

SMART ROUTING SYSTEM, METHOD, AND MANAGER

BACKGROUND OF THE INVENTION

5 FIELD OF THE INVENTION

The present invention generally relates to content delivery network and associated methodology that provides a media compliance engine. The media compliance engine according to various examples operates by way of local gateway servers, which utilize peer-to-peer networks and multiple data origins (clouds) to optimize the delivery of media and streamline the reporting process. The media compliance engine according to various examples matches requests from streaming providers with an optimized data source and network. By doing this the media compliance engine can minimize bandwidth consumption, licensing, and reporting costs.

SUMMARY OF THE INVENTION

15 Various examples provide a peer to peer Content Delivery Network (CDN) that can be added to any existing standard content delivery network, or server configuration without any changes to back end systems. The peer to peer CDN according to various examples is created when the end user installs a local peer to peer gateway server on the client machine. The gateway server receives request(s) from the media consuming client via encrypted or
20 unencrypted connections (e.g. HTTP, HTTPS, Secure Socket, and/or Socket).

The local gateway server acts as a peer on the peer-to-peer network and has an encrypted cache for storing data for delivery to other peers or for local delivery to a data consuming client. The local gateway server can also pull resources from a related remote data source (e.g. a server or other CDN). The consuming client would only need to pass a single request to the gateway
5 server, and the gateway server manages the resources and network connection independently of the client. This type of setup enables the delivery of media not only to stand alone desktop applications but also to browsers and media players, and mobile applications that have standard web browsers capabilities (e.g. HTTP, HTTPS, and/or Socket).

Various examples provide a peer-to-peer (P2P) gateway server that receives
10 communication from a client on a local machine. The communication or request can be formatted as a standard HTTP request directed at the local gateway server which will be registered under a local domain name. It is contemplated that the request(s) may be formatted differently if a new transfer protocol is created that references a reserved port where the gateway server would reside. In this case, the request would be formatted slightly differently (i.e. without
15 the HTTP prefix).

Various examples provide a Resource Name Server (RNS), which RNS caches resource URL's, and resource locations (i.e. IP addresses) and resolves resource requests with machine addresses. The general process or methodology for an un-matched media type would be as follows.

- 20 1. Client sends a request for resources to the gateway server;
2. The gateway server then sends the request to the RNS to resolve the resource request with a resource address;

3. Once the resource request is matched with the optimal (least costly) resource locations, the resource location data is returned to the gateway server;

4. The gateway then sends the request for resource data to the appropriate machines or server clusters;

5 5. The machines or service clusters then respond by serving the data that is requested to the gateway server located on the local machine.

6. The gateway process organizes and validates the data and then delivers the resources to the client on the local machine.

10 The reader will note that in a traditional Client-Server relationship, a client requests data from a server and the server delivers data pursuant to client request. In a traditional unmanaged peer-to-peer network each peer can act as both a server (i.e. a deliverer of data) and a client (i.e. a receiver of data). In an unmanaged environment a request for data is passed from peer to peer until a file is located.

15 A managed peer to peer network has a centralized server that indexes resources. The peers in such a network report and register their availability, thus making it easier and quicker to locate a resource. In a hybrid system a peer to peer network is used alongside a centralized data source/indexing server to provide the low costs of peer delivery but the consistency and speed of a centralized data source and in order to expedite resource delivery as in the managed peer to peer network. In this situation a mix of data origin server and peers deliver the data.

20 According to various examples, the client is a stand-alone client, and the data request originates and is consumed by a stand-alone client (browser, desktop or mobile application).

Unlike the networks prefaced hereinabove, the request for data does not originate with the peer, but with a stand-alone client as in a traditional client server relationship.

The gateway server receives the request and then resolves the request for a resource with a Resource Name Server (i.e. resource indexing server). The RNS responds with resource
5 locations (IP address), which can be resource origins or peers. Given that the network is data origin agnostic, peer data is not managed by a central data server, but rather indexed on the RNS as requests are passed and cached at the gateway server.

Accordingly, in such a network the data source is separate from the resource indexing server, thus allowing any request for data by a stand-alone client to be filled from the data origin
10 or a peer-to-peer (P2P) network, since the data within the P2P network is cached when the request is sent from the stand-alone client.

According to various embodiments, a routing and synchronization system operable with one or more data sources for delivering selectively synchronized data files to a user in real time may be provided. The routing and synchronization system may include: a client cooperable with
15 a first computer-implementable application, a gateway server, and a Resource Name Server (RNS) together in communication with a computer-populated network, the RNS for (1) caching data resource locations within the computer-populated network and (2) resolving resource requests with optimal data resource locations within the computer-populated network, the gateway server for (1) requesting and receiving optimal data resource locations via the RNS, (2)
20 requesting and receiving data files from the computer-populated network via the optimal data resource locations, and (3) processing received data files for data file delivery to the client, the first computer-implementable application being operable to respond to interactive and non-interactive requests by synchronizing and routing synchronized, consumable, legally-protected

data from a select optimal data resource location to the client for consumption, the select optimal data resource location being selected from a routing instruction fulfillment source as prompted by a routing instruction received from a routing instruction generation source, the routing instruction fulfillment and generation sources each being affiliated with a legal access point, the
5 synchronized, consumable, legally-protected data being sourced to the consumer from a select data library.

According to various embodiments, in a computer-populated environment, an origin-agnostic data delivery method for delivering a legally-protected select data file to an end user from an optimal resource location as selected from one or more data sources may be provided.
10 The origin-agnostic data delivery method may include the steps of: communicating a client, a gateway server, and a Resource Name Server (RNS) within a computer-populated network; caching data fulfillment sources within the computer-populated network via the RNS; requesting a data fulfillment source listing by the gateway server from RNS-cached data fulfillment sources via a routing instruction generation source; querying which of the data fulfillment sources
15 optimally meets user-defined data transmission requirements, the query thereby defining an optimal fulfillment source; requesting a legally-protected select data file from the optimal fulfillment source via the computer-populated network, the legally-protected select data file being sourced to the client from a select data file library; transmitting the legally-protected select data file from the optimal fulfillment source; and processing the transmitted legally-protected
20 select data file for delivery to the client.

According to various embodiments, a data-routing governance system for governing and reporting data routing within a content delivery network may be provided. The data-routing governance system may include a data-routing compliance appliance, the data-routing

compliance appliance being in communication with a routing and synchronization system operable (a) within the content delivery network and (b) with one or more data sources, the content delivery network comprising a plurality of routing instruction fulfillment sources, the routing instruction fulfillment sources each comprising data files, the content delivery network for delivering select data files to an end user from an optimal data fulfillment source as prompted by a routing instruction generation source, the optimal data fulfillment source being selected from the group comprising the routing instruction fulfillment sources, the routing instruction fulfillment and routing instruction generation sources each defining a legal access point, each legal access point being associated with a data file library, the select data files being sourced to the end user from a select data file library, the compliance appliance providing (a) industry rights management (b) compliance monitoring and/or (c) compliance reporting of data file transmissions of routed, legally-protected data from the optimal data source location to owners or owner agents of the select data files.

According to various embodiments, a routing and synchronization system operable with one or more data sources within a network-based media content playback environment for providing a selectively sourced media content broadcast to a consumer may be provided. The routing and synchronization system may include a primary computer-implementable application for synchronizing and routing consumable legally-protected media content to the consumer from a select routing instruction fulfillment source as prompted by routing and playback instructions generated via a routing instruction generation source, the select routing instruction fulfillment source being affiliated with at least one legal access point, the primary computer-implementable application being operable to (a) generate the routing and playback instructions via the routing instruction generation source for governing playback of the consumable legally-protected media

content via a content-delivery primary channel; (b) establish an instruction-passing secondary channel to the consumer over an operable network infrastructure; and (c) pass the routing and playback instructions to the consumer via the instruction-passing secondary channel for sourcing the consumable legally-protected media content to the consumer from the at least one legal access point.

According to various embodiments, a non-transitory computer-implementable media content-sharing system may be provided. The computer-implementable media content-sharing system may be operable within a network-based media content playback environment comprising at least two computers for providing a selectively sourced media content broadcast to a consumer having access to a first of the least two computers, the computer-implementable media content-sharing system comprising and providing computer-implementable instructions for (a) establishing an instruction-passing secondary channel to a consumer over an operable network; (b) generating routing and playback instructions for governing playback of the consumable legally-protected media content via a content-delivery primary channel; and (c) passing the routing and playback instructions to the consumer via the instruction-passing secondary channel for sourcing consumable legally-protected media content to the consumer from at least one legal access point.

CLAIMS:

1. A routing and synchronization system operable with one or more data sources for delivering selectively synchronized data files to a user in real time, the routing and synchronization system comprising:

a client cooperable with a first computer-implementable application, a gateway server, and a Resource Name Server (RNS) together in communication with a computer-populated network, the RNS for (1) caching data resource locations within the computer-populated network and (2) resolving resource requests with optimal data resource locations within the computer-populated network, the gateway server for (1) requesting and receiving optimal data resource locations via the RNS, (2) requesting and receiving data files from the computer-populated network via the optimal data resource locations, and (3) processing received data files for data file delivery to the client, the first computer-implementable application being operable to respond to interactive and non-interactive requests by synchronizing and routing synchronized, consumable, legally-protected data from a select optimal data resource location to the client for consumption, the select optimal data resource location being selected from a routing instruction fulfillment source as prompted by a routing instruction received from a routing instruction generation source, the routing instruction fulfillment and generation sources each being affiliated with a legal access point, the synchronized, consumable, legally-protected data being sourced to the consumer from a select data library.
2. The routing and synchronization system of claim 1 wherein the routing instruction fulfillment source is affiliated with at least two fulfillment-based, legal access points.
3. The routing and synchronization system of claim 1 wherein the synchronized, consumable, legally-protected data is sourced to the consumer from the select data library as governed by ID-to-hash mapping.
4. The routing and synchronization system of claim 1 comprising a second computer-implementable application operable via the RNS for (a) fragmenting data, (b) delivering

fragmented data, and thereby (c) enhancing delivery of non-corrupt data streams.

5. The routing and synchronization system of claim 1 comprising a third computer-implementable application operable via the RNS for indexing resource locations and thus for enhancing network efficiency of the routing and synchronization system.

6. The routing and synchronization system of claim 5 wherein the third computer-implementable application further operates to match data files independently from data file metadata for enhancing network efficiency of the routing and synchronization system.

7. The routing and synchronization system of claim 1 comprising a compliance appliance for managing, monitoring and/or reporting data file transmission of routed, synchronized, consumable, legally-protected data from the select optimal data resource location to owners or owner agents of the routed, synchronized, consumable, legally-protected data content.

8. The routing and synchronization system of claim 1 comprising a fourth computer-implementable application for associating event markers in frame headers of the data files for enhancing data file transmission.

9. The routing and synchronization system of claim 8 wherein the fourth computer-implementable application is operable to integrate advertisement content into data files.

10. In a computer-populated environment, an origin-agnostic data delivery method for delivering a legally-protected select data file to an end user from an optimal resource location as selected from one or more data sources, the origin-agnostic data delivery method comprising the steps of:

communicating a client, a gateway server, and a Resource Name Server (RNS) within a computer-populated network;

caching data fulfillment sources within the computer-populated network via the RNS;

requesting a data fulfillment source listing by the gateway server from RNS-cached data fulfillment sources via a routing instruction generation source;

querying which of the data fulfillment sources optimally meets user-defined data transmission requirements, the query thereby defining an optimal fulfillment source;

requesting a legally-protected select data file from the optimal fulfillment source via the computer-populated network, the legally-protected select data file being sourced to the client from a select data file library;

transmitting the legally-protected select data file from the optimal fulfillment source; and processing the transmitted legally-protected select data file for delivery to the client.

11. The origin-agnostic data delivery method of claim 10 comprising the step of verifying client authenticity.

12. The origin-agnostic data delivery method of claim 10 comprising the step of verifying server authenticity.

13. The origin-agnostic data delivery method of claim 10 comprising the step of fragmenting data files during data file delivery for enhancing delivery of non-corrupt data streams.

14. The origin-agnostic data delivery method of claim 10 comprising the step of indexing recourse locations for enhancing method efficiency.

15. The origin-agnostic data delivery method of claim 14 comprising the step of matching data files independently from data file metadata for enhancing method efficiency.

16. The origin-agnostic data delivery method of claim 10 comprising the step(s) of providing (a) industry rights management; (b) compliance monitoring; and/or (c) compliance reporting of data file transmission of routed, legally-protected data from the at least two data resource locations, the industry rights management; (b) compliance monitoring; and/or (c) compliance reporting being due owners or owner agents of the legally-protected select data file.

17. The origin-agnostic data delivery method of claim 10 comprising the step of associating event markers in frame headers of the data files for enhancing data file transmission.

18. The origin-agnostic data delivery method of claim 17 comprising the step of integrating advertisement content into data files.

19. The origin-agnostic data delivery method of claim 15 wherein the step of matching data files comprises the steps of:

extracting waveform data from a first data file, the extracted waveform data comprising length

segment values, the length segment values being extracted relative to a data extraction baseline and comprising trough-to-baseline and peak-to-baseline length segment values; deriving summary statistics from the extracted waveform data, the summary statistics being derived from the length segment values, the summary statistics comprising trough-to-baseline and peak-to-baseline length segment statistics;

generating a custom marker based on the derived summary statistics; associating the custom marker with the first data file thereby constructing a custom marked data file; and

accessing the custom marker when comparing a second data file to the custom marked data file for rendering a positive media file match.

20. A data-routing governance system for governing and reporting data routing within a content delivery network, the data-routing governance system comprising a data-routing compliance appliance, the data-routing compliance appliance being in communication with a routing and synchronization system operable (a) within the content delivery network and (b) with one or more data sources, the content delivery network comprising a plurality of routing instruction fulfillment sources, the routing instruction fulfillment sources each comprising data files, the content delivery network for delivering select data files to an end user from an optimal data fulfillment source as prompted by a routing instruction generation source, the optimal data fulfillment source being selected from the group comprising the routing instruction fulfillment sources, the routing instruction fulfillment and routing instruction generation sources each defining a legal access point, each legal access point being associated with a data file library, the select data files being sourced to the end user from a select data file library, the compliance appliance providing (a) industry rights management (b) compliance monitoring and/or (c) compliance reporting of data file transmissions of routed, legally-protected data from the optimal data source location to owners or owner agents of the select data files.

21. A routing and synchronization system operable with one or more data sources within a network-based media content playback environment for providing a selectively sourced media content broadcast to a consumer, the routing and synchronization system comprising:

a primary computer-implementable application for synchronizing and routing consumable legally-protected media content to the consumer from a select routing instruction fulfillment source as prompted by routing and playback instructions generated via a routing instruction generation source, the select routing instruction fulfillment source being affiliated with at least one legal access point, the primary computer-implementable application being operable to (a) generate the routing and playback instructions via the routing instruction generation source for governing playback of the consumable legally-protected media content via a content-delivery primary channel; (b) establish an instruction-passing secondary channel to the consumer over an operable network infrastructure; and (c) pass the routing and playback instructions to the consumer via the instruction-passing secondary channel for sourcing the consumable legally-protected media content to the consumer from the at least one legal access point.

22. The routing and synchronization system of claim 21 whereby the selectively sourced media content broadcast is characterized by direct source delivery of the consumable legally-protected media content to the consumer from a consumer-accessible content library as prompted by the routing instruction generation source.

23. The routing and synchronization system of claim 22 wherein the routing instruction generation source is a select initiating source, the select initiating source being selected from the group consisting of an incoming indirect source and a consumer-affiliated direct source.

24. The routing and synchronization system of claim 23 wherein the consumable legally-protected media content is sourced to the consumer as governed by pre-defined parameters, the pre-defined parameters selected from a parameter group comprising price efficiency parameters and data quality parameters, the price efficiency parameters for governing media playback from a cost effective content library, the data quality parameters for governing media playback from a high quality content library.

25. The routing and synchronization system of claim 23 wherein the consumer-affiliated direct source is peer-connected, the consumable legally-protected media content being directly sourced to the consumer based upon the consumer-affiliated direct source's legal right to source said consumable legally-protected media content.

26. The routing and synchronization system of claim 21 comprising a compliance appliance for providing (a) industry rights management, (b) compliance monitoring and/or (c) compliance reporting, said compliance appliance thus for managing, monitoring and/or reporting transmission of the consumable legally-protected content to owners or owner agents of the consumable legally-protected media content.
27. The routing and synchronization system of claim 21 comprising a secondary computer-implementable application operable for identifying content prompted by the routing instruction generation source and determining the select routing instruction fulfillment source by querying the existence of matching files from the at least one legal access point.
28. The routing and synchronization system of claim 21 wherein the computer-implementable application is operable to associate an event reference with the routing and playback instructions, the event reference and routing and playback instructions together for sourcing the consumable legally-protected media content to the consumer from the select content library.
29. The routing and synchronization system of claim 21 wherein the routing and playback instructions are associated with a select file location, the select file location being selected from a location group, the location group consisting of a file start location or a file end location.
30. The routing and synchronization system of claim 21 wherein the routing and playback instructions are timed metadata.
31. The routing and synchronization system of claim 28 wherein a custom media format accommodates the event reference and routing and playback instructions during an encoding process.
32. The routing and synchronization system of claim 21 wherein the routing and playback instructions are subject to a number of select playback events, the number of select playback events being selected from the group comprising (a) play, (b) pause, (c) stop, (d) load, (e) seek, (f) comment, (i) comment start, (ii) comment end, (g) audio mix, (h) playback speed, (j) playback direction, and (k) content identification.
33. A non-transitory computer-implementable media content-sharing system, the computer-

implementable media content-sharing system being operable within a network-based media content playback environment comprising at least two computers for providing a selectively sourced media content broadcast to a consumer having access to a first of the least two computers, the computer-implementable media content-sharing system comprising and providing computer-implementable instructions for (a) establishing an instruction-passing secondary channel to a consumer over an operable network; (b) generating routing and playback instructions for governing playback of the consumable legally-protected media content via a content-delivery primary channel; and (c) passing the routing and playback instructions to the consumer via the instruction-passing secondary channel for sourcing consumable legally-protected media content to the consumer from at least one legal access point.