user device malfunction or lose previously downloaded content as well.

It is a further problem for users that downloadable available 'for-free' content may be in a poor quality, since the content is illegal recorded during a concert, in a cinema or recorded from the original content by means of poor quality recording equipment, thus content in this case is in fact illegal obtained and in a poor quality.

In other words, it is a problem that user are uncomfortable with 'for-free' content since it may contain virus and / or make the user a thief, if the unaware user downloads such content.

Additionally, it is a problem that users are reluctant in sharing (i.e. transmitting to others) copy protected content since they risk being caught in infringement of the rightful proprietor, if sharing, especially when using Web-pages (to download content) not telling that eventually provided material (content) from a legal point of view is in fact a violation of copyright laws.

It is a further problem that currently the real cost of a downloaded item of content is not transparent to the user.

The present invention enables users to download legally protected content when applying the method according to the invention and / or when using the device according to the invention which communicates with the server in the peer-to-peer network. Subsequently, it is legal to play it back, view it and share it with others. This is possible, since the method (and the device and server applying the method) handles the property rights and the payments in a legal manner, which both the users and content providers are comfortable with, i.e. the user is assured that he does not make a thief out of himself, and the content providers (artist, singer, movie manufacturer, etc) are assured that their content is not being stolen, but paid for.

Further, it is assured that the downloaded content is virus-free and in an approved quality.

Additionally, users can - when applying the method by means of their device - easily and legally share (i.e. transmit to others) copy protected content since some steps of the methods ensure that the proprietor of content gets paid for his content, since users are charged for downloads. Further, users (of said devices), themselves can obtain a reward for sharing, this further expands sharing.

Further, it is an advantage of the invention that the real cost of a downloaded item of content is transparent to the user.

Said device and server, in combination and the system provide the same advantages and solve the same problem(s) for the same reasons as described previously in relation to the method.

The invention will be explained more fully below in connection with preferred embodiments and with reference to the drawings, in which:

fig. 1 shows a network of devices and a server; and

fig. 2 shows a method of peer to peer transfer of content.

Throughout the drawings, the same reference numerals indicate similar or corresponding features, functions, etc.

Figure 1 shows a network of devices and a server. Said network of devices with the server are illustrated by means of reference numeral 10. As will be explained more detailed in the next figure, a first device, reference numeral 11, or its user is looking for certain content (a video film as an example), the user will then try to find out from where the video film can be obtained, i.e. downloaded. He will use a specific selection criterion for the video film content. In technical terms, his device (first device) will receive the selection criterion e.g. movie name, genre, etc, which it then will send to another device (a second device. reference numeral 12,)) and to a server, reference numeral 18, since his own device (said first device) cannot know whether the server or another peer to peer device, has the requested content available. If the server has the content satisfying the selection criterion, it will provide it to the requesting device, i.e. to said first device. However, in order to offload and distribute network usage more efficient – if the server knows that another peer (device) has the requested content available, the server will redirect the transfer of content to this device which then will provide the content satisfying the selection criterion, i.e. transfer it to the requesting device equalling said first device. In the last case, the server is informed – by the actual device transferring content that content has been transferred to said first device, which then can be accordingly charged for receiving the requested content. Hereby, the first device (and its user) is comfortable with content charged for, since it is virus free and has been legally bought, i.e. the user is sure that he did not make a thief out of himself; further the user can rely on that the content has an approved quality level, since it comes form the legal owner or an administrator of network, he can trust.

In the first case, i.e. the server supplied directly the requested content, the server typically previously acknowledged that said first device is in fact a subscribing or paying (or one who later will pay) rightful recipient of the content, i.e. said video film. The content, in general, can be uploaded to or downloaded from more devices, e.g. reference numerals 13 and 14. In the network further devices may be present, e.g. reference numerals

15, 16 and 17. Generally, the server has to be accessible to and in the network of devices, i.e. to all devices, either for transfer of content the first time, and/ or subsequently for charging and rewarding, this is illustrated by means of the arrows connecting the server to the devices.

A requester needs not register or be registered to the server. There may be a third party that certifies the requester to the server. The server trusts the certifier and assumes the requester is allowed to receive. Or the requester pays 'on-the-spot' using virtual tokens or a mediation service (Pay-Pal).

The network is shown for illustrative purposes, any other dynamic or static topology or arrangement of peers or devices and one or more additionally servers may also be applied in the present invention.

Any of said devices may be a video cassette recorder (VCR), a personal digital assistant (PDA), a mobile phone, a television, a radio, a DVD player, a CD player, an information panel, a web tablet, a smart remote, a peer or a personal computer.

The device alternatives as mentioned may be understood as corresponding peers in a peer-to-peer type of transient network similar to the type found on the Internet, that allows a group of computer users (with access to their corresponding peers or devices) with the same or similar networking program or protocol to connect with each other and directly access content, e.g. in the form of files, etc to/from one another's hard drives, memories, etc.

A peer-to-peer network is simply a network of peers, the Internet, Gnutella software, computers are all just examples of aspects of specific implementations, however the present invention applies said server for rewarding direct peer to peer content sharing, and said server is furthermore applied to charge peers for download of content. Since content typically is copy protected content, at least one of said servers tracks, charges and rewards peers (devices) for down and upload, respectively of copy protected content.

In a preferred embodiment of the invention said content comprises one or more selected from the group:

- a DVD picture and sound signal;
- a CD sound signal;
- a given digital audio format (e.g. MP3, WMA, Real Audio, WAV, etc);
- a given digital movie format (e.g. DivX, DVD/MPEG2, Avi, wmf, MOV, Real Video, etc);
- a given picture format (e.g. JPEG, GIF, BMP, TIFF, etc); and/or
- any such format that is capable of causing the device to emit a picture and/or sound signal, e.g. G72x, aiff, real.

This is possible since said device can be a CD player, a DVD player, a radio, a mobile phone, etc. as discussed, accordingly content can be presented, i.e. shown and/ or played back on said device.

In other words, the above content combinations are copy protected content, which, generally, are in the form of numerical, textual information, picture, video, sound and / or any combination(s) thereof, and which, generally, also are being free from virus and in an approved quality.

Figure 2 shows a method of peer to peer transfer of content. The content is transferred among device in the peer to peer network, in initial situations, i.e. the first times content gets available, by means of the server.

Prior to the following steps, it is assumed that - as a starting point - that only the server can provide content; later on content can be distributed (or spread) to various devices (second, third, etc,) i.e. at later occasions these devices can provide content without directly involving the server, however, still devices requesting and receiving content are charged accordingly regardless from where (i.e. from the server or from the peer to peer device) said content is being transferred.

Further, content is copy protected content, i.e. legal content being free from virus and in an approved quality. The server is in all cases – also when content is transferred directly between devices – responsible for that the copy protected content is legal, free from virus and in the proper quality, this is possible since – from the starting point - content can only be introduced into the network via the server. The actual (content) data does not have to originate from the server. The server just needs to certify it. Any user may offer a piece of content to the server for certification. On the server side the content will be checked and when it is found to be acceptable, the content is certified, for download, redirection, etc. In step 100, a first request may be received on a first device. The request typically comprises a first selection criterion for a first content, the user of the first device can e.g. key in his selection criterion for the content by means of a keyboard or by means of any common user interface know in the art, e.g. a GUI like windows, soft-keys, menu driven, click by means of a mouse, etc. The content may reside on the server and / or another second device, i.e. said second device. Therefore, subsequently the request is transmitted from the first device to the server or to said second device, since said first device cannot know whether the server or another peer to peer (second) device has said requested first content available.

Said first selection criterion may be composed by means of one or more combinable items, e.g. program, channel, Web-site, genre, type, topic, style, start, duration, language, title, name, hyperlink including content reference, etc.

Said first selection criterion can then be helpful for the user and to the device from which content is requested, i.e. helpful to find and subsequently transmit content having the first selection criterion, i.e. said selection criterion in general may reflect content interest(s) of a specific user, the user can therefore avoid to surf through many available channels if the device is a TV, or surf through many Web sites if his device is an Internet PC or accessed via a server from a client PC in order to find his content. The user can apply this step instead.

Said selection criterion can therefore be understood as the users own profile of interests.

As discussed, the request is transmitted to the server or to another, i.e. the second device; in general, requests are put to the network (of devices or peers) as a whole including the server(s) as stated in this step. Although, due to the nature of the network, the requests will not reach all peers in the network, they should reach at least one server, e.g. via a Kazaa like super-node that is or knows a server. In the beginning the server will only have the content available and participate in transferring the content to the requester, here said first device. If a certain number of peers have downloaded the content, the server may stop offering it because it will be available from elsewhere, i.e. from said number of peers. This is in fact dealt with by means of steps 200, 300 and 400.

In step 200, the first content satisfying said first selection criterion may be transferred to said first device from the server. This is only in the case when said server previously has acknowledged said first device as a legal recipient of said first content, e.g. through an eventually registration, and when said first content is available only on said server.

Subsequently, the server will note that said first device now has the requested first content available for the other devices. This implies that if the same request (for content) arrives again to the server, the first device will then be the direct content supplier instead of the server. The latter – in fact redirecting of content - is dealt with in step 300.

Alternatively, instead of step 200, in step 300, said first request is redirected to a third device. Said third device is known to the server as a device in fact still having the requested first content. Subsequently, said first content satisfying said first selection criterion is transferred to said first device from the device re-directed to, i.e. from said third device.

The server will currently check that said content in fact still is on the third device, in case the user of the third device removes or removed the particular content, the server will subsequently find out. In that case, the server must provide content it self or redirect the request (for content) to another fourth device (in place of said third device). In other words, the server currently checks that content is in fact still available on said third device, and that said third device is on line, if not, the request is redirected to another, i.e. to said fourth device, etc.

Alternatively, instead of step 200 or step 300, in step 400, first content satisfying said first selection criterion is transferred to said first device from the second device. This is only the case when said first content is in fact available on said second device; in that case the server is subsequently informed (by said second device) that said first content has actually been transferred to said first device. The reason for doing the latter is to enable the server to charge said first device for receiving content, in fact requested by it self. Conversely – as in next step - to enable the server to reward said second device for transferring (and sharing) content.

It is assumed that when any device (second or third) provides or supplies content, the content, in all cases, initially came from the server or is at least approved from the server to legally be available from the other device(s) (second or third) for an eventually subsequent transfer. At later occasions, one of the other devices (second or third) devices can provide content (originally legally approved by the server, etc) to even more devices. Further, after reception of content on the first device, this also can play the role of 'content provider', i.e. acting in the same manner as said second and third devices; in fact when more devices have received the same content (satisfying the same criterion) any of these - of course – play the role of 'content provider' in competition with other devices having the same content, this lowers the waiting time for a requesting device and provides for an improvement in sharing of content among devices, this in turn also offloads the server.

Generally, in step 200, 300 and 400, the server, the third device and the second device, respectively transferred content to said first device.

In step 500, said second or third device, which in fact transferred content to said first device, is then rewarded. However, it may be the case that the server transferred content itself; in this case none, i.e. neither the second nor the third device are rewarded. However, in the general case, the second or third device is rewarded; conversely, the more rare case, i.e. the server transferred content, it will not reward itself, but it may note the transfer primarily for statistical purposes.

In all cases, regardless from where (server, second or third device) content was transferred, i.e. in step 600, said first device is charged for reception of said first content. The charge may be dependent of a subscription fee or subscription agreements in general or on a per transfer basis (download); it may be dependent on a file length, value or duration, and / or combinations thereof. This is possible since content may be transferred embedded in or by means of said file.

Optionally, said method comprises the following two steps, which deals with the opposite situation, i.e. the server receives content:

In step 700, a second content satisfying a second selection criterion and the second selection criterion are uploaded to the server from a fourth device. The server should then subsequently ensure that said second content is free for virus, has the right quality level (sufficient high sampling rate, low noise, stereo, aliasing, etc) and, most importantly, is legal, for the latter the owner of the server may have agreed contracts (e.g. through licence, partly or in whole, an exclusive right, etc) with the original creator, owner or supplier of content to ensure that it can be legally distributed afterwards as discussed in the steps above. The second selection criterion is uploaded with the corresponding second content in order to make said second content searchable again, when requested as discussed in step 100. The second selection criterion will be of the same nature and structure as that of said first selection criterion.

In step 800, the fourth device is rewarded. The reward is given to the fourth device in return for uploading said second content (with the second selection criterion) to the server. The reward may be given in form of credits, rebate, discounts, etc. The reward can then be used by said fourth device, if it later obtains a third content, etc.

Generally when the device is denoted first, second, etc device, it is to be understood that any device can perform the mentioned tasks, i.e. even though a first device, only as disclosed in the above steps requests content, it - as well as the other devices - may perform any task as reflected in the steps above.

Rewards, credits, rebate, discounts, the task of charging are generally dealt with by the server, i.e. the server keeps a balance of in and outgoing payments for each device up and downloading content.

As discussed above, for or each item of content the device has to pay a small fee. When a device is charged, a subsequent payment can be done on a transaction basis or included in telecommunication fees. The latter can be in the form of an elevated rate (price/minute) for the transfer or included in a periodic bill. Subscription is also an option.

Part of the fee is direct payment to the content provider, which may be represented by said server. Part of the fee is used to award a discount to the device offering the content. I.e. users of devices can recap part of that fee by sharing desirable content.

For each piece of content that is downloaded from a device (to the server or to another device), the device is rewarded with credits. These credits can be in the form of rebates on the purchase of new songs, on telecommunication fees or on downloading content from other devices. The credits can be proportional to the amount of data transferred, e.g. the size of the file, or proportional to the value of the song.

The content shared by devices is verified by the server. Devices offering non-compliant, e.g. sub standard content can be excluded from the exchange based on the identification of the mobile phone identification, i.e. not satisfying the criterion in step 200 of acknowledgement.

In general, according to the present invention, a service for sanctioned P2P transfer between devices is set up. Peers or devices who want to share content are registered at the server and the content they offer may indexed, e.g. the Napster model.

The server may offer a comprehensive collection of content. This can be done using an intuitive interface for the selection of content. The offering of content can be enhanced by supporting information. If certain content is not offered by any peer (device), e.g. very new content, the server may offer the content. The latter is a temporary measure till (enough) peers (devices) offer the content. This amounts to a transition model. Initially most content may be hosted by the server but few peers will use the redirection service. If the amount of connected peers in the network grows the demand on the redirection service will increase but at the same time the amount of content provided at the server side can decrease. Hence, if the popularity (and therefore the use) of the system increases the server will not have to be scaled up.

The transfer rate of content shared by peers is not guaranteed. This enables the definition of a lazy transfer mode to offer unused bandwidth at reduced price. If the premium service of voice communication uses more of the networks bandwidth, the bandwidth available to P2P transfers is reduced.

A computer readable medium may be magnetic tape, optical disc, digital versatile disk (DVD), compact disc (CD record-able or CD write-able), mini-disc, hard disk, floppy disk, smart card, PCMCIA card, etc.

In the claims, any reference signs placed between parentheses shall not be constructed as limiting the claim. The word "comprising" does not exclude the presence of

elements or steps other than those listed in a claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

The invention can be implemented by means of hardware comprising several distinct elements, and by means of a suitably programmed computer. In the device claim enumerating several means, several of these means can be embodied by one and the same item of hardware. The mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

CLAIMS:

1. A method of peer to peer transfer of content, said method comprising the steps of:

receiving and transmitting (100), from a first device (11), a first request with a first selection criterion for a first content to a server (18) or to a second device (12);

transferring (200) the first content satisfying said first selection criterion to said first device from the server, when said server previously has acknowledged said first device as a legal recipient of said first content and in case said first content is available only on said server, and noting that said first device subsequently has the requested first content available for other devices (14 , 15 , 16, 17); or

re-directing (300) said first request to a third device (13) on which the server knows that the requested first content is still available and transferring said first content satisfying said first selection criterion to said first device from the third device; or

transferring (400) the first content satisfying said first selection criterion to said first device from the second device, when said first content is available on said second device, and informing the server that said first content has been transferred to said first device from said second device; and

rewarding (500) the one of said second or third device from which said first content was transferred to said first device, when content was transferred from one of these; and

charging (600) said first device for reception of said first content.

2. A method according to claim 1, said method further comprising the steps of:

uploading (700) a second content satisfying a second selection criterion and the second selection criterion to the server from a fourth device; and

rewarding (800) the fourth device for uploading the second content and the second criterion to the server.

3. A method according to claim 1 or 2, characterized in that said content is copy protected content, such as numerical information, picture, video, sound and combinations thereof.

4. A method according to any one of claims 1 through 3, characterized in that said content comprises one or more selected from the group:

a DVD picture and sound signal;

a CD sound signal;

a given digital audio format (e.g. MP3, WMA, Real Audio, WAV, etc);

a given digital movie format (e.g. DivX, DVD/MPEG2, Avi, wmf, MOV, Real Video, etc);

a given picture format (e.g. JPEG, GIF, BMP, TIFF, etc); and/or

any such format that is capable of causing the device to emit a picture and/or sound signal, e.g. G72x, aiff, real.

5. A method according to any one of claims 1 through 4, characterized in that any of said devices is a video cassette recorder (VCR), a personal digital assistant (PDA), a mobile phone, a television, a radio, a DVD player, a CD player, an information panel, a web tablet, a smart remote, a peer or a personal computer.

6. A device comprising:

means for receiving and transmitting a first request with a first selection criterion for a first content to a server (18) or to a second device (12);

means for receiving a redirected said first request (13) on which the server knows that the requested first content is still available on said device;

means for transferring the first content satisfying said first selection criterion to a first device, when said first content is available on said device, and means for informing the server that said first content has been transferred to said first device;

means for being rewarded for transfer of content; and

means for being charged for reception of content.

7. A device according to claim 6 further comprising:

means for uploading a second content satisfying a second selection criterion and the second selection criterion to the server; and

means for being rewarded for the upload of the second content and the second selection criterion to the server.

8. A server comprising:

means for receiving a first request with a first selection criterion for a first content;

means for transferring the first content satisfying said first selection criterion to a first device, when said server previously has acknowledged said first device as a legal recipient of said first content and in case said first content is available only on said server, and means for noting that said first device subsequently has the requested first content available for other devices (14 , 15 , 16, 17); and / or

means for re-directing said first request to a third device (13) on which the server knows that the requested first content is still available; and / or

means for being informed that said first content has been transferred to said first device from said third device;

means for rewarding the one of said second or third device from which said first content was transferred to said first device, when content was transferred from one of these; and

means for charging said first device for reception of said first content.

9. A server according to claim 8 further comprising:

means for being uploaded with a second content satisfying a second selection criterion and means for being uploaded with the second selection criterion from a fourth device; and

means for rewarding the fourth device for uploading the second content and the second criterion.

10. A system comprising:

means for receiving and transmitting, from a first device (11), a first request with a first selection criterion for a first content to a server (18) or to a second device (12);

means for transferring the first content satisfying said first selection criterion to said first device from the server, when said server previously has acknowledged said first device as a legal recipient of said first content and in case said first content is available only

on said server, and noting that said first device subsequently has the requested first content available for other devices (14 , 15 , 16, 17);

means for re-directing said first request to a third device (13) on which the server knows that the requested first content is still available and transferring said first content satisfying said first selection criterion to said first device from the third device;

means for transferring the first content satisfying said first selection criterion to said first device from the second device, when said first content is available on said second device, and informing the server that said first content has been transferred to said first device from said second device;

means for rewarding the one of said second or third device from which said first content was transferred to said first device, when content was transferred from one of these; and

means for charging said first device for reception of said first content.

11. A system according to claim 10 further comprising:

means for uploading a second content satisfying a second selection criterion and the second selection criterion to the server from a fourth device; and

means for rewarding the fourth device for uploading the second content and the second criterion to the server.

12. A computer system for performing the method according to any one of claims 1 through 5.

13. A computer program product comprising program code means stored on a computer readable medium for performing the method of any one of claims 1 through 5 when the computer program is run on a computer.

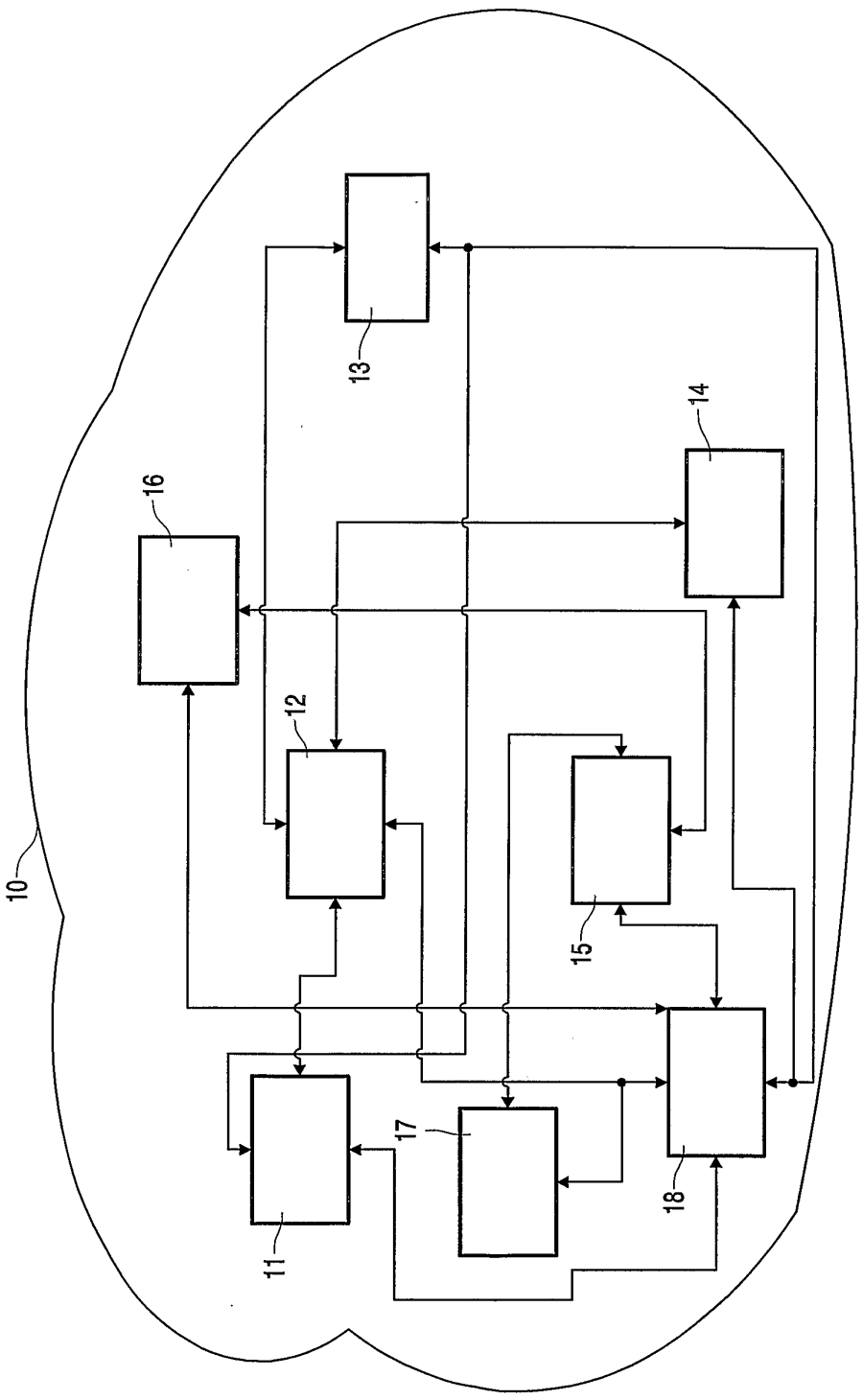

FIG. 1

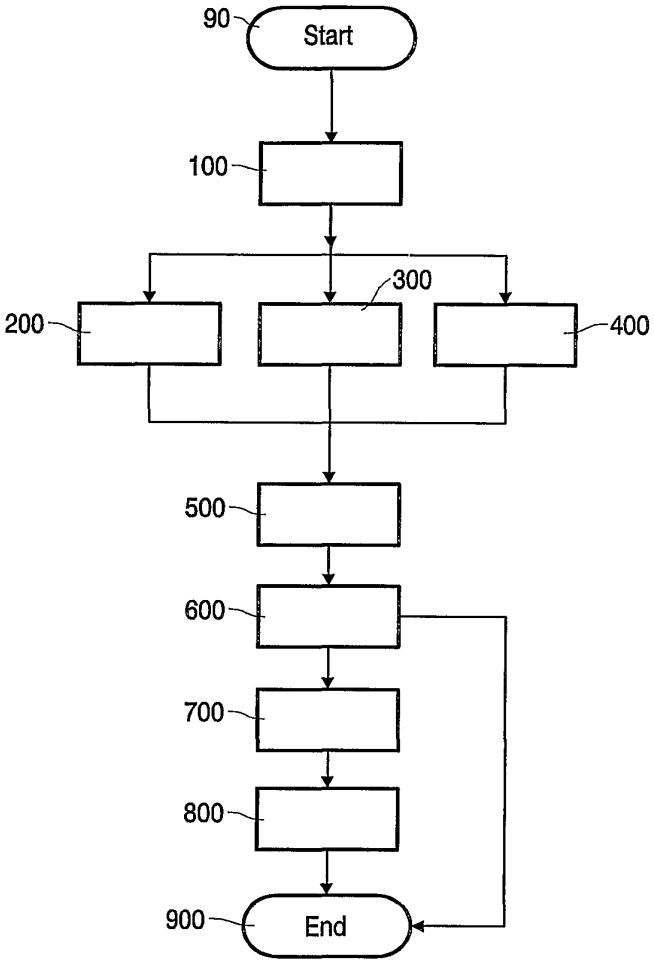

FIG. 2

Doc code: IDS
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(Not for submission under 37 CFR 1.99)

Application Number	16278107
Filing Date	2019-02-17
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	
Attorney Docket Number	HOLA-005-US10

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	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	
	Attorney Docket Number	HOLA-005-US10

	1	Michael J. Freedman, Princeton University, "Experiences with CoralCDN: a five-year operational view", Proceeding NSDI'10 Proceedings of the 7th USENIX conference on Networked systems design and implementation San Jose, California — April 28 - 30, 2010 (17 pages)	
	2	"The BitTorrent Protocol Specification", Website: https://web.archive.org/web/20120513011037/http:/www.bittorrent.org/beps/bep_0003.html describing BitTorrent dated Jan 10, 2008 downloaded using web archive on Aug 16, 2019 (6 pages)	
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	4	"VIP SOCKS/VPN SERVICE", Website: http://vip72.com:80/?drgn=1 describing VIP72 proxy service dated Jan 2010 downloaded using VIP Technologies webpage on Aug 16, 2019 (3 pages)	
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	7	"Net Transport", Website: http://www.xi-soft.com/default.htm describing Net Transport Overview dated 2005 downloaded using Net Transport webpage on Aug 16, 2019 (2 pages)	
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	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	
	Attorney Docket Number	HOLA-005-US10

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	Application Number	16278107
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	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	
	Attorney Docket Number	HOLA-005-US10

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-08-19
Name/Print	Yehuda Binder	Registration Number	73612

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EFS ID:	36920833
Application Number:	16278107
International Application Number:	
Confirmation Number:	4936
Title of Invention:	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION
First Named Inventor/Applicant Name:	Derry Shribman
Customer Number:	131926
Filer:	Yehuda Binder/Dorit Binder
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	OL-experiences.PDF	982664 ff387b22c928ab346236e7bc4bc67a1d3c132a13	no	17

Warnings:

Information:					
2	Non Patent Literature	OL-Net-Transport-News.pdf	90341 916adac0be4dc35a9b455f6c4b8f956470283da3	no	5
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3	Non Patent Literature	OL-Net-Transport-FAQ.pdf	90310 ae2f081d8c86db4faa96979e2d5f79bf0a19514b	no	4
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4	Non Patent Literature	OL-Net-Transport-Develop-History.pdf	193749 a7b92f38e227aa84a54392d80369e6c48381d92f	no	10
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5	Non Patent Literature	OL-Net-Transport.pdf	668603 20b39ac01f150e34dbec3862c09230155f9b76a1	no	2
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6	Non Patent Literature	OL-CoralCDN.pdf	215553 2152ae3c634318d6a861ecf51b8ff88ce211d1b7	no	2
Warnings:					
Information:					
7	Non Patent Literature	OL-Welcome-Easy-Hide-IP.pdf	69665 e61b31001bb6d3dc0a2789519174da2c25037d4c	no	2
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Information:					
8	Non Patent Literature	OL-VIP-SOCKS.pdf	175276 ce563cada54e4eb9ad18e4a0a59f077452eaa1f9	no	3
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Information:					

9	Non Patent Literature	OL-BitTorrent.pdf	316933 d4652b3b25a9336786b2c2a9c54863fadd17ca77	no	9
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Information:					
10	Non Patent Literature	OL-BitTorrent-Protocol.pdf	86208 62077f34492d991fec947aa0e4f93cce8da314d3	no	6
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11	Information Disclosure Statement (IDS) Form (SB08)	Second-OXYLABS-IDS-005-US10.pdf	1035327 c487a0d69a1824198d56fc3ab3c599a7fb891acd	no	5
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Exhibit L

Appeared in *7th USENIX Symposium on Network Design and Implementation (NSDI '10)*

Experiences with CoralCDN: A Five-Year Operational View

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Abstract

CoralCDN is a self-organizing web content distribution network (CDN). Publishing through CoralCDN is as simple as making a small change to a URL's hostname; a decentralized DNS layer transparently directs browsers to nearby participating cache nodes, which in turn cooperate to minimize load on the origin webserver. CoralCDN has been publicly available on PlanetLab since March 2004, accounting for the majority of its bandwidth and serving requests for several million users (client IPs) per day. This paper describes CoralCDN's usage scenarios and a number of experiences drawn from its multi-year deployment. These lessons range from the specific to the general, touching on the Web (APIs, naming, and security), CDNs (robustness and resource management), and virtualized hosting (visibility and control). We identify design aspects and changes that helped CoralCDN succeed, yet also those that proved wrong for its current environment.

1 Introduction

The goal of CoralCDN was to make desired web content available to everybody, regardless of the publisher's own resources or dedicated hosting services. To do so, CoralCDN provides an open, self-organizing web content distribution network (CDN) that any publisher is free to use, without any prior registration, authorization, or special configuration. Publishing through CoralCDN is as simple as appending a suffix to a URL's hostname, *e.g.*, `http://example.com.nyud.net/`. This URL modification may be done by clients, origin servers, or third parties that link to these domains. Clients accessing such *Coralized* URLs are transparently directed by CoralCDN's network of DNS servers to nearby participating proxies. These proxies, in turn, coordinate to serve content and thus minimize load on origin servers.

CoralCDN was designed to automatically and scalably handle sudden spikes in traffic for new content [14]. It can efficiently discover cached content anywhere in its network, and it dynamically replicates content in proportion to its popularity. Both techniques help minimize origin requests and satisfy changing traffic demands.

While originally designed for decentralized and unmanaged settings, CoralCDN was deployed on the PlanetLab research network [27] in March 2004, given PlanetLab's convenience and availability. CoralCDN has since remained publicly available for more than five years at hundreds of PlanetLab sites world-wide. Accounting for a majority of public PlanetLab traffic and users, CoralCDN typically serves several terabytes of data per day, in response to tens of millions of HTTP requests from around two million users (unique client IP addresses).

Over the course of its deployment, we have come to acknowledge several realities. On a positive note, CoralCDN's notably simple interface led to widespread and innovative uses. Sites began using CoralCDN as an elastic infrastructure, dynamically redirecting traffic to CoralCDN at times of high resource contention and pulling back as traffic levels abated. On the flip side, fundamental parts of CoralCDN's design were ill-suited for its deployment and the majority of its use. If one were to consider the various reasons for its use—for resurrecting long-unavailable sites, supporting random surfing, distributing popular content, and mitigating flash crowds—CoralCDN's design is insufficient for the first, unnecessary for the second, and overkill for the third, at least given its current deployment. But diverse and unanticipated use is unavoidable for an open system, yet openness is a necessary design choice for handling the final flash-crowd scenario.

This paper provides a retrospective of our experience building and operating CoralCDN over the past five years. Our purpose is threefold. First, after summarizing CoralCDN's published design [14] in Section §2, we present data collected over the system's production deployment and consider its implications. Second, we discuss various deployment challenges we encountered and describe our preferred solutions. Some of these changes we have implemented and incorporated into CoralCDN; others require adoption by third-parties. Third, given these insights, we revisit the problem of building a secure, open, and scalable content distribution network. More specifically, this paper addresses the following topics:

- *The success of CoralCDN's design given observed usage patterns (§3).* Our verdict is mixed: A large majority of its traffic does not require any cooperative caching at all, yet its handling of flash crowds relies on such cooperation.
- *Web security implications of CoralCDN's open API (§4).* Through its open API, sites began leveraging CoralCDN as an elastic resource for content distri-

bution. Yet this very openness exposed a number of web security challenges. Many can be attributed to a lack of explicitness for specifying appropriate protection domains, and they arise due to violations of traditional security principles (such as least privilege, complete mediation, and fail-safe defaults [33]).

- *Resource management in CDNs (§5).* CoralCDN commonly faced the challenge of interacting with oversubscribed and ill-behaved resources, both remote origin servers and its own deployment platform. Various aspects of its design react conservatively to change and perform admission control for resources.
- *Desired properties for deployment platforms (§6).* Application deployments could benefit from greater visibility into and control over lower layers of their platforms. Some challenges are again confounded when information and policies cannot be expressed explicitly between layers.
- *Directions for building large-scale, cooperative CDNs (§7).* While using decentralized algorithms, CoralCDN currently operates on a centrally-administered, smaller-scale testbed of trusted servers. We revisit the challenge of escaping this setting.

Rather than focus on CoralCDN's self-organizing algorithms, the majority of this paper analyzes CoralCDN as an example of an open web service on a virtualized platform. As such, the experiences we detail may have implications to a wider audience, including those developing distributed hash tables (DHTs) for key-value storage, CDNs or web services for elastic provisioning, virtualized network facilities for programmable networks, or cloud computing platforms for virtualized hosting. While many of the observations we report are neither new nor surprising in hindsight, many relate to mistakes, oversights, or limitations of CoralCDN's original design that only became apparent to us from its deployment.

We next review CoralCDN's architecture and protocols; a more complete description can be found in [14]. All system details presented after §2 were developed subsequent to that publication. We discuss related work throughout the paper as we touch on different aspects of CoralCDN.

2 Original CoralCDN Design

The Coral Content Distribution Network is composed of three main parts: (1) a network of cooperative HTTP proxies that handle client requests from users, (2) a network of DNS nameservers for `nyud.net` that map clients to nearby CoralCDN HTTP proxies, and (3) the underlying Coral indexing infrastructure and clustering machinery on which the first two applications are built. This paper consistently refers to the system's *indexing* layer as Coral, and the entire content distribution system as CoralCDN.

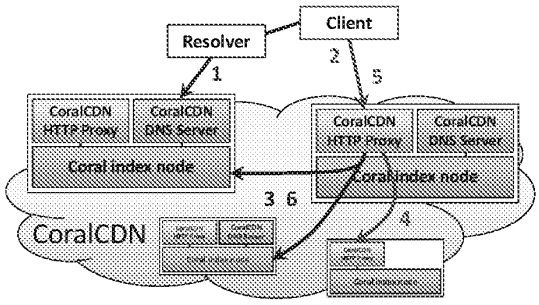

Figure 1: **The steps involved in serving a Coralized URL.**

2.1 System overview

At a high level, the following steps occur when a client issues a request to CoralCDN, as shown in Figure 1.

1. ***Resolving DNS.*** A client resolves a "Coralized" domain name (*e.g.*, of the form `example.com.nyud.net`) using CoralCDN nameservers. A CoralCDN nameserver probes the client to determine its round-trip-time and uses this information to determine appropriate nameservers and proxies to return.
2. ***Processing HTTP client requests.*** The client sends an HTTP request for a Coralized URL to one of the returned proxies. If the proxy is caching the web object locally, it returns the object and the client is finished. Otherwise, the proxy attempts to find the object on another CoralCDN proxy.
3. ***Discovering cooperative-cached content.*** The proxy looks up the object's URL in the Coral indexing layer.
4. ***Retrieving content.*** If Coral returns the address of a node caching the object, the proxy fetches the object from this node. Otherwise, the proxy downloads the object from the origin server `example.com`.
5. ***Serving content to clients.*** The proxy stores the web object to disk and returns it to the client browser.
6. ***Announcing cached content.*** The proxy stores a reference to itself in Coral, recording the fact that is now caching the URL.

This section reviews the design of the Coral indexing layer and the CDN's proxies, as proposed in [14].

2.2 Coral indexing layer

The Coral indexing layer is closely related to the structure and organization of distributed hash tables like Chord [34] and Kademlia [23], with the latter serving as the basis for its underlying algorithm. The system maps opaque keys onto nodes by hashing their value onto a flat, semantic-free identifier (ID) space; nodes are assigned identifiers in the same ID space. It allows scalable key lookup (in $O(\log(n))$ overlay hops for n-node systems), reorganizes itself upon network membership changes, and provides robust behavior against failure.

Compared to "traditional" DHTs, Coral introduced a few novel techniques that were well-suited for its particular application [13]. Its key-value indexing layer was designed with weaker consistency requirements in mind, and its lookup structure self-organized into a locality-optimized hierarchy of clusters of peers. After all, a client need not discover all proxies caching a particular file, it only needs to find several such proxies, preferably ones nearby. Like most DHTs, Coral exposes *put* and *get* operations, to announce one's address as caching a web object, and to discover other proxies caching the object associated with a particular URL, respectively. Inserted addresses are soft-state mappings with a time-to-live (TTL) value.

Coral's *put* and *get* operations are designed to spread load, both within the DHT and across CoralCDN proxies. To *get* the proxy addresses associated with a key k, a node traverses the ID space with iterative RPCs, and it stops upon finding any remote peer storing values for k. This peer need not be the one closest to k (in terms of DHT identifier space distance). To *put* a key/value pair, Coral routes to nodes successively closer to k and stops when finding either (1) the nodes closest to k or (2) one that is experiencing high request rates for k and already is caching several corresponding values (with longer-lived TTLs). It stores the pair at the node closest to k that it managed to reach. These processes prevent tree saturation in the DHT.

To improve locality, these routing operations are not initially performed across the entire global overlay. Instead, each Coral node belongs to several distinct routing structures called *clusters*. Each cluster is characterized by a maximum desired network round-trip-time (RTT). The system is parameterized by a fixed hierarchy of clusters with different expected RTT thresholds. Coral's deployment uses a three-level hierarchy, with level-0 denoting the global cluster and level-2 the most local one. Coral employs distributed algorithms to form localized, stable clusters, which we briefly return to in §5.3.

Every node belongs to one cluster at each level, as in Figure 2. Coral queries nodes in fast clusters before those in slower clusters. This both reduces lookup latency and increases the chance of returning values stored at nearby nodes, which correspond to addresses of nearby proxies.

2.3 The CoralCDN HTTP proxy

CoralCDN seeks to aggressively minimize load on origin servers. This section summarizes how its proxies use Coral for inter-proxy cooperation and adaptation to flash crowds.

2.3.1 Locality-optimized inter-proxy transfers

Each CoralCDN proxy keeps a local cache from which it can immediately fulfill client requests. When a client requests a non-resident URL, CoralCDN proxies attempt to fetch web content from each other, using the Coral indexing layer for discovery. A proxy only contacts a URL's origin server after the Coral indexing layer provides no referrals or none of its referrals return the data.

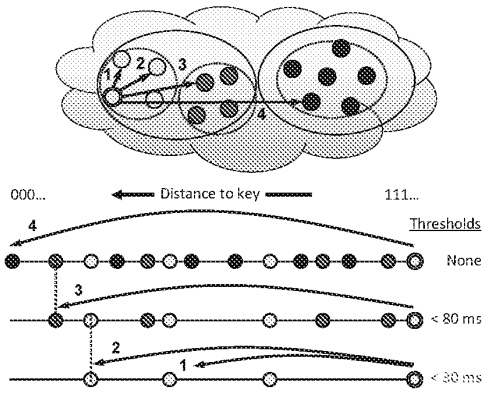

Figure 2: ***Coral's three-level hierarchical overlay structure.*** **A node first queries others in its level-2 cluster (the dotted rings), where pointers reference other caching proxies within the same cluster. If a node finds a mapping in its local cluster (after step 2), its *get* finishes. Otherwise, it continues among its level-1 cluster (the solid rings), and finally, if needed, to any node within the global level-0 system.**

CoralCDN's inter-proxy transfers are optimized for locality, both from their use of parallel connections to other proxies and by the order in which neighboring proxies are contacted. The properties of Coral's hierarchical indexing ensures that the list of proxies returned by *get* will be sorted based on their cluster distance to the request initiator. Thus, proxies will attempt to contact level-2 neighbors before level-1 and level-0 proxies, respectively.

2.3.2 Rapid adaptation to flash crowds

Unlike many web proxies, CoralCDN is explicitly designed for flash-crowd scenarios. If a flash crowd suddenly arrives for a web object, proxies self-organize into a form of multicast tree for retrieving the object. Data streams from the proxies that started to fetch the object from the origin server to those arriving later. This limits concurrent object requests to the origin server upon a flash crowd.

CoralCDN provides such behavior by cut-through routing and optimistic references. First, CoralCDN's use of *cut-through* routing at each proxy helps reduce transmission time for larger files. That is, a proxy will upload portions of a object as soon as they are downloaded, not waiting until it receives the entire object. Second, proxies optimistically announce themselves as sources of content. As soon as a CoralCDN proxy begins receiving the first bytes of a web object—either from the origin or another proxy—it inserts a reference to itself into Coral with a short TTL (30 seconds). It continually renews this short-lived reference until either it completes the download (at which time it inserts a longer-lived reference[1]) or the download fails.

[1]The deployed system uses 2-hour TTLs for successful results (status codes of 200, 301, 302, etc.), and 15-minute TTLs for 403, 404, and other unsuccessful, non-transient results.

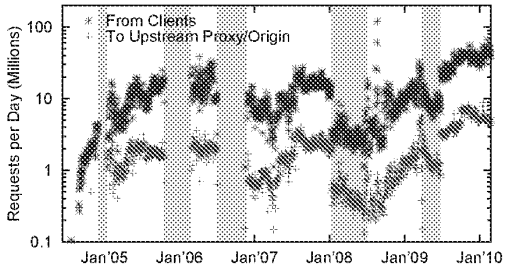

Figure 3: **Total HTTP requests per day during CoralCDN's deployment. Grayed regions correspond to missing or incomplete data.**

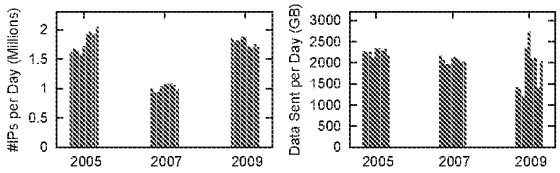

Figure 4: **CoralCDN usage: number of unique clients (left) and upload volume (right) for each day during August 9–18.**

2.4 Implementation and deployment

CoralCDN is composed of three stand-alone applications. The Coral daemon provides the distributed indexing layer, accessed over UNIX domain sockets from a simple client library linked into applications such as CoralCDN's HTTP proxy and DNS server. All three are written from scratch. Coral network communication uses Sun RPC over UDP, while CoralCDN proxies transfer content via standard HTTP connections. At initial publication [14], the Coral daemon was about 14,000 lines of C++, the DNS server 2,000 LOC, and the proxy 4,000 LOC. CoralCDN's implementation has since grown to around 50,000 LOC. The changes we later discuss help account for this increase.

CoralCDN typically runs on 300–400 PlanetLab servers (about 70–100 of which run its DNS server), spread over 100-200 sites worldwide. It avoids Internet2-only and commercial sites, the latter due to policy decisions that restrict their use for open services. CoralCDN uses no special knowledge of these machines' locations or connectivity (*e.g.*, GPS coordinates, routing information, etc.). Even though CoralCDN runs on a centrally-managed testbed, its mechanisms remain decentralized and self-organizing. The only use of centralization is for managing software and configuration updates and for controlling run status.

3 Analyzing CoralCDN's Usage

This section presents some HTTP-level data from CoralCDN's deployment and considers its implications.

3.1 System traces and traffic patterns

To understand some of the HTTP traffic patterns that CoralCDN sees, we analyzed several datasets in increasing depth. Figure 3 plots the total number of HTTP requests that the system received each day from mid-2004 through early 2010, showing both the number of HTTP requests from clients, as well as the number of requests issued to upstream CoralCDN peers or origin sites. The traces show common request rates for much of CoralCDN's deployment between 5 and 20 million HTTP requests per day, with more recent rates of 40–50 million daily requests.[2]

Year	Unique domains	Unique URLs	% URLs with 1 req	Reqs to most popular URL
2005	7881	577K	54%	697K
2007	21555	588K	59%	410K
2009	20680	1787K	77%	1578K

Figure 5: **CoralCDN traffic statistics for an arbitrary day (Aug 9).**

We examined three time periods from these logs in more depth, each consisting of HTTP traffic over the same nine-day period (August 9–18) in 2005, 2007, and 2009. CoralCDN received 15–25M requests during each day of these periods. Figure 4 plots the total number of unique client IP addresses from which these requests originated (left) and the aggregate amount of bandwidth uploaded (right). The traces showed 1–2 million clients per day, resulting in a few terabytes of content transferred. We will primarily use the 2009 trace, consisting of 209M requests, in later analysis. Figure 5 provides more information about the traffic patterns, focusing on the first day of each trace.

Figure 6 plots the distribution of requests per unique URL. We see that the number of requests per URL follows a Zipf-like distribution, as common among web caching and proxy networks [5]. Certain URLs are very popular—the so-called "head" of the distribution—such as the most popular one in the Aug-9-2009 trace, which received almost 1.6M requests itself. A large number of URLs—the distribution's "heavy tail"—receive only a single request.

The datasets also show stability in the most popular URLs and domains over time. In all three datasets, the most popular URL retained that ranking across all nine days. In fact, this URL in the 2007 and 2009 traces belonged to the same domain: a site that uses CoralCDN to distribute rule-set updates for the popular Firefox AdBlock browser extension. Exploring this further, Figure 7 uses the 2009 trace to plot the request rate per day for the most popular domains (taking the union of each day's most popular five domains resulted in nine unique domains). We see that six of the nine domains had stable traffic patterns—they were long-term CoralCDN "customers"—while three varied between two and six orders of magnitude per day. The traffic patterns that we see in these two figures have design implications, which we discuss next.

[2]The peak of 120M requests on August 21, 2008 corresponds to a short-lived experiment of an academic research project using CoralCDN as a key-value store [15].

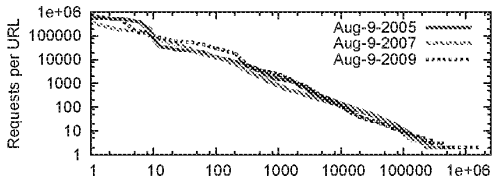

Figure 6: **Total requests per unique URL.**

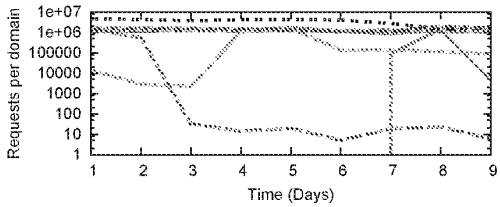

Figure 7: **Requests per top-5 domain over time (Aug 9-18, 2009).**

3.2 Implications of usage scenarios

For CoralCDN to help under-provisioned websites survive unexpected traffic spikes, it does not require any prior registration or authorization. Yet while such openness is necessary to enable even unmanaged websites to survive flash crowds, it comes at a cost: CoralCDN is used in a variety of ways that differ from this more narrow goal. This section considers how well CoralCDN's design is suited for its four main usage scenarios:

1. ***Resurrecting old content:*** Anecdotally, some clients attempt to use CoralCDN for long-term durability. One can download browser plugins that link to both CoralCDN and `archive.org` as potential sources of content when origin servers are unavailable.
2. ***Accessing unpopular content:*** CoralCDN's request distribution shows a heavy tail of unpopular URLs. Servers may Coralize URLs that few visit. And some clients use CoralCDN as a more traditional proxy, for (presumed) anonymity, censorship or filtering circumvention [32], or automated crawling.
3. ***Serving long-term popular content:*** Most requests are for a small set of popular objects. These objects, already widely cached across the network, belong to the stable set of customer domains that effectively use CoralCDN as a free, long-term CDN provider.
4. ***Surviving flash crowds to content:*** Finally, CoralCDN is used for its stated goal of enabling underprovisioned websites to withstand transient load spikes. Popular portals regularly link to Coralized URLs, and users post links in comments. Some sites even adopt dynamic and programmatic mechanisms to redirect requests to CoralCDN, based on observed load and request referrers. We discuss this further in §4.1.

Unfortunately, CoralCDN's design is not well-suited for the first three use cases.

Top URLs	Total Size (MB)	% of Total Reqs
0.01%	14	49.1%
0.1%	157	71.8%
1%	3744	84.8%
10%	28734	92.2%

Figure 8: **CoralCDN's working set size for its most popular URLs on Aug 9, 2009: A small percentage of URLs account for a large fraction of requests, yet they require relatively little storage to cache.**

Insufficient for resurrecting old content. CoralCDN is not designed for archival storage. Proxies do not proactively replicate content for durability, and unpopular content is evicted from proxy caches over time. Further, if content has an expiry time (default is 12 hours), a proxy will serve expired content for at most 24 hours after the origin fails. Still, some clients attempt to use CoralCDN for this purpose. This underscores a design tradeoff: In stressing support for flash crowds rather than long-term durability, CoralCDN devotes its resources to provide availability for content being actively requested. On the other hand, by serving expired content for a limited duration, CoralCDN can mask the *temporary* unavailability of an origin, at least for content already cached in its network.

Unnecessary for unpopular content. While proxies can discover even rare cached content, CoralCDN does not provide any benefit by serving such unpopular content: It does not reduce servers' load meaningfully, and it often results in higher client latency. As such, clients that use CoralCDN to avoid local filtering, circumvent geographic restrictions, or provide (minimal) anonymity may be better served by standard open proxies (that vanilla browsers can be configured to use) or through specialized tools such as Tor [12]. Yet, this type of usage persists—the long tail of Figure 6—and CoralCDN might then be better served with a different design for such traffic, *i.e.*, one that doesn't require a multi-hop, wide-area DHT lookup to complete before fetching content from the origin. For example, for its modest deployment on PlanetLab, each Coral node could maintain connectivity to all others and simply use consistent hashing for a global, one-hop DHT [17, 37]. Alternatively, Coral could only maintain connections with regional peers and eschew global lookups, a design which we evaluate further in §7.

Overkill for stably popular content, so far. For most of CoralCDN's traffic, cooperation is not needed: Figure 6 shows that a small number of URLs accounts for a large fraction of requests. We now measure their working set size in Figure 8, in order to determine how much storage is required to handle this traffic. We find that the most popular 0.01% of URLs account for more than 49% of the total requests to CoralCDN, yet require only 14 MB of storage. Each proxy has a 3.0 GB disk cache, managed using an LRU eviction policy. This is sufficient for serving nearly 85% of all requests from local cache.

70.4% hit in local cache
12.6% returned 4xx or 5xx error code
9.9% fetched from origin site
7.1% fetched from other CoralCDN proxy
$\vdash\!\!\rightarrow$ 1.7% from level-0 cluster (global)
$\vdash\!\!\rightarrow$ 1.9% from level-1 cluster (regional)
$\vdash\!\!\rightarrow$ 3.6% from level-2 cluster (local)

Figure 9: **CoralCDN access ratios for content during Aug 9, 2009.**

These workload distributions support one aspect of CoralCDN's design: Content should be locally cached by the "forward" CoralCDN proxy directly serving end-clients, given that small to moderate size caches in these proxies can serve a very large fraction of requests. This differs from the traditional DHT approach of just storing data on a small number of globally-selected proxies, so-called "server surrogates" [8, 37].

If CoralCDN's working set can be fully cached by each node, we should understand how much cooperation is actually needed. Figure 9 summarizes the extent to which proxies cooperate when handling requests. 70% of requests to proxies are satisfied locally, while only 7% result in cooperative transfers. (The high rate of error messages is due to admission control as a means of bandwidth management, which we discuss in §5.2.) In short, at least for its current workload and environment, only a small fraction of CoralCDN's traffic uses its cooperation mechanisms.

A related result about the limits of cooperative caching had been observed earlier [38], but from the perspective of limited improvements in client-side hit rates. This is a significantly different goal from reducing server-side request rates, however: Non-cooperating groups of nodes would each individually request content from the origin.

This design trade-off comes down to the question of how much traffic is too much for origin servers. For moderately-provisioned origins, such as the customers of commercial CDNs, a caching system might only rely on local or regional cooperation. In fact, Akamai's network is designed precisely so: Nodes *within* each of its approximately 1000 clusters cooperate, but each cluster typically fetches content independently from origin sites [22]. To replicate such scenarios, Coral's clustering algorithms could be used to self-organize a network into local or regional clusters. It could thus avoid the manual configuration of Harvest [7] or colocated deployments of Akamai.

On the other hand, while cooperation is not needed for most traffic, CoralCDN's ability to react quickly to flash crowds—to offload traffic from a failing or oversubscribed origin—is precisely the scenario for which it was designed (and commercial CDNs are not). We consider these next.

Useful for mitigating flash crowds. CoralCDN's traces regularly show spikes in requests to different URLs. We find, however, that these flash crowds grow in popularity on the order of minutes, not seconds. There is a sufficiently

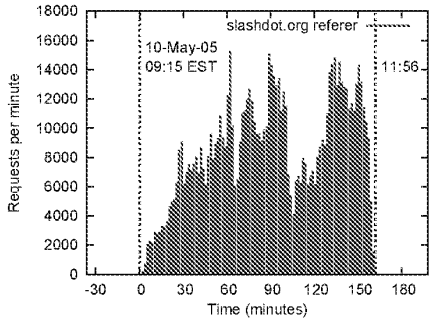

Figure 10: **Flash crowd to a Coralized URL linked to by Slashdot.**

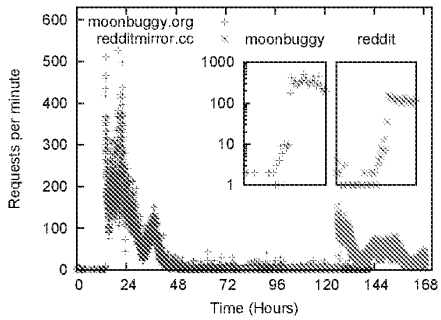

Figure 11: **Mini-flash crowds during August 2009 trace. Each datapoint represents a one-minute duration; embedded subfigures show request rates for the tens of minutes around the onset of flash crowds.**

long leading edge before traffic rises by several orders of magnitude, which has interesting implications.

Figures 10 and 11 show the request patterns of several flash crowds that CoralCDN experienced. The former was to a site linked to in a Slashdot article in May 2005. After rising, the Slashdot flash crowd lasted less than three hours in duration and came to an abrupt conclusion (perhaps as the story dropped off the website's main page). The latter, covering our August 2009 trace, shows spikes to the image cache of a less popular portal (`moonbuggy.org`), as well as to a well-publicized mirror for the collaboratively-filtered `reddit.com`, with another attenuated spike 24 hours later. The embedded graphs in Figure 11 depict the request rates around the onset of the traffic spike for a narrower range of time. All three flash crowds show that the initial rise took minutes.

For a more quantitative analysis of the frequency of flash crowds, we examined the prevalence of domains that experience a large increase in their request rates from one time period to the next. In particular, Figure 12 considers all five-second periods across the August 2009 ten-day trace. The left graph plots a complementary cumulative distribution function (CCDF) of the percentage of domains requested in each period that experience a 10- or 100-fold rate increase. The right graph plots the percentage of requests accounted for by these domains that experience orders-of-magnitude (OOM) increases. Sudden

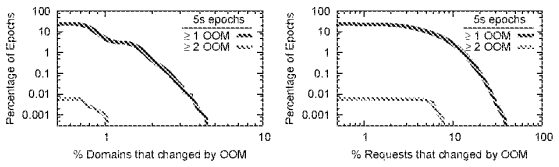

Figure 12: **CCDF of extent of flash-crowd dynamics in August 2009 trace. *Left* graph shows percentage of domains experiencing orders of magnitude (OOM) changes in request rates across five-second epochs. *Right* shows % requests for which these domains account.**

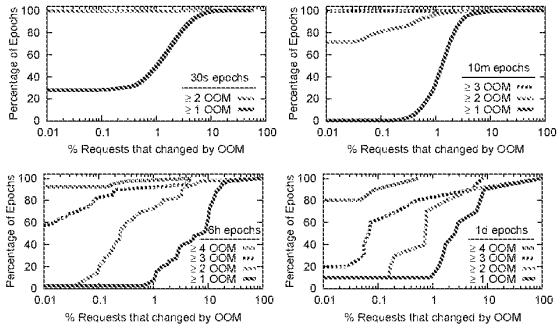

Figure 13: **CDFs of percentage of requests accounted for by domains experiencing order(s)-of-magnitude rate increases. Rate increases computed across epochs of 30 seconds (*top left*), 10 minutes (*top right*), six hours (*bottom left*), and one day (*bottom right*). Plots start on the y-axis with zero domains having such an increase, *e.g.*, 28% of 30s epochs have no domains with a ≥ 1 OOM rate increase.**

increases do exist, but they are rare. In 76% of 5s epochs, no domains experienced any 10-fold increase, while in 1% of epochs, 1.7% of domains (accounting for 12.9% of requests) increased by one order-of-magnitude. Larger dynamism was even more rare: only in 0.006% of epochs did there exist a domain that experienced a 100-fold increase in request rate. No three OOM increase occurred.

To further understand the precipitousness of "flash" crowds, Figure 13 extends this analysis across longer durations.[3] Among 30s epochs, 50% of epochs have at most 0.4% of domains experience a 10-fold increase in their rates (not shown), which account for a total of 1.0% of requests (top left). Only 0.29% of 30s epochs have *any* domains with more than a 100-fold rate increase. At 10-minute epochs, 28% of epochs have at least one domain that experiences a two OOM rate increase, while 0.21% have a domain with a three OOM increase. Still, these flash crowds account for a small fraction of total requests: Domains experiencing 100-fold increases accounted for at least 1% of all requests in only 3.8% of 10m epochs, and 10% of requests in 0.05% of epochs.

[3]To avoid overcounting unpopular domains, we do not count changes when the absolute number of requests to a domain in a given time period is less than some minimum amount, *i.e.*, 10 requests for 5s, 30s, and 10m periods, and 100 requests for 6h and 1d periods.

In short, this data shows that (1) only a small fraction of CoralCDN's domains experience large rate increases within short time periods, (2) those domains' traffic accounts for a small fraction of the total requests, and (3) any rate increases very rarely occur on the order of seconds.

This moderate adoption rate avoids the need to introduce even more aggressive content discovery algorithms. Simulated workloads in early experiments (Figure 4 of [14]) showed that under high concurrency, CoralCDN might issue several redundant fetches to an origin server due to a race-like condition in its lookup protocol. If multiple nodes concurrently *get* the same key which does not yet exist in the index, all concurrent lookups can fail and multiple nodes can contact the origin. This race condition is shared by most applications which use a distributed hash table (both peer-to-peer and datacenter services). But because these traces show that the arrival of user requests happens over a much longer time-scale than a DHT lookup, this race condition does not pose a significant problem.

Note that it is possible to mitigate this condition. While designing a network file system for PlanetLab that supported cooperative caching [2]—meant to quickly distribute a file in preparation for a new experiment—we sought to minimize redundant fetches to the file server. We extended Coral's insert operation to provide return status information, like test-and-set in shared-memory systems. A single *put+get* both returns the first values it encountered in the DHT, as well as inserts its own values at an appropriate location (for a new key, this would be at its closest node). This optimization comes at a subtle cost, however, as it now optimistically inserts a node's identity even before that proxy begins downloading the file! If the origin fetch fails—a greater possibility in CoralCDN's environment than with a managed file server—then the use of these index entries degrades performance. Thus, after using this *put+get* protocol in CoralCDN for several months during 2005, we discontinued its use.

CoralCDN's openness permits users to quickly leverage its resources under load, and its more complex coordination helps mitigate these flash crowds and mask temporary server unavailability. Yet this very openness led to varied usage, the majority of which does not require CoralCDN's more complex design. As we will see, this openness also introduces other problems.

4 Lessons for the Web

CoralCDN's naming technique provides an open API for CDN services that can transparently work for almost any website. Over the course of its deployment, clients and servers have used this API to adopt CoralCDN as an *elastic resource for content distribution*. Through completely automated means, work can be dynamically expanded out to use CoralCDN when websites require additional band-

width resources, and it can be contracted back when flash crowds abate. In doing so, its use presaged the notion of "surge computing" with public cloud platforms. But these naming techniques and CoralCDN's open design introduce a number of web security problems, many of which are engendered by a *lack of explicitness for specifying protection domains*. We discuss these issues here.

4.1 An API for elastic CDN services

We believe that the central reason for CoralCDN's adoption has been its simple user interface and open design.

Interface design. While superficially obvious, CoralCDN's interface design achieves several important goals:

- ***Transparency:*** Work with *unmodified*, *unconfigured*, and *unaware* web clients and webservers.
- ***Deep caching:*** Retrieve embedded images or links automatically through CoralCDN when appropriate.
- ***Server control:*** Not interfere with sites' ability to perform usage logging or otherwise control how their content is served (*e.g.*, via CoralCDN or directly).
- ***Ad-friendly:*** Not interfere with third-party advertising, analytics, or other tools incorporated into a site.
- ***Forward compatible:*** Be amenable to future end-to-end security mechanisms for content integrity or other end-host deployed mechanisms.

Consider an alternative and even simpler interface design [11, 25, 29], in which one embeds origin URLs into the HTTP path, *e.g.*, `http://nyud.net/example.com/`. Not only is HTTP parsing simpler, but nameservers would not need to synthesize DNS records on the fly (unlike our DNS servers for `*.nyud.net`). Unfortunately, while this interface can be used to distribute individual objects, it fails on entire webpages. Any relative links would lack the `example.com` prefix that a proxy needs to identify its origin. One alternative might be to try to rewrite pages to add such links, although active content such as javascript makes this notoriously difficult. Further, such active rewriting impedes a site's control over its content, and it can interfere with analytics and advertisements.

CoralCDN's approach, however, interprets relative links with respect to a page's Coralized hostname, and thus transparently requests these objects through it as well. But all absolute URLs continue to point to their origin sites, and third-party advertisements and analytics remain largely unaffected. Further, as CoralCDN does not modify content, content also may be amenable to verification through end-to-end content signatures [30, 35].

In short, it was important for adoption that *site owners retain sufficient control over how their content is displayed and accessed*. In fact, our predicted usage scenario of sites publishing Coralized URLs proved to be less popular than that of dynamic redirection (which we did not foresee).

An API for dynamic adoption. CoralCDN was envisioned with manual URL manipulation in mind, whether by publishers editing HTML, users typing Coralized URLs, or third-parties posting links. After deployment, however, users soon began treating CoralCDN's interface as an API for accessing CDN services.

On the client side, these techniques included simple browser extensions that offer "right-click" options to Coralize links or that provide a link when a page appears unavailable. They ranged to more complex integration into frameworks like Firefox's Greasemonkey [21]. Greasemonkey allows third-party developers to write site-specific javascript code that, once installed by users, manipulates a site's HTML content (usually through the DOM interface) whenever the user accesses it. Greasemonkey scripts for CoralCDN include those that automatically rewrite links on popular portals, or modify articles to include tooltips or additional links to Coralized URLs. CoralCDN also has been integrated directly into a number of client-side software packages for podcasting.

The more interesting cases of CoralCDN integration are on the server-side. One common strategy is for the origin to receive the initial request, but respond with a 302 redirect to a Coralized URL. This can work well even for flash crowds, as the overhead of generating redirects is modest compared to that of actually serving the content.

Generating such redirects can be done by installing a server plugin and writing a few lines of configuration code. For example, the complete dynamic redirection rule using Apache's `mod_rewrite` plugin is as follows.

```
RewriteEngine on
RewriteCond %{HTTP_USER_AGENT} !^CoralWebPrx
RewriteCond %{QUERY_STRING} !(^|&)coral-no-serve$
RewriteRule ^(.*)$ http://%{HTTP_HOST}.nyud.net
                          %{REQUEST_URI} [R,L]
```

Still, redirection rules must be crafted carefully. In this example, the second line checks whether the client is a CoralCDN proxy and thus should be served directly. Otherwise, a redirection loop potentially could be formed (although proxies prevent this from happening by checking for potential loops and returning errors if one is found).

Amusingly, some early users during CoralCDN's deployment caused recursion in a different way—and a form of amplification attack—by submitting URLs with a long string of `nyud.net`'s appended to a domain. Before proxies checked for such conditions, this single request caused a proxy to issue a number of requests, stripping the last instance of `nyud.net` off in each iteration.

While the above rewriting rule applies for all requests, other sites incorporate redirection in more inventive ways, such as only redirecting clients arriving from particular high-traffic referrers:

```
RewriteCond %{HTTP_REFERER} slashdot\.org [NC,OR]
RewriteCond %{HTTP_REFERER} digg\.com [NC,OR]
RewriteCond %{HTTP_REFERER} blogspot\.com [NC]
```

And most interestingly, some sites have even combined such tools with server plugins that monitor server load and bandwidth use, so that their servers only start rewriting requests *under high load conditions*.

Websites therefore used CoralCDN's naming technique to leverage its CDN resources in an elastic fashion. Based on feedback from users, we expanded this "API" to give sites some simple control over how CoralCDN should handle their requests. For example, webservers can include `X-Coral-Control` response headers, which are saved as cache meta-data, to specify whether CoralCDN proxies should "redirect home" domains that exceed their bandwidth limits (per §5.2) or just return an error as is standard.

4.2 Security and resource protection

A number of security mechanisms curtailed the misuse of CoralCDN. We highlight the design principle for each.

4.2.1 Limiting functionality

CoralCDN proxies have only ever supported GET and HEAD requests. Many of the attacks for which "open" proxies are infamous [24] are simply not feasible. For example, clients cannot use CoralCDN to POST passwords for brute-force cracking. Proxies do not support CONNECT requests, and thus they cannot be used to send spam as SMTP relays or to forge "From" addresses in web mail. Proxies do not support HTTPS and they delete all HTTP cookies sent in headers. These proxies thus provide *minimal application functionality* needed to achieve their goals, which is cooperatively serving cacheable content.

CoralCDN's design had several unexpected consequences. Perhaps most interestingly, given CoralCDN's multi-layer caching architecture, attempting to crawl or brute-force attack a website via CoralCDN is quite slow. New or randomly-selected URLs first require a DHT lookup to fail, which serves to delay requests against an origin website, in much the same way that `ssh` "tarpits" delay responses to failed login attempts. In addition, because CoralCDN only handles explicit Coralized URLs, it cannot be used by simply configuring a vanilla browser's proxy settings. Further, CoralCDN cannot be used to anonymously launch attacks, as it eschews anonymity. Proxies use unique `User-Agent` strings ("`CoralWebPrx`") and include their identity in `Via` headers, and they report an instigating client's IP address to the origin server (in an `X-Forwarded-For` request header). We can only surmise whether the combination of these properties played some role, but CoralCDN has seen little abuse as a platform for proxying server attacks.

4.2.2 Curtailing excessive resource use

CoralCDN's major limiting resource is aggregate bandwidth. The system employs fair-sharing mechanisms to balance bandwidth consumption between origin domains, which we discuss further in §5.2. In addition to monitoring server-side consumption, proxies keep a sliding window of client-side usage. Not only do we seek to prevent excessive bandwidth consumption by clients, but also an excessive number of (even small) requests. These are caused typically by server misconfigurations that result in HTTP redirection loops (per §4.1) or by "bot" misuse as part of a brute-force attack. While CoralCDN's limited functionality mitigates such attacks, one notable brute-force login attempt took advantage of poor security at a top-5 website, which used cleartext passwords over GET requests.

Given both its storage and bandwidth limitations, CoralCDN enforces a maximum file size of 50 MB. This has generally prevented clients from using CoralCDN for video distribution, a pragmatic goal when deploying proxies on university-hosted PlanetLab servers. We found that sites attempted to circumvent these limits by omitting `Content-Length` headers (on connections marked as persistent and without chunked encoding). To ensure compliance, proxies now monitor ongoing transfers and halt (and blacklist) any ones that exceed their limits. This skepticism is needed as proxies interact with potentially untrusted servers, and thus must enforce *complete mediation* [33] to their resources (in this case, bandwidth).

4.2.3 Blacklisting domains and offloading security

We maintain a global blacklist for blocking access to specified origin domain names. Each proxy regularly fetches and reloads the blacklist. This is a practical, but not fundamental, necessity, employed to prevent CoralCDN's deployment sites from restricting its use. Parties that request blacklisting typically cite one of the following reasons.

Suspected phishing. Websites have been concerned that CoralCDN is—or will be confused with—a phishing site. After all, both appear to be "scraping" content and publish a simulacrum under an alternate domain. The difference, of course, is that CoralCDN is serving the site's content unmodified, yet the web lacks any protocol to authenticate the integrity of content (as in S-HTTP [30]) in order to verify this. As SSL only authenticates identity, *websites must typically include CDNs in their trusted computing base.*

Potential copyright violation. Typically following a DMCA take-down notice, third-parties report that copyrighted material may be found on a Coralized domain and want it blocked. This scenario is mitigated by CoralCDN's explicit naming—which preserves the name of the actual origin in question—and by its caching design. Once content is removed from an origin server, it is evicted automatically from CoralCDN in at most 24 hours. This is a natural implication of its goal of handling flash crowds, rather than providing long-term availability.

Circumventing access-control restrictions. Some domains mediate access to their website via IP-based authen-

tication, whereby requests from particular IP prefixes are granted access. This practice is especially common for online academic journals, in order to provide easy access for university subscribers. But open proxies within whitelisted prefixes would enable external clients to circumvent these access-control restrictions.

By offloading policing to their customers, sites *unnecessarily enlarge their security perimeter to include their customer's networks*. This scenario is common yet unnecessary. Recall that CoralCDN proxies do not hide their identities, and they include the originating client's IP address in standard request headers. Thus, origin sites can retain IP-based authentication while verifying that a request does not originate from outside allowed prefixes.[4] Sites are just not making use of this information, and thus fail to properly mediate access to their protected resources.[5]

We did encounter some interesting attacks on our *domain*-based blacklists, akin to fast-flux networks. An adversary created dynamic DNS records for a random domain that pointed to the IP address of a target domain (an online academic journal). The random domain naturally was not blacklisted by CoralCDN, and the content was successfully downloaded from the origin target. Such a circumvention technique would not have worked if the origin site checked either proxy headers (as above) or even just the `Host` field of the HTTP request. The `Host` corresponded to the fast-flux attack domain, not that of the journal. Again, this security hole demonstrates a lack of explicit verification and fail-safe defaults [33].

4.3 Security and naming conflation

We argued that CoralCDN's naming provided a powerful API for accessing CDN services. Unfortunately, its technique has serious implications as the Web's Same Origin Policy (SOP) *conflates naming with security*.

Browsers use domain names for three purposes. (1) Domains specify *where* to retrieve content after they are resolved to IP addresses, precisely how CoralCDN enacts its layer of indirection. (2) Domains provide a human-readable name for *what administrative entity* a client is interacting with (*e.g.*, the "common name" identified in SSL server certificates). (3) Domains specify *what security policies* to enforce on web objects and their interactions.

The Same Origin Policy specifies how scripts and instructions from an origin domain can access and modify browser state. This policy applies to manipulating cookies, browser windows, frames, and documents, as well as to accessing other URLs via an XmlHttpRequest. At its simplest level, all of these behaviors are only allowed between resources that belong to an identical origin domain. This provides security against sites accessing each others' private information kept in cookies, for example. It also prevents websites that run advertisements (such as Google's AdSense) from easily performing click fraud to pay themselves advertising dollars by programmatically "clicking" on their site's advertisements.[6]

One caveat to the strict definition of an identical origin [18] is that it provides an exception for domains that share the same `domain.tld` suffix, in that `www.example.com` can read and set cookies for `example.com`. This has bad implications for CoralCDN's naming strategy. When `example.com` is accessed via CoralCDN, it can manipulate all `nyud.net` cookies, not just those restricted to `example.com.nyud.net`.[7] Concerned with the potential privacy violations from this scenario, CoralCDN deletes all cookies from headers.

Unfortunately, many websites now manage cookies via javascript, so cookie information can still "leak" between Coralized domains on the browser. This happens often without a site's knowledge, as sites commonly use a URL's `domain.tld` without verifying its name. Thus, if the Coralized `example.com` writes `nyud.net` cookies, these will be sent to `evil.com.nyud.net` if the client visits that webpage. Honest CoralCDN proxies will delete these cookies in transit, but attackers can still circumvent this problem. For example, when a client visits `evil.com.nyud.net`, javascript from that page can access `nyud.net` cookies, then issue a XmlHttpRequest back to `evil.com.nyud.net` with cookie information embedded in the URL. Similar attacks are possible against other uses of the SOP, especially as it relates to the ability to access and manipulate the DOM. Note that these attack vectors exist even while CoralCDN operates on fully-trusted nodes, let alone more peer-to-peer environments!

Rather than conclude that CoralCDN's domain manipulation is fundamentally flawed, we argue that better adherence to security principles is needed. Websites are partially at fault because they default access to `domain.tld` suffixes too readily, as opposed to stripping the minimal number of domain prefixes: a violation of the principle of least information. An alternative solution that embraces least

[4] This does not address the corner case in which the original request comes from an IP address within that prefix, while subsequent ones that access the then-cached content do not. This can be handled typically by marking content as not cacheable, or by having a proxy include headers that explicitly specify its client population (*i.e.*, as "open" or by IP prefix).

[5] One might argue that sites use a pure IP-based filtering approach given its ability to be implemented in layer-3 front-end load balancers. But this is not a simple firewall problem, as sites also permit access for individual users that login with the appropriate credentials. The sites with which we communicated implemented such authorization logic either directly in webservers or in complex, layer-7 front-end appliances.

[6] This is prevented because advertisements like AdSense load in an `iframe` that the parent document—the third-party website that stands to gain revenue—cannot access, as the frame belongs to a different domain.

[7] Commercial CDNs like Akamai are typically not susceptible to such attacks, as they generally use a separate top-level domains for each customer, as opposed to CoralCDN's suffix-based approach. Unlike CoralCDN's zero configuration, however, such designs require that origins preestablish an operational relationship with their CDN provider and point their domain to the CDN service (*e.g.*, by aliasing their domain to the CDN through CNAME records in DNS).

privilege (and has much better incremental deployability) would be to *allow sources of content to explicitly constrain default security policies*. As one simple example, when serving content for some `origin.tld`, proxies could use HTTP response headers to specify that the most permissive domain should be `origin.tld.domain.tld`, not their own `domain.tld`. Interestingly, HTML 5, Flash, and various javascript hacks [6] are all exploring methods to *expand* explicit cross-domain communication.[8] Both proposals avow that the SOP is insufficient and should be adapted to support more flexible control through explicit rules; ours just views its corner cases as too permissive, while the other views its implications as too restrictive.

5 Lessons for CDNs

Unlike most commercial counterparts, CoralCDN is designed to interact with overloaded or poorly-behaving origin servers. Further, while commercial systems will grow their networks based on expected use (and hence revenue), the CoralCDN deployment is comprised of volunteer sites with fixed, limited bandwidth. This section describes how we adapted CoralCDN to satisfy these realities.

5.1 Designing for faulty origins

Given its design goals, CoralCDN needs to react to non-crash failures at origin servers as the rule, not the exception. Thus, one design philosophy that has come to govern CoralCDN's behavior is that *proxies should accept content conservatively and serve results liberally*.

Consider the following, fairly common, situation. A portal runs a story that links to a third-party website, driving a sudden influx of readers to this previously unpopular site. A user then posts a Coralized link to the third-party site as a "comment" to the portal's story, providing an alternate means to fetch the content.

Several scenarios are possible. (1) The website's origin server becomes unavailable before any proxy downloads its content. (2) CoralCDN already has a copy of the content, but requests arrive to it after the content's *expiry* time has passed. Unfortunately, subsequent HTTP requests to the origin webserver result in failures or errors. (3) Or, CoralCDN's content is again expired, but subsequent requests to the origin yield only partial transfers. CoralCDN employs different mechanisms to handle these failures.

Cache negative service results (#1). CoralCDN may be hit with a flood of requests for an inaccessible URL, *e.g.*, DNS resolution fails, TCP connections timeout, etc. For these situations, proxies maintain a local negative result cache about repeated failures. Otherwise, both proxies and their local DNS resolvers have experienced resource exhaustion, given flash crowds to apparently dead sites. (While negative result caching has also long been part of some DNS implementations [19], it is not universal and does not extend to TCP or application-level failures.) While more a usability issue, CoralCDN still receives requests for some Coralized URLs several years after their origins became unavailable.

Serve stale content if origin faulty (#2). CoralCDN seeks to avoid replacing good content with bad. As its proxies mostly obey content expiry times specified in HTTP headers,[9] if cached content expires, proxies perform a conditional request (`If-Modified-Since`) to revalidate or update expired content. Overloaded origin servers might fail to respond or might return some temporary error condition (data in §7 shows this to occur in about 0.5% of origin requests). Rather than retransmit this error, CoralCDN proxies return the stale content and continue to retain it for future use (for up to 24 hours after it expires).

Prevent truncations through whole-file overwrites (#3). Rather than not responding or returning an error, what if a revalidation yields a truncated transfer? This is not uncommon during a flash crowd, as a CoralCDN proxy will be competing for a webserver's resources. Rather than have proxies lose stale yet complete versions of objects, proxies implement *whole-file overwrites* in the spirit of AFS [16]. Namely, if a valid web object is already cached, the new version is written to a temporary file. Only after the new version completes downloading and appears valid (based on `Content-Length`) will a proxy replace the old one.

These approaches are not fail-proof, limited by both semantic ambiguity in status directives and inaccuracies with their use. In terms of ambiguity, does a 403 (Forbidden) response code signify that a publisher seeks to make the content unavailable (permanent), or is it caused by a website surpassing its daily bandwidth limits and having requests rejected (temporary)? Does a 404 (File Not Found) code indicate whether the condition is permanent (due to a DMCA take-down notice) or temporary (from a PHP or database error)? On the other hand, the application of status directives can be flawed. We often found websites to report human-readable errors in HTML body content, but with an HTTP status code of 200 (Success). This scenario leads CoralCDN to replace valid content with less useful information. We hypothesize that bad defaults in scripting languages such as PHP are partially to blame. Instead of being fail-safe, the response code defaults to success.

Even if transient errors were properly identified, for how long should CoralCDN serve expired content? HTTP lacks

[8] This is in reaction to the common practice of inserting third-party objects into a document's namespace via `<script>`—and thus sacrificing security protections—as the SOP does not permit a middle ground.

[9] Proxies in our deployment are configured with a *minimum* expiry time of some duration (five minutes), and thus do not recognize `No-Cache` directives as such. Because CoralCDN does not support cookies, SSL bridging, or POSTs, however, many of the privacy concerns associated with caching such content are alleviated.

the ability to specify explicit policy for handling expired content. Akamai defaults to a fail-safe scenario by not returning stale content [22], while CoralCDN seeks to balance this goal with availability under server failures. As opposed to only using the system-wide default of 24 hours, CoralCDN recently enabled its users to explicitly specify their policy through `max-stale` response headers.[10]

These examples all point to another lesson that governs CoralCDN's proxy design: *Maintain the status quo unless improvements are possible.*

Decoupling service dependencies. A similar theme of only improving the status quo governs CoralCDN's management system. CoralCDN servers query a centralized management point for a number of tasks: to update their overall run status, to start or stop individual service components (HTTP, DNS, DHT), to reinstall or update to a new software version, or to learn shared secrets that provide admission control to its DHT. Although designed for intermittent connectivity, one of CoralCDN's significant outages came when the management server began misbehaving and returning unexpected information. In response, we adopted what one might call *fail-same behavior* that accepts updates conservatively, an application of decoupling techniques from fault-tolerant systems. Management information is stored durably on servers, maintaining their status-quo operation (even across local crashes) until well-formed new instructions are received.

5.2 Managing oversubscribed bandwidth

While commercial CDNs and computing platforms often respond to oversubscription by acquiring more capacity, CoralCDN's deployment on PlanetLab does not have that luxury. Instead, the service must manage its bandwidth consumption within prescribed limits. This adoption of bandwidth limits was spurred on by administrative demands from its deployment sites. Following the Asian tsunami of December 2004, and with YouTube yet to be created, CoralCDN distributed large quantities of amateur videos of the natural disaster. With no bandwidth restrictions on PlanetLab at the time, CoralCDN's network traffic to the public Internet quickly spiked. PlanetLab sites threatened to pull their servers off the network if such use could not be curtailed. It was agreed that CoralCDN should restrict its usage to approximately 10 GB per day per server (*i.e.*, per PlanetLab sliver).

Several design options exist for limiting bandwidth consumption. A proxy could simply shut down after exceeding a configured daily capacity (as supported by Tor [12]). Or it could rate-limit its traffic to prevent transient congestion (as done by BitTorrent and Tor). But as CoralCDN primarily provides a service for websites, as opposed to clients, we chose to allocate its limited bandwidth in a way that both preserves some notion of *fairness* across its customer domains and maintains its central goal of handling flash crowds. The technique we developed is more broadly applicable than just PlanetLab and federated testbeds: to P2P deployments where users run peers within resource containers, to multi-tenant datacenters sharing resources between their own services, or to commercial hosting environments using billing models such as 95th-%ile usage.

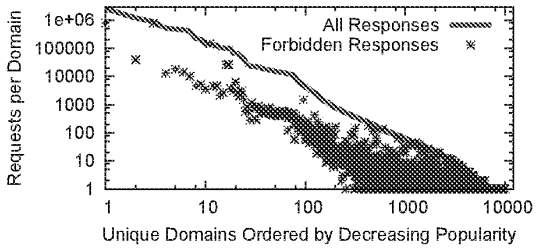

Figure 14: **Requests per domain and number of 403 rejections.**

Providing per-domain fairness might be resource intensive or difficult in the general case, given that CoralCDN interacts with 10,000s of domains each day, but our highly-skewed workloads greatly simplify the necessary accounting. Figure 14 shows the total number of requests per domain that CoralCDN received over one day (the solid top line). The distribution clearly has some very popular domains—the most popular one (a Tamil clone of YouTube) received 2.6M requests—while the remaining distribution fell off in a Zipf-like manner. (Note that Figure 6 was in terms of unique URLs, not unique domains.) Given that CoralCDN's traffic is dominated by a limited number of domains, its mechanisms can serve mainly to reject requests for (*i.e.*, perform admission control on) these bandwidth hogs. Still, CoralCDN should differentiate between peak limits and steady-state behavior to allow for flash crowds or changing traffic patterns.

To achieve these aims, each CoralCDN proxy implements an algorithm that attempts to simultaneously (1) provide a hard-upper limit on peak traffic per hour (configured to 1000 MB per hour per proxy), (2) bound the expected total traffic per epoch in steady state (400 MB per hour per proxy), and (3) bound the steady-state limit per domain. As setting this last limit statically—such as $1/k$-th of the total traffic if there are k popular domains—would lead to good fairness but poor utilization (given the non-uniform distribution across domains), we dynamically adjust this last traffic limit to balance this trade-off.

During each hour-long epoch, a proxy records the total number of bytes transmitted for each domain. It also calculates domains' average bandwidth as an exponentially-weighted moving average (attenuated over one week), as well as the total average consumption across all domains. This long attenuation period provides long-term fairness—

[10] HTTP/1.1 supports max-stale *request* headers, although we are not aware of their use by any HTTP clients. Further, as proxies often evict expired content from their caches, it is unclear whether such request directives can be typically satisfied.

and most consumption is long-term, as shown in Figure 7—but also emphasizes support for short-term flash crowds. Across epochs, bandwidth usage is only tracked, and durably stored, for the top-100 domains. If a domain is not currently one of the top-100 bandwidth consumers, its historical average bandwidth is set to zero (providing additional leeway to sites experiencing flash crowds).

When a requested domain is over its hourly budget (case 3 above), CoralCDN proxies respond with 403 (Forbidden) messages. If instead the proxy is over its peak or steady-state limit calculated over all domains (cases 1 or 2 above), then the proxy redirects the client back to the origin site, and the proxy temporarily makes itself unavailable for new client requests, which would be rejected anyway.[11]

By applying these mechanisms, CoralCDN reduces its bandwidth consumption to manageable levels. While its demand sometimes exceeds 10 TBs per day (aggregate across all proxies), its actual HTTP traffic remains steady at about 2 TB per day after rejecting a significant number of requests. The scatter plot in Figure 14 shows the number of requests resulting in 403 responses per domain, most due to these admission control mechanisms. We see how variances in domains' object sizes yield different rejection rates. The second-most popular domain serves mostly images smaller than 10 KB and experiences a rejection rate of 3.3%. Yet the videos of the third-most popular domain—user-contributed screensavers of fractal flames—are typically 5 MB in size, leading to an 89% rejection rate.

Note that we could significantly curtail the use of CoralCDN as a long-term CDN provider (see §3.2) through simple changes to these configuration settings. A low steady-state limit per domain, coupled with a greater weight on a domain's historic averages, devotes resources to flash-crowd relief at the exclusion of long-term consumption.

Admittedly, CoralCDN's approach penalizes an origin site with more regional access patterns. Bandwidth accounting and admission control is performed independently on each node, reflecting CoralCDN's lack of centralization. By not sharing information between nodes (provided that DNS resolution preserves locality), a site with regional interest can be throttled before it reaches its fair share of global capacity. While this does not pose an operational problem for CoralCDN, it is an interesting research problem to perform (approximate) accounting across the network that is both decentralized and scalable. Distributed Rate Limiting [28] considered a related problem, but focused on instantaneous limits (*e.g.*, Mbps) instead of long-term aggregate volumes and gossiped state that is linear in both the number of domains and nodes.

[11] If clients are redirected back to the origin, a proxy appends the query-string `coral-no-serve` on the location URL returned to the client. Origins that use redirection scripts with CoralCDN check for this string to prevent loops, per §4.1. Although not the default, operators of some sites preferred this redirection home even if their domain was to blame (a policy they can specify through a `X-Coral-Control` response header).

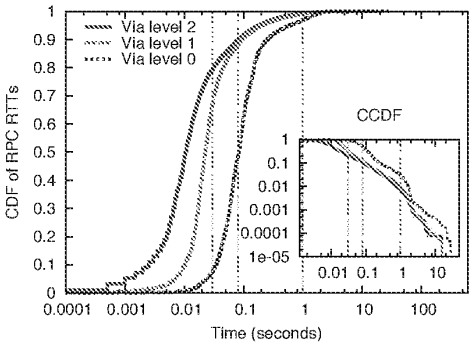

Figure 15: **RPC RTTs to various levels of Coral's DHT hierarchy.**

5.3 Managing performance jitter

Running on an oversubscribed deployment platform, CoralCDN developed several techniques to better handle latency variations. With PlanetLab services facing high disk, memory, and CPU contention, and sometimes additional traffic shaping in the kernel, applications can face both performance jitter and prolonged delays. These performance variations are not unique to PlanetLab, and they have been well documented across a variety of settings. For example, Google's MapReduce [10] took runtime adaption of cluster query processing [3] to the large-scale, where performance variations even among homogeneous components required speculative re-execution of work. More recently, studies of a MapReduce clone on Amazon's EC2 underscored how shared and virtualized platforms provide new performance challenges [39].

CoralCDN saw the implications of performance variations most strikingly with its latency-sensitive self-organization. For example, Coral's DHT hierarchy was based on nodes clustering by network RTTs. A node would join a cluster provided some minimum fraction (85%) of its members were below the specified threshold (30 ms for level 2, 80 ms for level 1). Figure 15 shows the RTTs for RPC between Coral nodes, broken down by levels (with vertical lines added at 30ms, 80ms, and 1s). While the clustering algorithms achieve their goals and local clusters have lower RTTs, the heavy tail in all CDFs is rather striking. Fully 1% of RPCs took longer than 1 second, even within local clusters. Coral's use of concurrent RPCs during DHT operations helped mask this effect.

Another lesson from CoralCDN's deployment was the need for *stability in the face of performance variations*. This translated to the following rule in Coral. A node would switch to a smaller (and hence less attractive) cluster only if fewer than 70% of a cluster's members now satisfy its threshold, and form a singleton only if fewer than 50% of neighbors are satisfactory. In other words, the barrier to enter a cluster is high (85%), but once a member, it's easier to remain. Before leveraging this form of hysteresis, cluster oscillations were much more common, which led

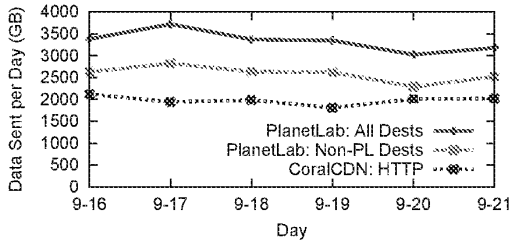

Figure 16: **Comparison of PlanetLab's accounting of all upstream traffic, PlanetLab's count to non-PlanetLab destinations, and CoralCDN's accounting through HTTP logs.**

to many stale DHT references. A related use of hysteresis within self-organizing systems helped improve virtual network coordinate systems for both PlanetLab [26] and Azureus [20], as well as failure recovery in Bamboo [31].

6 Lessons for Platforms

With the growth of virtualized hosting and cloud deployments, Internet services are increasingly running on third-party infrastructure. Motivated by CoralCDN's deployment on PlanetLab, we discuss some benefits from improving an application's visibility into and control over its lower layers. We first revisit CoralCDN's bandwidth management from the perspective of fine-grained service differentiation, then describe tackling its fault-tolerance challenge with adequate network support.

6.1 Exposing information and expressing preferences across layers

We described CoralCDN's bandwidth management as self-regulating, which works well in trusted environments. But many resource providers would rather *enforce* restrictions than assume applications behave well. Indeed, in 2006, PlanetLab began enforcing average daily bandwidth limits per node per service (*i.e.*, per PlanetLab "sliver"). When a sliver hits 80% of its limit—17.2 GB/day from each server to the public Internet—the kernel begins enforcing bandwidth caps (using Linux's Hierarchical Token Bucket scheduler) as calculated over five-minute epochs.

We now have the possibility of two levels of bandwidth management: admission control by CoralCDN proxies and rate limiting by the underlying hosting platform. Interestingly, even though CoralCDN uses a relatively conservative limit for itself (10 GB/day per sliver), it still surpasses the 80% mark (13.8 GB) on 5–10 servers per day (out of its 300-400 servers). The main cause of this overage is that, while CoralCDN counts only successful HTTP responses, its hosting platform accounts for all traffic—HTTP, DNS, DHT RPCs, log transfers, packet headers, retransmissions, etc.—generated by its sliver. Figure 16 shows the difference in these recorded values for the week of Sept 16, 2009. We see that kernel statistics were 50%-90% higher than CoralCDN's accounting. This problem of accurate accounting is a general one, as it is difficult or expensive to collect such data in user-space.[12] And even accurate information does not prevent CoralCDN's managed HTTP traffic from competing for network resources with the rest of its sliver's unmanaged traffic.

We argue that hosting platforms should provide better visibility and control. First, these platforms should export greater information to higher levels, such as their current measured resource consumption in a machine-readable format and in real time. Second, these platforms should allow applications to push policies into lower levels, *i.e.*, an application's explicit preferences for handling different classes of resources. For the specific case of network resources, the platform kernel could apply priorities on a granularity finer that just per-sliver, akin to a form of end-host DiffServ; CoralCDN would prioritize DNS and DHT traffic over HTTP traffic, in turn over log maintenance.

Note that we are concerned with a different type of resource management than that provided by VM hypervisors or kernel resource containers [4]. Those systems focus on *short-term* resource isolation or prioritized scheduling between applications, and typically reason about *coarse-grain* VM-level resources. Our focus instead is on *long-term* resource accounting. PlanetLab is not unique here; commercial cloud-computing providers such as Amazon and Rackspace use long-term resource accounting for billing purposes. (In fact, Amazon just launched its CloudWatch service in June 2009 to expose real-time resource monitoring on a coarser-grain per-VM basis [1].) Thus, providing greater visibility and control would be useful not only for deploying applications on platforms with hard constraints (*e.g.*, PlanetLab), but also for managing applications on commercial platforms so as to minimize costs (*e.g.*, in both metered and 95th-%ile billing scenarios).

6.2 Providing support for fault-tolerance

A central reliability issue in CoralCDN is due to its bootstrapping problem: To initially resolve a Coralized URL with no prior knowledge of system participants, a client's resolver must contact one of only 10–12 CoralCDN nameservers registered with the `.net` gTLD servers. If one of these nameservers fails—each IP address represents a static PlanetLab server—clients experience long DNS timeouts. Thus, while CoralCDN *internally* detects and reacts quickly to failure, the same rapid recovery is not enjoyed by its primary nameservers registered *externally*. And once legacy clients bind to a particular proxy's IP address—*e.g.*, web browsers cache name-to-IP mapping to prevent certain types of "rebinding" attacks on the

[12] In fact, even Akamai servers only use an estimate of bandwidth consumption (their so-called "fully-weighted bits") when calculating server load [22]. Only more recently did PlanetLab expose kernel accounting.

Same Origin Policy [9]—CoralCDN cannot recover for this client if that proxy fails.

While certainly observed before, CoralCDN's reliability challenge underscores the limits of purely application-layer recovery, especially as it relates to bootstrapping. In the context of DNS-based bootstrapping, several possibilities exist, including (1) dynamically updating root nameservers to reflect changes, *e.g.*, via the rarely-supported RFC2136 [36], (2) announcing IP anycast addresses via BGP or OSPF, or (3) using transparent network-layer failover between colocated nameservers (*e.g.*, ARP spoofing or VIP/DIP load balancers). IP-level recovery between proxies has its own solutions, but most commonly rely on colocated servers in LAN environments. None of these suggestions are new ones, but they still present a higher barrier to entry; PlanetLab did not have any available to it.

Deployment platforms should strive to provide or expose such network functionality to their services. Amazon EC2's launch of Elastic IP Addresses in March 2008, for example, hid the complexity of ARP spoofing for VM environments. The further development of such support should be an explicit goal for future deployment platforms.

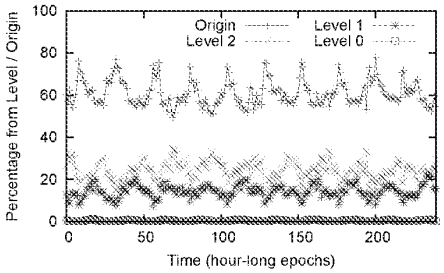

Figure 17: **Percentage of a proxy's upstream requests satisfied by origin and by peers at various clustering levels when *regional cooperation* is used, *i.e.*, level-0 peers only serve as a failover from a faulty origin. Dataset covers 10-day period from December 9–19, 2009.**

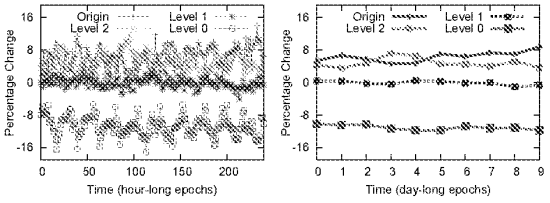

Figure 18: **Change in percentage between regional cooperation policy (Figure 17) and CoralCDN's traditional global peering. Positive values correspond to increased hit rates in regional peering.**

7 Conclusions and Looking Forward

Our retrospective on CoralCDN's deployment has a rather mixed message. We view the adoption of CoralCDN as a successful proof-of-concept of how users can and will leverage open APIs for CDN services. But many of its architectural features were over-designed for its current environment and with its current workload: A much simpler design could have sufficed with probably better performance to boot.

That said, it is a entirely different question as to whether CoralCDN provides a good basis for designing an Internet-scale cooperative CDN. The service remained tied to PlanetLab because we desired a solution that was backwards compatible with both unmodified clients and servers. Running on untrusted nodes seemed imprudent at best given our inability to provide end-to-end security checks. We have shown, however, that even running CoralCDN on fully trusted nodes introduces some security concerns. So, if we dropped the goal of full backwards compatibility, what minimal changes could better support more open, flexible infrastructure?

Naming. CoralCDN's naming provided a layer of indirection for composing two loosely-coupled Internet services. In fact, one could compose longer series of services that each offer different functionality by simply chaining together their domain names. While this technique would not be safe under today's Same Origin Policy, we showed in §4.3 how a trusted proxy could constrain the default security policy. For a participating origin server with an untrusted CDN, the origin should specify (and sign) its minimally required domain suffix of `origin.tld.*`.

Content Integrity. Today's CDNs are full-fledged members of a website's trusted computing base. They have free reign to return modified content. Often, they can even programmatically read and modify any content served *directly* from a customer website to its clients (either by serving embedded `<script>`'s or by playing SOP tricks while masquerading as their customer behind a DNS alias). To provide content delivery via untrusted nodes, the natural solution is an HTTP protocol that supports end-to-end signatures for content integrity [30]. In fact, even a browser extension would suffice to deploy such security [35].

Fine-Grain Origin Control. A tension in this paper is between client latency and server load, underscored by our varied usage scenarios. An appropriate strategy for interacting with a well-provisioned server is a minimal attempt at cooperation before contacting the origin. Yet, an oversubscribed server wants its clients to make a maximal effort at cooperation. So far, proxies have used a "one-size-fits-all" approach, treating all origins as if they were oversubscribed. Instead, much as they have adopted dynamic URL rewriting, origin domains can signal a CoralCDN proxy about their desired policy in-band. At a high-level, this argues for a richer API for elastic CDN services.

To explore the effect of *regional cooperation*, we changed the default lookup policy on about half the deployed CoralCDN proxies since September 2009. If re-

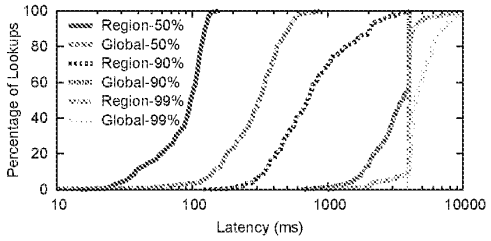

Figure 19: **CDF of median, 90th percentile, and 99th percentile lookup latency (over all hour-long epochs of Dec 9–19, 2009), comparing regional and global cooperation policies. Individual lookups were configured with a five-second timeout.**

quested content is not already cached locally, these proxies only perform lookups within local and regional clusters (level 2 and 1) before contacting the origin. For proxies operating under such a policy, Figure 17 shows the percentage of upstream requests that were satisfied by the origin and at different levels of clusters. Figure 18 depicts the *change* in behavior compared to the traditional global lookup strategy, showing that the 10–12% of requests that had been satisfied by level-0 proxies shifted to higher hit rates at both the origin and local proxies.[13] This change was associated with an order-of-magnitude latency improvement for the Coral lookup, shown in Figure 19. The global index still provides some benefit to the system, however, as per Figure 17, it satisfies an average of 0.56% of requests (stddev 0.51%) that failed over from origin servers. In summary, system architectures like CoralCDN can support different policies that trade-off server load for latency, yet still mask temporary failures at origins.

While perhaps imperfectly suited for a smaller-scale platform like PlanetLab, CoralCDN's architecture provides interesting self-organizational and hierarchical properties. This paper discussed many of the challenges—in security, availability, fault-tolerance, robustness, and, perhaps most significantly, resource management—that we needed to address during its five-year deployment. We believe that its lessons may have wider and more lasting implications for other systems as well.

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[13] These graphs also show interesting diurnal patterns, related to a default expiry time of 12 hours for content.

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July 12, 2017

- Version 2.96L fixed some bugs, and may be the last version

March 1, 2015

- Version 2.96k fixed some bugs.

Jan 4, 2014

- Version 2.96j added support for Red5 plus nginx FLASH Media Server. The inbuilt Sniffer used NDIS interface instead of raw socket, which can capture almost every IP packet to improve the chance of obtaining the real links. You can run program as normal user, but starting Sniffer will probably fire "User Access Control", in this case you must click "Yes" button. Now 95/98/ME/NT will not be supported.

Nov 15, 2013

- Version 2.96i added support for Windows 8.1 and Enhanced Protected Mode for IE11. On Windows 8.1 x64 changing option "Monitor" will probably fire "User Access Control", in this case you must click "Yes" button.

June 10, 2013

- Issued 2.96f. Port of Mac OS X fixed many bugs, degraded CPU usage. I have been tested for several weeks on 10.8.3, "browser (Safari, Firefox, Chrome) monitor", "URL Sniffer" features can work also like Windows.

April 6, 2013

- Issued 2.96e. This update fixed some bugs.
- Issued first version from Mac OS X, it does not support MMS, RTSP and eMule protocols.

Feb 9, 2013

- Issued 2.96d. This update fixed some bugs.
- NetTransport for Mac OS is being developing, MMS and RTSP protocols won't be supported in the 1st version.

Feb 20, 2011

- Issued 2.96b. This update owned the most changes in the developing history of "NetTransport", but I still named it "2.96b" instead of "2.97",

because there were neight significant changes, nor new features or modules were added, and it is beta feature to add support for "Wowza Media Server". I prefer to "Flash Media Server", the reason is that in the case of bad network traffic FMS still transfers the whole media data (only pops "Insufficient Bandwidth Warning") so that NetTransport can compose nearly perfect MP4 file, but NetTransport can NOT do this for Wowza because of some data not being transferred without any prompt.

- There were some changes about "URL-Sniffer" in every update recently, next release I will still change something about it, because there are still many video sites NetTransport can't capture their flash links.

August 30, 2010

- Version 2.95 also fixed a running problem about mfc90u.dll.

July 29, 2010

- Note, we will discontinue UNICODE version, but keep x86, x64, Classic and 9x version.

May 29, 2010

- Issued x64 version.

May 21, 2010

- I will issue x64 installation package at the end of this month or the beginning of June.

May 16, 2010

- No update issued. I want to regard this News as blog.
- Today I converted some Assembly code about Real authentication to C code, so it is possible to make 64bits program.

April 1, 2010

- Issued 2.92 added magnet URI support for BT, which means BT task does NOT need seed file any more.

Feb 25, 2010

- Issued 2.91, a new VS2005 like User Interface. I used VC2008 Feature Pack to modify the main user framework, especially FTPTransport was changed much thoroughly. I fixed some not very perfect places about Feature Pack, but I am sure that bugs are still existed in the new UI, if you find, please let me know, thank you.

Jan 3, 2010

- Happy New Year :-)
- Issued 2.90 added a feature to combine a couple of Flash or MP4 movies into one file. Also rewrote the passive listener for BT and eMule to reduce the System Resources usage.

August 16, 2009

- Issued 2.86, improved the transmission performance for SFTP significantly. FTPTransport perhaps is one of the best SFTP clients.
- Improved RTMP protocol according to Adobe official specification.

April 15, 2009

- Issued 2.83, enhanced to parse FLASH link.

March 15, 2009

- If you help us to sell, we promise to pay you at most 40% as the commission.
- Issued 2.81.

July 26, 2008

- The recent 2.6x serial is mainly designed for RTMP. Version 2.63 can record FLASH perfectly.
- Next month my just born boy will be back from his mother's home, I am afraid that I have not enough time to update project in the later, so recently NetTransport was issued slight frequently.

March 23, 2008

- The price will be increased up to $29.95 from April 1 due to USD depreciation continually.

Nov 11, 2007

- Added support for IPv6. But eMule protocol itself does NOT support IPv6; only SOCKS5 proxy supports IPv6; and I also don't know how to implement IPv6 for UPnP. I am proud that NetTransport is ready for the future.

July 6, 2007

- Both eMule and BitTorrent support streaming encryption (obfuscation) protocol, which are your first choice. And early hidden settings now are added into the global Options.

June 20, 2007

- Emergently fixed a fatal bug on Microsoft RTSP that NetTransport incorrectly did the process for ANNOUNCE command. But 2.28 and below version haven't this issue.
- Added support for BitTorrent Message Stream Encryption protocol. You can create a registry key, set the value of "HKEY_CURRENT_USER\Software\Xi\NetXfer\Torrent\Crypto" to 2 with type REG_DWORD to allow encryption for active connection. Next release will implement the user interface for this settings.

June 6, 2007

- Added support for eMule protocol. NetTransport has the same capability as eMule on search and download. Please use 20 and above threads for every task, and you can use the hidden settings, see : adjust parameter.

Mar 6, 2007

- Issued 2.30, added RealNetworks RTSP cloaked through HTTP, supporting SOCKS, HTTP<CONNECT> proxy, also supporting HTTP<GET>, and is better than RealPlayer 10 on NTLM authentication.

Feb 23, 2007

- Modified and uploaded Website. Because some pages displayed incorrectly under Firefox, Opera, etc.

Dec 3, 2006

- Issued 2.26. Rewrote UPnP to download BT in LAN.

Oct 3, 2006

- Issued 2.23. I modified and enhanced BitTorrent protocol. See: adjust parameter.
- I will have about 2 months marriage vacation, so I will stop developing in this period. Please forgive me for inconvenience.

Aug 27, 2006

- Issued 2.22. I rewrote BitTorrent protocol, added download and upload for both active and passive connections, which improves download efficiency. See: adjust parameter.

Jun 11, 2006

- Issued 2.20.
- Added BitTorrent protocol and its several extension protocols. I didn't use open source to implement, because many open source codes are based on BitTorrent project, which is written by Python, I think its performance can NOT compare with C/C++ (sorry for my words). Please use at least 10 threads to download BT. You take some time to quit Net Transport after downloading BT, though you see the icon in the taskbar's status area disappears, but you still can see "NetTransport.exe" in the "Task Manager", because Net Transport is informing every tracker of stopping event, please be patient. I am NOT satisfied with BT of this version, because its practical result is not pretty, I hope I can improve in the next release. See: adjust parameter.
- [FTP] PORT transfer mode can traverse SOCKS proxy protocol. Few FTP clients implemented this feature including some very famous clients. I am glad and proud. :-)

Apr 4, 2006

- Issued 2.11, fixed some small bugs.

Feb 15, 2006

- Issued 2.10, added sniffer to parse HTML to get URL.

Jan 8, 2006

- Issued 2.02.

Dec 1, 2005

- Issued 2.01.
- I haven't yet implemented some features in 2.01 due to not enough time, I will restore some features in 1.9x, such as import/export URL, showing traffic in the drop pane, etc.

Oct 29, 2005

- Issued the new release version 2.00.

Please refer to the internal help firstly, you can find it by the main menu "File" > "Help" > "Help".

>> When I try to start the inbuilt "URL-Sniffer" I get the following error "An attempt was made to access a socket in a way forbidden by its access permissions", then how to do?

Two ways: 1) Disable User Account Control; 2) Run NetTransport as administrator.

>> How to record Flash movies?

Please start the inbuilt "URL-Sniffer" firstly. When you are visiting web pages, it will show the RED actual playing links, then click "Download" button. You'd better use this feature to find and record Flash movies.

>> Why the browser embedded player can play, but Transport can't?

- For Microsoft Media Service, please try the below steps:

1. Rename protocol header from "mms" to "rtsp", this can get the best performance.
2. Keep protocol header "mms", and check "Other Settings > Streaming > via HTTP" in the task "Properties" dialog. This way also has better performance. And it is very useful in LAN, if your network administrator allows to access only Web pages.
3. Use the pure mms protocol.
4. Rename protocol header to "http", and select "NSPlayer/9.0.0.2980" from "Other Settings > Streaming > User-Agent" in the task "Properties" dialog.

- For RealMedia, please try the below steps:

1. Use the pure rtsp protocol, this is the first choice.
2. Check "Other Settings > Streaming > via HTTP" in the task "Properties" dialog to use HTTP tunnel. This feature is very useful in LAN, if your network administrator allows to access only Web pages.
3. Rename protocol header to "http", and select "RMA/1.0 (compatible; RealMedia)" from "Other Settings > Streaming > User-Agent" in the task "Properties" dialog.

- For MP3 (Shoutcast), please select "WinampMPEG/5.0" from "Other Settings > Streaming > User-Agent" in the task "Properties" dialog.

>> How to capture streaming URLs? Or how to start?

The best way is to use the inbuilt "URL-Sniffer" feature. When you are surfing, it will parse every Web page to show found URLs in the result list.

At presently the inbuilt "URL-Sniffer" can explore such resources as MMS, RTSP, Flash, etc very accurately.

>> Why NetTransport displays "Invalid argument" when I start the inbuilt "URL Sniffer"?

You must have the below conditions:

1. Sniffer is available only in Windows 2000/XP/2003/Vista and later versions of Windows.
2. This feature requires Administrator privilege on the local computer.
3. Your computer must be installed at least one network adapter, except the wireless network card.

>> Cool features

1. Streaming download.
2. FTP is an excellent feature with the flexible "Site Manager", supports SSL, SSH.
3. "Schedule Manager" is also cool, you can start a job at any time. Even you can record the dynamic URL according to time and save it as your desire filename.

>> How to register, and how to remove advertisement bar?

Recommend upgrade to the latest version firstly. The registration information has 2 lines text, encoded by BASE64, one is short, the other is long, no return, no wrap. In the "Register" dialog, please paste the short one into "Part 1", paste the long one into "Part 2", then click "Enter". If your registration name is shown after "Licensed to:", registration has been successful.

For register user only. Please uncheck the main menu "Tools/Scroll Advertisement" to close the advertisement bar.

>> How to change the default download folder?

From 2.01, I removed the "Path" field in the "Options/Download". You can just change the "Directory" of root node "Job" in the left "folder" pane. NetXfer has a great file manager from it was born.

>> How to add scheduler?

1. Open "Other Settings/Schedule" tab.
2. Click "Add".
3. Check days and enter the start/end time.
4. Click "OK".

>> Some streaming files could not be downloaded. Is it true?

Use HTTP protocol to try to download these files as normal ones. Sometimes RTSP can be converted to HTTP, MMS can also be converted to MMS(HTTP), even to HTTP. Please try these ways.

>> How do I bypass the click monitor of Net Transport?

There are two methods:

1. Check "Options/Monitor/Confirmation". When dialog "Job" appears, pressing button "cancel".
2. Uncheck "Monitor browser click" in the Drop Zone Window or Tray context (right-click) menu.

>> The "Download All By Transport" and "Download using Transport" (in IE extend context menu) options don't work. Why?

Under installation path run "DelKeys.exe /Add" to fix.

>> Why some HTTP URLs cannot be downloaded by Transport?

Some sites require referrer URL (where the user is from), for example, download NVTESetup.EXE from this site, please enter the origin into the "Job/Referrer" dialog. And some sites require cookies, please check the "Job/Other settings/Download/Cookie" item.

>> Downloaded file is not what I want or an error. For example, the downloaded file extension is "zip" but cannot be opened by WinZip. Why?

I estimate the URL does not point to the actual file but a WEB page such as acknowledgement, server selection, etc. there are two solutions:

1. Check "Options/Monitor/Confirmation", when "Job" dialog appears the first time, pressing button "cancel", when it shows a second time, pressing "OK", because this time the URL should be real.
2. Check "Options/Monitor/Parse URL", let Net Transport help you find the real URL, but this feature will slow down your browser.

>> How to use category management feature? How to set default download folder?

You can maintain every category except the top "Job" by menu "Category" or category window context menu. Create a new category you want to make as the default folder, then open the dialog "Job", select it in "category" field (also modify its "Directory"), and press the "Save settings" button. After jobs are finished, files will be moved to that folder automatically.

>> **I found when downloading via RTSP, the progress is over 100%, but the job was still running, and I also found the temporary files under installation path were growing at the same time, which is eating my hard disk space, it's horrible.**

Because the packet length of RealMedia file isn't fixed and streaming file size is evaluated and not very accurate, it's very difficult even impossible to write packet data into one file like other protocols. My resolution is, every thread downloads its dispatched part, after receiving end notify, Net Transport unites them into one final file then delete those temporary files. For better video and audio quality, every thread would download a bit extra bytes to find the resume point. Above 2 things may cause progress over 100%. So I recommend you install Net Transport under a large logical disk (8G and more), don't remind the ugly progress. In merging process, Net Transport

uses nearly 100% CPU resource due to a large amount of disk operation, please be patient. Since more threads more long waiting time, I strongly recommend only run 1-2 threads every job, and check "Job/Other settings/Streaming/Delivery bandwidth" to accelerate download.

NET TRANSPORT OFFICIAL SITE

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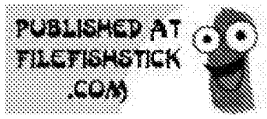
Download

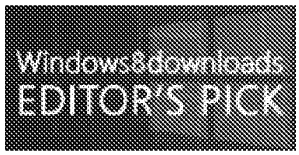
30-days trial, please buy it.

Windows x86 (XP/2000/2003/Vista/2008/Win7/2008R2/Win8/Win2012)

- Net Transport v2.96L.725 (5,939,651 bytes) from official site. MD5: **F9D78C64D7B50E61D4065663CBF663A3**
- 

- 

- 

- 

- Download Net Transport Opera Plug-ins (18,274 bytes), and also supports Firefox 3.5+, Chrome. This allows some of the same "Click Monitoring" to make using Net Transport to download as easy as clicking within your web browser. Please read ReadMe in it firstly.

Windows x64 (XP/2003/Vista/2008/Win7/2008R2/Win8/Win2012)

- Net Transport v2.96L.725 (9,837,366 bytes) from official site. MD5: **DE1230855488C7DFCCA6FB2C80C5DB1B**
- Download Net Transport Google Chrome 64-bit for Windows Plug-ins (108,635 bytes).

Mac OS X (10.6/10.7/10.8/10.9/10.10)

- Beta v0.96E (13,273,302 bytes) from official site. MD5: **8A6F13F3BAF8747D1EA665EAF286A897**

Develop History

Net Transport 2.96L (July 21, 2017)

1. Added code for BT task to recognize whether the torrent file content is UTF-8 encoded.
2. Modified to reduce the restrictions on FLV consolidation.
3. Fixed some login problems for SSH.

Net Transport 2.96k (March 1, 2015)

1. Fixed a bug for Mac version that when deleting the running tasks program would freeze.
2. Fixed a bug for Mac version that the scheduled tasks sometimes would not work.
3. Fixed a bug for Mac version that the duplicate URL checker would not work.
4. Added code to implement the progress bar in the System Taskbar for Windows 7 and above.
5. Added domain support for HTTPS.
6. Enhanced "URL-Sniffer" not to add the duplicate result.
7. Added an option for "URL-Sniffer" to download the result automatically.
8. Changed the default value of some options for "URL-Sniffer".
9. Changed the periodic record feature from minute to second.
10. Modified that program would ignore "trackinfo" when merging FLV.
11. Appended ".acc" extension name when finishing the "audio/aacp" type of tasks.
12. Added that BT tasks would not do with the incoming handshakes to degrade CPU usage after finishing.
13. Fixed that program would crash when accessing BT tracker via https.
14. Added an option "Connection will be closed after finishing its initial part".
15. Issued the plug-ins for Google Chrome 64-bit for Windows.

Net Transport 2.96j (Jan 14, 2014)

1. Added "Buffer" option for RTMP to control the recording performance.
2. Added code for RTMP to process Connection general-header field.
3. **Modified to run Sniffer module as Administrator, so you could open the main program as normal user**.
4. Added code to limit the number of result lines for Sniffer, the earliest entries would be overlaid.
5. Fixed file operation in UTF-8 encoding for SSH so that Desktop system could display correctly.
6. Added "Parse browser click" context menu item for the drop window.

Net Transport 2.96i (Nov 15, 2013)

1. **Added support for Windows 8.1 and Enhanced Protected Mode for IE11.**
2. **Added a new feature that you can press CTRL+ALT to ignore the current click capture in IE.**
3. Fixed a bug that FTPTransport displayed the incorrect length for the local files over 4GB.
4. Fixed a bug that a SSH connection shared between browse and download would crash the program.

Net Transport 2.96h (Oct 6, 2013)

1. Modified code not to send too many requests for one peer at the end of the BT task process.
2. Enhanced link click catcher for IE, enabling "Need to be parsed" option would check whether the clicking link is the downloadable resource or not, if yes program would take over it, otherwise let IE open.
3. Fixed a bug not to get the huge chunk-size transfer coding data via HTTP.

Net Transport 2.96g (July 8, 2013)

1. Fixed a bug that merging FLV would make program to crash probably due to out of memory.
2. Added a feature to obtain UTF-8 filename from "Content-Disposition" field.
3. Added a feature to obtain filename from "Content-Type" field.
4. Fixed a bug that "Monitor these types" was unavailable.
5. Rewrote Firefox/Chrome/Opera plug-in for cookie support.
6. Fixed some native languages.

Net Transport 2.96f (June 10, 2013)

1. Enhanced "URL-Sniffer" to parse HTTP link whose status code is 206.
2. Enhanced "URL-Sniffer" to pass extra information to download task after capturing RTMP link.
3. Added an option "Starting recording after NetStream.Play.Start notify". Don't use it unless you think it is necessary.
4. Enhanced FTP to support 4 digit year.
5. Fixed a bug for BT that adding lock mechanism when operating files to avoid occasional crash problem in the download process.
6. Fixed a bug that exiting main program would crash occasionally.

Net Transport 2.96e (April 6, 2013)

1. Added an option for "URL-Sniffer" to capture Content-Types for HTTP.
2. Enhanced to recognize Router devices.
3. Improved that program had no respond when many tasks were running.
4. Modified not to rename "Downloaded" subfolder when switching language.

5. Fixed a bug for BT that handling incorrect list properties would make program deadlock.
6. Added Cookie while catching links from browsers.
7. Fixed a crash on installation when Windows Firewall was disabled.

Net Transport 2.96d (Feb 9, 2013)

1. Enhanced "URL-Sniffer" not to process this type of IP packets without content to get more results.
2. Restored a feature that RTSP obtained links from SMIL script.
3. Added support for RTMP Encryption protocol type 9.
4. Fixed a bug that performance degraded when running P2P tasks.
5. Fixed a bug that the task database file of x64 program was not fully compatible with x86.
6. Fixed a crash about display.
7. Enhanced FTP over SSL handshake protocol.
8. Changed the default Folder names.
9. Enhanced "URL-Sniffer" to capture an extra field for RTMP.
10. Fixed a bug that running P2P tasks made program deadlock.
11. Reduced code for HTTP and FTP.
12. Fixed a bug that incorrect data type probably made x64 program to crash.

Net Transport 2.96c (Aug 4, 2011)

1. Enhanced support for Win7/Win2008R2.
2. Modified to save streaming via RTMP as Flash Video file instead of MPEG4 file.
3. Fixed a bug that SSL probably made program to crash occasionally.
4. Improved [MS-RTSP] protocol according to Microsoft official specification.

Net Transport 2.96b (Feb 20, 2011)

1. Added support for Wowza Media Server.
2. Added support for Helix Mobile Server version 14.
3. Enhanced the combination of partial data files for MP4, which made it possible not to lose a large section of audio and video content.
4. Fixed a bug that audio and video of MP4 might be out of sync after downloading.
5. Fixed a bug that the downloaded MP4 file might have no sound.
6. Fixed a bug for RTMP that sending incorrect protocol control message led the task be in waiting state.
7. Modified that RTMP task would continue even if error happened.
8. Modified code to get more stream info from session description protocol to help the combination of partial data files for MP4.
9. Added an option "use getStreamLength function" to get the length of stream for RTMP.

10. Added an option to regard HTTP as LIVE show.
11. Added an option to generate new tasks automatically on parsing Playlist/Script file.
12. Restored the option "The number of max concurrent tasks".
13. Enhanced "URL-Sniffer" to capture more information about RTMP link to ensure the task can go on.
14. Enhanced "URL-Sniffer" to capture HTTP link with its Cookie.
15. Enhanced "URL-Sniffer" to capture RTSP link with its Cookie.
16. Modified to handle "Content-Disposition" field case insensitive.
17. Fixed that program could not backup task database file on Win7.
18. Fixed that in some cases program could not well download one by one FTP task.
19. Improved performance, you could not do anything if there were too many tasks in the "Queue" pane.

Net Transport 2.96 (Dec 17, 2010)

1. Added UPnP indicator in the status bar.
2. **Added support for the regular RTMP URL**.
3. **Enhanced RTMP Encryption protocol**.
4. Added code to paste URL from Clipboard when you click "Add batch downloads" dialog.
5. Enhanced "URL-Sniffer" to capture RTSP link with its Referer page.
6. Added an option "Retrieve the Cookie of the site before downloading via HTTP".
7. Modified that you could customize HTTP header fields.
8. Modified the default value of "Data buffer" to 512K.
9. Fixed a bug for RTSP that incorrectly processing ANNOUNCE method probably made the task download again automatically.
10. Enhanced "Content-Disposition" field.
11. **Fixed a bug that program could not resume for RapidShare**.
12. **Added code to capture magnet URI**.

Net Transport 2.95 (Aug 30, 2010)

1. Fixed a bug for RTMP that program could not record certain of LIVE sites.
2. Fixed that program would crash if "piece length" of a torrent file was not a multiple of 16K.
3. Fixed that program probably crashed if parsing DNS failed.
4. Fixed for new UI that the tool tip control of the Drop-Zone window didn't work if there were too many information to be updated.

Net Transport 2.94a (July 5, 2010)

1. **Added "SWF verification" feature support for RTMP**.
2. Fixed a bug for "Site-Explorer" to analyze UTF-8 encoding pages incorrectly.

3. Added code to try WMSP (Windows Media HTTP Streaming Protocol) if connecting to Microsoft Media Server timeouted.
4. **Issued Windows x64 version**.
5. Fixed a bug that the tool tip for toolbar could not be shown in native language.
6. Enhanced "URL-Sniffer" to capture accurate RTMP link.

Net Transport 2.93 (April 25, 2010)

1. Rewrote the inbuilt "URL-Sniffer" to detect SHOUTcast Radio Stations, YouTube video sharing website.
2. Fixed a bug that RTMP sometimes never put the downloaded steams together into a full Flash file.
3. Improved support for RapidShare. You can download published URL along with your username and password directly without logging in firstly.
4. Removed this feature showing the number of files and total size of the selected tasks, which slowed down the main program very significantly.
5. Modified that unchecking "Always send URLs as UTF-8" would handle the destination filename and its path as ANSI.

Net Transport 2.92 (April 1, 2010)

1. **Improved RTMP protocol according to Adobe official specification**.
2. Fixed a bug that the downloaded MP4 file might have no sound.
3. **Added magnet URI support for BT**, a link on a web page only containing the info hash.

Net Transport 2.91a (March 7, 2010)

1. Fixed a bug that switching to Japanese environment would make program crash.
2. Fixed a bug that you could not restart streaming tasks again.
3. Fixed a bug for eMule that parsing ed2k link incorrectly would make program crash.
4. Added a handler for ed2k link.

Net Transport 2.91 (Feb 25, 2010)

1. **New User Interface** (except ANSI version).
2. Added an option to allow the generated subtask not to inherit the scheduling settings of its parent task.
3. Added to show recorded timestamp while downloading streaming protocols.
4. Modified that the files of the moved tasks would overwrite the existed ones.
5. Added to show the number of files and total size of the selected tasks.

Net Transport 2.90a (Jan 10, 2010)

1. Fixed a security issue that eMule login request handling probably made memory overflow. With a specially crafted request, a remote attacker can potentially cause arbitrary code execution.
2. Modified "Quick Connect" bar to hide password.
3. Added a feature for combining Flash or MP4 movies that you could add files by dropping.

Net Transport 2.90 (Jan 3, 2010)

1. Added a feature to combine a couple of Flash or MP4 movies into one file. At presently the supported Codecs for MP4 are H264, AAC.
2. Changed the passive listener from multiple threads to single thread for BT and eMule, which can not only spare the System Resources but also have no effect on transmission.
3. Fixed a bug for BT that program could not process a certain UTF-8 type of seed file.
4. Added an option to split songs by its title respectively for Shoutcast.
5. Modified code to reduce the memory usage significantly when loading eMule peer nodes.
6. Updated help manual.

Net Transport 2.89 (Nov 11, 2009)

1. Added French manual.
2. **Added support for RTMP/RTMPT Encryption protocol**.
3. **Added support for RTMP/RTSP to get this type of MP4 files whose audio format is MPA(MP3)**.
4. Simplified the local destination filename for RTMP.
5. **Modified "URL-Sniffer" to highlight the entries by color in the result list**.
6. Modified "URL-Sniffer/Options" to offer more configurations.
7. Modified that "URL-Sniffer" would restart when you changed "Options".
8. Enhanced that "URL-Sniffer" would add "<break>" keyword between the application name and the file path while capturing RTMP resources.
9. Enhanced that "URL-Sniffer" would append Referer page while capturing HTTP resources.
10. Modified "URL-Sniffer" to simplify RTMP result resources.
11. Fixed a crash bug for eMule when you closed the program.

Net Transport 2.88 (Oct 6, 2009)

1. Smaller SSH code.
2. **Added support to get LATM-based MPEG-4 Audio file via Darwin/QuickTime Streaming Server**.
3. **Modified CONNECT method to promote successful chance to record streaming via RTMP**.
4. Fixed a crash bug while BT task was uploading.
5. Improved the upload transfer rate for BT.

6. Most socket connections were changed from non-blocking mode to blocking mode to improve transfer performance.

Net Transport 2.87 (Sep 23, 2009)

1. Improved NTLM authentication algorithm according to Microsoft official specification.
2. Improved "URL-Sniffer" to capture UTF-8 encoding URLs for RTMP.
3. Prolonged parsing time up to 30 seconds for a single TCP connection to get more resources.
4. **Added a feature for scheduler to allow you to record streaming every desired minutes**. For example, you can record 10 minutes every an hour from 8:00am to 6:00pm. This feature helps to reduce the amount of scheduled entries.
5. Fixed a bug that "Seed" and "Step" fields of "Scheduler" dialog could not be set higher than 100.
6. Smaller DHT code.
7. Modified that when you open BT task by menu "Open Directory", if the BT task downloads a directory, then this action will open that directory, otherwise select the downloaded file.
8. Fixed a bug that eMule processed packed packet incorrectly.
9. Modified that the torrent seed task downloaded via HTTP would be converted to BT task at once. When the BT task is deleted, the seed file will also be deleted.
10. Added an option to allow you to choice preferred cipher for SSH.
11. Added CAST-128, RC4 ciphers for SSH.
12. Added a feature that you can restart uncompleted tasks.

Net Transport 2.86 (Aug 16, 2009)

1. **Improved the transmission performance for SFTP significantly**.
2. Fixed a bug that program would clear task list. When loading task database file, program probably regarded MMS tasks as Real ones under certain condition.
3. Fixed a bug that DHT and KAD opened the same port.
4. **Improved RTMP protocol according to Adobe official specification**.
5. Fixed a bug that "URL-Sniffer" got incomplete URL when parsing RTMP protocol.
6. Fixed that program would not record MP4 from certain servers via RTMP.
7. Enhanced FTP to accept nonstandard reply code from certain servers.

Net Transport 2.85 (Jun 8, 2009)

1. **Added DHT network support for BT**.
2. Added options to enable/disable KAD and DHT networks respectively.

Net Transport 2.84a (May 18, 2009)

1. Fixed a bug that program could not parse RTSP protocol from some SMIL scripts.
2. Fixed a fatal bug that "Streaming" > "Locate" was not 24h format.
3. Fixed a bug for BT that some trackers perhaps crashed program.

Net Transport 2.84 (May 5, 2009)

1. Modified that "Decrease" menu of the task would remove the selected connection instead of the last one.
2. Added support for more Flash Media Servers.
3. Enhanced the combination of partial data files for MP4 to smooth video by comparing more content between two partial parts.
4. Modified content of some requests for RTMP protocol.

Net Transport 2.83 (Apr 15, 2009)

1. Enhanced the inbuilt "URL-Sniffer" to parse RTMP protocols. The task added by this feature can greatly promote successful chance to record streaming via RTMP.
2. Added code to limit the length of the local filename up to 250 bytes.
3. Enhanced [MS-RTSP] to recognize more Windows Media Services.
4. Fixed a fatal bug that program could not record LIVE streaming via RTMP from some sites.

Net Transport 2.82 (Mar 30, 2009)

1. **Enhanced the inbuilt "URL-Sniffer" to parse MS-MMSP, RTMP protocols**.
2. Fixed a bug that [MS-RTSP] could not handle this type of ASF header with padding data.

Net Transport 2.81 (Mar 15, 2009)

1. Added code to implement that if you use NetTransport first time, respective two toolbars would be put side by side in the "Download" and "Site-Explorer" tabs.
2. Enhanced [MS-RTSP] that if the remote server refuses "OPTIONS" method, program would continue to send "DESCRIBE" method.
3. Enhanced [MS-MMSP] to record this type of streaming that only older Windows Media Player (WMP6.4) can play. Please choose "NSPlayer/4.1.0.3937" entry from "Task Properties" -> "Other Settings" -> "Streaming" -> "User-Agent".
4. Enhanced [MS-WMSP] to decode the "chunked" transfer-coding.
5. Fixed a bug that other connections except the first connection could not use the dynamic URL that generated by the task.
6. Added code to recognize these type of URLs including only "new line" without "carriage return".

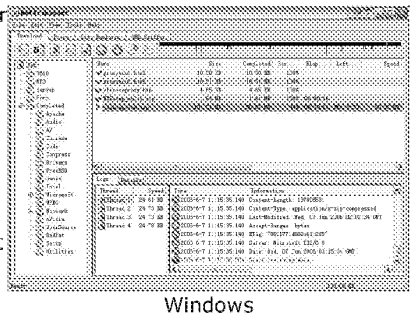
Net Transport 2.80 (Jan 12, 2009)

1. Added Kademlia network support for eMule.

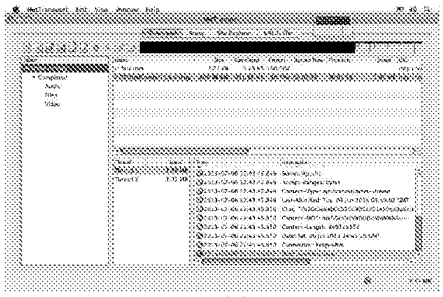
2. Fixed a bug that program could not recognize only one dial-up entry under Vista.

"Net Transport" (also called NetTransport or NetXfer) is a faster, exciting and the most powerful downloading manager that you ever saw, now supports the most pop Internet protocols, including:

- HTTP / HTTPS
- FTP / over SSL (Secure Sockets Layer) / over SSH (Secure Shell)
- MMS (Microsoft Media Services)
- RTSP (Real-Time Streaming Protocol)
- BitTorrent
- eMule
- RTMP / RTMPE / RTMPT (Real Time Messaging Protocol)
- Inbuilt powerful URL-Sniffer



Windows



Mac OS X

News

- Version 2.96L fixed some bugs.
- Mac OS X Version 0.96E fixed some bugs.

Note

- Please select "Other Settings" -> "Download" -> "User-Agent" to "WinampMPEG/5.0" in the "Task Properties" dialog when recording SHOUTcast Radio.

Other Features

1. The inbuilt powerful "URL-Sniffer" can capture the real video links.
2. The flexible "Scheduler Manager" is also most powerful item in NetXfer. Even you can record the dynamic URL according to time and save it as your desire filename.
3. You can use the inbuilt "URL Sniffer" to catch the real URLs for streaming, Flash, etc.
4. You can use the simple but powerful "File Manager" to categorize and manage downloaded files more efficiently.
5. Simple multi-user management. You can maintain several databases by logging on Windows with different username.
6. You can use the inbuilt "Site Explorer" to list the directory structure of the remote server, and easily select the desired files. FTP is the most powerful item in NetXfer.
7. FTP reuse mechanism allows you to use one connection to get different files from the same site.
8. The "Multiple Proxies mode" allows you to assign every working thread a different proxy to break certain site restrictions, like only one connection per IP.
9. You can adjust the bandwidth usage of Net Transport to ensure surf at the same time.
10. Monitor browser click. And you can add links through Internet Explorer extended context menu, or drag links to the "drop zone" window, etc.
11. Net Transport can automatically shutdown the system or hang up the modem once all downloads are completed.
12. Multilingual support for the user interface. We will be glad if you help us localize NetXfer.
13. You can use multi-threads for all streaming protocols to significantly reduce the time of downloads.
14. Automatically parse streaming script such as .asx, .smi to acquire real URLs.
15. From version 2 on, you can record the clip with range.
16. The disk cache buffer can prolong your hard disk life.
17. Except eMule, other protocols all support IPv6. Net Transport is ready for IPv6 epoch.

Supported OS: Win2000 / WinXP / Win2003 / Vista / Win2008 / **Win7 / Win2008R2 / Win8 / Win2012**; **Mac OS X 10.6 / 10.7 / 10.8 / 10.9 / 10.10**

Recommend strongly install Internet Explorer 5.01 and above for Windows 95/98/NT.

Affiliated Sites

Russian Site http://www.NetXfer.narod.ru/

日本語

"You make it fun; we'll make it run"

CORAL

The Coral Content Distribution Network

Our Goal

Are you tired of clicking on some link from a web portal, only to find that the website is temporarily off-line because thousands or millions of other users are also trying to access it? Does your network have a really low-bandwidth connection, such that everyone, even accessing the same web pages, suffers from slow downloads? Have you ever run a website, only to find that suddenly you get hit with a spike of thousands of requests, overloading your server and possibly causing high monthly bills? If so, CoralCDN might be your free solution for these problems!

Using CoralCDN

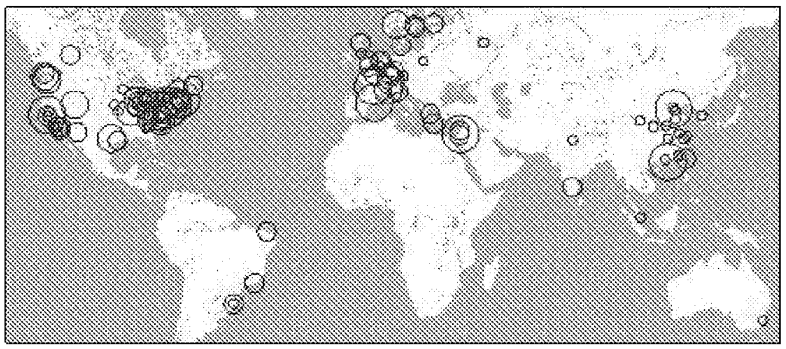
Taking advantage of CoralCDN is simple. Just append

```
.nyud.net
```

to the hostname of any URL, and your request for that URL is handled by CoralCDN! Try our project page, or any other site:

www.cnn.com Go

Current Deployment



260 servers world-wide

Thu Jun 16 17:43:08 EDT 2005

What is CoralCDN?

CoralCDN is a free and open content distribution network based around peer-to-peer technologies, comprised of a world-wide network of web proxies and nameservers. It allows a user to run a web site that offers high performance and meets huge demand, all for the price of a $50/month cable modem.

Publishing through CoralCDN is as simple as appending a short string to the hostname of objects' URLs; a peer-to-peer DNS layer transparently redirects browsers to participating caching proxies, which in turn cooperate to minimize load on the source web server. CoralCDN proxies automatically replicate content as a side effect of users accessing it, improving its availability. Using modern peer-to-peer indexing techniques, CoralCDN will efficiently find a cached object if it exists *anywhere* in the network, requiring that it use the origin server only to initially fetch the object once.

One of CoralCDN's key goals is to avoid ever creating hot spots in its infrastructure. It achieves this through a novel indexing abstraction we introduce called a *distributed sloppy hash table* (DSHT), and it creates self-organizing clusters of nodes that fetch information from each other to avoid communicating with more distant or heavily-loaded servers.

CoralCDN has been continuously operated since March 2004, running on 300-400 servers on the PlanetLab testbed, spread worldwide. As of 2011, it receives 25-50 million requests per day from a few million unique clients.

(What's with the Google ads? Our Illuminati measurement project sought to understand how IP addresses and public information characterize Web clients. One related question is how such information plays a role in pay-per-click advertising, so we decided to run some ourselves to better understand how such systems work.)

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Country:	United States
City / Region:	Ashburn (Virginia)
Lat / Long:	39.0403 / -77.489
	My full IP info & location

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Easy Hide IP is the worlds most advanced IP changer, bypass virtually any form of censorship or internet traffic blocking imposed on you by your ISP, your company, or third parties. Your internet traffic is routed through remote servers. On your ISP's log file, only the IPs of the remote servers will be shown, not the sites you have visited. Download Easy Hide IP now!

Easy Hide IP protects your identity by replacing your real IP address with a different one. You will appear to access the internet from a different location, not your own. Your real location is never revealed.

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Your IP address can link your internet activities directly to you, it can be used to find your name and address. Easy Hide IP protects your online identity by hiding your IP address and giving you a new one.

How does Easy Hide IP hide my IP address?

Easy Hide IP routes all your internet traffic through our encrypted network of dedicated internet servers so that all remote servers that you connect to can only see the IP address of our server and not your original IP address.

Key Features

- Choose your IP address
- Choose your Location
- Access internet TV websites
- Choose which applications are protected
- Encrypt all connections
- Redirect DNS lookups
- Unlimited software updates
- Unlimited bandwidth usage

Our Server Locations

- Canada, Hamilton x 4
- Denmark, Kobenhavn
- Germany, Frankfurt x 5
- Netherlands, Amsterdam x 2
- Portugal, Porto
- Singapore, Singapore
- Spain, Madrid
- Switzerland, Zurich
- United Kingdom, Gosport
- United Kingdom, London x 3
- United Kingdom, Portsmouth
- United Kingdom, Southampton x 6


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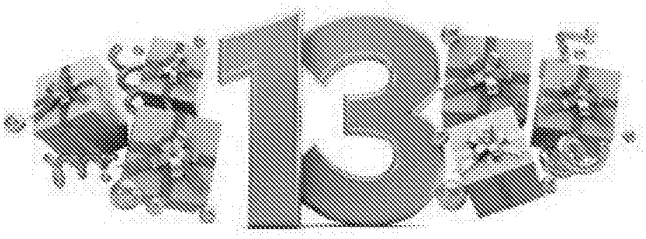

- We have a large quantity of online socks and proxy servers - at all times we have lots of socks online
NOW: 25015 IP in 183 countries
- Our serices have high anonymity. We gurantee that our proxy and socks servers are completely anonymous!
(proxies don't record logs and don't modify HTTP headers)

- **The best traffic encryption technologies!**
Your IP is protected with our encrypted socks without the need of a VPN (your IP is not visible even on proxies, all of your connection is hidden and protected)
We include access in the standard package! You can hide or change your IP with doubleclick of mouse!
Watch the DEMO

Compatible with Windows 2k/2k3/XP/Vista/Seven/Win8/Win10
Compatible with MacOS, Linux, BSD (100% compatibility using WINE)
Compatible with all virtual machines (VmWare,VirtualBox, etc...)

- Our service has the lowest prices, the highest quality, and we offer unlimited access
- Our main rule: - you will pay less, if you buy more
- You have the possibility of choosing the best anonymous proxies and then filtering them to parameters such as
-IP Hostname Language Uptime Country City Region
- Professional Support
- Automatic payment with WebMoney , PerfectMoney, BITCOIN payment systems
- Anonymous VPN Service
- Access through protected https protocol
- "All you need to do for access is to register and pay!

News

ICQ:
374772798
339983393

Jabber:
support@j.vip72.org
support1@j.vip72.org

Check your IP/DNS:
check2ip.com

OpenVPN Service:
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Mirrors:
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vip72.com
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DO NOT try to use another websites!

- 13.07.2019

13 years! we are working for your safety. Special rates for 1/3/5 year plans with free OpenVPN are available from today

- 09.07.2019

New :) summer offer. Get CHANCE to WIN 2x or 3x for any payment with promo code: VIPX2X3

- 18.06.2019

The beginning :) of summer sale and bonuses. +10% to subscriptiuon time and usage limit with payments using LiteCoin

- 01.05.2019

New version of Socks Client
- Installer integrated with proxifier standart edition instead of portable for better compatibility
- Optimized work in WINE with high traffic upload
- Optimized BlackList checker
- Stability fixes

- 23.04.2019

We have updated our openvpn configuration for better compatibility

- 01.03.2019

New version of Socks Client with powerful DNS options.

- 15.12.2018

Happy New Year 2019 !!! sale started !

Also we introducing updated Socks Client (many fixes, including SSL, and other things, for details click >>> HERE <<<

- 21.07.2018

VIP72 celebrates 12th birthday)

- 16.12.2017

Happy New Year 2018 ! Plans for 1 and 3 years with free OpenVPN as bonus!

Now we accept **LITECOIN** as payment method for socks and proxy. Low transaction fee and fast transaction processing - it could be really better for micropayments.

- 11.09.2017

Support #2 ICQ has been changed. Actual contacts on the left on this page

- 14.07.2017

VIP72 works for you within 11 years! Great days for big discounts. Special promo plans already available

- 10.04.2017

Socks Client has been updated (1.8.3) Update is high priority and affect GEO database

- 05.11.2014

We offer new prices for all accounts, registered after '05 november 2014 00:00'. Customers, which registered till that date will be able to use old prices

- 01.2010

All our customers having paid socks account, have possibility absolutely free of charge to take 'OpenVPN Lite'

BitTorrent

BitTorrent is a protocol that underpins the practice of peer-to-peer file sharing and is used for distributing large amounts of data over the Internet. BitTorrent is one of the most common protocols for transferring large files and it has been estimated that, collectively, peer-to-peer networks have accounted for approximately 43% to 70% of all Internet traffic (depending on geographical location) as of February 2009.[1] Most of this peer-to-peer traffic is likely from BitTorrent, after the demise of LimeWire.

Programmer Bram Cohen designed the protocol in April 2001 and released the first available version on July 2, 2001.[2] Currently, numerous BitTorrent clients are available for a variety of computing platforms, including an official one released by Bittorrent, Inc.

As of January 2012, BitTorrent is utilized by 150 million active users (according to BitTorrent, Inc.). Based on this figure, the total number of monthly BitTorrent users can be estimated at more than a quarter of a billion.[3] At any given instant, BitTorrent has, on average, more active users than YouTube and Facebook combined (this refers to the number of active users at any instant and not to the total number of unique users).[4][5] Since 2010, more than 200,000 users of the protocol have been sued by copyright trolls.[6]

Contents

Description

The BitTorrent protocol can be used to reduce the server and network impact of distributing large files. Rather than downloading a file from a single source server, the BitTorrent protocol allows users to join a "swarm" of hosts to download and upload from each other simultaneously. The protocol is an alternative to the older single source, multiple mirror sources technique for distributing data, and can work over networks with lower bandwidth so many small computers, like mobile phones, are able to efficiently distribute files to many recipients.

A user who wants to upload a file first creates a small *torrent* descriptor file that they distribute by conventional means (web, email, etc.). They then make the file itself available through a BitTorrent node acting as a *seed*. Those with the torrent descriptor file can give it to their own BitTorrent nodes which, acting as *peers* or *leechers*, download it by connecting to the seed and/or other peers.

The file being distributed is divided into segments called *pieces*. As each peer receives a new piece of the file it becomes a source (of that piece) for other peers, relieving the original seed from having to send that piece to every computer or user wishing a copy. With BitTorrent, the task of distributing the file is shared by those who want it; it is entirely possible for the seed to send only a single copy of the file itself and eventually distribute to an unlimited number of peers.

Each piece is protected by a cryptographic hash contained in the torrent descriptor.[7] This ensures that any modification of the piece can be reliably detected, and thus prevents both accidental and malicious modifications of any of the pieces received at other nodes. If a node starts with an authentic copy of the torrent descriptor, it can verify the authenticity of the entire file it receives.

Pieces are typically downloaded non-sequentially and are rearranged into the correct order by the BitTorrent Client, which monitors which pieces it needs, and which pieces it has and can upload to other peers. Pieces are of the same size throughout a single download (for example a 10 MB file may be transmitted as ten 1 MB Pieces or as forty 256 KB Pieces). Due to the nature of this approach, the download of any file can be halted at any time and be resumed at a later date, without the loss of previously downloaded information, which in turn makes BitTorrent particularly useful in the transfer of larger files. This also enables the client to seek out readily available pieces and download them immediately, rather than halting the download and waiting for the next (and possibly unavailable) piece in line, which typically reduces the overall length of the download.

When a peer completely downloads a file, it becomes an additional seed. This eventual shift from peers to seeders determines the overall "health" of the file (as determined by the number of times a file is available in its complete form).

The distributed nature of BitTorrent can lead to a flood like spreading of a file throughout many peer computer nodes. As more peers join the swarm, the likelihood of a complete successful download by any particular node increases. Relative to traditional Internet distribution schemes, this permits a significant reduction in the original distributor's hardware and bandwidth resource costs.

Distributed downloading protocols in general provide redundancy against system problems, reduces dependence on the original distributor[8] and provides sources for the file which are generally transient and therefore harder to trace by those who would block distribution compared to the situation provided by limiting availability of the file to a fixed host machine (or even several).

One such example of BitTorrent being used to reduce the distribution cost of file transmission is in the BOINC Client-Server system. If a BOINC distributed computing application needs to be updated (or merely sent to a user) it can be done so with little impact on the BOINC Server.

Operation

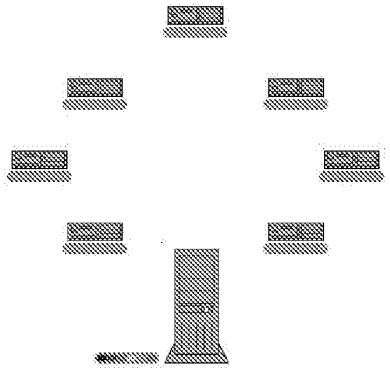
A BitTorrent client is any program that implements the BitTorrent protocol. Each client is capable of preparing, requesting, and transmitting any type of computer file over a network, using the protocol. A peer is any computer running an instance of a client.

To share a file or group of files, a peer first creates a small file called a "torrent" (e.g. MyFile.torrent). This file contains metadata about the files to be shared and about the tracker, the computer that coordinates the file distribution. Peers that want to download the file must first obtain a torrent file for it and connect to the specified tracker, which tells them from which other peers to download the pieces of the file.

Though both ultimately transfer files over a network, a BitTorrent download differs from a classic download (as is typical with an HTTP or FTP request, for example) in several fundamental ways:

- BitTorrent makes many small data requests over different TCP connections to different machines, while classic downloading is typically made via a single TCP connection to a single machine.
- BitTorrent downloads in a random or in a "rarest-first"[9] approach that ensures high availability, while classic downloads are sequential.

Taken together, these differences allow BitTorrent to achieve much lower cost to the content provider, much higher redundancy, and much greater resistance to abuse or to "flash crowds" than regular server software. However, this protection, theoretically, comes at a cost: downloads can take time to rise to full speed because it may take time for enough peer connections to be established, and it may take time for a node to receive sufficient data to become an effective uploader. This contrasts with regular downloads (such as from an HTTP server, for example) that, while more vulnerable to overload and abuse, rise to full speed very quickly and maintain this speed throughout.



In this animation, the colored bars beneath all of the 7 clients represent the file, with each color representing an individual piece of the file. After the initial pieces transfer from the seed (large system at the bottom), the pieces are individually transferred from client to client. The original *seeder* only needs to send out one copy of the file for all the clients to receive a copy.

In general, BitTorrent's non-contiguous download methods have prevented it from supporting progressive download or "streaming playback". However, comments made by Bram Cohen in January 2007[10] suggest that streaming torrent downloads will soon be commonplace and ad supported streaming[11] appears to be the result of those comments. In January 2011 Cohen demonstrated an early version of BitTorrent streaming, saying the feature was projected to be available by summer 2011.[9]

Creating and publishing torrents

The peer distributing a data file treats the file as a number of identically sized pieces, usually with byte sizes of a power of 2, and typically between 32 kB and 16 MB each. The peer creates a hash for each piece, using the SHA-1 hash function, and records it in the torrent file. Pieces with sizes greater than 512 kB will reduce the size of a torrent file for a very large payload, but is claimed to reduce the efficiency of the protocol.[12] When another peer later receives a particular piece, the hash of the piece is compared to the recorded hash to test that the piece is error-free.[13] Peers that provide a complete file are called seeders, and the peer providing the initial copy is called the initial seeder.

The exact information contained in the torrent file depends on the version of the BitTorrent protocol. By convention, the name of a torrent file has the suffix `.torrent`. Torrent files have an "announce" section, which specifies the URL of the tracker, and an "info" section, containing (suggested) names for the files, their lengths, the piece length used, and a SHA-1 hash code for each piece, all of which are used by clients to verify the integrity of the data they receive.

Torrent files are typically published on websites or elsewhere, and registered with at least one tracker. The tracker maintains lists of the clients currently participating in the torrent.[13] Alternatively, in a *trackerless system* (decentralized tracking) every peer acts as a tracker. Azureus was the first BitTorrent client to implement such a system through the distributed hash table (DHT) method. An alternative and incompatible DHT system, known as Mainline DHT, was later developed and adopted by the BitTorrent (Mainline), µTorrent, Transmission, rTorrent, KTorrent, BitComet, and Deluge clients.

After the DHT was adopted, a "private" flag — analogous to the broadcast flag — was unofficially introduced, telling clients to restrict the use of decentralized tracking regardless of the user's desires.[14] The flag is intentionally placed in the info section of the torrent so that it cannot be disabled or removed without changing the identity of the torrent. The purpose of the flag is to prevent torrents from being shared with clients that do not have access to the tracker. The flag was requested for inclusion in the official specification in August, 2008, but has not been accepted yet.[15] Clients that have ignored the private flag were banned by many trackers, discouraging the practice.[16]

Downloading torrents and sharing files

Users find a torrent of interest, by browsing the web or by other means, download it, and open it with a BitTorrent client. The client connects to the tracker(s) specified in the torrent file, from which it receives a list of peers currently transferring pieces of the file(s) specified in the torrent. The client connects to those peers to obtain the various pieces. If the swarm contains only the initial seeder, the client connects directly to it and begins to request pieces.

Clients incorporate mechanisms to optimize their download and upload rates; for example they download pieces in a random order to increase the opportunity to exchange data, which is only possible if two peers have different pieces of the file.

The effectiveness of this data exchange depends largely on the policies that clients use to determine to whom to send data. Clients may prefer to send data to peers that send data back to them (a tit for tat scheme), which encourages fair trading. But strict policies often result in suboptimal situations, such as when newly joined peers are unable to receive any data because they don't have any pieces yet to trade themselves or when two peers with a good connection between them do not exchange data simply because neither of them takes the initiative. To counter these effects, the official BitTorrent client program uses a mechanism called "optimistic unchoking", whereby the client reserves a portion of its available bandwidth for sending pieces to random peers (not necessarily known good partners, so called preferred peers) in hopes of discovering even better partners and to ensure that newcomers get a chance to join the swarm.[17]

Although swarming scales well to tolerate flash crowds for popular content, it is less useful for unpopular content. Peers arriving after the initial rush might find the content unavailable and need to wait for the arrival of a seed in order to complete their downloads. The seed arrival, in turn, may take long to happen (this is termed the seeder promotion problem). Since maintaining seeds for unpopular content entails high bandwidth and administrative costs, this runs counter to the goals of publishers that value BitTorrent as a cheap alternative to a client-server approach. This occurs on a huge scale; measurements have shown that 38% of all new torrents become unavailable within the first month.[18] A strategy adopted by many publishers which significantly increases availability of unpopular content consists of bundling multiple files in a single swarm.[19] More sophisticated solutions have also been proposed; generally, these use cross-torrent mechanisms through which multiple torrents can cooperate to better share content.[20]

BitTorrent does not offer its users anonymity. It is possible to obtain the IP addresses of all current and possibly previous participants in a swarm from the tracker. This may expose users with insecure systems to attacks.[17] It may also expose users to the risk of being sued, if they are distributing files without permission from the copyright holder(s). However, there are ways to promote anonymity; for example, the OneSwarm project layers privacy-preserving sharing mechanisms on top of the original BitTorrent protocol.

Adoption

A growing number of individuals and organizations are using BitTorrent to distribute their own or licensed material. Independent adopters report that without using BitTorrent technology and its dramatically reduced demands on their private networking hardware and bandwidth, they could not afford to distribute their files.[21]

Film, video, and music

- BitTorrent Inc. has obtained a number of licenses from Hollywood studios for distributing popular content from their websites.
- Sub Pop Records releases tracks and videos via BitTorrent Inc.[22] to distribute its 1000+ albums. Babyshambles and The Libertines (both bands associated with Pete Doherty) have extensively used torrents to distribute hundreds of demos and live videos. US industrial rock band Nine Inch Nails frequently distributes albums via BitTorrent.
- Podcasting software is starting to integrate BitTorrent to help podcasters deal with the download demands of their MP3 "radio" programs. Specifically, Juice and Miro (formerly known as Democracy Player) support automatic processing of .torrent files from RSS feeds. Similarly, some BitTorrent clients, such as µTorrent, are able to process web feeds and automatically download content found within them.
- DGM Live purchases are provided via BitTorrent.[23]
- Vodo, a service which distributes "free-to-share" movies and TV show BitTorrent.[24][25][26]

Broadcasters

- In 2008, the CBC became the first public broadcaster in North America to make a full show (*Canada's Next Great Prime Minister*) available for download using BitTorrent.[27]
- The Norwegian Broadcasting Corporation (NRK) has since March 2008 experimented with bittorrent distribution, available online.[28] Only selected material in which NRK owns all royalties are published. Responses have been very positive, and NRK is planning to offer more content.
- The Dutch VPRO broadcasting organization released four documentaries under a Creative Commons license using the content distribution feature of the Mininova tracker.[29]

Personal material

- The Amazon S3 "Simple Storage Service" is a scalable Internet-based storage service with a simple web service interface, equipped with built-in BitTorrent support.
- Blog Torrent offers a simplified BitTorrent tracker to enable bloggers and non-technical users to host a tracker on their site. Blog Torrent also allows visitors to download a "stub" loader, which acts as a BitTorrent client to download the desired file, allowing users without BitTorrent software to use the protocol.[30] This is similar to the concept of a self-extracting archive.

Software

- Blizzard Entertainment uses BitTorrent (via a proprietary client called the "Blizzard Downloader") to distribute content and patches for Diablo III, StarCraft II and World of Warcraft, including the games themselves.[31]
- Many software games, especially those whose large size makes them difficult to host due to bandwidth limits, extremely frequent downloads, and unpredictable changes in network traffic, will distribute instead a specialized, stripped down bittorrent client with enough functionality to download the game from the other running clients and the primary server (which is maintained in case not enough peers are available).
- Many major open source and free software projects encourage BitTorrent as well as conventional downloads of their products (via HTTP, FTP etc.) to increase availability and to reduce load on their own servers, especially when dealing with larger files.[32]

Government

- The UK government used BitTorrent to distribute details about how the tax money of UK citizens was spent.[33][34]

Education

- Florida State University uses BitTorrent to distribute large scientific data sets to its researchers.[35]
- Many universities that have BOINC distributed computing projects have used the BitTorrent functionality of the client-server system to reduce the bandwidth costs of distributing the client side applications used to process the scientific data.

Others

- Facebook uses BitTorrent to distribute updates to Facebook servers.[36]
- Twitter uses BitTorrent to distribute updates to Twitter servers.[37][38]

- The Internet Archive added Bittorrent to its file download options for over 1.3 million existing files, and all newly uploaded files, in August 2012.[39][40] This method is the fastest means of downloading media from the Archive.[39][41]

As of 2011 BitTorrent has 100 million users and a greater share of network bandwidth than Netflix and Hulu combined.[4][42]

At any given instant of time BitTorrent has, on average, more active users than YouTube and Facebook combined. (This refers to the number of active users at any instant and not to the total number of registered users.) [4][5]

CableLabs, the research organization of the North American cable industry, estimates that BitTorrent represents 18% of all broadband traffic.[43] In 2004, CacheLogic put that number at roughly 35% of all traffic on the Internet.[44] The discrepancies in these numbers are caused by differences in the method used to measure P2P traffic on the Internet.[45]

Routers that use network address translation (NAT) must maintain tables of source and destination IP addresses and ports. Typical home routers are limited to about 2000 table entries while some more expensive routers have larger table capacities. BitTorrent frequently contacts 20–30 servers per second, rapidly filling the NAT tables. This is a common cause of home routers locking up.[46]

Indexing

The BitTorrent protocol provides no way to index torrent files. As a result, a comparatively small number of websites have hosted a large majority of torrents, many linking to copyrighted material without the authorization of copyright holders, rendering those sites especially vulnerable to lawsuits.[47] Several types of websites support the discovery and distribution of data on the BitTorrent network.

Public torrent-hosting sites such as The Pirate Bay allow users to search and download from their collection of torrent files. Users can typically also upload torrent files for content they wish to distribute. Often, these sites also run BitTorrent trackers for their hosted torrent files, but these two functions are not mutually dependent: a torrent file could be hosted on one site and tracked by another, unrelated site.

Private host/tracker sites operate like public ones except that they restrict access to registered users and keep track of the amount of data each user uploads and downloads, in an attempt to reduce leeching.

Search engines allow the discovery of torrent files that are hosted and tracked on other sites; examples include Mininova, BTDigg, BTJunkie, Torrentz, The Pirate Bay, Eztorrent, and isoHunt. These sites allow the user to ask for content meeting specific criteria (such as containing a given word or phrase) and retrieve a list of links to torrent files matching those criteria. This list can often be sorted with respect to several criteria, relevance (seeders-leechers ratio) being one of the most popular and useful (due to the way the protocol behaves, the download bandwidth achievable is very sensitive to this value). Bram Cohen launched a BitTorrent search engine on http://www.bittorrent.com/search that co-mingles licensed content with search results.[48] Metasearch engines allow one to search several BitTorrent indices and search engines at once. DHT search engines monitors the DHT network and indexes torrents via metadata exchange from peers.

However, recently some P2P, decentralized alternatives to Torrent search engines have emerged, see decentralized keyword search further down the page.

Technologies built on BitTorrent

The BitTorrent protocol is still under development and therefore may still acquire new features and other enhancements such as improved efficiency.

Distributed trackers

On May 2, 2005, Azureus 2.3.0.0 (now known as Vuze) was released,[49] introducing support for "trackerless" torrents through a system called the "distributed database." This system is a DHT implementation which allows the client to use torrents that do not have a working BitTorrent tracker. The following month, BitTorrent, Inc. released version 4.2.0 of the Mainline BitTorrent client, which supported an alternative DHT implementation (popularly known as "Mainline DHT", outlined in a draft (http://bittorrent.org/beps/bep_0005.html) on their website) that is incompatible with that of Azureus.

Current versions of the official BitTorrent client, uTorrent, BitComet, Transmission and BitSpirit all share compatibility with Mainline DHT. Both DHT implementations are based on Kademlia.[50] As of version 3.0.5.0, Azureus also supports Mainline DHT in addition to its own distributed database through use of an optional application plugin.[51] This potentially allows the Azureus client to reach a bigger swarm.

Another idea that has surfaced in Vuze is that of *virtual torrents*. This idea is based on the distributed tracker approach and is used to describe some web resource. Currently, it is used for instant messaging. It is implemented using a special messaging protocol and requires an appropriate plugin. Anatomic P2P is another approach, which uses a decentralized network of nodes that route traffic to dynamic trackers.

Most BitTorrent clients also use Peer exchange (PEX) to gather peers in addition to trackers and DHT. Peer exchange checks with known peers to see if they know of any other peers. With the 3.0.5.0 release of Vuze, all major BitTorrent clients now have compatible peer exchange.

Web seeding

Web seeding was implemented in 2006 as the ability of BitTorrent clients to download torrent pieces from an HTTP source in addition to the swarm. The advantage of this feature is that a website may distribute a torrent for a particular file or batch of files and make those files available for download from that same web server; this can simplify long-term seeding and load balancing through the use of existing, cheap, web hosting setups. In theory, this would make using BitTorrent almost as easy for a web publisher as creating a direct HTTP download. In addition, it would allow the "web seed" to be disabled if the swarm becomes too popular while still allowing the file to be readily available.

This feature has two distinct and incompatible specifications.

The first was created by John "TheSHADoW" Hoffman, who created BitTornado.[52][53] From version 5.0 onward, the Mainline BitTorrent client also supports web seeds, and the BitTorrent web site had[54] a simple publishing tool that creates web seeded torrents.[55] uTorrent added support for web seeds in version 1.7. BitComet added support for web seeds in version 1.14. This first specification requires running a web service that serves content by info-hash and piece number, rather than filename.

The other specification is created by GetRight authors and can rely on a basic HTTP download space (using byte serving).[56][57]

In September 2010, a new service named Burnbit was launched which generates a torrent from any URL using webseeding.[58]

There exist server-side solutions that provide initial seeding of the file from the webserver via standard BitTorrent protocol and when the number of external seeders reach a limit, they stop serving the file from the original source.[59]

RSS feeds

A technique called broadcatching combines RSS with the BitTorrent protocol to create a content delivery system, further simplifying and automating content distribution. Steve Gillmor explained the concept in a column for Ziff-Davis in December, 2003.[60] The discussion spread quickly among bloggers (Ernest Miller,[61] Chris Pirillo, etc.). In an article entitled *Broadcatching with BitTorrent*, Scott Raymond explained:

> I want RSS feeds of BitTorrent files. A script would periodically check the feed for new items, and use them to start the download. Then, I could find a trusted publisher of an Alias RSS feed, and "subscribe" to all new episodes of the show, which would then start downloading automatically — like the "season pass" feature of the TiVo.
>
> — Scott Raymond, scottraymond.net[62]

The RSS feed will track the content, while BitTorrent ensures content integrity with cryptographic hashing of all data, so feed subscribers will receive uncorrupted content.

One of the first and popular software clients (free and open source) for *broadcatching* is Miro. Other free software clients such as PenguinTV and KatchTV are also now supporting broadcatching.

The BitTorrent web-service MoveDigital had the ability to make torrents available to any web application capable of parsing XML through its standard REST-based interface,[63] although this has since been discontinued. Additionally, Torrenthut is developing a similar torrent API that will provide the same features, as well as further intuition to help bring the torrent community to Web 2.0 standards. Alongside this release is a first PHP application built using the API called PEP, which will parse any Really Simple Syndication (RSS 2.0) feed and automatically create and seed a torrent for each enclosure found in that feed.[64]

Throttling and encryption

Since BitTorrent makes up a large proportion of total traffic, some ISPs have chosen to throttle (slow down) BitTorrent transfers to ensure network capacity remains available for other uses. For this reason, methods have been developed to disguise BitTorrent traffic in an attempt to thwart these efforts.[65]

Protocol header encrypt (PHE) and Message stream encryption/Protocol encryption (MSE/PE) are features of some BitTorrent clients that attempt to make BitTorrent hard to detect and throttle. At the moment Vuze, Bitcomet, KTorrent, Transmission, Deluge, uTorrent, MooPolice, Halite, rTorrent and the latest official BitTorrent client (v6) support MSE/PE encryption.

In September 2006 it was reported that some software could detect and throttle BitTorrent traffic masquerading as HTTP traffic.[66]

Reports in August 2007 indicated that Comcast was preventing BitTorrent seeding by monitoring and interfering with the communication between peers. Protection against these efforts is provided by proxying the client-tracker traffic via an encrypted tunnel to a point outside of the Comcast network.[67] Comcast has more recently called a "truce" with BitTorrent, Inc. with the intention of shaping traffic in a protocol-agnostic manner.[68] Questions about the ethics and legality of Comcast's behavior have led to renewed debate about net neutrality in the United States.[69]

In general, although encryption can make it difficult to determine *what* is being shared, BitTorrent is vulnerable to traffic analysis. Thus, even with MSE/PE, it may be possible for an ISP to recognize BitTorrent and also to determine that a system is no longer downloading but only uploading data, and terminate its connection by injecting TCP RST (reset flag) packets.

Multitracker

Another unofficial feature is an extension to the BitTorrent metadata format proposed by John Hoffman[70] and implemented by several indexing websites. It allows the use of multiple trackers per file, so if one tracker fails, others can continue to support file transfer. It is implemented in several clients, such as BitComet, BitTornado, BitTorrent, KTorrent, Transmission, Deluge, uTorrent, rtorrent, Vuze, Frostwire. Trackers are placed in groups, or tiers, with a tracker randomly chosen from the top tier and tried, moving to the next tier if all the trackers in the top tier fail.

Torrents with multiple trackers[71] can decrease the time it takes to download a file, but also has a few consequences:

- Poorly implemented[72] clients may contact multiple trackers, leading to more overhead-traffic.
- Torrents from closed trackers suddenly become downloadable by non-members, as they can connect to a seed via an open tracker.

Decentralized keyword search

Even with distributed trackers, a third party is still required to find a specific torrent. This is usually done in the form of a hyperlink from the website of the content owner or through indexing websites like isoHunt, Torrentz, BTDigg or The Pirate Bay.

The Tribler BitTorrent client is the first to incorporate decentralized search capabilities. With Tribler, users can find .torrent files that are hosted among other peers, instead of on a centralized index sites. It adds such an ability to the BitTorrent protocol using a gossip protocol, somewhat similar to the eXeem network which was shut down in 2005. The software includes the ability to recommend content as well. After a dozen downloads the Tribler software can roughly estimate the download taste of the user and recommend additional content.[73]

In May 2007 Cornell University published a paper proposing a new approach to searching a peer-to-peer network for inexact strings,[74] which could replace the functionality of a central indexing site. A year later, the same team implemented the system as a plugin for Vuze called Cubit[75] and published a follow-up paper reporting its success.[76]

A somewhat similar facility but with a slightly different approach is provided by the BitComet client through its "Torrent Exchange"[77] feature. Whenever two peers using BitComet (with Torrent Exchange enabled) connect to each other they exchange lists of all the torrents (name and info-hash) they have in the Torrent Share storage (torrent files which were previously downloaded and for which the user chose to enable sharing by Torrent Exchange).

Thus each client builds up a list of all the torrents shared by the peers it connected to in the current session (or it can even maintain the list between sessions if instructed). At any time the user can search into that Torrent Collection list for a certain torrent and sort the list by categories. When the user chooses to download a torrent from that list, the .torrent file is automatically searched for (by info-hash value) in the DHT Network and when found it is downloaded by the querying client which can after that create and initiate a downloading task.

Implementations

The BitTorrent specification is free to use and many clients are open source, so BitTorrent clients have been created for all common operating systems using a variety of programming languages. The official BitTorrent client, µTorrent, Xunlei, Vuze and BitComet are some of the most popular clients.[78]

Some BitTorrent implementations such as MLDonkey and Torrentflux are designed to run as servers. For example, this can be used to centralize file sharing on a single dedicated server which users share access to on the network.[79] Server-oriented BitTorrent implementations can also be hosted by hosting providers at co-located facilities with high bandwidth Internet connectivity (e.g., a datacenter) which can provide dramatic speed benefits over using BitTorrent from a regular home broadband connection.

Services such as ImageShack can download files on BitTorrent for the user, allowing them to download the entire file by HTTP once it is finished.

The Opera web browser supports BitTorrent,[80] as does Wyzo. BitLet allows users to download Torrents directly from their browser using a Java applet. An increasing number of hardware devices are being made to support BitTorrent. These include routers and NAS devices containing BitTorrent-capable firmware like OpenWrt.

Proprietary versions of the protocol which implement DRM, encryption, and authentication are found within managed clients such as Pando.

Development

An unimplemented (as of February 2008) unofficial feature is Similarity Enhanced Transfer (SET), a technique for improving the speed at which peer-to-peer file sharing and content distribution systems can share data. SET, proposed by researchers Pucha, Andersen, and Kaminsky, works by spotting chunks of identical data in files that are an exact or near match to the one needed and transferring these data to the client if the "exact" data are not present. Their experiments suggested that SET will help greatly with less popular files, but not as much for popular data, where many peers are already downloading it.[81] Andersen believes that this technique could be immediately used by developers with the BitTorrent file sharing system.[82]

As of December 2008, BitTorrent, Inc. is working with Oversi on new Policy Discover Protocols that query the ISP for capabilities and network architecture information. Oversi's ISP hosted NetEnhancer box is designed to "improve peer selection" by helping peers find local nodes, improving download speeds while reducing the loads into and out of the ISP's network.[83]

Legal issues

There has been much controversy over the use of BitTorrent trackers. BitTorrent metafiles themselves do not store file contents. Whether the publishers of BitTorrent metafiles violate copyrights by linking to copyrighted material without the authorization of copyright holders is controversial.

Various jurisdictions have pursued legal action against websites that host BitTorrent trackers. High-profile examples include the closing of Suprnova.org, TorrentSpy, LokiTorrent, BTJunkie, Mininova, Demonoid and Oink's Pink Palace. The Pirate Bay torrent website, formed by a Swedish group, is noted for the "legal" section of its website in which letters and replies on the subject of alleged copyright infringements are publicly displayed. On 31 May 2006, The Pirate Bay's servers in Sweden were raided by Swedish police on allegations by the MPAA of copyright infringement;[84] however, the tracker was up and running again three days later.

In the study used to value NBC Universal in its merger with Comcast, Envisional found that all of the top 10,000 torrents on the BitTorrent network violated copyright.[85]

Between 2010 and 2012, 200,000 people have been sued by copyright trolls for uploading and downloading copyrighted content through BitTorrent.[6]

In 2011, 18.8% of North American internet traffic was used by peer-to-peer networks which equates to 132 billion music file transfers and 11 billion movie file transfers on the BitTorrent network.[86]

On April 30, 2012 the UK High Court ordered five ISPs to block BitTorrent search engine The Pirate Bay.[87]

BitTorrent and malware

Several studies on BitTorrent have indicated that a large portion of files available for download via BitTorrent contain malware. In particular, one small sample[88] indicated that 18% of all executable programs available for download contained malware. Another study [89] claims that as much as 14.5% of BitTorrent downloads contain zero-day malware, and that BitTorrent was used as the distribution mechanism for 47% of all zero-day malware they have found.

See also

- Bencode
- Glossary of BitTorrent terms
- Torrent file
- Super-seeding
- Torrent poisoning
- µTP (Micro Transport Protocol)
- Cache Discovery Protocol
- Comparison of BitTorrent clients
- Comparison of BitTorrent tracker software
- Comparison of BitTorrent sites
- FastTrack
- Magnet URI scheme
- Segmented downloading
- Similarity Enhanced Transfer
- Simple file verification
- Anti-Counterfeiting Trade Agreement

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Further reading

- Pouwelse, Johan (2005). "The Bittorrent P2P File-Sharing System: Measurements and Analysis". *Peer-to-Peer Systems IV* (http://books.google.com/books?id=Dnw7E8xzQUMC&lpg=PA205&dq=The%20Bittorrent%20P2P%20File-Sharing%20System%3A%20Measurements%20and%20Analysis%20Johan%20Pouwelse%20%2C%20Pawel%20Garbacki%2C%20Dick%20Epema%2C&pg=PA205#v=onepage&q&f Berlin: Springer. pp. 205–216. doi:10.1007/11558989_19 (https://doi.org/10.1007%2F11558989_19). ISBN 978-3-540-29068-1. Retrieved September 4, 2011. Unknown parameter |coauthors= ignored (|author= suggested) (help)

External links

- Official BitTorrent website (http://www.bittorrent.com/)
- Official BitTorrent Specification (http://www.bittorrent.org/beps/bep_0003.html)
- BitTorrent (https://curlie.org/Computers/Internet/File_Sharing/BitTorrent) at Curlie
- Interview with chief executive Ashwin Navin (http://streaming.scmp.com/podcasting/upload/News_BitTorrent_june15.mp3)
- Unofficial BitTorrent Protocol Specification v1.0 (https://wiki.theory.org/BitTorrentSpecification) at wiki.theory.org
- Unofficial BitTorrent Location-aware Protocol 1.0 Specification (https://wiki.theory.org/BitTorrent_Location-aware_Protocol_1.0_Specification) at wiki.theory.org
- Michal Czerniawski, Responsibility of Bittorrent Search Engines for Copyright Infringements (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1540913), at SSRN (December 2009)
- Under the hood of BitTorrent (http://www.stanford.edu/class/ee380/Abstracts/050216.html) — lecture given by BitTorrent protocol designer, Bram Cohen at Stanford University (video archive (http://stanford-online.stanford.edu/courses/ee380/050216-ee380-100.asx)).
- Tiny perl script to view contents inside torrent files (http://wiki.gotux.net/downloads/btview)

BEP:	3
Title:	The BitTorrent Protocol Specification
Version:	11031
Last-Modified:	2008-02-28 16:43:58 -0800 (Thu, 28 Feb 2008)
Author:	Bram Cohen <bram at bittorrent.com>
Status:	Final
Type:	Standard
Created:	10-Jan-2008
Post-History:	24-Jun-2009, clarified the encoding of strings in torrent files

Contents

BitTorrent is a protocol for distributing files. It identifies content by URL and is designed to integrate seamlessly with the web. Its advantage over plain HTTP is that when multiple downloads of the same file happen concurrently, the downloaders upload to each other, making it possible for the file source to support very large numbers of downloaders with only a modest increase in its load.

A BitTorrent file distribution consists of these entities:

- An ordinary web server

- A static 'metainfo' file
- A BitTorrent tracker
- An 'original' downloader
- The end user web browsers
- The end user downloaders

There are ideally many end users for a single file.

To start serving, a host goes through the following steps:

1. Start running a tracker (or, more likely, have one running already).
2. Start running an ordinary web server, such as apache, or have one already.
3. Associate the extension .torrent with mimetype application/x-bittorrent on their web server (or have done so already).
4. Generate a metainfo (.torrent) file using the complete file to be served and the URL of the tracker.
5. Put the metainfo file on the web server.
6. Link to the metainfo (.torrent) file from some other web page.
7. Start a downloader which already has the complete file (the 'origin').

To start downloading, a user does the following:

1. Install BitTorrent (or have done so already).
2. Surf the web.
3. Click on a link to a .torrent file.
4. Select where to save the file locally, or select a partial download to resume.
5. Wait for download to complete.
6. Tell downloader to exit (it keeps uploading until this happens).

The connectivity is as follows:

- Strings are length-prefixed base ten followed by a colon and the string. For example `4:spam` corresponds to 'spam'.
- Integers are represented by an 'i' followed by the number in base 10 followed by an 'e'. For example `i3e` corresponds to 3 and `i-3e` corresponds to -3. Integers have no size limitation. `i-0e` is invalid. All encodings with a leading zero, such as `i03e`, are invalid, other than `i0e`, which of course corresponds to 0.
- Lists are encoded as an 'l' followed by their elements (also bencoded) followed by an 'e'. For example `l4:spam4:eggse` corresponds to ['spam', 'eggs'].
- Dictionaries are encoded as a 'd' followed by a list of alternating keys and their corresponding values followed by an 'e'. For example, `d3:cow3:moo4:spam4:eggse` corresponds to {'cow': 'moo', 'spam': 'eggs'} and `d4:spaml1:a1:bee` corresponds to {'spam': ['a', 'b']}. Keys must be strings and appear in sorted order (sorted as raw strings, not alphanumerics).

Metainfo files are bencoded dictionaries with the following keys:

announce

The URL of the tracker.

info

This maps to a dictionary, with keys described below.

The `name` key maps to a UTF-8 encoded string which is the suggested name to save the file (or directory) as. It is purely advisory.

`piece length` maps to the number of bytes in each piece the file is split into. For the purposes of transfer, files are split into fixed-size pieces which are all the same length except for possibly the last one which may be truncated. `piece length` is almost always a power of two, most commonly 2 18 = 256 K (BitTorrent prior to version 3.2 uses 2 20 = 1 M as default).

`pieces` maps to a string whose length is a multiple of 20. It is to be subdivided into strings of length 20, each of which is the SHA1 hash of the piece at the corresponding index.

There is also a key `length` or a key `files`, but not both or neither. If `length` is present then the download represents a single file, otherwise it represents a set of files which go in a directory structure.

In the single file case, `length` maps to the length of the file in bytes.

For the purposes of the other keys, the multi-file case is treated as only having a single file by concatenating the files in the order they appear in the files list. The files list is the value `files` maps to, and is a list of dictionaries containing the following keys:

`length` - The length of the file, in bytes.

`path` - A list of UTF-8 encoded strings corresponding to subdirectory names, the last of which is the actual file name (a zero length list is an error case).

In the single file case, the name key is the name of a file, in the muliple file case, it's the name of a directory.

All strings in a .torrent file that contains text must be UTF-8 encoded.

Tracker GET requests have the following keys:

info_hash

The 20 byte sha1 hash of the bencoded form of the info value from the metainfo file. Note that this is a substring of the metainfo file. This value will almost certainly have to be escaped.

peer_id

A string of length 20 which this downloader uses as its id. Each downloader generates its own id at random at the start of a new download. This value will also almost certainly have to be escaped.

ip

An optional parameter giving the IP (or dns name) which this peer is at. Generally used for the origin if it's on the same machine as the tracker.

port

The port number this peer is listening on. Common behavior is for a downloader to try to listen on port 6881 and if that port is taken try 6882, then 6883, etc. and give up after 6889.

uploaded

The total amount uploaded so far, encoded in base ten ascii.

downloaded

The total amount downloaded so far, encoded in base ten ascii.

left

The number of bytes this peer still has to download, encoded in base ten ascii. Note that this can't be computed from downloaded and the file length since it might be a resume, and there's a chance that some of the downloaded data failed an integrity check and had to be re-downloaded.

event

This is an optional key which maps to `started`, `completed`, or `stopped` (or `empty`, which is the same as not being present). If not present, this is one of the announcements done at regular intervals. An announcement using `started` is sent when a download first begins, and one using `completed` is sent when the download is complete. No `completed` is sent if the file was complete when started. Downloaders send an announcement using `stopped` when they cease downloading.

Tracker responses are bencoded dictionaries. If a tracker response has a key `failure reason`, then that maps to a human readable string which explains why the query failed, and no other keys are required. Otherwise, it must have two keys: `interval`, which maps to the number of seconds the downloader should wait between regular rerequests, and `peers`. `peers` maps to a list of dictionaries corresponding to `peers`, each of which contains the keys `peer id`, `ip`, and `port`, which map to the peer's self-selected ID, IP address or dns name as a string, and port number, respectively. Note that downloaders may rerequest on nonscheduled times if an event happens or they need more peers.

If you want to make any extensions to metainfo files or tracker queries, please coordinate with Bram Cohen to make sure that all extensions are done compatibly.

BitTorrent's peer protocol operates over TCP. It performs efficiently without setting any socket options.

Peer connections are symmetrical. Messages sent in both directions look the same, and data can flow in either direction.

The peer protocol refers to pieces of the file by index as described in the metainfo file, starting at zero. When a peer finishes downloading a piece and checks that the hash matches, it announces that it has that piece to all of its peers.

Connections contain two bits of state on either end: choked or not, and interested or not. Choking is a notification that no data will be sent until unchoking happens. The reasoning and common techniques behind choking are explained later in this document.

Data transfer takes place whenever one side is interested and the other side is not choking. Interest state must be kept up to date at all times - whenever a downloader doesn't have something they currently would ask a peer for in unchoked, they must express lack of interest, despite being choked. Implementing this properly is tricky, but makes it possible for downloaders to know which peers will start downloading immediately if unchoked.

Connections start out choked and not interested.

When data is being transferred, downloaders should keep several piece requests queued up at once in order to get good TCP performance (this is called 'pipelining'.) On the other side, requests which can't be written out to the TCP buffer immediately should be queued up in memory rather than kept in an application-level network buffer, so they can all be thrown out when a choke happens.

The peer wire protocol consists of a handshake followed by a never-ending stream of length-prefixed messages. The handshake starts with character ninteen (decimal) followed by the string 'BitTorrent protocol'. The leading character is a length prefix, put there in the hope that other new protocols may do the same and thus be trivially distinguishable from each other.

All later integers sent in the protocol are encoded as four bytes big-endian.

After the fixed headers come eight reserved bytes, which are all zero in all current implementations. If you wish to extend the protocol using these bytes, please coordinate with Bram Cohen to make sure all extensions are done compatibly.

Next comes the 20 byte sha1 hash of the bencoded form of the info value from the metainfo file. (This is the same value which is announced as `info_hash` to the tracker, only here it's raw instead of quoted here). If both sides don't send the same value, they sever the connection. The one possible exception is if a downloader wants to do multiple downloads over a single port, they may wait for incoming connections to give a download hash first, and respond with the same one if it's in their list.

After the download hash comes the 20-byte peer id which is reported in tracker requests and contained in peer lists in tracker responses. If the receiving side's peer id doesn't match the one the initiating side expects, it severs the connection.

That's it for handshaking, next comes an alternating stream of length prefixes and messages. Messages of length zero are keepalives, and ignored. Keepalives are generally sent once every two minutes, but note that timeouts can be done much more quickly when data is expected.

All non-keepalive messages start with a single byte which gives their type.

The possible values are:

- 0 - choke
- 1 - unchoke
- 2 - interested
- 3 - not interested
- 4 - have
- 5 - bitfield
- 6 - request
- 7 - piece
- 8 - cancel

'choke', 'unchoke', 'interested', and 'not interested' have no payload.

'bitfield' is only ever sent as the first message. Its payload is a bitfield with each index that downloader has sent set to one and the rest set to zero. Downloaders which don't have anything yet may skip the 'bitfield' message. The first byte of the bitfield corresponds to indices 0 - 7 from high bit to low bit, respectively. The next one 8-15, etc. Spare bits at the end are set to zero.

The 'have' message's payload is a single number, the index which that downloader just completed and checked the hash of.

'request' messages contain an index, begin, and length. The last two are byte offsets. Length is generally a power of two unless it gets truncated by the end of the file. All current implementations use 2 15 , and close connections which request an amount greater than 2 17.

'cancel' messages have the same payload as request messages. They are generally only sent towards the end of a download, during what's called 'endgame mode'. When a download is almost complete, there's a tendency for the last few pieces to all be downloaded off a single hosed modem line, taking a very long time. To make sure the last few pieces come in quickly, once requests for all pieces a given downloader doesn't have yet are currently pending, it sends requests for everything to everyone it's downloading from. To keep this from becoming horribly inefficient, it sends cancels to everyone else every time a piece arrives.

'piece' messages contain an index, begin, and piece. Note that they are correlated with request messages implicitly. It's possible for an unexpected piece to arrive if choke and unchoke messages are sent in quick succession and/or transfer is going very slowly.

Downloaders generally download pieces in random order, which does a reasonably good job of keeping them from having a strict subset or superset of the pieces of any of their peers.

Choking is done for several reasons. TCP congestion control behaves very poorly when sending over many connections at once. Also, choking lets each peer use a tit-for-tat-ish algorithm to ensure that they get a consistent download rate.

The choking algorithm described below is the currently deployed one. It is very important that all new algorithms work well both in a network consisting entirely of themselves and in a network consisting mostly of this one.

There are several criteria a good choking algorithm should meet. It should cap the number of simultaneous uploads for good TCP performance. It should avoid choking and unchoking quickly, known as 'fibrillation'. It should reciprocate to peers who let it download. Finally, it should try out unused connections once in a while to find out if they might be better than the currently used ones, known as optimistic unchoking.

The currently deployed choking algorithm avoids fibrillation by only changing who's choked once every ten seconds. It does reciprocation and number of uploads capping by unchoking the four peers which it has the best download rates from and are interested. Peers which have a better upload rate but aren't interested get unchoked and if they become interested the worst uploader gets choked. If a downloader has a complete file, it uses its upload rate rather than its download rate to decide who to unchoke.

For optimistic unchoking, at any one time there is a single peer which is unchoked regardless of it's upload rate (if interested, it counts as one of the four allowed downloaders.) Which peer is optimistically unchoked rotates every 30 seconds. To give them a decent chance of getting a complete piece to upload, new connections are three times as likely to start as the current optimistic unchoke as anywhere else in the rotation.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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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.

Office Action Summary	**Application No.** 16/278,107	**Applicant(s)** Shribman et al.	
	Examiner MINH CHAU N NGUYEN	**Art Unit** 2459	**AIA (FITF) 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 17 February 2019.

☐ 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) 1-24 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) 1-24 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 11 March 2019 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 See Continuation Sheet.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Continuation of Attachment(s) 2) Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date: 02/17/2019; 03/11/2019; 04/28/2019; 07/01/2019; 08/06/2019; 08/20/2019

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

This action is responsive to the application 16/278,106 filed on February 17, 2019. **Claims 1-24** are pending.

Double Patenting

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 obviousness-type double patenting rejection is appropriate where the conflicting claims 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 conflicting 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.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-24 (hereafter "*examined claim*") are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims **1-29** (hereafter "*patent claim*") of U.S. Patent No. **10,257,319**. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the instant application are merely obvious variations of the claims in the patent 10,257,319 as outlined in the table below:

Examined claim 2 the method according to claim 1, further comprising **receiving, by the first client device from the second server over the established TCP connection, the first content identifier.** **Examined claim 1** A method for use with a web server that responds to Hypertext Transfer Protocol (HTTP) requests and stores a first content identified by a first content identifier, the method by a first client device comprising: establishing a Transmission Control Protocol (TCP) connection with a second server;	**Patent claim 1** A method for use with a first client device, for use with a first server that comprises a web server that is a Hypertext Transfer Protocol (HTTP) server that responds to HTTP requests, the first server stores a first content identified by a first content identifier, and for use with a second server, the method by the first client device comprising:

	receiving, from the second server, the first content identifier;
sending, to the web server over the Internet, the first content identifier; and	sending, to the first server over the Internet, a Hypertext Transfer Protocol (HTTP) request that comprises that first content identifier;
receiving, the first content from the web server over the Internet in response to the sending of the first content identifier; and	receiving, the first content from the first server over the Internet in response to the sending of the first content identifier; and
sending, the received first content, to the second server over the established TCP connection, in response to the receiving of the content identifier.	sending, the first content by the first client device to the second server, in response to the receiving of the content identifier.

Examined claim 2 is merely a broader version of patent claim 1. It would have been obvious to broaden patent claim 1 because omitting the limitation is obvious variation.

Examined claims 3-24 recite the similar limitations of patent claims 2-29.

Claims 1-24 (hereafter "*examined claim*") are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims **1-24** (hereafter "*copending claim*") of copending Application **2019/0182359** (reference application **10/278,106)**. Although the claims at issue are not identical, they are not patentably distinct from each other because the claims of the instant application are merely provisionally variations of the claims in the copending application as outlined in the table below:

Examined claim 2	**Copending claim 2**
the method according to claim 1, further comprising **receiving, by the first client device from the second server over the**	the method according to claim 1, further comprising **sending the received first content, by the first client device to**

established TCP connection, the first content identifier.	**the second server over the established TCP connection, in response to the receiving of the first content identifier.**
Examined claim 1	**Copending claim 1**
A method for use with a web server that responds to Hypertext Transfer Protocol (HTTP) requests and stores a first content identified by a first content identifier, the method by a first client device comprising:	A method for use with a web server that responds to Hypertext Transfer Protocol (HTTP) requests and stores a first content identified by a first content identifier, the method by a first client device comprising:
establishing a Transmission Control Protocol (TCP) connection with a second server;	establishing a Transmission Control Protocol (TCP) connection with a second server;
sending, to the web server over the Internet, the first content identifier; and	**receiving, from the second server over the established TCP connection, the first content identifier;**
receiving, the first content from the web server over the Internet in response to the sending of the first content identifier; and	sending, to the web server over the Internet, the first content identifier; and
sending, the received first content, to the second server over the established TCP connection, in response to the receiving of the content identifier.	receiving, the first content from the web server over the Internet in response to the sending of the first content identifier.

Examined claim 2 is similar version of copending claim 2. Examined claims 3-24 recite the similar limitations of copending claims 3-24.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Claim Objections

Claim 1 is objected to because of the following informalities: the claim recites limitation "*sending, to the web server over **the** Internet, the first content identifier*" should be changed as

"sending, to the web server over **an** Internet, the first content identifier". Appropriate correction is required.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MINH CHAU N NGUYEN whose telephone number is (571)272-4242. The examiner can normally be reached on M-F 8am-4pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JEFFREY NICKERSON can be reached on (571)270-3631. 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.

/MINH CHAU NGUYEN/
Primary Examiner, Art Unit 2459

Notice of References Cited	Application/Control No. 16/278,107	Applicant(s)/Patent Under Reexamination Shribman et al.	
	Examiner MINH CHAU N NGUYEN	Art Unit 2459	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20060212584-A1	09-2006	Yu; Mingjian	H04L67/104	709/227
*	B	US-20110035503-A1	02-2011	ZAID; SAM	H04L63/0407	709/228
*	C	US-9015335-B1	04-2015	Gigliotti; Samuel S.	G06F16/40	709/231
*	D	US-7865585-B2	01-2011	Samuels; Allen	H04L67/28	709/217
*	E	US-20010054020-A1	12-2001	Barth, Brian E.	G06Q10/02	705/37
*	F	US-20060212542-A1	09-2006	Fang; Han	H04L67/104	709/219
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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	Art Unit
	MINH CHAU N NGUYEN	2459

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L67/42	09/15/2019	MN
H04L41/046	09/15/2019	MN
H04L67/1002	09/15/2019	MN
H04L67/22	09/15/2019	MN
H04L67/02	09/15/2019	MN

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Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
709	202	09/15/2019	MN

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Search Notes	**Date**	**Examiner**
search on EAST	09/15/2019	MN

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	**Art Unit**
	MINH CHAU N NGUYEN	2459

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant					☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	09/15/2019								
	1	✓								
	2	✓								
	3	✓								
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	24	✓								

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16278107
Filing Date	2019-02-17
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	9177157	B2	2015-11-03	Yehuda Binder	

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/M.N/	1	20070142036	A1	2007-06-21	Johan Wikman	
	2	20090248793	A1	2009-10-01	Sanny Jacobsson	
	3	20130080575	A1	2013-03-28	Matthew Browning Prince	
	4	20110066924	A1	2011-03-17	Gregory Dorso	
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	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

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/M.N/	1	2004094980	WO	A2	2004-11-04	FONTIJN, Wilhelmus, F., J. et al		

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/M.N/	1	Third-party submission under 37 CFR 1.290 filed on July 23, 2019 and entered in U.S. Appl. No. 16/140,749	
	2	Third-party submission under 37 CFR 1.290 filed on July 23, 2019 and entered in U.S. Appl. No. 16/140,785	
	3	Third-party submission under 37 CFR 1.290 filed on July 23, 2019 and entered in U.S. Appl. No. 16/214,433	
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	5	Third-party submission under 37 CFR 1.290 filed on July 23, 2019 and entered in U.S. Appl. No. 16/214,476	
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	Attorney Docket Number	HOLA-005-US10

/M.N/	8	Third-party submission under 37 CFR 1.290 filed on July 22, 2019 and entered in U.S. Appl. No. 16/292,364	
	9	Third-party submission under 37 CFR 1.290 filed on July 23, 2019 and entered in U.S. Appl. No. 16/292,374	
	10	Third-party submission under 37 CFR 1.290 filed on July 23, 2019 and entered in U.S. Appl. No. 16/292,382	
	11	Third-party submission under 37 CFR 1.290 filed on July 25, 2019 and entered in U.S. Appl. No. 16/365,250	
	12	Third-party submission under 37 CFR 1.290 filed on July 25, 2019 and entered in U.S. Appl. No. 16/365,315	
	13	"Slice Embedding Solutions for Distributed Service Architectures" - Esposito et al., Boston University, 02/12/2011 http://www.cs.bu.edu/techreports/pdf/2011-025-slice-embedding.pdf (Year 2011) (16 pages)	

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Name/Print	Yehuda Binder	Registration Number	73612

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Application Number	16/278107
Filing Date	2/17/2019
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

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/M.N/	1	20030097408	A1	2003-05-22	Masahiro Kageyama	
	2	20070100839	A1	2007-05-03	Deok-ho Kim	
	3	20080256175	A1	2008-10-16	Sang-kwon Lee	
	4	20060212542	A1	2006-09-21	Han Fang	

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Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-02-03
Name/Print	Yehuda BINDER	Registration Number	73612

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PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16278107
Filing Date	2019-02-17
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	9015335	B1	2015-04-21	Samuel S. Gigliotti	
/M.N/	2	7788378	B2	2010-08-31	Ravi T. Rao	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20130304796	A1	2013-11-14	Steven J. Jackowski	
	2	20120164980	A1	2012-06-28	Vinh Van Phan	
	3	20010054020	A1	2001-12-20	Brian E. Barth	
	4	20160105530	A1	2016-04-14	Derry Shribman	

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	Attorney Docket Number	HOLA-005-US10

/M.N/	5	20070050522	A1	2007-03-01	Adam J. Grove	
	6	20090216887	A1	2009-08-27	Andreas Hertle	
	7	20130080575	A1	2013-03-28	Matthew Browning Prince	

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/M.N/	1	2922275	EP	B1	2016-03-23	Axis AB		

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/M.N/	1	"Keep Alive" - Imperva, 2019 https://www.imperva.com/learn/performance/keep-alive (2019) (3 pages)	
	2	Third party observation filed on June 21, 2019 in PCT Application No. PCT/IL2018/050910 (7 pages)	
	3	IETF named: IPv6 Tunnel Broker, April 1999 - First uploaded document submitted with third party observation dated June 21, 2019 (13 pages)	

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	Attorney Docket Number	HOLA-005-US10

/M.N/	4	RFC 3053 (January 2001) named: IPv6 Tunnel Broker - Secod uploaded document submitted with third party observation dated June 21, 2019 (13 pages)	

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That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-07-01
Name/Print	Yehuda Binder	Registration Number	73612

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Filing Date	2/17/2019
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	7742485	B2	2010-06-22	Xinyan Zhang	
	2	7831720	B1	2010-11-09	Wael Noureddine	

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/M.N/	1	20140359081	A1	2014-12-04	Mattijs Oskar Van Deventer	
	2	20090010426	A1	2009-01-08	Scott D. Redmond	
	3	20130007232	A1	2013-01-03	Wei Wang	
	4	20150206197	A1	2015-07-23	Assaf Toval	

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/M.N/	5	20150206176	A1	2015-07-23	Assaf Toval	
	6	20170221092	A1	2017-08-03	Assaf Toval	
	7	20070174246	A1	2007-07-26	Johann Tomas Sigurdsson	
	8	20100262650	A1	2010-10-14	Abhishek Chauhan	
	9	20060047844	A1	2006-03-02	Li Deng	
	10	20130171964	A1	2013-07-04	Sumeet Singh Bhatia	
	11	20130219458	A1	2013-08-22	Vasudevan Ramanathan	

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Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-02-03
Name/Print	Yehuda Binder	Registration Number	73,612

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Bibliographic Data

Application No: 16/278,107

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /MINH CHAU NGUYEN/ Examiner's Signature | Initials

Title: SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/17/2019	709	2459	HOLA-005-US10
RULE			

APPLICANTS

WEB SPARK LTD., Netanya, ISRAEL

INVENTORS

Derry Shribman Tel Aviv, ISRAEL

Ofer Vilenski Moshav Hadar Am, ISRAEL

CONTINUING DATA

This application is a CON of 15957945 04/20/2018 PAT 10257319

15957945 is a CON of 14025109 09/12/2013 PAT 10069936

14025109 is a DIV of 12836059 07/14/2010 PAT 8560604

12836059 has PRO of 61249624 10/08/2009

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/M.N/	1	7673048		2010-03-02	James W. O'Toole	
	2	7783777		2010-08-24	Kuldipsingh A. Pabla	
	3	8719430		2014-05-06	Michel Van Ackere	
	4	8838811		2014-09-16	Songqing Chen	
	5	7751628	B1	2010-07-06	Richard R. Reisman	
	6	5519693	A	1996-05-21	ROBERT J. GALUSZKA	
	7	6519693	B1	2003-02-11	HENRY C. DEBEY	
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/M.N/	1	20150206176	A1	2015-07-23	Assaf Toval	
	2	20020091760	A1	2009-09-08	John Rozen	
	3	20060224687	A1	2006-10-05	Laird Alexander Popkin	
	4	20090248793	A1	2009-10-01	Sanny Jacobsson	
	5	20110035503	A1	2011-02-10	SAM ZAID	
	6	20110087733	A1	2011-04-14	Derry Shribman	
	7	20120124239	A1	2012-05-17	Derry Shribman	
	8	20120166582	A1	2016-06-28	Yehuda BINDER	
	9	20130064370	A1	2013-03-14	Christopher S. Gouge	

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/M.N/	10	20130080575	A1	2013-03-28	Matthew Browning Prince	
	11	20060039352	A1	2006-02-23	Christopher K. Karstens	
	12	20080222291	A1	2008-09-11	Timothy N. Weller	
	13	20100235438	A1	2010-09-16	Kumar Narayanan	
	14	20150067819	A1	2015-03-05	Derry Shribman	
	15	20120254456	A1	2012-10-04	Zubair Visharam	
	16	20150189401	A1	2015-07-02	Donghoon YI	
	17	20150341812	A1	2015-11-26	Gino Louis Dion	
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/M.N/	1	2004094980	WO		2004-11-04	FONTIJN, Wilhelmus, F., J. et al		

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Examiner Signature	/MINH CHAU NGUYEN/	Date Considered	09/15/2019

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16278107
	Filing Date	2019-02-17
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-03-11
Name/Print	Yehuda Binder	Registration Number	73,612

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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.

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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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	29	("2006/0212584").URPN.	USPAT	OR	OFF	2019/09/15 20:19
L2	4581	(servers same (peers clients)) same ((content$1 document$1 page$1) with (deliver$4 quer$4 inquir$4 retriev$4 search$4)) and (web near server$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L3	460	L2 and (server$1 with (receiv$4 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L4	248	L3 and @ad<"20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L5	74	L2 and ((client$1 peer$1) near3 (transmit$4 send$4 forward$4 deliver$4) with ((retrieved received inquiried obtained) near3 (content$1 document$1 file$1 web$page$1 page$1)) with server$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L6	29	L5 and @ad<"20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L7	29	L5 and @ad<"20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L8	0	L7 and (server$1 with (list$1 near3 (node$1 peer$1 terminal$1 device$1) near3 client$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L9	248	L3 and @ad<"20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20

L10	6	L9 and ((client$1 peer$1) near3 (transmit$4 send$4 forward$4 deliver$4) with ((retrieved received inquiried obtained) near3 (content$1 document$1 file$1 web$page$1 page$1)) with server$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L11	0	L10 and (server$1 with (list$1 near3 (node$1 peer$1 terminal$1 device$1) near3 client$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L12	3	L9 and (server$1 with (list$1 near3 (node$1 peer$1 terminal$1 device$1) near3 client$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L13	31	L9 and (keep$4 near3 alive$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L14	31	L9 and (keep$4 near3 alive$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20
L15	17	L14 and (live online) and (geographic$6 location$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/15 20:20

EAST Search History (Interference)

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PTO/SB/08a (03-15)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16/278107
Filing Date	2/17/2019
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	3922494	A	1975-11-25	Cooper , et al.	
	2	5758195	A	1998-05-26	Balmer; Keith	
	3	6061278	A	2000-05-09	Kato , et al.	
	4	6466470	B1	2002-10-15	Houn Chang	
	5	7865585		2011-01-04	Allen Samuels, et al.	
	6	7120666		2006-10-10	Steven McCanne, et al.	
	7	7203741		2007-04-10	Talmon Marco, et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20030009518	A1	2003-01-09	Harrow, Ivan P. ; et al.	
	2	20030074403	A1	2003-04-17	Harrow, Ivan P. ; et al.	
	3	20140082260	A1	2014-03-20	OH; HakJune ; et al.	
	4	20110314347	A1	2011-12-22	NAKANO; Rikizo ; et al.	
	5	20100329270	A1	2010-12-30	Asati; Rajiv ; et al.	
	6	20100085977	A1	2010-04-08	Khalid; Mohamed ; et al.	
	7	20100066808	A1	2010-03-18	Tucker; Curtis E. ; et al.	
	8	20090279559	A1	2009-11-12	Wong; Yuen Fai ; et al.	
	9	20080025506	A1	2008-01-31	Muraoka; Jochiku	
	10	20040264506	A1	2004-12-30	Furukawa, Rei	

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	Attorney Docket Number	HOLA-005-US10

/M.N/	11	20020123895	A1	2002-09-05	Sergey Potekhin	
	12	20150033001	A1	2015-01-29	Ivanov; Vladimir	
	13	20150358648	A1	2015-12-10	Limberg; Allen LeRoy	
	14	20160021430	A1	2016-01-21	LaBosco; Mark ; et al.	
	15	20110087733	A1	2011-04-14	Derry Shribman; et al.	
	16	20030174648	A1	2003-09-18	Mea Wang; et al.	
	17	20080008089	A1	2008-01-10	Claudson F. Bornstein; et al.	
	18	20040088646	A1	2004-05-06	William J. Yeager; et al.	
	19	20030009583	A1	2003-01-09	Chung Chan; et al.	
	20	20080235391	A1	2008-09-25	Christopher Painter; et al.	
	21	20070156855	A1	2007-07-05	Moses Johnson	

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/M.N/	22	20020007413	A1	2002-01-17	JJ Garcia-Luna-Aceves, et al.	
	23	20030210694	A1	2003-11-13	Suresh Jayaraman, et al.	
	24	20030200307	A1	2003-10-23	Jyoti Raju, et al.	

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/M.N/	1	International Search Report issued in PCT Application No. PCT/US2010/051881 dated 09 December 2010	
/M.N/	2	Supplementary European Search Report issued in EP Application No. 10822724 dated 24 April 2013	

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☒ A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-02-03
Name/Print	Yehuda BINDER	Registration Number	73612

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	8479251	B2	2013-07-02	Feinleib et al	
	2	8499059	B2	2013-07-30	Stoyanov	
	3	7970835	B2	2011-28-01	Xerox Corporation	
	4	8832179	B2	2014-09-09	Owen , et al.	
	5	6173330	B1	2001-09-01	Guo , et al.	
	6	8769035	B2	2014-01-07	Resch , et al.	
	7	8171101	B2	2012-05-01	Gladwin , et al.	
	8	7558942	B2	2009-07-07	Chen , et al.	

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	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	9	4937781	A	1990-06-26	Lee , et al.	
/M.N/	10	7970835	B2	2011-06-28	Robert St. Jacques	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20150067819	A1	2015-03-05	Hola Networks Ltd.	
	2	20120254456	A1	2012-10-04	Visharam Zubair et al.	
	3	20080222291	A1	2008-09-11	Weller et al.	
	4	20100235438	A1	2010-09-16	Narayanan et al.	
	5	20120124239	A1	2012-05-17	Shribman et al.	
	6	20130166768	A1	2013-06-27	Thomson Licensing	
	7	20020065930	A1	2002-30-05	Rhodes, David L.	

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	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	8	20030204602	A1	2003-10-30	Hudson Michael D.	
	9	20120099566	A1	2012-04-26	Laine; Tuomas ; et al.	
	10	20130201316	A1	2013-08-08	BINDER; Yehuda ; et al.	
	11	20080125123	A1	2008-05-29	Dorenbosch; Jheroen P. ; et al.	
	12	20140301334	A1	2014-10-09	Labranche; Miguel ; et al.	
	13	20070239655	A1	2007-10-11	Agetsuma; Masakuni ; et al.	
	14	20070226810	A1	2007-09-27	Hotti; Timo	
	15	20100094970	A1	2010-04-15	Zuckerman; Gal ; et al.	
	16	20020120874	A1	2002-29-08	Shu, Li ; et al.	
	17	20100115063	A1	2010-06-05	GLADWIN; S. CHRISTOPHER ; et al.	
	18	20100154044	A1	2010-17-06	Manku; Tajinder	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	19	20100293555	A1	2010-15-11	VEPSALAINEN; Ari M.	
	20	20130272519	A1	2013-17-10	Huang; Lawrence P.	
	21	20030115364	A1	2003-06-19	Shu Li et al.	
	22	20090217122	A1	2009-27-08	Yokokawa; Takashi ; et al.	
	23	20010033583	A1	2001-25-10	Rabenko, Theodore F. ; et al.	
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	25	20020133621	A1	2002-09-19	Talmon Marco et al	
	26	20040107242	A1	2004-06-03	John Vert et al	
	27	20070073878	A1	2007-03-29	Alfredo C. Issa	
	28	20090319502	A1	2009-12-24	Olivier Chalouhi et al	
	29	20060212584	A1	2006-09-21	Mingjian Yu et al	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/M.N/	1	2015034752	WO	A1	2015-03-12	Akamai Technologies INC		
	2	2000/018078	WO	A1	2000-03-30	Sopuch David. J		
	3	0948176	EP	A2	1999-10-06	Siemens Inf &Comm Networks		
	4	2597869	EP	A1	2015-05-29	Sharp Kabushiki Kaisha Osaka-shi		
	5	2010090562	WO	A1	2010-08-12	Telefonaktiebolaget L M Ericsson		
	6	2007280388	JP		2007-25-10	Xerox Corporation		
	7	1020090097034	KR		2009-15-09	KT Corporation		
	8	2343536	RU	C2	2009-10-01	Microsoft Corporation		
	9	101075242	CN	A	2007-11-21	TENGXUN SCIENCE & TECHNOLOGY		

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	Attorney Docket Number	HOLA-005-US10

/M.N/	10	101179389	CN	A	2008-05-14	Wang Matrix XIN		

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Examiner Initials*	Cite No	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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
/M.N/	1	R. Fielding et al, RFC 2616: Hypertext Transfer Protocol -- HTTP/1.1, June 1999, retrieved from the Internet http://rcf-editor.org [retrieved Apr. 15, 2002] (114 pages)	
	2	"On the Leakage of Personally Identifiable Information via Online Social Networks"-Wills et al, AT&T, Apr. 2009 http://www2.research.att.com/~bala/papers/wosn09.pdf.	
	3	Notice of Preliminary Rejection in KR Application No. 10-2012-7011711 dated July 15, 2016	
	4	KEI SUZUKI, a study on Cooperative Peer Selection Method in P2P Video Delivery, Vol. 109, No. 37, IEICE Technical Report, The Institute of Electronics, Information and Communication Engineers, May 14, 2009	

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Examiner Signature	/MINH CHAU NGUYEN/	Date Considered	09/15/2019

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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See attached certification statement.

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☒ A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-02-03
Name/Print	Yehuda BINDER	Registration Number	73612

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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.

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PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16278107
Filing Date	2019-02-17
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	6895011	B1	2005-05-17	Harold Aaron Lassers	

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/M.N/	1	20090232003	A1	2009-09-17	Jean-Philippe Vasseur	
	2	20140189802	A1	2014-07-03	Gregory MONTGOMERY	
	3	20030229785	A1	2003-12-11	Michael J. Daseke	
	4	20050027782	A1	2005-02-03	Rajkumar Jalan	
	5	20030229718	A1	2003-12-11	Theron Tock	

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/M.N/	6	20090292816	A1	2009-11-26	Craig S. Etchegoyen	
/M.N/	7	20120166582	A1	2012-06-28	Yehuda BINDER	

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/M.N/	1	Reed et al, "Anonymous Connections and Onion Routing", Naval Research Laboratory, 03/1998 https://www.onion-router.net/Publications/JSAC-1998.pdf (Year: 1998)	

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Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-04-23
Name/Print	Yehuda Binder	Registration Number	73,612

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/M.N/	1	8639630		2014-01-28	Fomenko et al	

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/M.N/	1	Michael J. Freedman, Princeton University, "Experiences with CoralCDN: a five-year operational view", Proceeding NSDI'10 Proceedings of the 7th USENIX conference on Networked systems design and implementation San Jose, California — April 28 - 30, 2010 (17 pages)	
	2	"The BitTorrent Protocol Specification", Website: https://web.archive.org/web/20120513011037/http:/www.bittorrent.org/beps/bep_0003.html describing BitTorrent dated Jan 10, 2008 downloaded using web archive on Aug 16, 2019 (6 pages)	
	3	"BitTorrent", Website: https://en.wikipedia.org/w/index.php?title=BitTorrent&oldid=530466721 describing BitTorrent dated Dec 30, 2012 downloaded using Wikipedia on Aug 16, 2019 (9 pages)	
	4	"VIP SOCKS/VPN SERVICE", Website: http://vip72.com:80/?drgn=1 describing VIP72 proxy service dated Jan 2010 downloaded using VIP Technologies webpage on Aug 16, 2019 (3 pages)	
	5	"Welcome to Easy Hide IP", Website: https://web.archive.org/web/20130702093456/http://www.easy-hide-ip.com:80/ describing Easy Hide IP dated June 26, 2007 downloaded using web archive on Aug 16, 2019 (2 pages)	
	6	"You make it fun; we'll make it run", Website: https://web.archive.org/web/20130726050810/https://www.coralcdn.org describing CoralCDN dated Jan 25, 2005 downloaded using web archive on Aug 16, 2019 (2 pages)	
	7	"Net Transport", Website: http://www.xi-soft.com/default.htm describing Net Transport Overview dated 2005 downloaded using Net Transport webpage on Aug 16, 2019 (2 pages)	
	8	Net Transport - Develop History, Website: http://www.xi-soft.com/download.htm describing Net Transport Download dated 2005 downloaded using Net Transport webpage on Aug 16, 2019 (10 pages)	
	9	Net Transport FAQ, Website: http://www.xi-soft.com/faq.htm describing Net Transport FAQ dated 2005 downloaded using Net Transport webpage on Aug 16, 2019 (4 pages)	
	10	Net Transport News, Website: http://www.xi-soft.com/news.htm describing Net Transport News dated 2005 downloaded using Net Transport webpage on Aug 16, 2019 (5 pages)	

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EXAMINER SIGNATURE			
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Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-08-19
Name/Print	Yehuda Binder	Registration Number	73612

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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 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.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16/278107
Filing Date	02/17/2019
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	7788378		2010-08-31	Ravi T. Rao	
	2	9253164		2016-02-02	Christopher S. Gouge	
	3	7890547	B2	2011-02-15	Timo Hotti	
	4	8832179	B2	2014-09-09	Owen , et al.	
	5	7818430	B2	2010-10-19	Gal Zuckerman	
	6	6154782	A	2000-11-28	NAOHISA KAWAGUCHI	
	7	5577243	A	1996-17-11	Sherwood , et al.	
	8	8135912	B2	2012-13-03	Shribman , et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	9	8719505	B2	2014-06-05	Shribman , et al.	
	10	9201808	B2	2015-01-12	Shribman , et al.	
	11	9990295	B2	2018-06-05	Shribman , et al.	

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U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20080109446	A1	2008-05-08	Matrix Xin Wang	
	2	20110066924	A1	2011-03-17	Gregory Dorso	
	3	20110128911	A1	2011-06-02	Kamel M. Shaheen	
	4	20130157699	A1	2013-06-20	Mohit Talwar	
	5	20130326607	A1	2013-12-05	Liang Feng	
	6	20030204602	A1	2003-30-10	Hudson, Michael D. ; et al.	

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	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	7	20120124173	A1	2012-17-05	De; Pradipta ; et al.	
	8	20020069241	A1	2002-06-06	Narlikar, Girija ; et al.	
	9	20130201316	A1	2013-08-08	BINDER; Yehuda ; et al.	
	10	20120099566	A1	2012-26-04	Laine; Tuomas ; et al.	
	11	20120254370	A1	2012-10-04	Utz BACHER	
	12	20080125123	A1	2008-05-29	Jheroen P. Dorenbosch	
	13	20140301334	A1	2014-10-09	Miguel Labranche	
	14	20070239655	A1	2007-10-11	Masakuni Agetsuma	
	15	20070226810	A1	2007-09-27	Timo Hotti	
	16	20100094970	A1	2010-04-15	Gal Zuckerman	
	17	20130007253	A1	2013-01-03	Guohuai Li	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	Attorney Docket Number	HOLA-005-US10

/M.N/	18	20090037529	A1	2009-02-05	Gilad Armon-Kest	
	19	20090182843	A1	2009-07-16	Michael G. Hluchyj	
	20	20060036755	A1	2006-02-16	Ibrahim S. Abdullah	
	21	20140376403	A1	2014-12-25	Wenqi Shao	
	22	20050228964	A1	2005-13-10	Sechrest, Stuart ; et al.	
	23	20080086730	A1	2008-10-04	Vertes; Marc	
	24	20060259728	A1	2006-16-11	Chandrasekaran; Sashikanth ; et al.	
	25	20040254907	A1	2004-16-12	Crow, Preston F. ; et al.	
	26	20050015552	A1	2005-20-01	So, Kimming ; et al.	
	27	20050022236	A1	2005-01-27	Akihiko Ito; et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/M.N/	1	2597869	EP	A1	2013-18-12	Sharp Kk		
	2	2010090562	WO	A1	2010-12-08	Telefonaktiebolaget L M Ericsson (Publ)		
	3	2011068784	WO	A1	2011-09-06	Azuki Systems, Inc		

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Examiner Initials*	Cite No	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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
/M.N/	1	Screen captures from YouTube video clip entitle "nVpn.net | Double your Safety and use Socks5 + nVpn" 38 pages, last accessed 11/20/2018 <https://www.youtube.com/watch?v=L0Hct2kSnn4>	
	2	Screen captures from YouTube video clip entitle "Andromeda" 47 pages, publicly known and available as of at least 2011 <https://www.youtube.com/watch?v=yRRYpFLbKNU>	
	3	SpyEye, https://www.symantec.com/security-center/writeup/2010-020216-0135-9; http://securesql.info/riskyclouds/spyeye-user-manual; known as of at least 2010 (13 pages)	
	4	Screen captures from YouTube video clip entitle "Change Your Country IP Address & Location with Easy Hide IP Software" 9 pages, publicly known and available as of at least 2011, <https://www.youtube.com/watch?v=ulwkf1sOfdA and https://www.youtube.com/watch?v=iFEMT-o9DTc>	
	5	CoralCDN ("CoralCDN"), https://pdos.csail.mit.edu/6.824/papers/freedman-coral.pdf (14 PAGES)	

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	Attorney Docket Number	HOLA-005-US10

/M.N/	6	European Search Report for EP 14182547.1, dated July 30, 2015
	7	R. Fielding et al, RFC 2616: Hypertext Transfer Protocol -- HTTP/1.1, June 1999, retrieved from the Internet http://rfc-editor.org [retrieved Apr. 15, 2002]
	8	"On the leakage of personally identifiable information via online social networks", Wills et al. AT&T, Apr. 2009 http://www2.research.att.com/-bala/papers/wosn09.pdf*
	9	"Slice Embedding Solutions for Distributed Service Architectures" - Esposito et al., Boston University, Computer Science Dept., 10/2011 http://www.cs.bu.edu/techreports/pdf/2011-025-slice-embedding.pdf
	10	International Search Report of PCT/US2010/034072 dated July 01, 2010
	11	YouTube video clip entitled "nVpn.net | Double your Safety and use Socks5 + nVpn" <https://www.youtube.com/watch?v=L0Hct2kSnn4>
	12	YouTube video clip entitled "Andromeda" <https://www.youtube.com/watch?v=yRRYpFLbKNU>
	13	YouTube video clip entitled "Change Your Country IP Address & Location with Easy Hide IP Software" <https://www.youtube.com/watch?v=ulwkf1sOfdA and https://www.youtube.com/watch?v=iFEMT-p9DTc>

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EXAMINER SIGNATURE

Examiner Signature	/MINH CHAU NGUYEN/	Date Considered	09/15/2019

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Yehuda Binder/	Date (YYYY-MM-DD)	2019-02-03
Name/Print	Yehuda Binder	Registration Number	73,612

This collection of information is required by 37 CFR 1.97 and 1.98. 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 1 hour 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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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.

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Doc Code: DIST.E.FILE **Document Description: Electronic Terminal Disclaimer - Filed**	PTO/SB/25 PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION AND TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	16278107
Filing Date	17-Feb-2019
First Named Inventor	Derry Shribman
Attorney Docket Number	HOLA-005-US10
Title of Invention	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent Interest
WEB SPARK LTD.	100 %

The owner(s) of percent interest listed above 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(s)

16278106 filed on 02/17/2019

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 owner 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 owner 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.

The owner(s) with percent interest listed above 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 prior patent number(s)

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In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- 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 presently shortened by any terminal disclaimer.

(●) Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

( ) I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicants claims the following fee status:

(●) Small Entity

( ) Micro Entity

( ) Regular Undiscounted

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

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 is of record in this application

Registration Number 73612

( ) A sole inventor

( ) A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

( ) A joint inventor; all of whom are signing this request

Signature	/Yehuda Binder/
Name	Yehuda BINDER

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	16278107
Filing Date:	17-Feb-2019
Title of Invention:	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION
First Named Inventor/Applicant Name:	Derry Shribman
Filer:	Yehuda Binder/Dorit Binder
Attorney Docket Number:	HOLA-005-US10

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	160	160
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**160**

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 16278107

Filing Date: 17-Feb-2019

Applicant/Patent under Reexamination: Shribman

Electronic Terminal Disclaimer filed on September 23, 2019

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt	
EFS ID:	37236150
Application Number:	16278107
International Application Number:	
Confirmation Number:	4936
Title of Invention:	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION
First Named Inventor/Applicant Name:	Derry Shribman
Customer Number:	131926
Filer:	Yehuda Binder/Dorit Binder
Filer Authorized By:	Yehuda Binder
Attorney Docket Number:	HOLA-005-US10
Receipt Date:	23-SEP-2019
Filing Date:	17-FEB-2019
Time Stamp:	04:35:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$160
RAM confirmation Number	E20199M535366802
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1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	36111 772cbf50a598fe6bb256db9ece196140d58ae49e	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30344 8440029877143e339226ec74bc197cfdf9d9dc27	no	2
Warnings:					
Information:					
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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY.'S DOCKET: HOLA-005-US10

In re Application of:	)	Confirmation No. 4936
	)	
Derry Shribman *et al.*	)	Art Unit: 2459
	)	
Appln. No.: 16/278,107	)	Examiner: Nguyen, Minh Chau
	)	
Filed: February 17, 2019	)	Washington, D.C.
	)	
For: System providing faster and more efficient data communication	)	September 23, 2019
	)	

RESPONSE / AMENDMENT:

Honorable Commissioner for Patents
U.S. Patent and Trademark Office
Randolph Building, Mail Stop Amendments
401 Dulany Street
Alexandria, VA 22314

Sir:

In response to the Office Action of September 17, 2019 ("Action"):

Amendments to the Claims appear in the Listing of Claims that begins on page **2** of this paper.

Remarks/Arguments begin on page **7** of this paper.

Amendments to the claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1. (Currently amended) A method for use with a web server that responds to Hypertext Transfer Protocol (HTTP) requests and stores a first content identified by a first content identifier, the method by a first client device comprising:

establishing a Transmission Control Protocol (TCP) connection with a second server;

sending, to the web server over an ~~the~~ Internet, the first content identifier;

receiving, the first content from the web server over the Internet in response to the sending of the first content identifier; and

sending the received first content, to the second server over the established TCP connection, in response to the receiving of the first content identifier.

2. (Original) The method according to claim 1, further comprising receiving, by the first client device from the second server over the established TCP connection, the first content identifier.

3. (Original) The method according to claim 1, wherein the sending of the first content identifier to the web server over the Internet comprises sending a Hypertext Transfer Protocol (HTTP) request that comprises the first content identifier.

4. (Original) The method according to claim 1, further comprising storing, by the first client device in response to the receiving from the web server, the first content.

5. (Original) The method according to claim 1, wherein the second server is a Transmission Control Protocol/Internet

Protocol (TCP/IP) server that communicates over the Internet based on, or according to, using TCP/IP protocol or connection, and wherein the first client device is a Transmission Control Protocol/Internet Protocol (TCP/IP) client that communicates with the second server over the Internet based on, or according to, TCP/IP protocol.

6. (Original) The method according to claim 1, wherein the first client device communicates over the Internet based on, or according to, one out of UDP, DNS, TCP, FTP, POP#, SMTP, or SQL standards.

7. (Original) The method according to claim 1, wherein the first content comprises web-page, audio, or video content, and wherein the first content identifier comprises a Uniform Resource Locator (URL).

8. (Original) The method according to claim 1, further comprising executing, by the first client device, a web browser application or an email application.

9. (Original) The method according to claim 1, for use with a third server that comprises a web server that is Hypertext Transfer Protocol (HTTP) server, the third server responds to HTTP requests and stores a second content identified by a second content identifier, the method by the first client device further comprising:

receiving the second content identifier;

sending, to the third server over the Internet in response to the receiving, the second content identifier; and

receiving the second content from the third server over the Internet in response to the sending.

10. (Original) The method according to claim 9, further comprising executing, by the first client device, a web browser application or an email application.

11. (Original) The method according to claim 1, further comprising periodically communicating over the TCP connection between the second server and the first client device.

12. (Original) The method according to claim 11, wherein the periodically communicating comprises exchanging 'keep alive' messages.

13. (Original) The method according to claim 1, wherein the first client device is identified by a Media Access Control (MAC) address or a hostname, and wherein the method further comprising sending, by the first client device, during, as part of, or in response to, a start-up or power-up of the first client device, a first message to the second server, and wherein the first messages comprises the first client IP address, the MAC address, or the hostname.

14. (Original) The method according to claim 13, for use with a first application stored in the first client device and associated with a first version number, wherein the first message comprises the first version number.

15. (Original) The method according to claim 14, for use with a second application that is a version of the first application, is stored in the second server, and is associated with a second version number, wherein the method further comprising receiving, by the first client device from the second server, in response to the first message, a second message that comprises the second version number.

16. (Original) The method according to claim 15, wherein the method further comprising downloading over the Internet, by the first client device from the second server, in response to the first message, the second application from the second server, and installing the second application in the first client device as a replacement for the first application.

17. (Original) The method according to claim 1, further comprising determining, by the first client device, that the received first content, is valid.

18. (Original) The method according to claim 17, wherein the determining is based on the received HTTP header according to, or based on, IETF RFC 2616.

19. (Original) The method according to claim 17, further comprising:

sending, a message over the Internet in response to the determining that the received first content, is not valid; and

receiving, over the Internet in response to the sending of the message, from the second server or from a second client device selected from a plurality of client devices, the first content.

20. (Original) The method according to claim 1, further comprising storing, operating, or using, a client operating system.

21. (Original) The method according to claim 1, wherein the steps are sequentially executed.

22. (Original) The method according to claim 1, for use with a software application that includes computer instructions that, when executed by a computer processor, cause the processor to perform the sending of the Hypertext Transfer Protocol (HTTP) request, the receiving and storing of the first content, the receiving of the first content identifier, and the sending of the part of, or the whole of, the stored first content, the method is further preceded by:

downloading, by the first client device from the Internet, the software application; and

installing, by the first client device, the downloaded software application.

23. (Original) The method according to claim 22, wherein the software application is downloaded from the second server.

24. (Original) A non-transitory computer readable medium containing computer instructions that, when executed by a computer processor, cause the processor to perform the method according to claim 1.

REMARKS / ARGUMENTS

The examiner's action dated September 17, 2019 ("Action") has been received and its contents carefully noted.

An eTD was filed to overcome the Double Patenting rejection.

Claim 1 is amended to overcome the objection.

The absence of a reply to a specific rejection, issue, or comment, does not signify agreement with that rejection, issue, or comment. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims that have not been expressed.

Nothing in this reply should be understood as conceding any issue with regard to any claim, except as specifically stated in this reply, and the amendment of any claims does not necessarily signify concession of unpatentability to the claim before its amendment.

In view of the foregoing, it is requested that all of the rejections be reconsidered and withdrawn and that the claims be considered allowable.

If the above arguments should not now place the application in the condition for allowance, the examiner is invited to call undersigned counsel to resolve any remaining issues.

Respectfully submitted,

By /Yehuda Binder/
Yehuda Binder
Registration No. 73,612

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Electronic Acknowledgement Receipt

EFS ID:	37236155
Application Number:	16278107
International Application Number:	
Confirmation Number:	4936
Title of Invention:	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION
First Named Inventor/Applicant Name:	Derry Shribman
Customer Number:	131926
Filer:	Yehuda Binder/Dorit Binder
Filer Authorized By:	Yehuda Binder
Attorney Docket Number:	HOLA-005-US10
Receipt Date:	23-SEP-2019
Filing Date:	17-FEB-2019
Time Stamp:	04:41:19
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		9-2019-Non-Final-OA-reply.pdf	43019 6f813c685a1e9a78c42fd00a23513f1d0d45cbb5	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	6
	Applicant Arguments/Remarks Made in an Amendment	7	8
Warnings:			
Information:			
	Total Files Size (in bytes):	43019	

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.

<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>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. 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.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/278,107	Filing Date 02/17/2019	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $230 =	
☐ 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).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	09/23/2019	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 24	Minus	** 24	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VIOLA D ROGERS/
*** 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 number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. 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, 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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NOTICE OF ALLOWANCE AND FEE(S) DUE

131926 7590 10/03/2019

May Patents Ltd. c/o Dorit Shem-Tov
P.O.B 7230
Ramat-Gan, 5217102
ISRAEL

EXAMINER
NGUYEN, MINH CHAU

ART UNIT	PAPER NUMBER
2459	

DATE MAILED: 10/03/2019

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/278,107	02/17/2019	Derry Shribman	HOLA-005-US10	4936

TITLE OF INVENTION: SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	01/03/2020

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: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (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)

131926 7590 10/03/2019
May Patents Ltd. c/o Dorit Shem-Tov
P.O.B 7230
Ramat-Gan, 5217102
ISRAEL

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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/278,107	02/17/2019	Derry Shribman	HOLA-005-US10	4936

TITLE OF INVENTION: SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	01/03/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, MINH CHAU	2459	709-202000

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 03-09 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 must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). 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. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

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.
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.
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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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/278,107	02/17/2019	Derry Shribman	HOLA-005-US10	4936

131926 7590 10/03/2019

May Patents Ltd. c/o Dorit Shem-Tov
P.O.B 7230
Ramat-Gan, 5217102
ISRAEL

EXAMINER	
NGUYEN, MINH CHAU	
ART UNIT	PAPER NUMBER
2459	

DATE MAILED: 10/03/2019

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 30 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. 16/278,107	Applicant(s) Shribman et al.	
	Examiner MINH CHAU N NGUYEN	Art Unit 2459	AIA (FITF) 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 Amendment, filed 09/23/2019.
   ☐ 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 1-24 . 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 _____.

/MINH CHAU NGUYEN/
Primary Examiner, Art Unit 2459

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

Applicant's amendment dated September 23, 2019 responding to September 17, 2019 Office Action provided in the rejection of claims 1-24. **Claims 1-24** remain pending in the application and which have been fully considered by the examiner.

The terminal disclaimer filed on September 23, 2019 had been approved.

REASONS FOR ALLOWANCE

The following is an Examiner's statement of reasons for allowance:

Claims 1-24 are considered allowable since when reading the claims in light of the specification, as per MPEP §2111.01 or Toro Co. v. White Consolidated Industries Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999), none of the references of record alone or in combination disclose or suggest the combination of limitations specified in **independent claim 1**.

For example, the independent claims contain limitations, *a first client device comprising: receiving, from a second server over established TCP connection, a first content identifier; sending, to a web server over an Internet, the first content identifier; receiving, the first content from the web server over the Internet in response to the sending of the first content identifier; and sending by the first client device the received first content back to the second server over the established TCP connection, in response to the receiving of the first content identifier.* Therefore, the Examiner agrees that the limitations of the independent claims, within its environment, is

allowable subject matter over the prior art, in light of the specification and in view of the Applicant's arguments.

Because **claims 2-24** depend directly or indirectly on claim 1, these claims are considered allowable for at least the same reasons noted above with respect to **claim 1**.

To the extent that these features are not found in the prior art cited by Examiner, the present case is held allowable over the art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance".

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MINH CHAU N NGUYEN whose telephone number is (571)272-4242. The examiner can normally be reached on M-F 8am-4pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JEFFREY NICKERSON can be reached on (571)270-3631. 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.

/MINH CHAU NGUYEN/
Primary Examiner, Art Unit 2459

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	Art Unit
	MINH CHAU N NGUYEN	2459

CPC - Searched*		
Symbol	**Date**	**Examiner**
H04L67/42	09/15/2019	MN
H04L41/046	09/15/2019	MN
H04L67/1002	09/15/2019	MN
H04L67/22	09/15/2019	MN
H04L67/02	09/15/2019	MN

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**
709	202	09/15/2019	MN

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
search on EAST	09/15/2019	MN
update search on EAST, google patents	10/01/2019	MN

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**
USPAT, USPG-Pub text search	Independent claim search	10/01/2019	MN

/MINH CHAU NGUYEN/ Primary Examiner, Art Unit 2459	

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	**Art Unit**
	MINH CHAU N NGUYEN	2459

CPC							
Symbol						**Type**	**Version**
H04L	/	67	/	42		F	2013-01-01
H04L	/	41	/	046		I	2013-01-01
H04L	/	67	/	22		I	2013-01-01
H04L	/	67	/	1063		I	2013-01-01
H04L	/	67	/	2814		I	2013-01-01
H04L	/	67	/	2819		I	2013-01-01
H04L	/	67	/	1002		I	2013-01-01
H04L	/	67	/	1023		I	2013-01-01
H04L	/	67	/	108		I	2013-01-01
H04L	/	67	/	02		A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	24	
/MINH CHAU NGUYEN/ Primary Examiner, Art Unit 2459	01 October 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20191001

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	**Art Unit**
	MINH CHAU N NGUYEN	2459

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04L	/	29	/	06
H04L	/	29	/	08
H04L	/	12	/	24

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 24	
/MINH CHAU NGUYEN/ Primary Examiner, Art Unit 2459 (Primary Examiner)	01 October 2019 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office — Part of Paper No.: 20191001

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	**Art Unit**
	MINH CHAU N NGUYEN	2459

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	7	10	12	19										
15	2	8	11	22	20										
16	3	9	12	23	21										
17	4	2	13	13	22										
18	5	3	14	14	23										
19	6	4	15	24	24										
20	7	5	16												
21	8	10	17												
6	9	11	18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	24	
/MINH CHAU NGUYEN/ Primary Examiner, Art Unit 2459	01 October 2019	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20191001

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/278,107	Shribman et al.
	Examiner	**Art Unit**
	MINH CHAU N NGUYEN	2459

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/15/2019	10/01/2019							
1	1	✓	=							
15	2	✓	=							
16	3	✓	=							
17	4	✓	=							
18	5	✓	=							
19	6	✓	=							
20	7	✓	=							
21	8	✓	=							
6	9	✓	=							
7	10	✓	=							
8	11	✓	=							
9	12	✓	=							
2	13	✓	=							
3	14	✓	=							
4	15	✓	=							
5	16	✓	=							
10	17	✓	=							
11	18	✓	=							
12	19	✓	=							
22	20	✓	=							
23	21	✓	=							
13	22	✓	=							
14	23	✓	=							
24	24	✓	=							

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	47	(("8639630") or ("9177157") or ("20070142036") or ("20090248793") or ("20130080575") or ("20110066924") or ("20120246273") or ("2004094980") or ("9015335") or ("7788378") or ("20130304796") or ("20120164980") or ("20010054020") or ("20160105530") or ("20070050522") or ("20090216887") or ("20130080575")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:02
S2	8	S1 and ((servers and (peers clients)) same ((content$1 document$1 page$1) with (deliver$4 quer$4 inquir$4 retriev$4 search$4)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:02
S3	3	S2 and (server$1 with (receiv$4 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:04
S4	2	S3 and @ad< "20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:04
S5	0	S4 and ((web near server$1) with (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:05
S6	8	S1 and ((servers and (peer$1 client$1)) same ((content$1 document$1 page$1) with (deliver$4 quer$4 inquir$4 retriev$4 search$4)))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:06
S7	0	S6 and ((web near server$1) with (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:06

S8	0	S1 and ((web near server$1) with (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:08
S9	24643	(server$1 with (request$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:10
S10	2240	S9 and ((web near server$1) with (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:12
S11	100	S10 and ((client$1 peer$1 node$1 terminal$1) with (respon$4 repl$3 transmit$4 forward$4 send$4) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:14
S12	75	S11 and @ad<"20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:14
S13	55	S12 and ((web near server$1) same server$1 same (peer$1 client$1)) same ((deliver$4 quer$4 inquir$4 retriev$4 search$4 transfer$4 provid$4 transmit$4 send$4 forward$4) with (content$1 document$1 page$1 file$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:15
S14	13	S13 and ((web near server$1) with (store$1 keep$4 kept maintain$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:17
S15	0	S14 and (keep$4 with live$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:20
S16	10	S14 and ((web near server$1) same server$1 same (peer$1 client$1) same (internet tcp))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	OFF	2019/09/27 17:21

			DERWENT; IBM_TDB			
S17	3	S14 and ((web near server$1) same server$1 same (peer$1 client$1) same (internet and tcp))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:22
S18	0	S17 and (((client$1 peer$1 node$1 terminal$1) near1 (respon$4 repl$3 transmit$4 forward$4 send$4)) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:23
S19	2	S14 and (((client$1 peer$1 node$1 terminal$1) near1 (respon$4 repl$3 transmit$4 forward$4 send$4)) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:24
S20	151293	(H04L67/42 H04L41/046 H04L67/108 H04L67/22 H04L67/02).CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:28
S21	0	S19 and (live online) and (geographic$6 location$1)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:28
S22	7338	S20 and ((web near server$1) same server$1 same (peer$1 client$1)) same ((deliver$4 quer$4 inquir$4 retriev$4 search$4 transfer$4 provid$4 transmit$4 send$4 forward$4) with (content$1 document$1 page$1 file$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 17:55
S23	234	S22 and ((web near server$1) with (store$1 keep$4 kept maintain$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 18:12
S24	97	S23 and ((web near server$1) with (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 18:12
S25	5	S24 and ((client$1 peer$1 node$1 terminal$1) with (respon$4 repl$3 transmit$4 forward$4 send$4) with	US-PGPUB; USPAT; USOCR;	OR	OFF	2019/09/27 18:12

		((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))	FPRS; EPO; JPO; DERWENT; IBM_TDB			
S26	4	S25 and @ad<"20091008"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 18:13
S27	0	S26 and (((client$1 peer$1 node$1 terminal$1) near1 (respon$4 repl$3 transmit$4 forward$4 send$4)) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2019/09/27 18:13

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S28	1	(((web near server$1) same server$1 same (peer$1 client$1)) same ((deliver$4 quer$4 inquir$4 retriev$4 search$4 transfer$4 provid$4 transmit$4 send$4 forward$4) with (content$1 document$1 page$1 file$1)) and ((web near server$1) with (store$1 keep$4 kept maintain$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2)))) and (((client$1 peer$1 node$1 terminal$1) near1 (respon$4 repl$3 transmit$4 forward$4 send$4)) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))).clm.	US-PGPUB; USPAT	OR	OFF	2019/09/27 18:54
S29	1	S28 and @ad<"20091008"	US-PGPUB; USPAT	OR	OFF	2019/09/27 19:00
S30	1	(((web near server$1) same server$1 same (peer$1 client$1)) same ((deliver$4 quer$4 inquir$4 retriev$4 search$4 transfer$4 provid$4 transmit$4 send$4 forward$4) with (content$1 document$1 page$1 file$1)) and ((web near server$1) with (store$1 keep$4 kept maintain$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2)))) and ((web near server$1) with (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1)) and (((client$1 peer$1 node$1 terminal$1) near1 (respon$4 repl$3 transmit$4 forward$4 send$4)) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))).clm.	US-PGPUB; USPAT	OR	OFF	2019/09/27 19:00
S31	1	S30 and @ad<"20091008"	US-PGPUB; USPAT	OR	OFF	2019/09/27 19:02
S32	0	(((web near server$1) same server$1 same (peer$1 client$1)) same ((deliver$4 quer$4	US-PGPUB;	OR	OFF	2019/09/27 19:02

		inquir$4 retriev$4 search$4 transfer$4 provid$4 transmit$4 send$4 forward$4) with (content$1 document$1 page$1 file$1)) and ((web near server$1) near1 (store$1 keep$4 kept maintain$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2)))) and ((web near server$1) near1 (respon$4 repl$3 quer$4 transmit$4 inquir$4 send$4) with (url$1 ((content$1 page$1 document$1) near (identifier$1 address$2))) with (client$1 peer$1 node$1 terminal$1)) and (((client$1 peer$1 node$1 terminal$1) near1 (respon$4 repl$3 transmit$4 forward$4 send$4)) with ((inquired received returned responsed) near1 (content$1 page$1 document$1)) with (server))).clm.	USPAT			

10/ 1/ 2019 12:08:21 AM
C:\ Users\ mnguyen2\ Documents\ EAST\ Workspaces\ 16278107_01.wsp

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
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May Patents Ltd.
c/o Dorit Shem-Tov
P.O.B. 7230
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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/278,107	02/17/2019	Derry Shribman	HOLA-005-US10	4936

TITLE OF INVENTION:

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0	$0	$500	01/03/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS

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.

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2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

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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: WEB SPARK LTD.

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Netanya, Israel 4250713

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ■ Corporation or other private group entity ❑ Government

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❑ Publication Fee (No small entity discount permitted)

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5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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Authorized Signature /Yehuda Binder/ Date October 10, 2019

Typed or printed name Yehuda BINDER Registration No. 73,612

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Electronic Patent Application Fee Transmittal

Application Number:	16278107
Filing Date:	17-Feb-2019
Title of Invention:	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION
First Named Inventor/Applicant Name:	Derry Shribman
Filer:	Yehuda Binder/Dorit Binder
Attorney Docket Number:	HOLA-005-US10

Filed as Small 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:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**500**

Electronic Acknowledgement Receipt

EFS ID:	37442330
Application Number:	16278107
International Application Number:	
Confirmation Number:	4936
Title of Invention:	SYSTEM PROVIDING FASTER AND MORE EFFICIENT DATA COMMUNICATION
First Named Inventor/Applicant Name:	Derry Shribman
Customer Number:	131926
Filer:	Yehuda Binder/Dorit Binder
Filer Authorized By:	Yehuda Binder
Attorney Docket Number:	HOLA-005-US10
Receipt Date:	13-OCT-2019
Filing Date:	17-FEB-2019
Time Stamp:	03:25:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$500
RAM confirmation Number	E20190C426152265
Deposit Account	
Authorized User	
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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	ptol85b.pdf	75044 c9762138e8d3d178213de1e9c8c30b9d5c82548c	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30154 0707924074aa58236486932613c452532ae58fe5	no	2
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		Total Files Size (in bytes):	105198		

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

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New International Application Filed with the USPTO as a Receiving Office

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/M.N/ Change(s) applied to document. /J.M./ 10/16/2019	1	2597869	EP	A1	~~2013-10-12~~ 05/2013	Sharp Kk		
	2	2010090562	WO	A1	2010-12-08	Telefonaktiebolaget L M Ericsson (Publ)		
	3	2011068784	WO	A1	2011-09-06	Azuki Systems, Inc		

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	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, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
/M.N/	1	Screen captures from YouTube video clip entitle "nVpn.net | Double your Safety and use Socks5 + nVpn" 38 pages, last accessed 11/20/2018 <https://www.youtube.com/watch?v=L0Hct2kSnn4>	
	2	Screen captures from YouTube video clip entitle "Andromeda" 47 pages, publicly known and available as of at least 2011 <https://www.youtube.com/watch?v=yRRYpFLbKNU>	
	3	SpyEye, https://www.symantec.com/security-center/writeup/2010-020216-0135-9; http://securesql.info/riskyclouds/spyeye-user-manual; known as of at least 2010 (13 pages)	
	4	Screen captures from YouTube video clip entitle "Change Your Country IP Address & Location with Easy Hide IP Software" 9 pages, publicly known and available as of at least 2011, <https://www.youtube.com/watch?v=ulwkf1sOfdA and https://www.youtube.com/watch?v=iFEMT-o9DTc>	
	5	CoralCDN ("CoralCDN"), https://pdos.csail.mit.edu/6.824/papers/freedman-coral.pdf (14 PAGES)	

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	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
/M.N/	1	2015034752	WO	A1	2015-03-12	Akamai Technologies INC		
	2	2000/018078	WO	A1	2000-03-30	Sopuch David. J		
	3	0948176	EP	A2	1999-10-06	Siemens Inf &Comm Networks		
	4	2597869	EP	A1	2015-05-29	Sharp Kabushiki Kaisha Osaka-shi		
	5	2010090562	WO	A1	2010-08-12	Telefonaktiebolaget L M Ericsson		
	6	2007280388	JP		~~2007-25-10~~ 10/2007	Xerox Corporation		
	7	1020090097034	KR		~~2009-15-09~~ 09/2009	KT Corporation		
	8	2343536	RU	C2	2009-10-01	Microsoft Corporation		
	9	101075242	CN	A	2007-11-21	TENGXUN SCIENCE & TECHNOLOGY		

Change(s) applied to document. /J.M./ 10/16/2019

EFS Web 2.1.17

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16/278107
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First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	8479251	B2	2013-07-02	Feinleib et al	
	2	8499059	B2	2013-07-30	Stoyanov	
Change(s) applied to document, /J.M./ 10/16/2019	3	7970835	B2	~~2011-28-01~~ 06/2011	~~Xerox Corporation~~ St. Jacques	
	4	8832179	B2	2014-09-09	Owen , et al.	
	5	6173330	B1	2001-09-01	Guo , et al.	
	6	8769035	B2	2014-01-07	Resch , et al.	
	7	8171101	B2	2012-05-01	Gladwin , et al.	
	8	7558942	B2	2009-07-07	Chen , et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	9	8719505	B2	2014-06-05	Shribman , et al.	
	10	9201808	B2	2015-01-12	Shribman , et al.	
	11	9990295	B2	2018-06-05	Shribman , et al.	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20080109446	A1	2008-05-08	Matrix Xin Wang	
	2	20110066924	A1	2011-03-17	Gregory Dorso	
	3	20110128911	A1	2011-06-02	Kamel M. Shaheen	
	4	20130157699	A1	2013-06-20	Mohit Talwar	
	5	20130326607	A1	2013-12-05	Liang Feng	
	6	20030204602	A1	~~2003-30-10~~ 10/2003	Hudson, Michael D. ; et al.	

Change(s) applied to document,
/J.M./
10/17/2019

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16/278107
Filing Date	02/17/2019
First Named Inventor	Derry Shribman
Art Unit	2459
Examiner Name	MINH-CHAU NGUYEN
Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	7788378		2010-08-31	Ravi T. Rao	
	2	9253164		2016-02-02	Christopher S. Gouge	
	3	7890547	B2	2011-02-15	Timo Hotti	
	4	8832179	B2	2014-09-09	Owen , et al.	
	5	7818430	B2	2010-10-19	Gal Zuckerman	
	6	6154782	A	2000-11-28	NAOHISA KAWAGUCHI	
	7	5577243	A	~~1996-17-11~~ 11/1996	Sherwood , et al.	
Change(s) applied to document, /J.M./ 10/17/2019	8	8135912	B2	~~2012-13-03~~ 03/2012	Shribman , et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	19	20100293555	A1	2010-15-11	VEPSALAINEN; Ari M.	
	20	20130272519	A1	2013-17-10	Huang; Lawrence P.	
	21	20030115364	A1	2003-06-19	Shu Li et al.	
	22	20090217122	A1	2009-27-08	Yokokawa; Takashi ; et al.	
	23	20010033583	A1	2001-25-10	Rabenko, Theodore F. ; et al.	
	24	20080109446	A1	~~2008-05-08~~ 05/2008	Wang Matrix XIN	
	25	20020133621	A1	2002-09-19	Talmon Marco et al	
	26	20040107242	A1	~~2004-06-03~~ 06/2004	John Vert et al	
	27	20070073878	A1	2007-03-29	Alfredo C. Issa	
	28	20090319502	A1	2009-12-24	Olivier Chalouhi et al	
	29	20060212584	A1	2006-09-21	Mingjian Yu et al	

Change(s) applied to document, /J.M./ 10/17/2019

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
	Filing Date	2/17/2019
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

/M.N/	8	20030204602	A1	2003-10-30	Hudson Michael D.	
	9	20120099566	A1	2012-04-26	Laine; Tuomas ; et al.	
	10	20130201316	A1	2013-08-08	BINDER; Yehuda ; et al.	
	11	20080125123	A1	2008-05-29	Dorenbosch; Jheroen P. ; et al.	
	12	20140301334	A1	2014-10-09	Labranche; Miguel ; et al.	
	13	20070239655	A1	2007-10-11	Agetsuma; Masakuni ; et al.	
	14	20070226810	A1	2007-09-27	Hotti; Timo	
	15	20100094970	A1	2010-04-15	Zuckerman; Gal ; et al.	
	16	20020120874	A1	2002-29-08	Shu, Li ; et al.	
	17	20100115063	A1	2010-06-05	GLADWIN; S. CHRISTOPHER ; et al.	
	18	20100154044	A1	~~2010-17-06~~ 06/2010	Manku; Tajinder	

Change(s) applied to document,
/JM/
10/17/2019

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16/278107
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	First Named Inventor	Derry Shribman
	Art Unit	2459
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	Attorney Docket Number	HOLA-005-US10

/M.N/	9	4937781	A	1990-06-26	Lee , et al.	
/M.N/	10	7970835	B2	2011-06-28	Robert St. Jacques	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20150067819	A1	2015-03-05	~~Hola Networks Ltd.~~ Shribman et al.	
	2	20120254456	A1	2012-10-04	Visharam Zubair et al.	
	3	20080222291	A1	2008-09-11	Weller et al.	
	4	20100235438	A1	2010-09-16	Narayanan et al.	
	5	20120124239	A1	2012-05-17	Shribman et al.	
	6	20130166768	A1	2013-06-27	~~Thomson Licensing.~~ Gouache et al.	
	7	20020065930	A1	~~2002-38-05~~ 05/2002	Rhodes, David L.	

Change(s) applied to document.
/J.M./
10/16/2019

Change(s) applied to document.
/J.M./
10/17/2019

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16278107
	Filing Date	2019-02-17
	First Named Inventor	Derry Shribman
	Art Unit	2459
	Examiner Name	MINH-CHAU NGUYEN
	Attorney Docket Number	HOLA-005-US10

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/M.N/	1	20150206176	A1	2015-07-23	Assaf Toval	
	2	20020091760	A1	~~2009-09-80~~ 07/2002	John Rozen	
	3	20060224687	A1	2006-10-05	Laird Alexander Popkin	
	4	20090248793	A1	2009-10-01	Sanny Jacobsson	
	5	20110035503	A1	2011-02-10	SAM ZAID	
	6	20110087733	A1	2011-04-14	Derry Shribman	
	7	20120124239	A1	2012-05-17	Derry Shribman	
	8	20120166582	A1	~~2010-06-28~~ 06/2012	Yehuda BINDER	
	9	20130064370	A1	2013-03-14	Christopher S. Gouge	

Change(s) applied to document. /J.M./ 10/17/2019

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/278,107	11/19/2019	10484510	HOLA-005-US10	4936

131926 7590 10/30/2019

May Patents Ltd. c/o Dorit Shem-Tov
P.O.B 7230
Ramat-Gan, 5217102
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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 0 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):

WEB SPARK LTD., Netanya, ISRAEL;
Derry Shribman, Tel Aviv, ISRAEL;
Ofer Vilenski, Moshav Hadar Am, ISRAEL;

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court EASTERN DISTRICT OF TEXAS, MARSHALL DIVISION on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:19-cv-395	12/06/2019	EASTERN DISTRICT OF TEXAS, MARSHALL DIVISION

PLAINTIFF	DEFENDANT

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,469,614 B2	11/05/2019	LUMINATI NETWORKS LTD.
2	10,257,319 B2	04/09/2019	LUMINATI NETWORKS LTD.
3	10,484,510 B2	11/19/2019	LUMINATI NETWORKS LTD.
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

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Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AO 120 (Rev. 08/10)

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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:19-cv-397	12/6/2019	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Luminati Networks Ltd	BI Science (2009) Ltd.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,469,614 B2	11/5/2019	Luminati Networks Ltd.
2	10,257,319 B2	4/9/2019	Luminati Networks Ltd.
3	10,484,510 B2	11/19/2019	Luminati Networks Ltd.
4	10,484,511 B2	11/19/2019	Luminati Networks Ltd.
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

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In Compliance with 35 U.S.C. í 290 and/or 15 U.S.C. í 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☐ Patents. (☐ the patent action involves 35 U.S.C. í 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:19-cv-414	12/31/2019	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Luminati Networks Ltd.	Tefincom S.A. d/b/a NordVPN

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,469,614 B2	11/05/2019	Luminati Networks Ltd.
2	10,257,319 B2	04/09/2019	Luminati Networks Ltd.
3	10,484,510 B2	11/19/2019	Luminati Networks Ltd.
4	10,484,511 B2	11/19/2019	Luminati Networks Ltd.
5			

In the above´ entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
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☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:19-cv-397	12/6/2019	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Luminati Networks Ltd	BI Science (2009) Ltd.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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2	10,257,319 B2	4/9/2019	Luminati Networks Ltd.
3	10,484,510 B2	11/19/2019	Luminati Networks Ltd.
4	10,484,511 B2	11/19/2019	Luminati Networks Ltd.
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Trials@uspto.gov
571-272-7822

Paper 11
Entered: February 2, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CODE200, UAB; TESO LT, UAB; METACLUSTER LT, UAB;
AND OXYSALES, UAB,
Petitioner,

v.

LUMINATI NETWORKS LTD.,
Patent Owner.

IPR2020-01358
Patent 10,484,510 B2

Before THOMAS L. GIANNETTI, SHEILA F. McSHANE, and RUSSELL E. CASS, *Administrative Patent Judges.*

McSHANE, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background and Summary

Code200, UAB, Teso LT, UAB, Metacluster LT, UAB, and Oxysales, UAB ("Code200" or "Petitioner")[1] filed a Petition requesting *inter partes* review of claims 1, 2, 6–11, 13, and 15–24 of U.S. Patent No. 10,484,510 B2 (Ex. 1001, "the '510 patent") pursuant to 35 U.S.C. §§ 311–319, along with the supporting Declaration of Michael Freedman, Ph. D. Paper 5 ("Pet."); Ex. 1009. Luminati Networks Ltd. ("Luminati" or "Patent Owner") filed a Preliminary Response to the Petition. Paper 9 ("Prelim. Resp.").

We have authority under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

For the reasons that follow, we exercise our discretion under 35 U.S.C. § 314(a) to deny institution of *inter partes* review.

B. Related Matters

The parties identify the related litigations, *Luminati Networks Ltd. v. Teso LT, UAB et al.*, 2:19-cv-00395-JRG (E.D. Tex.) ("the 395 district court case") and *Luminati Networks Ltd. v. Tefincom S.A. D/B/A NordVPN*, 2:19-cv-00414-JRG (E.D. Tex.). Pet. 2; Paper 6, 2.

The parties also note another petition has been filed in IPR2020-01266, which is directed to U.S. Patent No. 10,257,319, which claims the

[1] Petitioner additionally identifies coretech lt, UAB as a real party-in-interest. Pet. 2.

benefit of the same provisional application, and is a continuation of the same application, as the '510 patent. Pet. 2; Paper 6, 2.

C. The '510 Patent

The '510 patent is titled "System Providing Faster and More Efficient Data Communication" and issued on November 19, 2019, from an application filed on February 17, 2019. Ex. 1001, codes (22), (45), (54). The application for the '510 patent is a continuation of several applications, and other related applications include a divisional application and a provisional application. *See id.*, code (60). The '510 patent is subject to a terminal disclaimer. *Id.*, code (*).

The '510 patent is directed to a system and method for increasing network communication speed for users, while lowering network congestion for content owners and internet service providers (ISPs). Ex. 1001, code (57). The system employs network elements including an acceleration server, clients, agents, and peers, where communication requests generated by applications are intercepted by the client on the same machine. *Id.* The IP address of the server in the communication request is transmitted to the acceleration server, which provides a list of agents to use for this IP address. *Id.*

The communication request is sent to the agents. Ex. 1001, code (57). One or more of the agents respond with a list of peers that have previously seen some or all of the content which is the response to this request (after checking whether this data is still valid). *Id.* The client then downloads the data from these peers in parts and in parallel, thereby speeding up the Web transfer, releasing congestion from the Web by fetching the information

from multiple sources, and relieving traffic from Web servers by offloading the data transfers from them to nearby peers. *Id.*

Challenged claim 1 is the only independent claim. Claim 1 of the '510 patent is reproduced below.

> 1. A method for use with a web server that responds to Hypertext Transfer Protocol (HTTP) requests and stores a first content identified by a first content identifier, the method by a first client device comprising:
>
> establishing a Transmission Control Protocol (TCP) connection with a second server;
>
> sending, to the web server over an Internet, the first content identifier;
>
> receiving, the first content from the web server over the Internet in response to the sending of the first content identifier; and
>
> sending the received first content, to the second server over the established TCP connection, in response to the receiving of the first content identifier.

Ex. 1001, 19:18–31.

D. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims of the '510 patent on the following grounds:

Claims Challenged	35 U.S.C. §	Reference(s)
1, 2, 6, 7, 15, 16, 18–23	102(b)[2]	Crowds[3]

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the '510 patent claims priority to a provisional application that was filed before this date, with Petitioner not contesting that priority, the pre-AIA versions of §§ 102, 103 apply. *See* Ex. 1001, code (60); Pet. 12.
[3] Michael K. Reiter, *Crowds: Anonymity for Web Transactions*, ACM Transactions on Information and System Security, Vol. 1, No. 1, November 1998, at 66–92 (Ex. 1011).

Claims Challenged	35 U.S.C. §	Reference(s)
1, 2, 6–11, 13, 15, 16, 18–23	103(a)	Crowds, RFC 2616[4]
1, 6, 10, 15–20, 23, 24	102(b)	Border[5]
1, 6, 8–11, 13, 15–20, 22–24	103(a)	Border, RFC 2616
1, 2, 6–8, 13, 15, 16, 18–23	102(b)	MorphMix[6]
1, 2, 6–11, 13, 15, 16, 18–23	103(a)	MorphMix, RFC 2616

Pet. 15–16.

II. DISCRETIONARY DENIAL UNDER § 314(a)

A. Overview

Patent Owner requests that we exercise our discretion under 35 U.S.C. § 314(a) to deny the Petition under *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"). Prelim. Resp. 4–16.

In assessing whether to exercise such discretion, the Board weighs the following factors:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;

[4] Hypertext Transfer Protocol—HTTP/1.1, Network Working Group, RFC 2616, The Internet Society, 1999 (Ex. 1018).
[5] U. S. Patent No. 6,795,848, issued September 21, 2004 (Ex. 1017).
[6] Marc Rennhard, MorphMix—A Peer-to-Peer-based System for Anonymous Internet Access (2004) (Ph.D. dissertation, Swiss Federal Institute of Technology) (Ex. 1013).

> 4. overlap between issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Fintiv at 6. Recognizing that "there is some overlap among these factors" and that "[s]ome facts may be relevant to more than one factor," the Board "takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.*

As identified above, the 395 district court case, which involves the '510 patent, is pending in the Eastern District of Texas. *See* Pet. 2; Paper 6, 2; Prelim. Resp. 4–5. The 395 district court case has a Docket Control Order entered that set December 14, 2020, as the deadline for completing fact discovery, January 21, 2021, as the deadline for completing expert discovery, and May 3, 2021, for jury selection and trial. Ex. 1004, 1, 3. The parties have advised us that the date for jury selection has been moved to May 10, 2021. The Court has conducted a claim construction hearing, and on December 7, 2020, issued a Claim Construction Opinion and Order. Paper 10; Ex. 2017.

Petitioner advised us that the presiding judge in the 395 district court case, Judge Gilstrap, has continued jury trial dates in other cases scheduled for trial from December 2020 through February 2021, due to the COVID-19 pandemic. *See* Ex. 3001. We have not, however, been informed of any change in the May 10, 2021 jury selection date in the 395 district court case.

We address each *Fintiv* factor below.

B. Factor 1 – Stay of Related Litigation Proceeding

Petitioner filed a motion to stay the 395 district court case, which was denied without prejudice as premature because it was filed in advance of the Board's decision to institute *inter partes* reviews on any of the asserted patents in the litigation.[7] Ex. 2015, 3. Although the district court denied the motion without prejudice, with refiling permitted within 24 days of the Board's institution decisions for the asserted patents, Patent Owner argues that the District Court has not indicated one way or the other whether a stay is likely to be granted at that time. Prelim. Resp. 6–7.

Because the Board has previously "decline[d] to infer" how a District Court would decide a stay motion, Petitioner asserts that this factor is neutral. Pet. 7 (quoting *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (PTAB May 13, 2020) (informative)). Patent Owner argues that because the District Court has not granted a stay and "would not likely grant a stay given the lateness of the Petition, this factor favors denial of institution." Prelim Resp. 7.

We decline to speculate on the likelihood of how the District Court may rule on a future motion to stay. Accordingly, we find that this factor is neutral.

C. Factor 2 — Proximity of Court's Trial Date

Patent Owner argues that the Petition should be denied because jury selection in the 395 district court case is scheduled approximately nine months before a final determination would issue in this case. Prelim. Resp. 4, 7–10.

---

[7] Three patents, the '510 patent as well as U.S. Patent Nos. 10,469,614 and 10,257,319, are asserted in the 395 district court case. Ex. 2015, 1.

Petitioner alleges that Patent Owner has previously sought to delay trials as the set trial date approaches. Pet. 7 (referring to *Luminati Networks Ltd. v. UAB Tesonet*, No. 2:18-cv-00299-JRG (E.D. Tex.)). Petitioner argues that in light of Patent Owner's history and the potential for COVID-related delays, Factor 2 is neutral. *Id.* at 8. Patent Owner responds that the previous litigation has been misrepresented by Petitioner, and instead Patent Owner filed a motion to consolidate the referenced case with another case to accelerate the date by which the '510 patent infringement claims could be tried. Prelim. Resp. 7.

As mentioned above, Petitioner additionally brings to our attention Judge Gilstrap's Order to continue jury trials from December 2020 through February of 2021, but the communication notes that Petitioner does not know what impact the continuances may have on the trial date in this case. *See* Ex. 3001. Patent Owner asserts that the Judge Gilstrap's Order does not impact the schedule for trial in the case, and "no other facts can be inferred from the Order." *Id.*

As Patent Owner asserts, the related jury trial in the 395 district court case is currently scheduled to occur approximately nine months before a final determination would issue in this case. Although there may be a delay in the trial date, presuming that there would be delay would be conjecture at this time. Accordingly, this factor favors discretionary denial of *inter partes* review.

D. Factor 3 — Investment in the Parallel Proceeding

Petitioner notes that this Petition was filed less than three months after the asserted claims were disclosed in the 395 district court case. Pet. 8. However, it is undisputed that at this time that claim construction briefing

has been completed, a *Markman* hearing was conducted, and a claim construction order issued in the 395 district court case, which includes interpretation of claim terms associated with the '510 patent. *See* Ex. 2016. Under the Docket Control Order, fact discovery in that case was completed on December 14, 2020, and expert discovery was completed on January 21, 2021. *See* Ex. 1004, 1, 3. The parties have not advised us of any changes to those dates as scheduled.

Accordingly, in view of the status of the progress of the 395 district court case, we agree with Patent Owner that this factor favors denial of institution of *inter partes* review. *See* Prelim. Resp. 12.

E. Factor 4 — Overlap With Issues Raised in Parallel Proceeding

Petitioner asserts that because claims 1, 2, 8–11, 13, 15, 16, 18–20, 22, and 23 are asserted in the 395 district court case, but the Petition also challenges claims 6, 7, 17, 21, and 24 of the '510 patent, this factor weighs in favor of institution. Pet. 8.

Patent Owner argues that the overlap of the issues raised in Petition and the 395 district court case are substantial. Prelim Resp. 12. More specifically, Patent Owner contends that the Crowds, MorphMix, Border, and RFC 2616 prior art asserted in the challenges in this proceeding are all identified in the invalidity contentions in the 395 district court case. *Id.* (citing Ex. 2006, ¶¶ 3–4). Patent Owner also asserts that only claim 1 of the '510 patent is independent, and the additional claims challenged in the Petition are all dependent. *Id.* at 12–13. As such, Patent Owner argues that there is no other independent claim at issue here that is not asserted in the district court case, and the resolution of the patentability of independent

claim 1 in the district court is also likely to have an impact on the additional dependent claims challenged here. *Id.* at 13.

In light of the common prior art asserted here and in the 395 district court case, as well as the common challenge to the sole independent claim of the '510 patent, we agree with the Patent Owner that the overlap in issues between the two proceedings is substantial. Accordingly, we determine that this factor favors denial of institution of *inter partes* review.

F. Factor 5 — Commonality of Parties in Parallel Proceedings

Petitioner asserts that Code200 is a named petitioner here, but is not a defendant in the 395 district court case. Pet. 9. Patent Owner argues that three of the four named petitioners are also defendants in the 395 district court case. PO Resp. 13. Patent Owner also asserts that there is a close corporate relationship between Code200 and the other petitioners because they share a common parent company. *Id.* at 14 (citing Ex. 2013, Ex. 2014). Petitioner does not challenge this contention.

Given the commonality of most of the parties in this proceeding and 395 district court case, we find that this factor favors denial of institution.

G. Factor 6 — Other Circumstances

Petitioner contends that the challenged patent is "extraordinarily weak," and policy favors instituting review under these circumstances. Pet. 9. Patent Owner disagrees, arguing that Petitioner's reading of the claims is unreasonable and the asserted prior art is weak. Prelim. Rep. 15–16.

We have reviewed Petitioner's unpatentability arguments and Patent Owner's preliminary responses, and based on the limited record before us, we do not find that the merits outweigh the other *Fintiv* factors favoring denial of institution.

H. Conclusion

The majority of the *Fintiv* factors, and particularly factor 2, the proximity of the trial date in the 395 district court case, favor the denial of institution. Thus, based on our assessment of the *Fintiv* factors, we exercise our discretion under 35 U.S.C. § 314(a) to deny *inter partes* review.

III. ORDER

Accordingly, it is:

ORDERED that the Petition is *denied* as to all grounds and all challenged claims of the '510 patent.

For PETITIONER:

Craig Tolliver
George Scott
CHARHON, CALLAHAN, ROBSON & GARZA, PLLC
ctolliver@tolliverlawfirm.com
jscott@ccrglaw.com

For PATENT OWNER:

Thomas Dunham
Don Livornese
RUYAKCHERIAN LLP
tomd@dunham.cc
donl@ruyakcherian.com

AO 120 (Rev. 08/10)

TO:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK

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☐ Trademarks or ☑ Patents. (☑ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:20-cv-00073-JRG	3/5/2020	for the Eastern District of Texas

PLAINTIFF	DEFENDANT
Teso LT, UAB, Metacluster LT, UAB, and Code200, UAB	Luminati Networks Ltd. and EMK Capital LLP

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	9,241,044	1/19/2016	Luminati Networks Ltd.
2	9,742,866	8/22/2017	Luminati Networks Ltd.
3	10,469,614	11/19/2019	Luminati Networks Ltd.
4	10,484,510	11/19/2019	Luminati Networks Ltd.
5	10,257,319	11/19/2019	Luminati Networks Ltd.

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading		
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
Order dated April 20, 2021 dismissing all claims and counterclaims with prejudice pursuant to Joint Stipulation and Motion to Dismiss Case in its Entirety.

CLERK	(BY) DEPUTY CLERK	DATE
David A. O'Toole		4/29/21

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Copy 2—Upon filing document adding patent(s), mail this copy to Director **Copy 4—Case file copy**

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☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
2:21-cv-225	6/18/2021	Eastern District of Texas, Marshall Division

PLAINTIFF	DEFENDANT
Bright Data Ltd	NetNut Ltd.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,257,319	4/9/2019	BRIGHT DATA LTD.
2	10,484,510	11/19/2019	BRIGHT DATA LTD.
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PLAINTIFF	DEFENDANT
Bright Data Ltd	NetNut Ltd.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,257,319	4/9/2019	BRIGHT DATA LTD.
2	10,484,510	11/19/2019	BRIGHT DATA LTD.
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy