According to one aspect, the CODEC library is adapted to receive and store a new CODEC such that the new CODEC may be interfaced with the neural network in order to be chosen and applied to compress the streaming media signal as provided.

The invention according to another embodiment is a destination agent that is adapted to be stored by a destination device for use in decompressing a compressed representation of a streaming media signal. The destination agent is adapted to communicate with a remotely located, compressed streaming media transmission system in order receive and play streaming media signals therefrom. In a particularly beneficial aspect, the software agent is adapted to deliver information about the destination device to the compressed streaming media transmission system, and is also adapted to receive and decode certain encoded streaming media signals from the compressed streaming media transmission system.

The invention according to another embodiment is a system for communicating a streaming media signal having a destination agent that is adapted to be stored within a destination device for decompressing a compressed representation of a streaming media signal into a decompressed representation that may be played by the destination device.

According to one aspect of this embodiment, the destination agent has a diagnostic agent and also a decompression agent. The diagnostic agent is adapted to determine a value for at least one parameter of the destination device related to the capability for processing, storage, or display. The decompression agent is adapted to apply a CODEC decompressor to decompress the compressed representation of the streaming media signal into the decompressed representation using a CODEC based at least in part upon the value of the at least one parameter.

According to another aspect, the destination agent comprises a software agent. In one variation, the software agent is embedded within the destination device. In another variation, the software agent is adapted to be loaded onto the destination device at least in part by a remotely located source that is adapted to deliver the compressed representation of the streaming media signal to the destination device.

The invention according to another embodiment is a transcoder for trancoding streaming media signals between at least one initial format and at least one transcoded format. The transcoder includes a single thread for each of several streaming media signals.

The invention according to another embodiment is a video-on-demand streaming media system incorporating the embodiments shown in the Figures and otherwise described herein.

The invention according to another embodiment is a mobile telephone communications system incorporating the embodiments shown in the Figures and otherwise described herein.

The invention according to another embodiment is an interactive gaming system incorporating the embodiments shown in the Figures and otherwise described herein.

The invention according to another embodiment incorporates the various modes, embodiments, aspects, features, and variations herein disclosed above and elsewhere to static media, as well as to media that is stored locally after processing (e.g. compressing) and not transmitted.

## BRIEF DESCRIPTION OF THE FIGURES

Figures 1A-B show schematic block diagrams representing two respective variations of prior media communications systems using conventional CODEC systems.

Figures 1C-D show schematic block diagrams representing two respective variations of prior media transcoder systems.

Figure 1E shows a schematic block flow diagram of the various interrelated components in a prior WAP gateway communications system.

Figures 2-3 show schematic block diagrams of the transcoder system of one embodiment of the present invention during two respective modes of use.

Figures 4A-5 show block flow diagrams in various detail, respectively, of a media communications system according one embodiment of the invention.

Figure 6 shows a schematic block flow diagram of various interrelated components of a "video-on-demand" streaming video communications system according one embodiment of the invention.

Figure 7 shows a schematic block flow diagram of various interrelated components of a wireless streaming video communications system according to one embodiment of the present invention.

Figure 8 shows a schematic block flow diagram of various interrelated components of a WAP gateway media communications system according one embodiment of the present invention.

Figure 9 shows a schematic block flow diagram of various interrelated components of a wireless communications system during backhauling according to one particular mode of use of the media communications system of an embodiment the present invention.

Figure 10 shows a schematic block flow diagram of various interrelated components of an interactive gaming communications system and set-top TV browsing of one embodiment of the present invention.



Aylo Exhibit 1018
Page 2043 of 2308

## DETAILED DESCRIPTION OF THE EMBODIMENTS

The present invention as illustrated variously through the embodiments below (and by reference to the Figures) provides a media communications system that includes a compression system, a delivery system, and a decompression system, and in another aspect includes a transcoder system. In general, the combination of these individual sub-systems provides a capability to efficiently transcode media between multiple encoding formats, in addition to customize the compression, delivery, and decompression of randomly selected streaming media signals based upon a large array of system parameters as variables. These variables include for example, without limitation, parameters related to the following: the source video signal, the source transmitting device, the transmission modality, and the destination device. The compression, delivery, and decompression of a media signal is thus customized to be optimally efficient for a given, and changing, environment of use. As a result, a wide range of complex streaming media signals may be communicated with a level of efficiency and range of device compatibility that is significantly improved over other known systems.

Notwithstanding the benefits of the overall streaming media communication system herein described, each sub-system described also independently provides beneficially useful results for streaming media communication. The various subsystems themselves, and the various iterations of combinations of these sub-systems apparent to one of ordinary skill based at least in part upon this disclosure, are also contemplated within the scope of the invention. In addition, various aspects of the overall communication system, as well as of each sub-system described, are also contemplated as useful for other applications other than specifically for streaming media communication in particular. Therefore, where apparent to one of ordinary skill, such additional applications are further contemplated within the scope of the invention, despite the particularly useful modes applied to improved streaming media communication.

### Transcoder

A video/audio transcoder 200 is provided according to the invention that enables one incoming video source 210 to be streamed across multiple formats 215 (for example MPEG4, Real Video™, and QuickTime™) from one device without human intervention. The transcoder 200 according to the present embodiment provides substantially greater functionality at a fraction of the price of other

commercially available transcoder systems. Moreover, because the system works "on-the-fly," pre-compressing of the video source 210 is significantly diminished.

More specifically, the transcoder 200 system and method according to the invention is adapted to transcode digitized media originating from any compressed or uncompressed format to be reproduced into any other compressed format -- on demand, real-time. The system 200 and method also enables efficient, simultaneous processing of multiple streams 215 of differing data from a multiplicity of different compressed or uncompressed formats into a multiplicity of different compressed formats.

The transcoder 200 of the present embodiment is herein described in an overall system by way of illustration by reference to Figure 3. As shown, a first player initially makes a connection to a server 300 that houses the transcoder 200. The player format (e.g., Microsoft Media), connection speed (e.g., 32 Kbps) and protocol (HTTP) are identified. The server 300 pulls the live or pre-encoded video into a "live buffer" or "cache" 310 and encodes it as digitized but nearly uncompressed data (e.g., AVI or MPEG2). The server 300 then loads an appropriate CODEC thread (e.g. Microsoft Media™) at the connection speed (e.g. 32 Kbps). Next, the server 300 loads a HTTP/MS player thread that serves the first client Then, a second stream is requested by a client using M/S Player at 100Kbps with MMS. The server loads the appropriate MS CODEC thread at the appropriate 100 Kbps rate. Then, the server 300 loads an MMS/MS player thread to serve the second client. Then, a third stream is requested by a client using Real Player at 40 Kbps with RTSP. The server 300 loads the appropriate Real CODEC thread at the appropriate 40 Kbps rate. Then, the server 300 loads an RTSP/Real player thread to serve the third client. Again, this illustration is exemplary, and other specific CODECS may be suitable substitutes, as well as other bit-rates, etc.

In order to provide still a further understanding of the present transcoder embodiment, Figure 3 shows the transcoder 200 by way of further example as applied to serve multiple different video streams to different clients.

In brief, the present transcoder 200 shown and described uses "thread" communications instead of "IPC" or "Inter Processor Communications" that are used according to many conventional transcoding techniques. For the purpose of this transcoder 200 description, the term "thread" is herein intended to mean an encapsulation of the flow of control in a program. Single-threaded programs are those that only execute one path through their code "at a time". Multithreaded programs may have several threads running through different code paths "simultaneously". In a typical process in which multiple threads exist, zero or more threads may actually be running at any one time. This depends on

the number of CPUs the computer on which the process is running, and also on how the threads system is implemented. While a machine or system with a number of n CPUs may be adapted to run no more than n threads in parallel, the threading operation according to the present transcoder invention may give the appearance of running many more than *n* "simultaneously" by sharing the CPUs among threads.

The transcoder 200 provides abstract APIs, and therefore the CODEC is accessed without the (much larger) native encoder overhead. Buffering 310 is created as a function of client pull for different video streams. Moreover, the transcoder 200 of the invention utilizes a network architecture – a single thread for each different connection, combining clients into same thread if they are at they are within the buffered segment of the same content. The transcoder's 200 use of threads in the manner herein shown and described is considered highly beneficial because a context switch between two threads in a single process is believed to be considerably cheaper (processing/memory/IO) than using a context switch between two processes. In addition, the fact that all data except for stack and registers are shared between threads makes them a natural vehicle for implementing tasks that can be broken down into subtasks that can be run cooperatively.

While various specific architectures may be built around the transcoder 200 embodiments just described in order to achieve particularly desired results on a case-by-case basis. However, for the purpose of further illustration, the following is an example of a more detailed system using the transcoder 200 described. The transcoder 200 is provided adapted to support a large number of simultaneous customer streams, each with differing formats. In particular, such system may support more than 5000 simultaneous streams, and in some circumstances more than 7000 simultaneous customer streams, each with differing video formats. Still further, the transcoder 200 may be implemented to convert any of a wide number of video sources to a format uniquely appropriate or required for many different individual clients each having differing needs. In one particular example, a transcoder 200 as herein described may be implemented to support such high demand simultaneously on any of the following formats: MPEG 1; MPEG 2; MPEG 4; Motion JPEG; AVI; H.261; H.263; H.263 +; RealVideo™; G-8; QuickTime™; Shockwave Flash™; Indeo Cinepak™; ASF.

It is further contemplated that the transcoder 200 may be adapted in an overall communication system to be compliant with all existing and soon anticipated fixed and mobile terminals and devices. Moreover, the transcoder 200 may be implemented to adapt output stream format variables to dynamically accommodate the channel and platform conditions of each client. Still further, the system incorporating the transcoder is adapted to support load balancing servers and routers for multi-

transcoder installations. Accordingly, it is believed that the transcoder 200 of the present invention delivers significantly greater functionality for significantly lower cost than other prior transcoding techniques and systems.

As described above, various different system architectures may incorporate the transcoder 200 of the invention without departing from the scope of the invention. However, more details of a particular architecture that is believed to suitably provide the beneficial level of support just described includes the following aspects: (i) dual P3-933 processor; (ii) any variant of Unix OS; (iii) 512 MB RAM; Redundant Firewire or Gigabit Ethernet; Redundant Power Supplies. Such system may be provided in a rack mounted configuration, or otherwise to suit a particular need.

The following aspects of the transcoder 200 of the invention should be contemplated as broadly beneficial, both independently and in various combinations as is apparent to one of ordinary skill based at least in part from this disclosure.

A system and method is provided for utilizing asynchronous software thread communication in both user and kernel space to perform efficient transcoding on multiprocessor and/or distributed computing platforms (such as clustering). It has been observed that this method is more efficient than utilizing traditional IPC methods to implement the transcoder. A shared library of CODEC algorithms is created and used to access the various CODEC algorithms, thereby incurring a lower processing overhead as well as lower memory utilization than that required by the traditional combined encoder functionality such as that used in the majority of commercial encoders. Of particular benefit, common threads may be used for multiple connections, and in fact even a single thread may be used for every individual connection using the present transcoder.

A system and method is also provided for combining multiple clients to be served by the same thread (for efficiency) whenever the same content is demanded and dynamic buffers (caches) can accommodate all of the data points demanded.

**Media Compression and Delivery System**

A data compression and delivery system 400 and method is also provided according to the invention for real time dynamic data signal processing for optimal reproduction of approximations of original media data over a given set of constraints. This system 400 and method is illustrated schematically by way of block flow diagrams in Figures 4A and 5. Further description of the various

beneficial features and operation of this system is provided as follows by way of exemplary embodiments generally incorporating by reference the description provided by these Figures 4A-5.

Figure 4 A ia a block diagram illustration of one embodiment of the data compression and delivery system 400 of the present invention. As shown in Figure 4A, the data compression and delivery system 400 comprises media module 405, dynamic player module 407, image processor 410, baseline snapshot module 415, classifier 417, quality of standard (QoS) module 420, network layer input module 425 and network output layer module 430. The system 400 further comprises a neural network processing module 440, timer 435, CODEC library module 445, dynamic client request module 450, ICMP module 455, device and network parameters measurement module 460 and delivery and transmit module 465.

In one embodiment, the system 400, resident at a server node(s), processes incoming uncompressed or previously compressed data. The system 400 employs neural networks 440 with artificial intelligence to monitor the incoming data to determine a plurality of key characteristics of each data segment. The system 400 correlates the incoming data characteristics with libraries 445 of pre-developed self-referencing experientially learned rules of the patterns in a scene in a sequence of frames in the input signal ( e.g., a video signal) and with externally imposed constraints to optimally choose a preferred commercially available compression/decompression algorithm (e.g. CODEC) for each segment of the data. The system 400 then sets up an extensive array of usage controls, parameters and variables to optimize the chosen algorithm. Choice of algorithm and set up of parameters and variables will dynamically vary with each segment of incoming data depending upon the characteristics of the data as well as the evolving optimization process itself. The set of possible algorithms is numerous, limited only by availability and other commercial considerations. Each segment of data is encoded and compressed in the above manner and then served to a communications channel.

The compression system 400 just described is particularly useful as a streaming media compression engine, which, based upon information from the available CODEC's and the streaming media delivery system, performs frame-by-frame analysis of the incoming video using another artificially intelligent neural network 440. The system 400 then chooses the most appropriate compression format and configures the compression parameters for optimal video compression based on the best quality as measured by , in one embodiment, a selection of a peak signal to noise ratio from the underlying system environment. The result is the "optimal" video and audio service for the device and conditions present.

A more specific account of the artificial intelligence/neural network 440 aspect of this system as applied to streaming media signals is provided as follows. Initially, a library of separate and distinct CODECs are added to the system as a searchable CODEC library 445. Additional libraries of relevant reference information are also provided, including: a Network Transport Standards (NTS) library 443; and a Quality-of-Service (QoS) library 447. Then, a video (media source) is introduced either in a digitized or non-digitized format (AD conversion is used) via image processor 410. Image processor 410 then decompresses the source (if required) and employs various standard image processing algorithms used for "cleaning-up" the source image(s). The resultant source media is then passed to the baseline snapshot 415 repository where it will be used as a "perfect gold standard" for later comparison. Simultaneously, this resultant source media is also fed to the classifier 417.

The classifier 417 analyzes the source media for temporal, spatial and logical features for the purpose of creating source media sub-segments which exhibit similar combinations of temporal, spatial and logic features. "Similar" is defined to mean a contiguous sub-segment of the source media that contains common temporal, spatial and logic features that would lend themselves to a particular encoding/compression algorithm (as found in the CODEC library 445). This source media sub-segment (or, in one embodiment, a group of contiguous video and audio frames) is referred to as a "scene".

The neural network process 440 then operates upon this scene by employing CODECs from the CODEC library 445 to compress the scene. The internal configuration of each CODEC are manipulated/changed in accordance with inputs obtained from the NTS library 443, QoS library 447, Timer Process 435, Network Input Layer 425, ICMP agent 455 and the Device and Network Parameter measurement agent 460. The compressed scene is then decompressed and a comparison is made against the Baseline Snapshot 415 using a quality measurement made by the quality standard process 420. In one embodiment of the present invention, the Quality Standard Process 420 employs a peak signal noise ration (PSNR) algorithm in order to perform the comparison of the decompressed scene against the baseline snapshot of the source media. The comparison process is repeated with various CODECs from the CODEC library 445 until the Neural Network Process 440 is satisfied with the quality of the resultant compressed scene, within the constraints of the inputs received from the NTS library 443, QoS library 447, Timer process 435, Network Input Layer 425, ICMP Agent 455 and the Device and Network Parameter Measurement Agent 460. Finally, the resultant compressed scene is sent to the Network Layer Output 430 which transports the compressed scene to the Client using an appropriate Network Transport protocol and QoS algorithm.

The above process is repeated until the entire source media has been transmitted to the Client or until the process is aborted due to various possible conditions which may include: a Client request to abort, network transport failure, Client hardware failure, etc.

The NTS library 443 is a repository of network transport services that are selected and used by the Network layer output 430 to transport compressed source media to the Client and by the Network Layer Input 425 to receive information from the Client. The selection is based upon qualitative and quantitative inputs received from the Network Layer Input 425, ICMP agent 445 and the Device and Network Parameter Measurement agent 460.

The QoS library 447 is a repository of quality of service algorithms that are selected and used by the network layer output 430 to transport compressed source media to the Client. The selection is based upon qualitative and quantitative inputs received from the Network Layer Input 425, ICMP agent 455 and the Device and Network Parameter Measurement agent 460.

The ICMP agent 455 generates inputs to the neural network process 440 that dynamically provides it with the quantitative and qualitative characteristics of the transport in use between the processor and the client. In one embodiment of the present invention, the ICMP protocol is used for this purpose.

The Device and Network Parameters Measurement agent 460 generates inputs to the neural network process 440 that dynamically provides it with the qualitative and quantitative characteristics of the client's environment. In one embodiment of the present invention, these client environment characteristics include central processing unit (CPU) capacity, network interface characteristics, storage capacity and media rendering devices capabilities.

Still referring to Figure 4A, the Network Layer Input 425 provides inbound (originating from the client) network transport services. The Network Layer Output 430 provides outbound (originating from the processor) network transport services. The Timer Process 435 provides a way for the user of the invention to limit the maximum amount of time that the Neural Network Process 440 will spend in processing a given source media.

Figure 4B is a block diagram illustration of one embodiment of a CODEC selection scheme of the neural network processing module 440 of one embodiment of the present invention. The neural network processing module 440 shown in Figure 4B comprises a video frame selection module 475, CODEC parameters module 480, input layer module 485 , hidden layers 486 – 487 and output module 488. In one embodiment of the present invention, a CODEC representative signal suitable to be used as

a reference baseline signal for incoming signals to the neural network processing module 440 is generated by the neural network processing module 440. In one embodiment, the classifier 417 determines which scenes in segments of an incoming video signal represents the best scene in light of the available parameters of the underlying CODEC. A list of standards are used by the neural network processing module 440 to determine which scene in the signal represents the best scene. In one embodiment, the Neural Network Process 440 samples a number of pixels in a particular frame of video to determine changes in the number of pixels in that particular frame vis-à-vis the pre-determined parameters of the video signal. In another embodiment, significant motion changes in a particular scene in the video signal may be used as the baseline reference scene ("best scene") for subsequent incoming video.

In one embodiment of the present invention, the neural network processing module 440 takes a segment of video from the classifier 417 as an input and subsequently takes a sample of this input to derive enough information that characterizes the video signal. For example, in the scheme illustrated in Figure 4B, the Neural Network Process 440 takes a window snap-shot (e.g., a 176 X 144 pixel window) to examine. It is advantageous for the Neural Network Process 440 to look at the center of the sample window to generate enough information about the video signal. In one embodiment of the present invention, the Neural Network Process 440 uses a minimum of 8 frames to generate the requisite information about the video signal. Information from the sample window is presented with the particular CODEC parameters from parameter module 480 to the input layer 485.

The input layer 485 is coupled to a plurality of hidden layers 486 – 487 via a plurality of neurons with each connection forming either a strong or weak synoptic link from one neuron to the other. In one embodiment, each CODEC supported by the neural network processing module 440 is provided with its own neural network to process the CODEC specific parameters that come with the particular CODEC. The Neural Network Process 440 generates the "best" video signal through a round-robin like process referred to as a "bake-off" from the plurality of CODECs processed during a video sampling capture period. In processing the best video representation from incoming signals, each of the corresponding neural networks for each of the CODECS generates the best representative sample from the hidden layers 486 – 487 and feed the signal to the output module 488. In one embodiment of the present invention, the output data set of the best CODEC from each class of CODECS being processed by the Neural Network Process 440 has two possibilities. The first being the Neural Network Process 440 submitting the best results for each CODEC to the output module 488 to a "bake-off" neural network of the plurality of "best" samples for each of the plurality of CODECS which in

turn generates the winning best CODEC from the plurality of best CODECS. The bake-off neural network is smaller and faster than the neural networks that handle the processing of the CODECS.

In a second processing scheme, the Neural Network Process 440 may implement a genetic algorithm processing of the best CODECS generated by the plurality of CODECS. The genetic algorithm follows the same statistical selection approach of a marble game. Thus, instead of feeding the winning output CODEC from the various neural networks into a "bake-off" neural network, a genetic algorithm processing may be applied to feed the output module 488 from the various neural networks into a bucket and picking the best CODEC representation from a collection of scenes at the end of the source media, for example, a movie, etc. In one embodiment of the present invention, the Neural Network Process 440 uses a combination of forward and backward propagating algorithm to process the CODECS.

Referring back to Figure 4A, for the purpose of providing a further understanding of this artificial intelligence process, the following example of one particular application is provided. It is to be appreciated that the features and operation of the system provided by this exemplary application are to be considered as broadly descriptive of the neural network 440 aspect for data compression and delivery according to the invention. Other applications may be made and fall within the scope of the invention.

A video content provider installs the system of the present invention on its server. Sample videos are introduced to the system in order to perform an initial AI process as described above. A complex matrix of CODEC characterizations, e.g. for each bit rate, pattern of video, etc., is created to be drawn from later. Next, a client end-user connects to the content provider system in order to view a video M. The communication system of the invention residing on the server delivers a software agent to the client's device, thus enabling the client to connect to the communication system in order to deliver device-specific information and receive the appropriate compressed signal with decompression CODEC for playing. Next, the AI system begins loading the video M as a streaming signal into a buffer for the purpose of choosing the appropriate CODEC for each frame and compressing each frame appropriately for transmission. The time period of the buffer depends upon multiple variables, principally the processing power of the system, and may be generally for example approximately 15 seconds for systems having appropriate capability for pre-recorded but uncompressed video media. Within the buffer, each frame is compared against each CODEC according to the "types" of sequences pre-tested in matrix as depicted in the diagram.

Next, the system 400 looks at end-user parameters, e.g. screen resolution, memory available, via information received from the software agent in the client's device. The most appropriate CODEC is then chosen and configured/tuned for optimal performance by setting certain variables within the CODEC to fixed quantities (e.g. based on comparing source video vs. patterns in past, transmission channel capabilities or constraints, and destination device capabilities or constraints). The process just described is generally done frame-by-frame by the classifier 417, but the CODECS are compared for temporal compression efficiency such that the process for each frame contemplates other leading and lagging frames. Once the appropriate CODEC is chosen and tuned for each frame (or block of frames where appropriately determined automatically by the system), the delivery system reports to the client agent and delivers the tuned CODEC ahead of the corresponding frame(s) to be decompressed and played.

It is to be appreciated that the neural network 440 of this system 400 continuously learns and remembers the performance and operation of the CODECS within the CODEC library 445, and continuously uses its learning to improve the compression efficiency of the input media signal. The process of running a signal frame through the library, modifying CODEC operating parameters, comparing compression performance by the compare logic 525 (Figure 5) against reference standard compression, and running the loop again with further modifications, is an iterative 550 (Figure 5) one that generally continues to improve compression efficiency. In fact, compression with one or more CODECS in the library 445 may reach improved levels better than the reference compression algorithm(s).

Nevertheless, when time constraints 435 (Figure 4A) are present (such as in real-time push or pull demand for the streaming media content), this process must eventually be stopped at some point so that a particular frame or series of frames being processed may be compressed 575 and delivered 580 to the destination without unacceptable delay by timer 435. Then, the next frame or series may be operated upon by the neural network 440 within the CODEC operating system. These endpoints may be defined by reaching a predetermined desired result, such as for example but without limitation: (i) reaching a predetermined percentage (%) compression efficiency, such as for example as compared to the reference standard; or (ii) reaching a predetermined or imposed time limit set on the process, such as for example according to a time related to the buffer time (e.g. 15 seconds); or (iii) the earlier occurrence of either (i) or (ii). In any event, though an endpoint is reached for choosing the appropriate CODEC and performing the compression 575 and delivery 580 operations, this does not mark an endpoint for the neural network 440 training which continues. The information that is gathered through

each loop in the process is stored 550. When subsequent similar frames or system constraint parameters in an incoming frame are encountered 545 in the future, the stored information is remembered and retrieved by the neural network 440 for improving compression 575 and delivery 580 efficiency.

While many different communication protocols are contemplated, one particular embodiment which is believed to be beneficial uses a "full duplex network stack" protocol, which allows for bi-directional communication between the server and the client device. Again, while other protocols may be appropriate for a particular application, the full duplex system is preferred.

The system 400 just described addresses the difficulties encountered with previously known CODEC systems by utilizing the streaming media delivery architecture to overcome latency issues and the embedded neural network 440 to overcome speed concerns. The system 400 is then able to reconfigure the algorithms used for compression in the neural network 440, the goal being to achieve optimum results every time over any network configuration.

A wide variety of CODECS may be used within the CODEC library 445 according to the overall compression systems and methods just described, though beneficial use of any particular CODEC according to the invention contemplates such CODEC taken either alone or in combination with other CODECS. For example, an appropriate CODEC library 445 may include one or more of the following types of CODECS: (i) block CODECS (e.g. MPEG versions, such as Microsoft Media™ or QuickTime™); (ii) fractal CODECS; and (iii) wavelet CODECS (e.g. Real™). According to another aspect, an appropriate CODEC library 445 may include one or more of the following types of CODECS: (i) motion predictive CODECS; and (ii) still CODECS. Still further, the CODEC library 445 may contain one or more of the following: (i) lossy CODECS; and (ii) lossless CODECS.

In one embodiment of the present invention, all of these different types of CODECS may be represented by the CODEC library 445 according to the invention; and, more than one particular CODEC of a given type may be included in the library. Or, various combinations of these various types may be provided in order to achieve the desired ability to optimize compression of a streaming media communication over a wide range of real-time variables in the signal itself, transmission channel constraints, or destination device constraints. Still further, an additional highly beneficial aspect of the invention allows for new CODECS to be loaded into the library 445 and immediately available for use in the neural network 440 compression/delivery system 400. Nevertheless, one particular example of a CODEC library 445 which is believed to be beneficial for use in optimally communicating a wide range of anticipated streaming media signals, and of particular benefit for image signals, includes the



Aylo Exhibit 1018
Page 2054 of 2308

following specific CODECS: MPEG versions 1, 2, and 4 (e.g. Microsoft Media™ and QuickTime™); DUCK TruMotion™; ON2; Real Media™; MJPEG: H.261; H.263; H.263+; GIF; JPEG; JPEG2000; BMP; WBMP; DIVX.

The following are further examples of various aspects of the compression system and method just described that should be considered as broadly beneficial, both independently and in various combinations as is apparent to one of ordinary skill based at least in part on this disclosure. Further examples of such broad aspects are elsewhere provided in the "Summary of the Invention" as well as in the appended claims.

Use of neural networks 440 with artificial intelligence to achieve the various CODEC operations described is broadly and uniquely beneficial. In particular, a system and method is provided for pre-processing 410 of source data determined by application of learned responses to the signal quality, data content and format of the data. A system and method is provided for processing each unit (e.g. frame or block of frames) of source data by selection and application of a suitable CODEC (from a set of all available CODECS in the CODEC library 445) dependent upon observed characteristics of the source data and application of past-learned responses to compressing similar data. A system and method is provided for processing each unit of source data by setting a multiplicity of compression characteristics within a chosen compression algorithm to optimize capture and preservation of the original data integrity. Still further, each or all of the aforementioned signal processing steps is applied to each unique, sequential unit of signal data, e.g., signal clip, video frame, or individual packet as appropriate.

It is further contemplated that a CODEC management system 400 according to the invention provides a system and method for image processing that is adapted to normalize original source data/images as well as to resize and resample original data to fit the specification of the neural network processing module 440. An ability to serve any transmission or recording channel with a single system and with any source data stream is also provided. Moreover, the various systems and methods herein described, individually and beneficially in combination, are provided with compatibility to any connection or connectionless protocol, including but not limited to TCP, UDP, WTP/WDP, HTTP, etc.

The invention as herein shown and described also allows for highly beneficial applications for accelerating the learning rate of neural networks 440 while minimizing the data storage requirements to implement said networks. Different classes of data streams each have unique characteristics that require substantially greater processing by neural networks 440. For example, video data streams differ by prevalence and degree of motion, color contrast, and pattern and visibility of details. Greater

processing requires longer times to reach optimal functionality. Greater processing also requires more predictive library storage, often growing to unlimitedly large sizes. For real-time neural network processing, processing time and storage can be minimized to greatly increase functionality by providing pre-developed predictive libraries characteristic of the class of data stream.

Accordingly, the following are examples of aspects of the pre-trained neural network 440 aspects of the invention that should be appreciated as broadly beneficial, both independently and in combination (including in combination with other embodiments elsewhere herein shown and described). A system and method is provided that creates and uses artificial intelligence in a neural network 440 and pre-trains that intelligent network for use in solving a problem, which problem may be for example but not necessarily limited to streaming media compression according to a particular beneficial aspect of the invention. A system and method is also provided for subdividing the universe of problems to be solved into useful classes that may be processed according to a learned history by the intelligent network.

An intelligent streaming media delivery system and method is also provided according to the invention that manages content transmission based on end-user capabilities and transmission channel constraints, such as for example, but without limitation, available transmission speeds or bandwidth, and Internet congestion. The data compression and delivery system 400 utilizes a computer implemented intelligence process, such as an artificial intelligence process based on a neural network to analyze aspects of the connection (including without limitation differing bit rates, latencies, transmission characteristics and device limitations) to make modifications in the compression methodology and to manage Quality of Service ("QoS") 420 issues. Compressed, digital, restorable and/or decompressible data streams may be therefore delivered to a multiplicity of different local and/or remote devices via a multiplicity of transmission mediums characterized by differing capabilities. In addition, a decompression system is provided for reproducing the decompressed data at the terminal device.

In one beneficial embodiment, a terminal device establishes a link with the system resident on a server node(s). Except for software normally required to establish communications, the terminal device might not initially have resident software embedded therein associated with the present system. Upon linking the terminal device to the server node, the system transmits a software agent to the terminal device that cooperates with other software modules on the server-side that together form the overall delivery system. The software agent informs the system of the terminal device configuration and processing capacities for decompressing and displaying the data. The software agent also reports

certain relevant information to the system of the characteristics of the communication channel between the terminal and the server. Such information includes, without limitation: latency, bandwidth, and signal path integrity. Based upon terminal device configuration and real time updates of channel characteristics and capabilities, the system actively manages transmission of the compressed data stream by varying parameters such as buffer length, transmitted bit rate, and error correction. The system also feeds operating conditions to the compression system to dynamically alter encoding and compression settings to optimize delivery of the data. The delivery software agent resident on the terminal device decompresses the data stream that is composed of segment-by-segment variations in compression/decompression algorithm and settings thereof. Dependent upon the terminal device configuration, and especially for very thin clients, instructions may be refreshed on a segment-by-segment basis for each decompression algorithm and encoding setting combination. Instructions for decompressing may also be kept resident if appropriate to the terminal device.

The software agent described for transmission to and operation by the destination device is therefore also considered a highly beneficial aspect of the compression/delivery systems and methods described. By delivering the software agent to the device from the source, a wide range of existing destination devices may be used for communication according to methods that may include variable uses of one or more algorithms or other operations at the transmission source. In other words, the destination devices may not be required to be "format-specific" players as is required by much of the conventional streaming and static media communication systems. Also, by providing the destination agent with a diagnostic capability, diagnostic information may be gathered at the destination device and transmitted back to the source in a format that is compliant for use by the source in its neural network process for achieving the proper CODEC operation for a given set of circumstances.

The use of a client-side agent to supply quality of service information including client-side device data and communication channel status in real time is therefore also believed to be broadly beneficial beyond the specific applications and combinations of other aspects of the invention also herein provided. In addition, the processing of each unit of compressed, transmission-ready data to accommodate client-side device and real-time communication channel conditions is also broadly contemplated as having broad-reaching benefits. Still further, a system and method is described that provides instructions to a client-side agent to enable decompression of each sequential, uniquely compressed unit of data. Therefore, another broad benefit of the invention provides a destination device (such as from the transmission source as herein described for the particular embodiments) with a CODEC that is adapted to decompress a compressed representation of an original media signal into a

decompressed representation based upon variable parameters related to at least one of the following: aspects of the original media signal, transmission channel constraints, and destination device constraints. In another broad aspect, the destination device is adapted to use a CODEC that is chosen from a library of CODECS based upon a parameter related to an aspect of the original media signal.

The systems and methods herein described are also considered applicable to the signal processing of each unique, sequential unit of signal data, e.g., signal clip, video frame, or individual packet as appropriate. In addition, the system and its various sub-systems may also be purely software that must be loaded into each appropriate device, or it may be embedded in a host hardware component or chip, e.g. on the server side, or in certain circumstances, on the client side (e.g. various aspects of the destination agent), or for example may be stored such as in flash memory.

The various aspects of the media compression system and method just described are considered beneficial for use according to a wide range of known and soon anticipated media communication needs, including for example according to the various communications devices, communication/transmission channel formats and standards, and media types and formats elsewhere herein described (e.g. in the "Background" section above).

However, for the purpose of further understanding, Figure 6 shows a schematic view of the overall streaming media communications system 600 as specifically applied to "video-on-demand" aspects according to one embodiment of the present invention, wherein many different end users 610 – 620 at many different locations may request and receive, real-time (e.g. without substantial delay), pre-recorded video from a remote source. Further to the information provided in Figure 6, at least one specific implementation of the media communication system 600 delivers the following types of video at the following bit-rates (denotes compressed representations of original signals that are convertible by a destination device to decompressed representations having no or insubstantial loss as observed by the eye of the typical human observer): VHS-format video as low as about 250Kbs; DVD-format video at about 400 Kbps; and HDTV-format video at about 900Kbps. According to these speeds, it is believed that video-on-demand may be provided by telephone carriers over resident transmission line channels, such for example over existing DSL lines 630 - 640.

However, as available bandwidth and mass communication continue to present issues, it is believed that even greater efficiencies may be achieved resulting in delivery of compressed representations of these types of video signals at even lower bit rates. Again, as elsewhere herein described, the compression efficiencies of the invention are closely related to and improve as a function of the processing power made available to the neural network 440, and the neural network's 440

continued learning and training with respect to varied types of media. These resources may even make more remarkable compression efficiencies achievable without modification to the fundamental features of the present invention.

Therefore, the following are further examples of transmission rates for certain compressed video signals that are believed to be desirable and achievable according to one embodiment of the invention: VHS-format video as low as about 200Kbps, more preferably as low as about 150Kbps, and still more preferably as low as about 100Kbps; DVD-format video as low as about 350Kbps, more preferably as low as about 300Kbps, and still more preferably as low as about 250Kbps; and HDTV-format video as low as about 800Kbps, and still more preferably as low as about 700 Kbps.

Moreover, at least one implementation of the media communications system 400 of one embodiment of the invention delivers 20-24 frames/sec color video at a transmission rate of 7 Kbps. This is believed to enable substantial advances in communication of streaming media signals via to wireless destination devices via the WAP Gateway, as is further developed elsewhere hereunder.

It is also to be appreciated that, while video communication has been emphasized in this disclosure, other types of streaming or static media are also contemplated. For example, at least one implementation of the compression and delivery embodiments has been observed to provide substantially CD-quality sound (e.g. via compressed representations of original signals that are convertible by a destination device to decompressed representations having no or insubstantial loss as observed by the ear of the typical human observer) at a bit-rate of about 24 Kbps. At these rates, audiophile-quality sound may be delivered for playing over dial-up modems. However, with further regard to available resource commitment and extent of neural network training, it is further contemplated that the invention is adapted to deliver CD-quality sound at speeds as low as about 20Kbps, and even as low as about 15 Kbps or even 10Kbps.

## Wireless Audio Communications System

It is further contemplated that the streaming media communication system of the invention has particularly useful applications within wireless audio communications networks, and in particular cellular telephony networks. Therefore, Figures 7 and 8 schematically show, with respectively increasing amounts of detail, streaming media communications systems 700 and 800 respectively specifically applied to wireless audio communications systems according to certain specific, respective embodiments of the present invention. While particular devices, system parameters, or arrangements

of communicating devices shown are believed to be beneficial in the overall application of the invention, they are not to be considered limiting and may be suitably replaced with other substitutes according to one of ordinary skill based upon this disclosure. The various wireless communications systems 700 and 800, standards, and protocols referenced elsewhere in this disclosure are thus incorporated into this section for the purpose of integration with the various aspects of compression, delivery, decompression, and transcoding according to one embodiment of the invention.

Combination of the communications system 400 of one embodiment of the present invention with the other components of a cellular communications network allows for the enhanced compression, delivery, and decompression according to the invention to manifest in an increased quality of service for wireless audio communications. Improvements in cellular communications according to the invention include, without limitation, the following examples: increasing available bandwidth, extending range of reception, and providing graceful degradation while maintaining connectivity during periods of low signal quality or reception levels.

More specifically, cellular telephony signals are characterized by relatively high degrees of variability, due for example to the roaming positions of clients, and limited cell ranges, atmospheric conditions, and significantly limited and changing available bandwidths over daily use cycles. Therefore, a self-optimizing CODEC management system according to the present invention is particularly well suited to adjust the appropriate communications and compression modalities to the changing environment. At the very least, the increase in compression efficiency and resulting decrease in bandwidth used for given signals is a valuable achievement as wireless channel traffic continues to congest.

In one particular regard, the increased compression efficiency according to the present invention is well applied to improving bandwidth issues during "soft hand-offs" between cells, as illustrated in Figure 9. During cellular phone communications, whenever a transmitter or receiver migrates between cell coverage zones, communications bandwidth requirements and resultant costs are increased by systemic requirement to "pass off" active communications between cells. The act of passing off the communication results in a "backhaul" channel from the previously active cellular transmitter to a central office for forwarding to a newly active cellular transmitter. The backhaul channel represents a significant use of bandwidth. Savings will result from increased compression. As Figure shows, such "backhauling" may include a doubling (media sent back from first cell being left and resent to second cell for transmission) or even a quadrupling (overlapping communication from both first and second cells) in the bandwidth used for communicating a particular signal.

The media communications system 400 of the present invention may recognize when backhaul is occurring, such as according to the transmission channel diagnostics provided in the software agent(s), and may respond by adjusting the degree of compression to compensate.

## WAP Video Gateway

With a particular view of the rapid growth observed and predicted in the wireless or mobile Internet, embodiments of the present invention contemplate application of the intelligent compression/delivery/ decompression embodiments in combination with WAP Gateway functionality.

A system and method is therefore also provided according to the invention for encoding, compressing and transmitting complex digital media (e.g., video pictures) via bandwidth-constrained wireless communications systems utilizing Wireless Applications Protocol (WAP). In one embodiment, data is processed by the system, resident at a server node(s), employing neural networks with artificial intelligence. Sample segments of data are captured from the input stream and processed to comply with requirements unique to the class of clients. As is described in detail above, the system correlates the continuously varying digital data streams' characteristics with libraries of pre-developed experientially learned rules and with externally imposed constraints to optimally choreograph the coherence, continuity and detail of the data as ultimately received, decoded and presented at the client interface.

A gateway provided with the added functionality of the streaming media communications system herein described is shown schematically in Figure 8. According to the WAP gateway system 830 , a client agent is provided that is adapted to run on a variety of platforms, and requires no specialized hardware to decode the video streams. According to use of the streaming media delivery system of the invention elsewhere herein described, the viewer of the WAP device maintains constant communication with the system server upstream, such that the user-side client 825 may provide the encoding platform with relevant information for streaming media communication, including without limitation: available screen size, processing power, client operating system and browser version, connection speed and latency, thereby allowing the streaming media delivery system to tailor the stream to each individual client it "talks" to. Accordingly, an AI driven server 830 incorporating the AI compression as herein described may be combined with a WAP Gateway 830, combining the necessary WAP to TCP/IP protocol (or other protocol, e.g. dual server stack) translation with a Video and Audio Server 835 employing compression, delivery, and decompression systems and methods

herein described. The WAP Gateway 830 may further include a video transcoder, such as for example incorporating the transcoder systems and methods herein described. An appropriate host architecture according to this system (not shown) generally includes a rack mount system running Linux OS with a modified WAP Gateway 830 or as a software plug-in to existing servers.

This WAP gateway system 830 may be further provided in a Master/Slave relationship as another beneficial aspect of the overall streaming media delivery architecture (applicable to other delivery systems other than specifically wireless). Various content distribution networks, such as available through Akamai and Inktomi, have capitalized on the concept of improving data delivery over the Internet by using "smart caching" on servers which reside on the borders of the Internet. Such a Master/Slave relationship is maintained by the present system wherein a Master Server resides at the source of the content to be delivered and Slave Servers reside on the borders. These servers communicate "intelligently" to optimize the content delivery over the Internet and reduce latency, bandwidth and storage requirements, improving the overall quality of the video/audio stream to the end-user and decreasing the cost of media delivery to the content provider.

The WAP gateway 830 of the present invention supports continued growth in mobile communications, as large telecommunications operators are transitioning to multi-service broadband networks, and as the number of subscribers to the mobile Internet continues to expand rapidly. In particular, mobile communications is a broad class of systems and protocols, each having its own constraints and needs for interacting devices to communicate streaming media. The Gateway 830 in a particularly beneficial aspect may support a variety of "2G" systems with upgradability for upcoming "2.5G" and "3G" network technologies (numerical progression of systems generally represents progression of Internet-enabled capabilities).

The following Table 3 provides examples of known mobile communication standards, and provides certain related information used by the AI system of the present invention for optimizing communication of streaming media amongst the field of mobile destination devices as media players:

Table 3: Existing/Soon Anticipated Mobile Communications Standards

| **MODE** | **BAUD RATE (generally)** |
|---|---|
| GSM (2G) | 9.6 Kbps |
| CDMA | 9.6 Kbps |
| TDMA | 14.4 Kbps |
| CDPD | 14.4 Kbps |

| | |
|---|---|
| iMODE | 128 Kbps |
| GPRS | 144 Kbps |
| WCDMA or CDMA2000 | 144 Kbps to 2 Mbps |
| GSM (3G) | 2 Mbps |

In addition, the present invention is particularly beneficial in its ability to stream a wide variety of media signals to various different types of wireless communications devices. Examples of wireless communications devices that are appropriate for use with the streaming media communications systems and methods of the invention, and which the systems and methods support interchangeably, are provided in the following Table 4:

Table 4: Examples of Internet-enabled PDA's

| DEVICE | MAKE | SPEED | MEMORY | SCREEN DEPTH | SCREEN SIZE | MODEM TYPE | CONNECT SPEED |
|---|---|---|---|---|---|---|---|
| iPAQ | Compaq | 206 MHz | 16-64 Mb | 12 b/pixel color | 320x240 | External (e.g. CDPD) | 9600-14.4 Kbps |
| PalmVII | Palm | 33 MHz | 4 -16Mb | 4 b/pixel b/w 8 b/pixel color | | Internal | 14.4 Kbps |
| Handspring | Palm | 33 MHz | 4 -16Mb | 4 b/pixel b/w; 8 b/pixel color | | External | 14.4 Kbps |
| Blackberry | Research-In-Motion | 33 MHz | 4 Mb | 2 b/pixel b/w | | Internal | 9.6-14.4 Kbps |
| Jornada | HP | 133 MHz | 16-32 Mb | 18 b/pixel | 320x240 | External | 9.6-14.4 Kbps |

| Casseopeia ▪▪▪▪▪▪▪▪▪ | Casio | 150 Mhz | 16-31 Mb | 12 b/pixel | 320x240 | External | 9.6-14.4 Kbps |
|---|---|---|---|---|---|---|---|

Various specific examples are described later below that provide observations of actual wireless Internet applications of the invention as herein described. Such examples include use of a CODEC library according to varied parameters associated with at least the following (without limitation): destination wireless communication device; transmission channel; communications protocol; and the respective streaming media signals themselves. The various particular features of the systems and methods used according to these examples are contemplated as further defining independently beneficial aspects of the invention.

Shared Interactive Environment

A system and method is also provided according to the invention for enabling real-time remote client interaction with a high-definition, multi-dimensional, multi-participant simulated environment without the need for significant client-side processing capacity. More specifically, Figure 10 shows an overall streaming media communication system as applied to shared interactive gaming according to the invention.

This system includes: (i) a proxy server; (ii) graphics rendering capabilities; (iii) a client software agent for feedback of client inputs to the game; (iv) a client software agent for supporting the delivery system of the invention; and (v) streaming from the server to the client. It is contemplated that for multiple clients, which typically represent shared interactive gaming by design, multiple components as just described are provided to support each client.

The interactive gaming embodiments contemplate implementation of data compression and delivery embodiments with devices that are also destination devices for compressed signals from other like, remotely located device systems. This arrangement is broadly beneficial, such as for example in further interactive media implementations such as video conferencing and the like. Accordingly, each remote system is both a source and a destination device, and sends and receives agents between it and other remote systems.

Destination Device

Although the communications systems of the present invention enables communication of streaming media signals to a wide variety of destination devices, a further contemplated feature of the invention provides a remote receiver to be housed as a destination device/player by client users. This set-top player may be adapted to serve at least one, though preferably multiple ones, and perhaps all, of the following: Video on Demand (VOD); Music on Demand (MOD); Interactive Gaming on Demand (IGOD); Voice Over Internet Protocol ("VoIP"), any technology providing voice telephony services over IP connections; Television Web Access; Digital Video Recording to record, pause, and playback live television; e-mail; chat; a DVD player; and other applications apparent to one of ordinary skill. All of this may be delivered to existing televisions in the comfort of users' own homes. Moreover, clients utilizing this box, or other systems interfacing with the communications system of the invention, may receive DVD quality video and surround sound over cable and DSL connections.

## EXAMPLES

For the purpose of further illustrating the highly beneficial results that may be achieved according to the invention, the following are examples of specific embodiments that have been used for different types of streaming media communication, including observed results with pertinent discussion. These examples illustrate communication the same pre-recorded video over different transmission channels and to different destination devices, wherein the pre-recorded video has the following originating properties: 720lines of resolution and 32bits of color information, an originating file size of about 1.4Gigabytes.

Example 1

An "iPAQ" model 3650 hand-held PDA (commercially available from Compaq, Inc. for approximately $500 at the time of this disclosure) was provided. The PDA was interfaced with a 14.4 Kbps (max) wireless CDPD modem ("AirCard 300" wireless external modem, commercially available from Sierra Wireless for approximately $200 at the time of this disclosure) using an extension assembly (iPAQ™ PCMCIA expansion sleeve from Compaq, Inc.) with a PCMCIA card slot that couples to the wireless modem. The iPAQ™ used is generally characterized as having the following processing parameters: 206 MHz processor; 32 Mb memory; 12 b/pixel color; 240X320 screen dimensions; PocketPC™ operating system version 3.0 from Microsoft Corp. and stereo sound. The iPAQ™ was

connected to the Internet in San Francisco, California via the interfaced CDPD modem over the AT&T cellular wireless carrier system at a connection bandwidth of about 13.3Kbit/sec. A server located in San Jose, California (approximately 50mi away) was contacted by the PDA employing the http and rtsp protocols, and the PDA was used to initiate a request for a pre-recorded video having the following originating properties: 720lines of resolution and 32bits of color information, the originating file size was 1.4Gigabytes. Within about seven seconds, a compressed approximation of the pre-recorded video was received, decompressed, and displayed by the PDA on the PDA's screen. The entire video was seen at 240x320x12bpp resolution in full motion without observable delays or defects.

Example 2

A "Jornada™" model 548 hand-held PDA (commercially available from HP, Inc. for approximately $300 at the time of this disclosure) was provided. The PDA was interfaced with a 9.6 Kbps (max) wireless CDMA phone ("Motorola i85s" wireless external digital cellular phone, commercially available from Motorola authorized vendors for approximately $200 at the time of this writing) using adaptor cables (Motorola and HP RS-232 standard interface cables from Motorola and HP.) that couple the phone and PDA together to form a wireless modem. The Jornada model PDA device used is generally characterized as having the following processing parameters: 133 MHz processor; 32 Mb memory; 12 b/pixel color; 240X320 screen dimensions; PocketPC™ operating system version 3.0 from Microsoft Corp. and stereo sound. The Jornada™ was connected to the Internet in Newark, NJ via the interfaced CDMA phone/modem over the Nextel digital cellular wireless carrier system at a connection bandwidth of 8Kbit/sec. A server -located in San Jose, California (approximately 2900mi away) was contacted by the PDA employing the http and WDP protocols, and the PDA was used to initiate a request for a pre-recorded video having the following originating properties: 720lines of resolution and 32bits of color information, the originating file size was 1.4Gigabytes. Within about seven seconds, a compressed approximation of the pre-recorded video was received, decompressed, and displayed by the PDA on the PDA's screen. The entire video was seen at 176x120x8bpp in full motion without observable delays or defects.

Example 3

A "Set-top Box" model st850 book PC (commercially available from MSI, Inc. for approximately $300 at the time of this writing) was provided. The Set-top Box was interfaced with a 10 Mbps (max) ethernet/802.11 connection using CAT5 ethernet cables (Generic) that couple the Set-top Box to a broadband connection (DS3). The Set-top Box used is generally characterized as having the following processing parameters: 400 MHz processor; 64 Mb memory; 32 b/pixel color; 720 lines of screen resolution; Windows CE operating system version 2.11 from Microsoft Corp. and AC3 digital 6 channel surround-sound. The Set-top Box was connected to the Internet in Newark, NJ via the interfaced shared DS3 connection over the Alter.Net Internet Backbone at a connection bandwidth of 376Kbit/sec. A server located in San Jose, California (approximately 2900mi away) was contacted by the Set-top Box employing the http and rtsp protocols, and the Set-top Box was used to initiate a request for a pre-recorded video having the following originating properties: 720lines of resolution and 32bits of color information, the originating file size was 1.4Gigabytes. Within
About nine seconds, a compressed approximation of the pre-recorded video was received, decompressed, and displayed by the Set-top Box on a commercially available reference monitor's (Sony) screen. The entire video was seen at 720linesx32bpp in full motion without observable delays or defects.

While various particular embodiments have been herein shown and described in great detail for the purpose of describing the invention, it is to be appreciated that further modifications and improvements may be made by one of ordinary skill based upon this disclosure without departing from the intended scope of the invention. For example, various possible combinations of the various embodiments that have not been specifically described may be made and still fall within the intended scope of the invention. According to another example, obvious improvements or modifications may also be made to the various embodiments and still fall within the intended scope of this invention.

What is claimed is:

1. A system for processing a media signal, comprising:

a searchable CODEC library that is adapted to store a plurality of separate and unique CODECS and also to be accessed by and searched by at least one of an artificial intelligence (AI) system and an operating system, such that each CODEC stored in the CODEC library may be individually located and accessed for use by at least one of the AI system and operating system in order to compress the media signal for transmission from a source to a destination device.

2. The system of Claim 1, wherein the CODEC library comprises at least one CODEC that is of at least one of the following three types of CODECS: block CODECS; fractal CODECS; and wavelet CODECS.

3. The system of Claim 2, wherein the CODEC library comprises:
a first CODEC of a first type on the three types, and
a second CODEC of a second type of the three types.

4. The system of Claim 3, wherein the CODEC library comprises:
a first CODEC of a first type of the three types,
a second CODEC of a second type of the three types; and
a third CODEC of a third type of the three types.

5. The system of Claim 4, wherein the CODEC library comprises:
a first CODEC that is a motion predictive CODEC; and
a second CODEC that is a still CODEC.

6. The system of Claim 5, wherein the CODEC library comprises:
a first CODEC that is a lossy CODEC; and
a second CODEC that is a lossless CODEC.

7. The system of Claim 1, further comprising:
a registry associated with the CODEC library and that is searchable in order to search and locate a particular CODEC within the CODEC library.

8. A system for communicating a media signal from a source to a destination device over a transmission channel, comprising:

a destination agent that is adapted to be used by the destination device to communicate with the source and to receive a compressed representation of the media signal from the source and to decompress the compressed representation into a decompressed representation of the media signal such that the decompressed representation may be stored or used by the destination device.

9. The system of Claim 8, wherein the destination agent comprises:

a diagnostic agent that is adapted to provide diagnostic information for transmission to a neural network associated with the source, which diagnostic information represents an ability of the destination device to receive, store, process, or display the media signal; and

a decompression agent that is adapted to decompress the compressed representation of the media signal into the decompressed representation of the signal to be stored or played by the destination device.

10. The system of Claim 9, wherein the destination agent further comprises:

a decompression agent that is adapted to receive a compressed representation of the media signal and also to receive a CODEC decompressor associated with the compressed representation of the signal from the delivery system, and that is adapted to use the CODEC decompressor to decompress the compressed representation of the signal into a decompressed representation of the signal to be stored or played by the destination device.

11. The system of Claim 10, wherein the destination agent is adapted to be stored and operated for decompressing and playing a media signal on a plurality of different destination devices each having different capabilities for decompressing, storing, or playing the media signal.

12. The system of Claim 11, wherein the destination agent is adapted to decompress a plurality of different compressed representations of the media signal by using different CODEC decompressors that are each associated with a corresponding different CODEC compressor used to compress the signal.

13. The system of Claim 12, wherein the destination agent is adapted to decompress the compressed representation of the media using a CODEC that is provided based upon at least one of the following parameters: a computer implemented previously learned behavior of the CODEC with

respect to a reference media signal, a computer implemented previously learned behavior of the CODEC with respect to a prior attempt at compressing or decompressing the same media signal, a comparison of the CODEC's operation with respect to the media signal against a reference algorithm compression of the media signal, a learned constraint of the transmission channel, and a learned constraint of the destination device.

14. The system of Claim 13, wherein the destination agent is adapted to interchangeably use a block CODEC, a fractal CODEC, or a wavelet CODEC.

15. A system for communicating a media signal from a source to a destination device over a transmission channel, comprising:

a CODEC that is adapted to compress the media signal for optimized transmission along the communications channel and decompression by the destination device, wherein the compression is done by the CODEC based upon at least one of the following parameters: a previously learned behavior of the CODEC with respect to another reference signal, a previously learned behavior of the CODEC with respect to a prior attempt at compressing or decompressing the same media signal, a comparison of the CODEC's operation with respect to the media signal against a reference algorithm compression of the media signal, a learned constraint of the transmission channel, and a learned constraint of the destination device.

16. The system of Claim 15, wherein the CODEC is adapted to compress the media signal into n different compressed representations of the media signal that are adapted to be transmitted to the destination device at n unique bit rates, respectively.

17. The system of Claim 15, further comprising:

a searchable quality of service (QoS) library associated with the CODEC and that is adapted to be used by at least one of an artificial intelligence system or an operating system in order to determine an appropriate use of the CODEC with respect to the media signal based upon at least one QoS standard stored in the QoS standards library.

18. A system for processing a media signal, comprising:

a CODEC operating system that is adapted to interface with a CODEC library and also with an artificial intelligence (AI) system in order to use the AI system to identify an appropriate CODEC from the library and to process the media signal with the CODEC.

19. The system of Claim 18, further comprising:

at least one CODEC associated with the CODEC operating system for use in processing the media signal based at least in part upon an operation by the CODEC operating system.

20. The system of Claim 19, further comprising:

a searchable CODEC library that is associated with the CODEC operating system and that is adapted to store a plurality of separate and unique CODECS, wherein the CODEC operating system is adapted to cooperate with the searchable CODEC library and also with the AI system in order to determine an appropriate CODEC stored in the CODEC library for use in processing the media signal.

21. The system of Claim 20, further comprising:

a searchable network transport standards library associated with the CODEC operating system and that is adapted to be used by at least one of an AI system or the CODEC operating system in order to determine an appropriate use of a CODEC with respect to the media signal based upon at least one network transport standard stored in the network transport standards library.

22. The system of Claim 21, further comprising:

a searchable quality of standard (QoS) library associated with the CODEC operating system and that is adapted to be used by at least one of an AI system or the operating system in order to determine an appropriate use of a CODEC with respect to the media signal based upon at least one QoS standard stored in the QoS standards library.

23. The system of Claim 22, further comprising:

a destination agent that is associated with the CODEC operating system and is adapted to be used by a destination device to communicate with a source also associated with the CODEC operating system to receive a compressed representation of the media signal from the source and to decompress the compressed representation into a decompressed representation of the media signal such that the decompressed representation may be stored or used by the destination device.

24. A system for processing a media signal, comprising:

a destination device that is adapted to communicate with a source and to receive a compressed representation of the media signal from the source, and that includes a CODEC that is adapted to decompress the compressed representation into a decompressed representation based upon at least one of the following parameters: a previously learned behavior of the CODEC with respect to another reference signal, a previously learned behavior of the CODEC with respect to a prior attempt at compressing or decompressing the same media signal, a comparison of the CODEC's operation with respect to the media signal against a reference algorithm compression of the media signal, a learned constraint of the transmission channel, and a learned constraint of the destination device.

25. The system of claim 24, wherein the media signal is adapted to be used according to an original format according to an original set of parameters, and the destination device is adapted to process and display the decompressed representation of the media signal in another format according to another set of parameters that are different than the original set of parameters, such that the destination device is incapable of processing and displaying the media signal in the original format according to the original set of parameters.

26. The system of claim 25, wherein the CODEC is adapted to compress the media signal into n different compressed representations of the media signal that are adapted to be transmitted to the destination device at n unique bit rates, respectively.

27. The system of claim 26, wherein the n different compressed representations are adapted to be transmitted at least at n substantially different transmission rates that are distinguished based upon at least one of the following parameters: different transmission system standards; different destination device standards; and different media type standards.

28. A system for processing a media signal, comprising:

a CODEC that is adapted to perform at least one of compression or decompression on the media signal; and

an artificial intelligence (AI) system that is adapted to operate in conjunction with the CODEC in order to tune the operation of the CODEC with respect to the media signal, wherein the AI system is adapted to learn a behavior of the CODEC with respect to at least one parameter affecting the CODEC's operation, and also to modify the operation of at least one of the AI system

itself or the CODEC based upon the learned behavior in order to increase the ability to provide the CODEC in an appropriate form for optimally compressing or decompressing the media signal.

29. The system of claim 28, wherein the CODEC comprises a discrete cosine transform CODEC.
30. The system of claim 29, wherein the CODEC comprises a fractal CODEC.
31. The system of claim 30, wherein the CODEC comprises a wavelet CODEC.
32. The system of claim 31, wherein the CODEC comprises a lossy CODEC.
33. The system of claim 32, wherein the CODEC comprises a substantially lossless CODEC.
34. The system of claim 33, further comprising:

a searchable CODEC library that is adapted to store a plurality of separate and unique CODECS,

wherein the CODEC is adapted to be stored in the searchable CODEC library, and the AI system is adapted to cooperate with the CODEC library in order to locate and access the CODEC so that the AI system may perform at least one operation with respect to the CODEC.

35. A system for processing a media signal, comprising:

a CODEC library that is adapted to store a plurality of separate and unique CODECS;

an artificial intelligence (AI) system associated with the CODEC library and that is adapted to perform an operation with respect to the CODEC library in order to determine an appropriate CODEC from the plurality of CODECS for use in processing the media signal;

a CODEC operating system associated with the CODEC library and also the AI system and that is adapted to control the operation of the AI system with respect to the CODEC library;

a source system that is adapted to compress the media signal based upon a CODEC from the CODEC library and based upon an operation of the AI system;

a destination system that is adapted to communicate with the source system and to receive a compressed representation of the media signal from the source system and decompress the compressed representation into a decompressed representation for use by the destination system; and

a communications system associated with the source system and also with the destination system so that the source system is adapted to transmit the compressed representation of the media signal to the destination system, and the destination system is adapted to receive the compressed representation and also to appropriately decompress the compressed representation into the decompressed representation for storage or use by the destination system.

36. The system of claim 35, further comprising:

a searchable network transport standards library associated with the AI system and also with the CODEC operating system and that is adapted to be used by the AI system in order to determine an appropriate CODEC from the CODEC library for processing the media signal based upon at least one network transport standard stored in the network transport standards library.

37. The system of claim 36, further comprising:
a searchable QoS standards library associated with the AI system and also with the CODEC operating system that is adapted to be used by the AI system in order to determine an appropriate CODEC from the CODEC library for processing the media signal based upon at least one QoS standard stored in the QoS standards library.

38. The system of claim 37, wherein the AI system is adapted to determine an appropriate use of a CODEC from the CODEC library for processing the media signal based upon at least one of the following parameters: a previously learned behavior of the CODEC with respect to another reference signal, a previously learned behavior of the CODEC with respect to a prior attempt at compressing or decompressing the same media signal, a comparison of the CODEC's operation with respect to the media signal against a reference algorithm compression of the media signal, a learned constraint of the transmission channel, and a learned constraint of the destination device.

39. A system for communicating a media signal between a source and n unique destination devices each having a unique ability to process the media signal, wherein n is an integer that is equal to or greater than one, comprising:

a compression system associated with the source and which is adapted to compress the media signal into n uniquely compressed representations of the media signal,

wherein each of the n uniquely compressed representations is adapted to be transmitted from the source to a unique one of the n destination devices, and is adapted to be decompressed by the respective destination device into a unique one of n decompressed representations of the media signal to be played by the respective destination device.

40. The system of claim 39, wherein the compression system further comprises:

a searchable CODEC library that is associated with the compression system and that is adapted to store a plurality of separate and unique CODECS, wherein the compression system is

adapted to compress the media signal into each of the n uniquely compressed representations based at least in part upon at least one CODEC stored by the CODEC library.

41. The system of claim 40, wherein the compression system further comprises:

a searchable network transport standards library associated with the compression system and that is adapted to be used by the compression system in order to determine at least one appropriate CODEC for compressing the media signal into the n uniquely compressed representations based upon at least one network transport standard stored in the network transport standards library.

42. The system of claim 41, wherein the compression system further comprises:

a searchable QoS standards library associated with the compression system and that is adapted to be used by the compression system in order to determine at least one appropriate CODEC from the CODEC library for compressing the media signal into the n uniquely compressed representations based upon at least one QoS standard stored in the QoS standards library.

43. The system of claim 42, further comprising:

a destination agent that is associated with the compression system and is adapted to be used by each of the n unique destination devices to communicate with the source, so that each of the n destination devices may receive a unique one of the n compressed representation of the media signal from the source system and to use an appropriate CODEC at least in part based upon a CODEC used by the compression system to create the respective compressed representation so that the respective destination device may appropriately decompress the respective compressed representation into an appropriate one of the decompressed representations of the media signal that may be stored or used by the respective destination device.

44. The system of claim 43, wherein the compression system is adapted to compress the media signal into each of the n different compressed representations based at least in part upon at least one of the following parameters: a previously learned behavior of at least one CODEC with respect to another reference signal, a previously learned behavior of at least one CODEC with respect to a prior attempt at compressing or decompressing the same media signal, a comparison of at least one CODEC's operation with respect to the media signal against a reference algorithm compression of the media signal, a learned constraint of at least one transmission channel, and a learned constraint of at least one destination device.

45. A system for communicating n uniquely compressed representations of a media signal from at least one source to a common receiver, comprising:

a destination device that is adapted to communicate with the at least one source and to receive each of the n uniquely compressed representations from the at least one source, wherein the destination device is further adapted to decompress each of the n uniquely compressed representations into n decompressed representations of the media signal and to play each of the n decompressed representations.

46. A system for communicating a media signal from a source to a destination device over a transmission channel, comprising:

a compression system that is adapted to receive information about a parameter of the transmission channel and to compress the media signal into a compressed representation of the media signal by using a compression technique that is based at least in part upon the parameter information.

47. A system for communicating n unique media signals between a source and a destination, comprising:

a compression system that is adapted to receive information about a parameter of the media signal and to compress the media signal into a compressed representation of the media signal by using a compression technique that is based at least in part upon the parameter information.

48. A system for compressing a media signal from a source for transmission to a destination device, comprising:

a compression system that is adapted to compress the media signal into a compressed representation of the media signal based upon at least one of a transmission channel constraint, a destination channel constraint, or a comparison of a parameter of the media signal against a prior compression operation of the compression system.

49. A system for decompressing a compressed media signal received from a source at a destination device, wherein the destination device is adapted to receive a compressed representation of the media signal from the source and also a decompression instruction from the source such that the destination device is adapted to decompress the compressed representation into a decompressed representation of the media signal based at least in part on the instruction.

50. A method for constructing a neural network for use in compressing media signals, comprising:

providing a plurality of CODECS; and

pre-learning at least one parameter associated with each CODEC's compression performance with respect to a predetermined type of media signal in a manner.....; and

remembering each pre-learned parameter in a manner such that at least a particular one of the CODECs may be chosen in the future to compress a particular new media signal based upon the pre-learned parameter of the particular CODEC.

51. The method of claim 50, further comprising:

forming a CODEC library with the plurality of CODECS;

compressing at least one predetermined type of a test media signal with each CODEC in the CODEC library;

automatically learning at least one parameter related to each CODEC's performance in compressing the at least one predetermined type of test media signal;

automatically remembering each such learned parameter in a manner such that a particular media signal to be compressed.

52. A system for communicating a media signal between a source and a destination at least in part over a wireless transmission channel, wherein a compressed representation is

a compression system that is adapted to compress the media signal into a compressed representation of the media signal that is further adapted to be transmitted to a wireless destination device over a wireless carrier; and

a neural network that uses artificial intelligence to optimize the compression of the media signal by the compression system by learning at least one of the following parameters: a constraint of the wireless destination device, a constraint of the wireless transmission carrier, and a comparison of a parameter of the media signal against a prior compression operation of the compression system.

53. A system for compressing a media signal for transmission from a wireless source to a destination device.

54. A system for compressing a media signal into a compressed representation of the media signal for transmission to a wireless destination device.

55. A system for decompressing a compressed representation of a media signal into a decompressed representation of the media signal at a destination device, wherein the compressed representation is received from a source over a wireless carrier at the destination device.

56. A system for communicating a media signal over an IP network between a source and a destination device, wherein a compressed representation of the media signal is transmitted from the source to the destination device over the IP network.

57. A system for compressing a media signal into a compressed representation of the media signal, such that the compressed representation of the media signal may be transmitted from a source to a destination device over an IP network.

58. A system for decompressing a compressed representation of a media signal into a decompressed representation of the media signal, wherein the compressed representation is received at a destination device from a source over an IP network.

59. A method for communicating a media signal over an IP network, comprising:

using artificial intelligence to determine the most appropriate CODEC from a plurality of available CODECS for compressing and decompressing the media signal, wherein the appropriate CODEC is determined based upon at least one of the following parameters: a previously learned behavior of the CODEC with respect to another reference signal, a previously learned behavior of the CODEC with respect to a prior attempt at compressing or decompressing the same media signal, a comparison of the CODEC's operation with respect to the media signal against a reference algorithm compression of the media signal, a learned constraint of the transmission channel, and a learned constraint of the destination device.

60. The method of Claim 59, wherein the system is adapted to communicate a streaming media signal over the IP network.

61. A system for communicating an audio signal between a source and a destination over a transmission channel, wherein the audio signal is compressed to form a compressed representation of the audio signal that may be transmitted over the transmission channel to the destination device

so that the destination device may decompress the compressed representation into a decompressed representation for storage or use by the destination device.

62. The system of Claim 62, wherein the system is adapted to communicate a streaming audio signal.

63. A system for compressing an audio signal into a compressed representation of the audio signal for transmission from a source to a destination device over a transmission channel.

64. A system for decompressing a compressed representation of an audio signal at a destination device for storage or use by the destination device, wherein the compressed representation is received by the destination device from a source over a transmission channel.

65. A method for communicating a streaming audio signal from a source to a destination device over a transmission channel, comprising:

delivering CD-quality music from the source to the destination device over the transmission channel at a transmission rate that is as low as about 25 Kbps.

66. The method of claim 65, wherein the CD-quality music is delivered by compressing a source audio signal into a compressed representation and delivering the compressed representation over the transmission channel to the destination device at the transmission rate, wherein the compressed representation may be decompressed by the destination device into a decompressed representation that is substantially CD-quality representation of the original audio signal that may be stored or played by the destination device.

67. A system for communicating a video signal between a source and a destination over a transmission channel, wherein the streaming video signal is compressed into a compressed representation that may be transmitted from the source to the destination device over the transmission channel and decompressed into a decompressed representation by the destination device for storage or playing by the destination device.

68. A system for communicating a streaming video signal between a source and a destination, comprising:

a media processing module;

a dynamic player module;

an image processor;

a baseline snapshot module;

a signal classifier;

a plurality of CODECS dependent neural networks processors;

a CODECS library;

a network layer input module;

a network layer output module; and

a timer.

69. The system of Claim 68, further comprising a dynamic client request processing module.

70. The system of Claim 69, further comprising a device and network parameters measurement module.

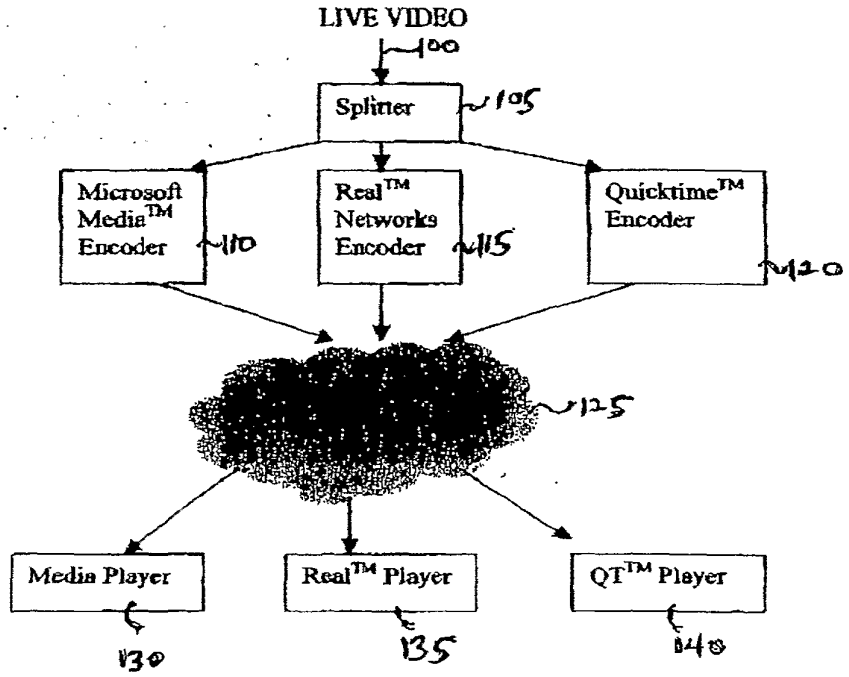



**FIGURE 1A**
(PRIOR ART)



Aylo Exhibit 1018
Page 2081 of 2308

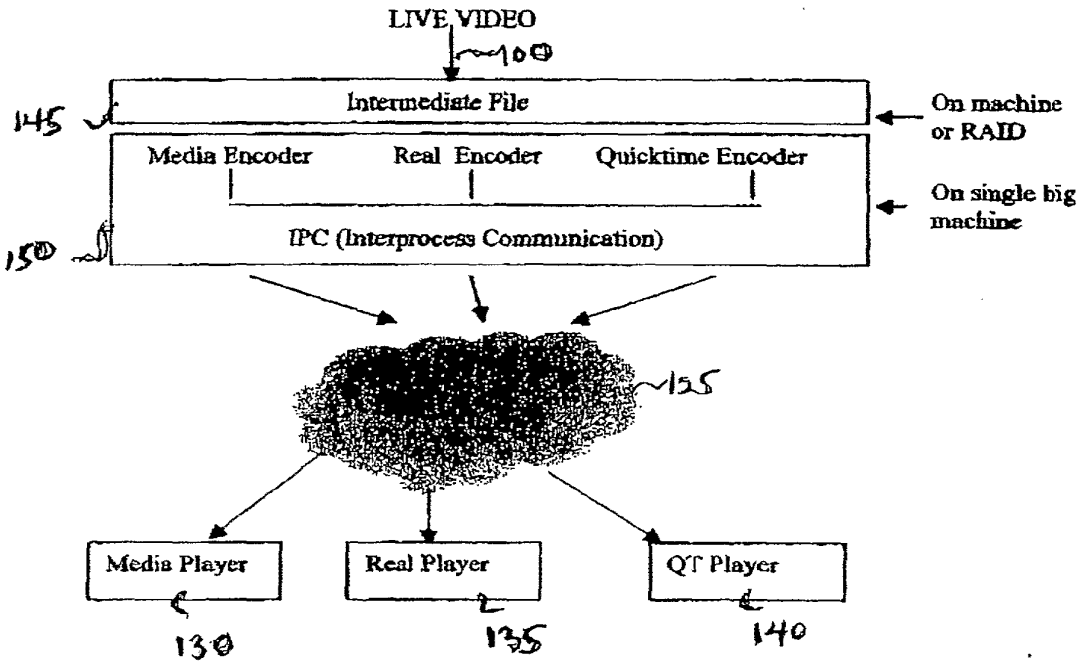



**FIGURE 1B**
(PRIOR ART)



Aylo Exhibit 1018
Page 2082 of 2308

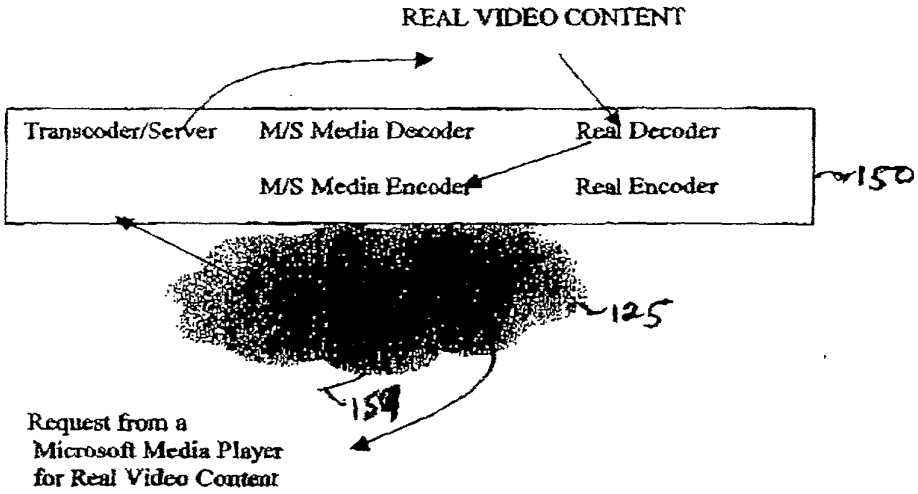



**FIG. 1C**
(PRIOR ART)



Aylo Exhibit 1018
Page 2083 of 2308

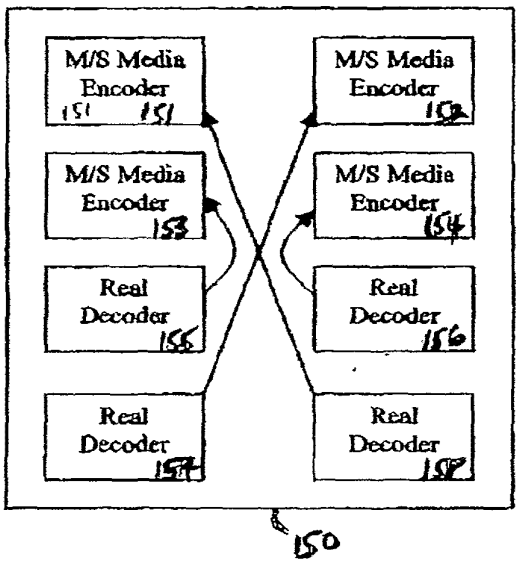



**FIGURE 1D**
(PRIOR ART)



Aylo Exhibit 1018
Page 2084 of 2308

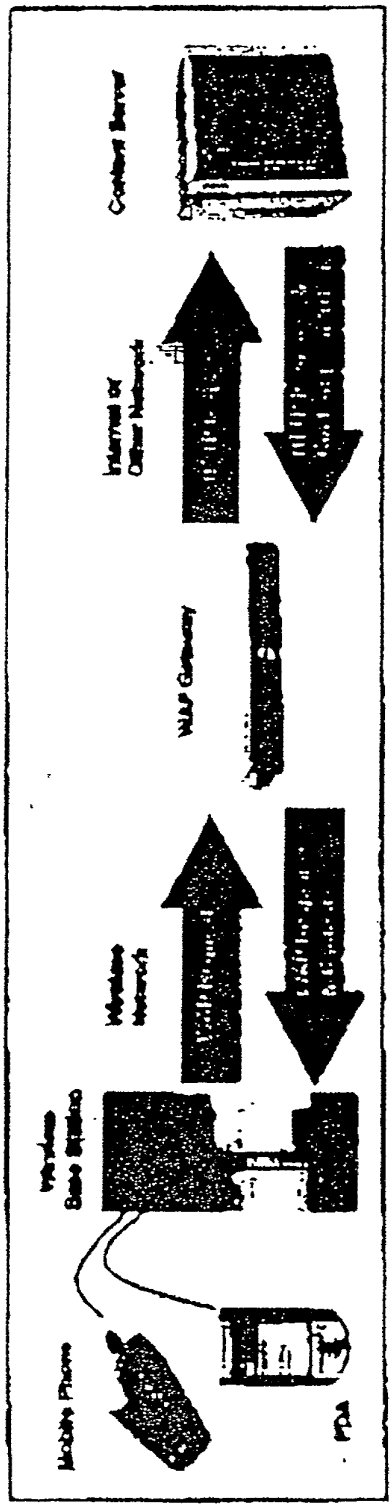



FIGURE 1E
(PRIOR ART)



Aylo Exhibit 1018
Page 2085 of 2308

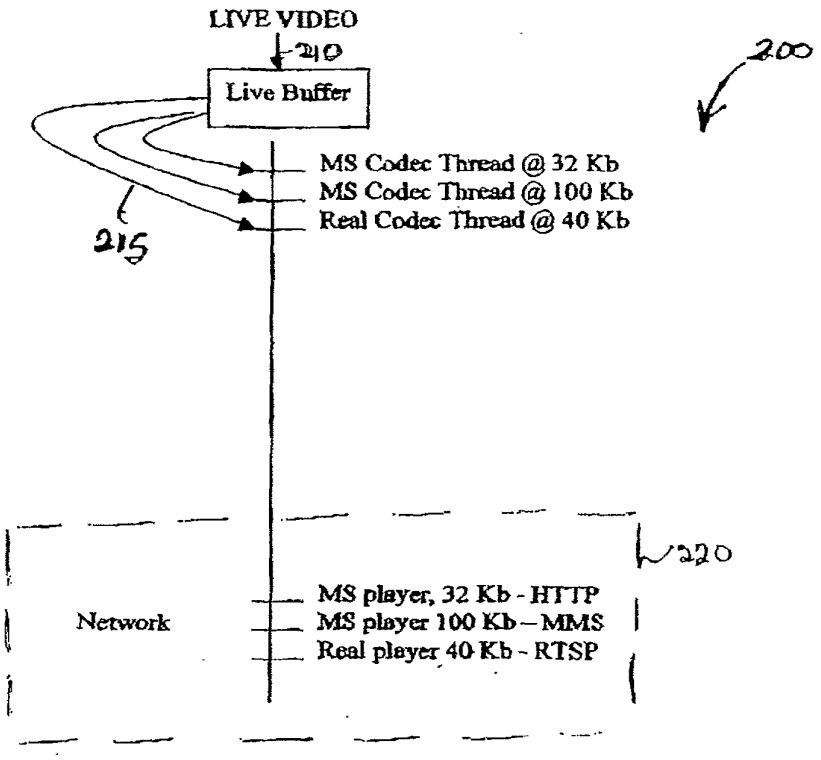



**FIGURE 2**



Aylo Exhibit 1018
Page 2086 of 2308

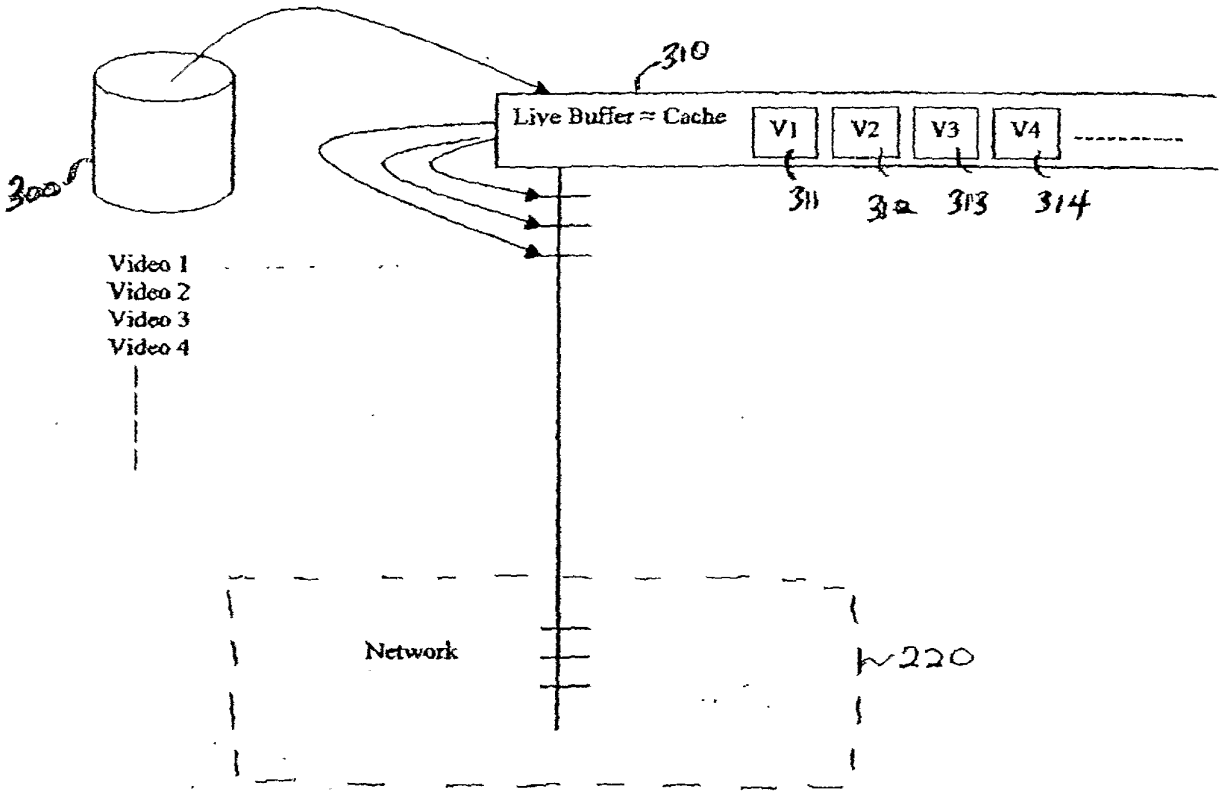



**FIGURE 3**



Aylo Exhibit 1018
Page 2087 of 2308

# FIGURE 4A

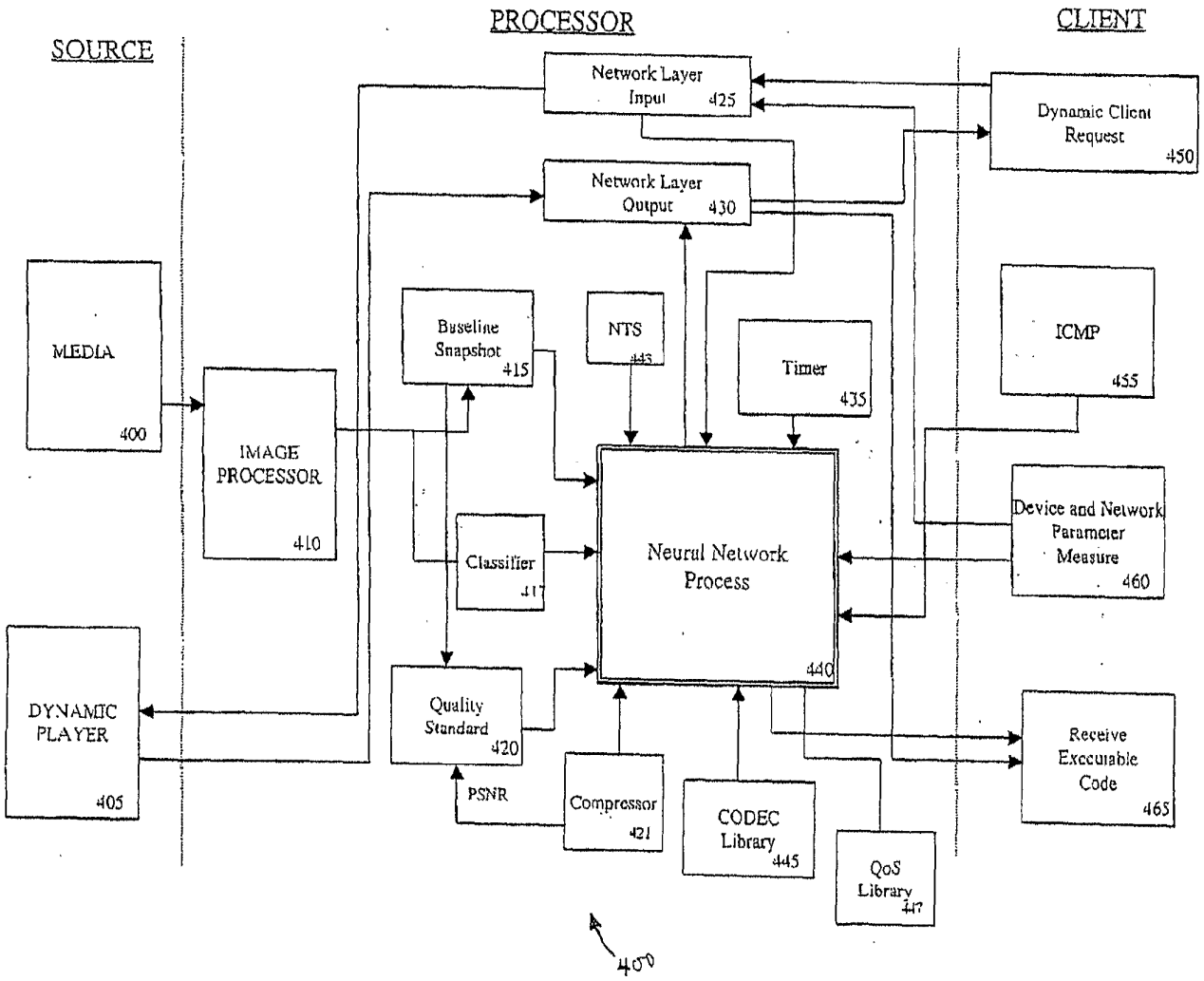
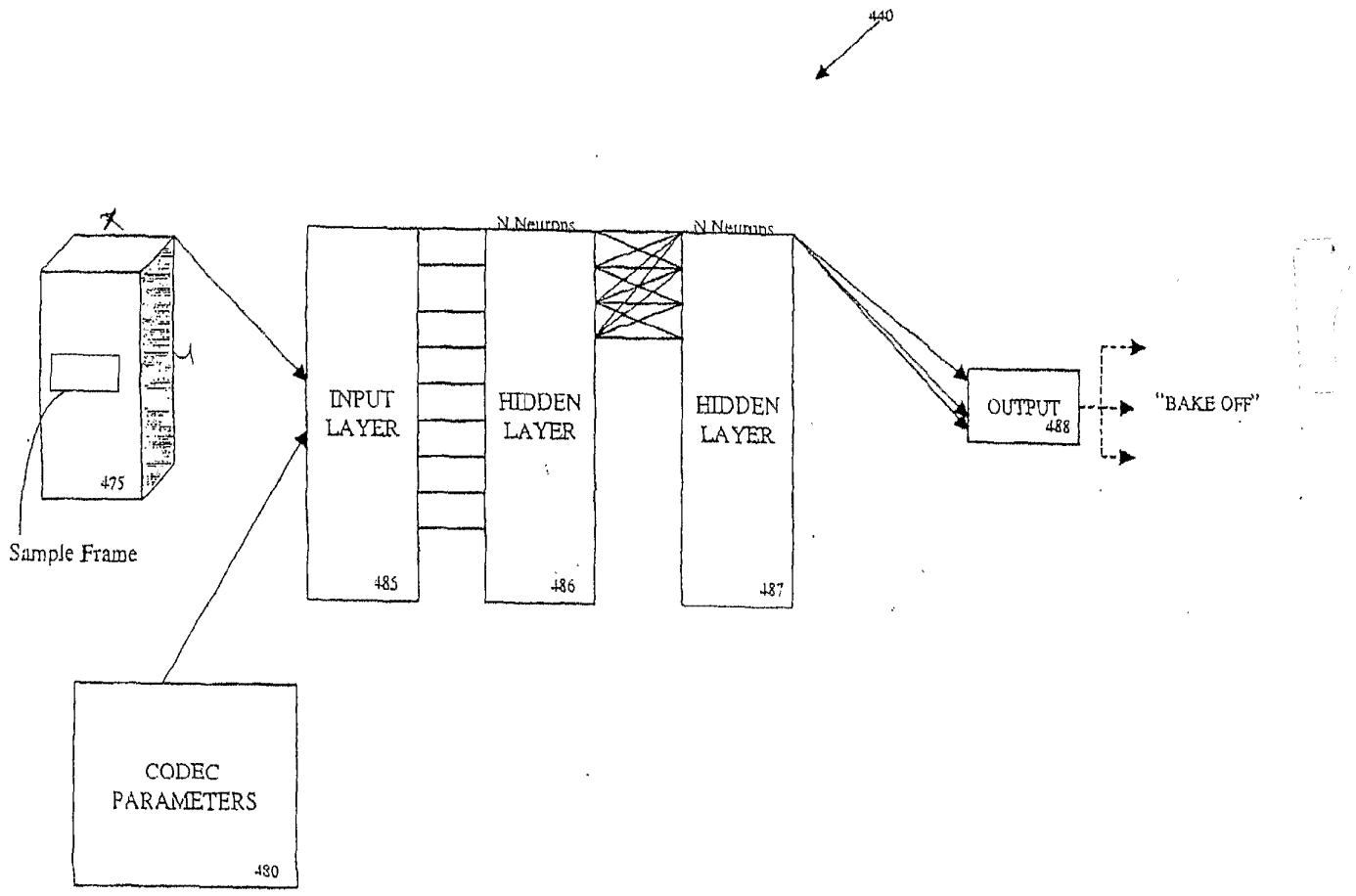
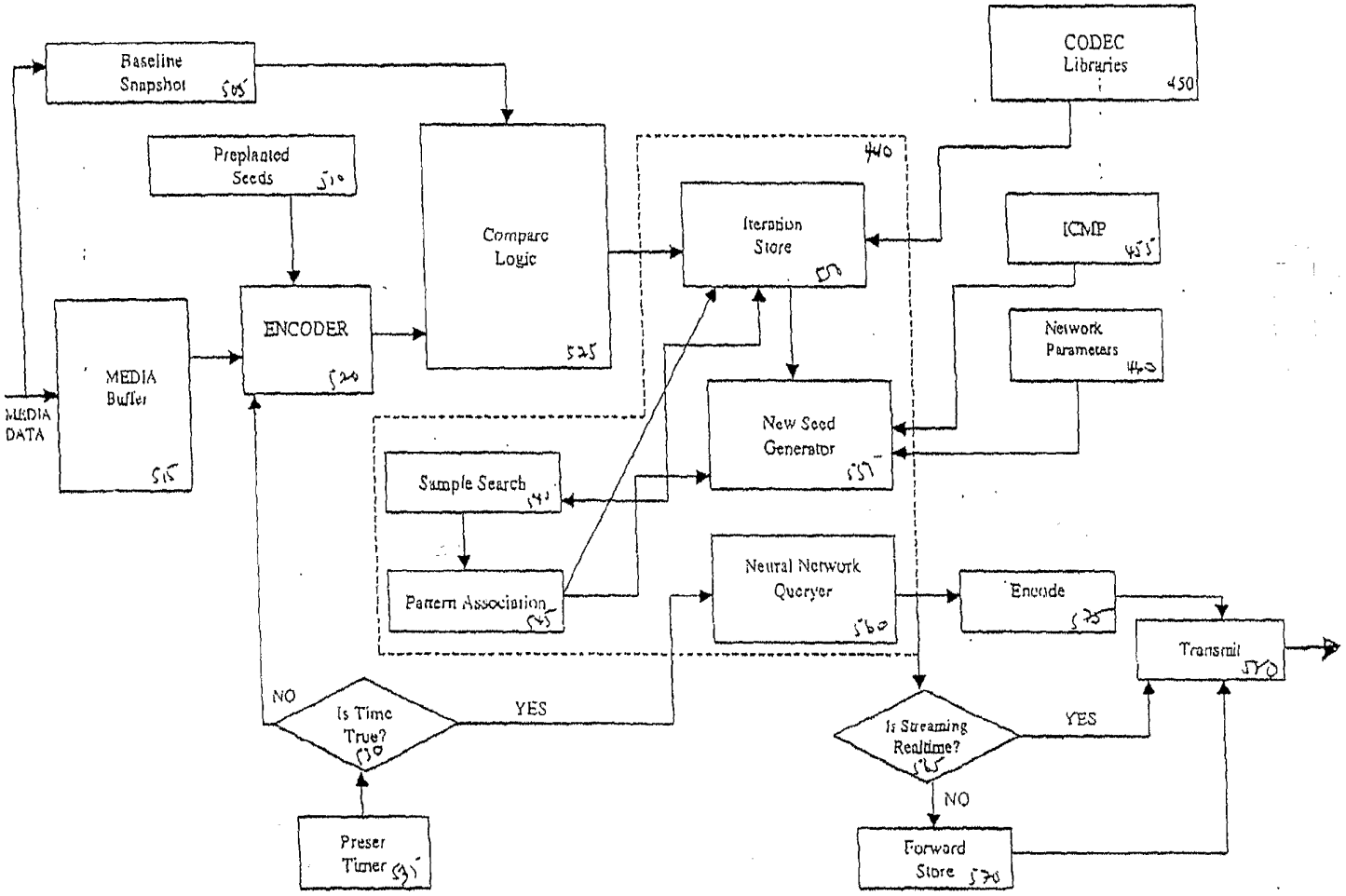

SOURCE
PROCESSOR
CLIENT
Network Layer Input 425
Network Layer Output 430
Dynamic Client Request 450
MEDIA 400
IMAGE PROCESSOR 410
Baseline Snapshot 415
NTS
Timer 435
ICMP 455
Classifier 417
Neural Network Process 440
Device and Network Parameter Measure 460
DYNAMIC PLAYER 405
Quality Standard 420
PSNR
Compressor 421
CODEC Library 445
QoS Library 447
Receive Executable Code 465
400

FIGURE 4B


440
475
Sample Frame
INPUT LAYER
485
N Neurons
HIDDEN LAYER
486
N Neurons
HIDDEN LAYER
487
OUTPUT
488
"BAKE OFF"
CODEC PARAMETERS
480

# FIGURE 5


Baseline Snapshot
Preplanted Seeds
Compare Logic
Iteration Store
CODEC Libraries
450
ICMP
Network Parameters
MEDIA Buffer
ENCODER
MEDIA DATA
New Seed Generator
Sample Search
Pattern Association
Neural Network Queryer
Encode
Transmit
NO
Is Time True?
YES
Is Streaming Realtime?
YES
NO
Preset Timer
Forward Store

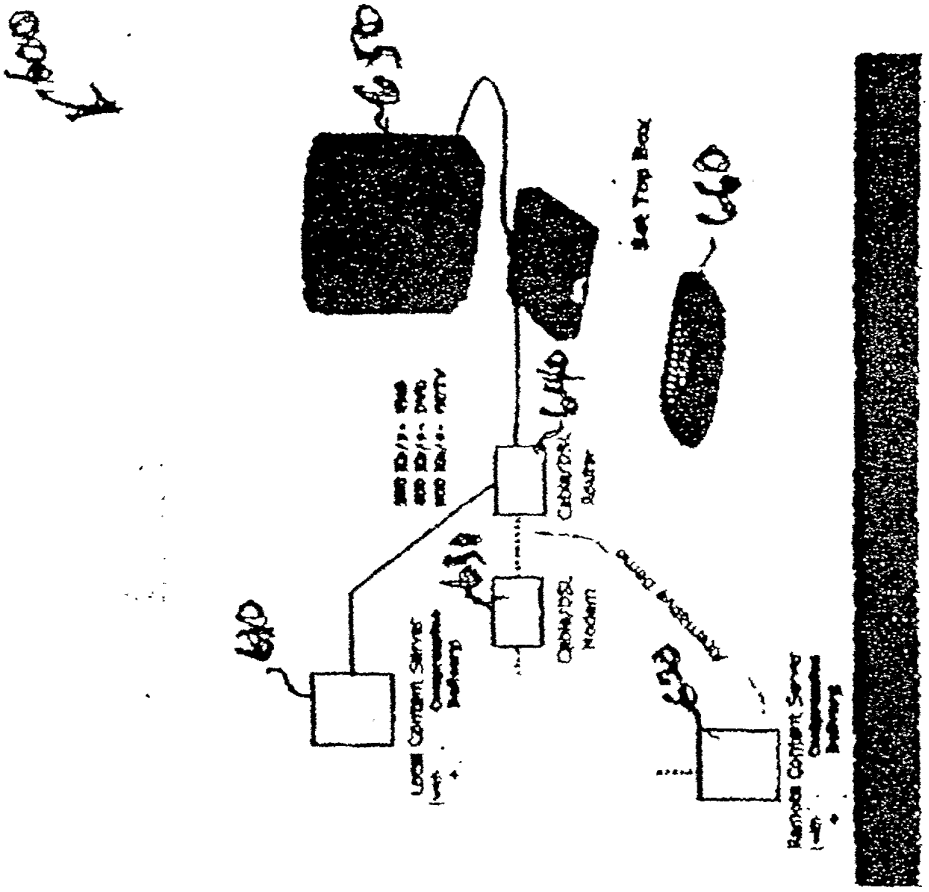



FIGURE 6



Aylo Exhibit 1018
Page 2091 of 2308

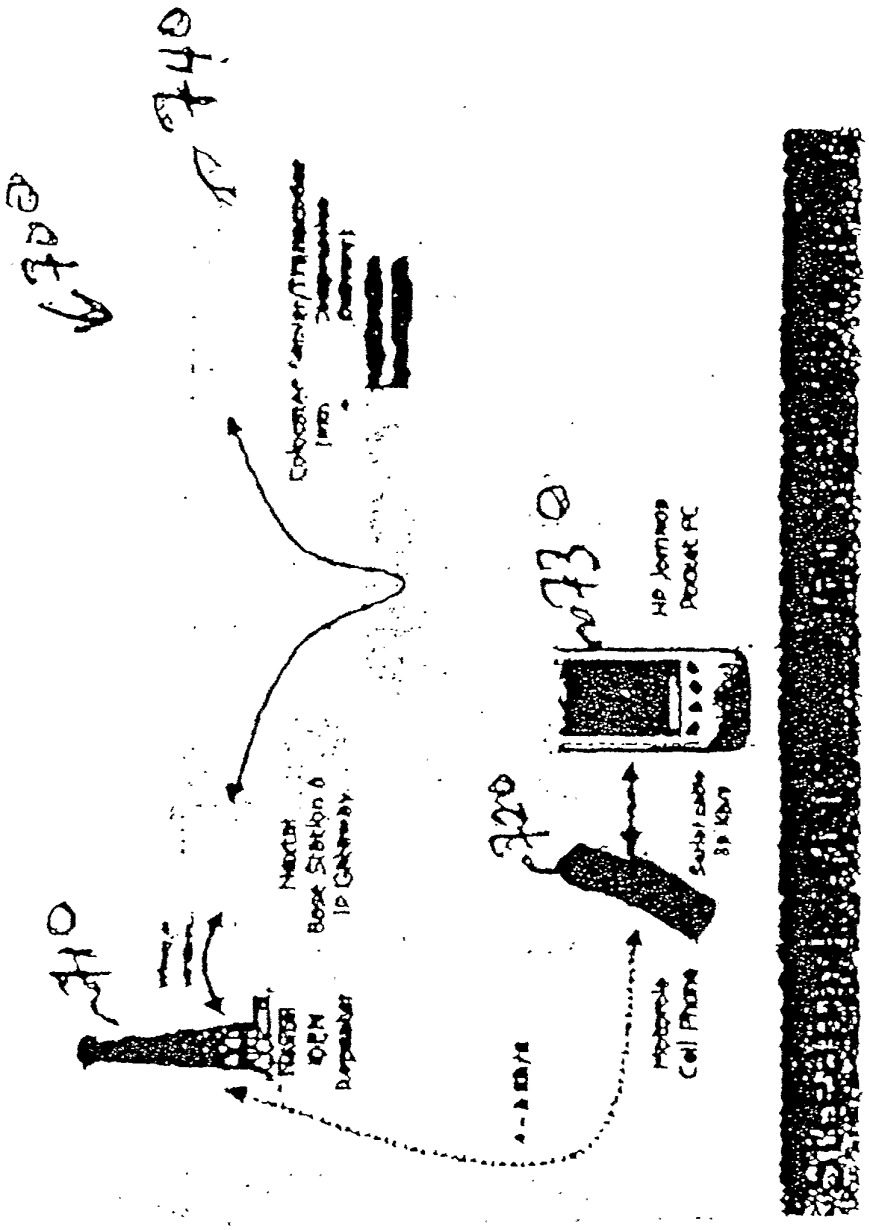


FIGURE 7



Aylo Exhibit 1018
Page 2092 of 2308

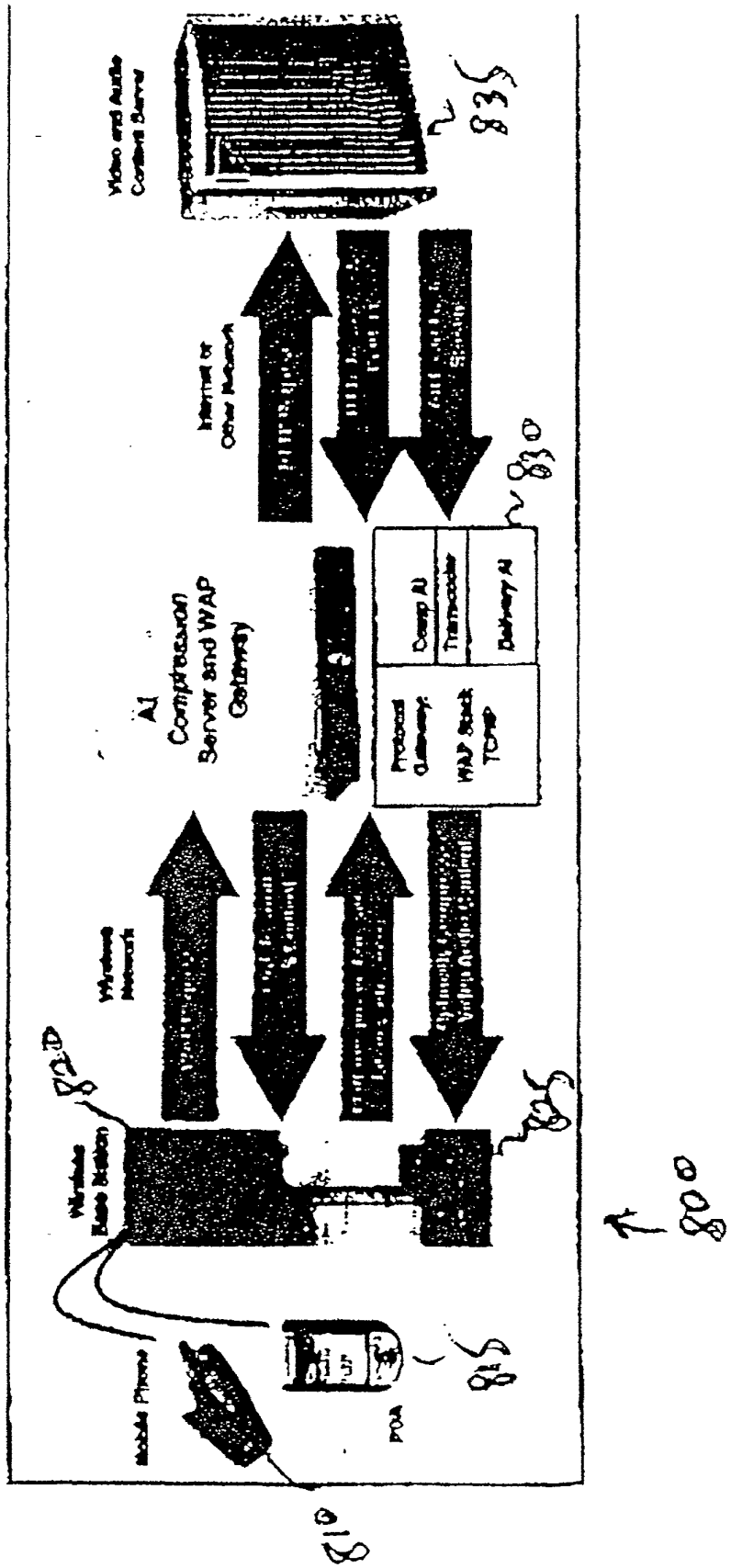
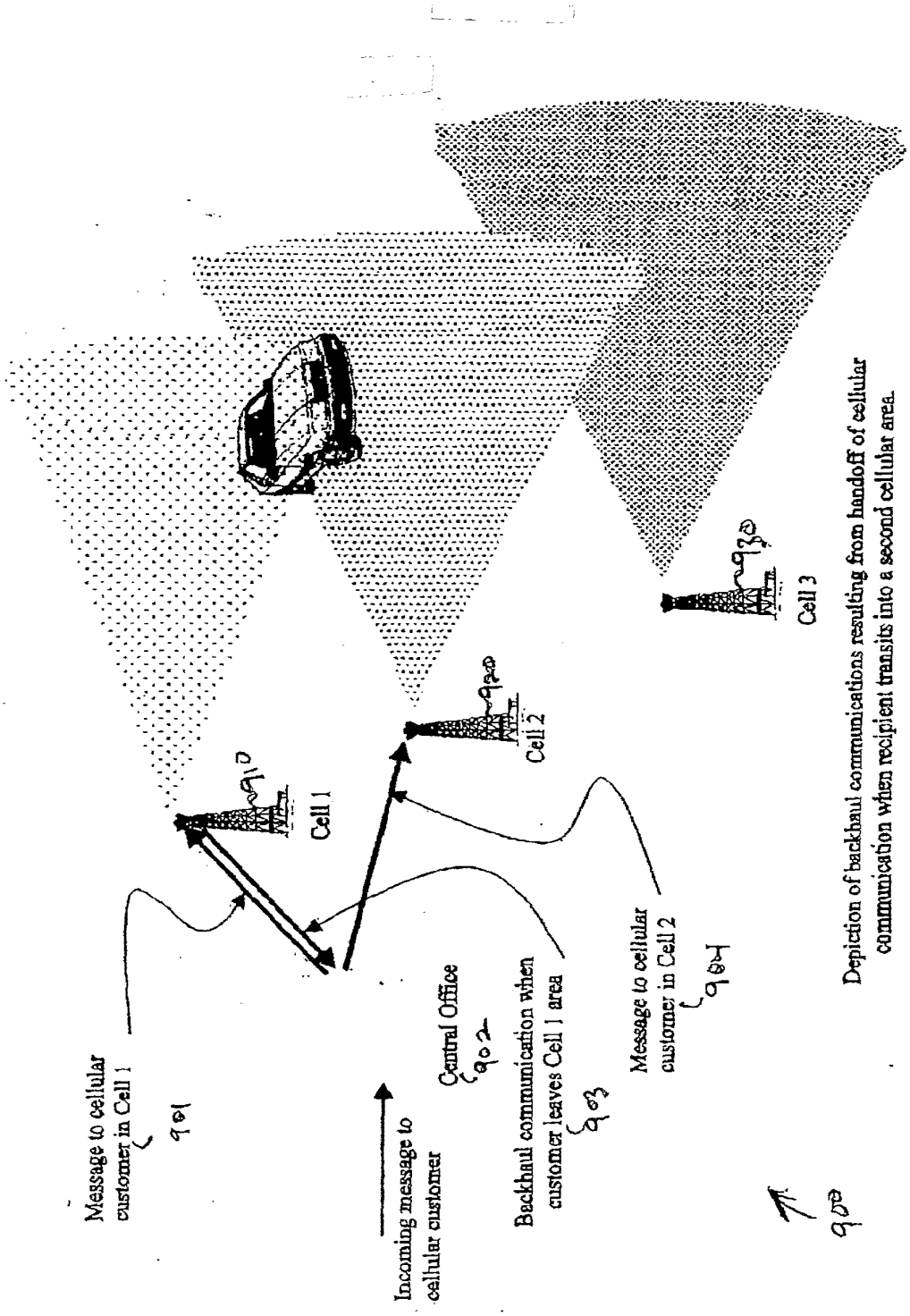



FIGURE 8



Aylo Exhibit 1018
Page 2093 of 2308

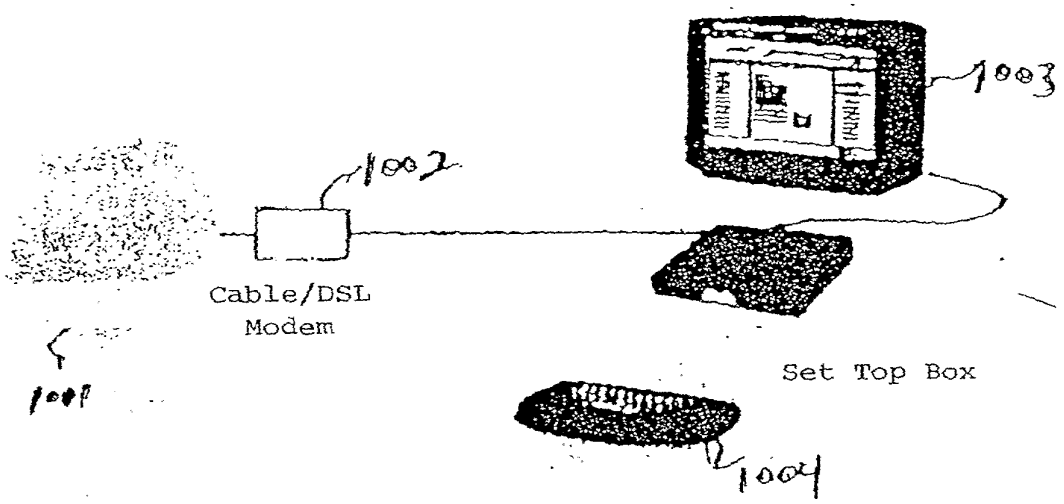
FIG. 9



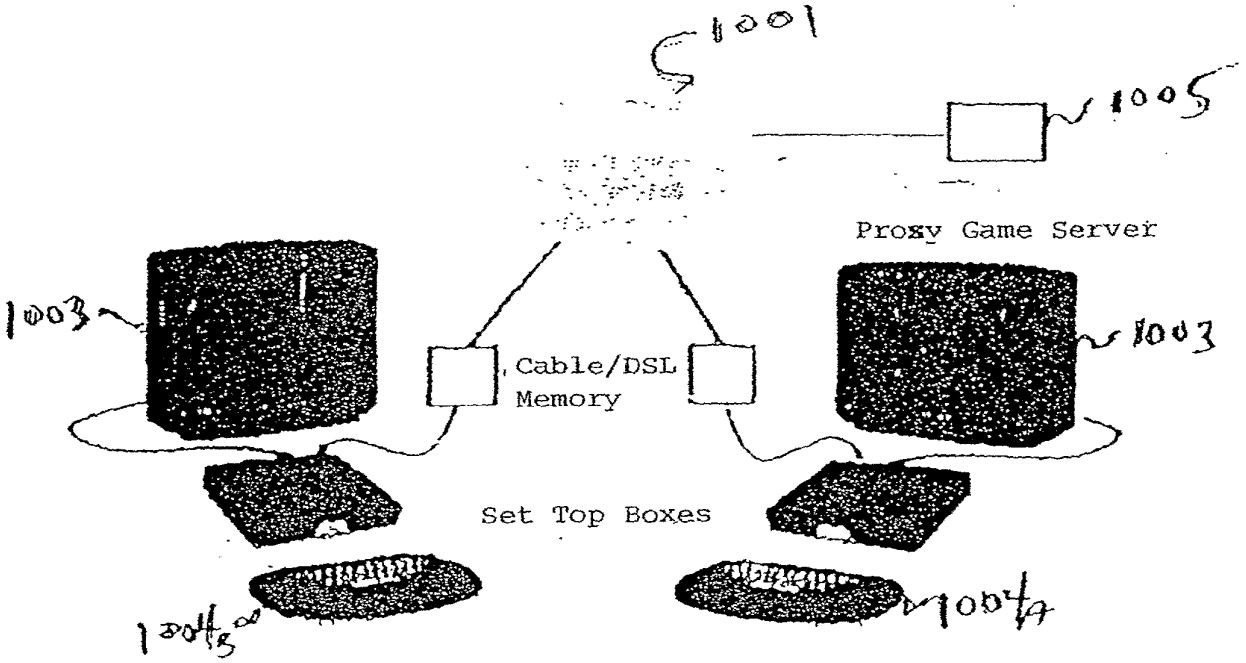

Depiction of backhaul communications resulting from handoff of cellular communication when recipient transits into a second cellular area.



Aylo Exhibit 1018
Page 2094 of 2308




**Browsing via the Set Top Box**




**Interactive Gaming**

Fig. 10



Aylo Exhibit 1018
Page 2095 of 2308

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/30874

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : G06F 15/16
US CL : 709/231,232,217-219,250,220; 704/243

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 709/231,232,217-219; 345/335,327

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| Y | US 6,195,692 B1 (HSU) 27 Febuary 2001, column 5 lines 4-19, | 1-69 |
| Y | US 6,243,676 B1 (WITTEMAN) 5 June 2001, column 7 line 55-col 8 line 56, | 1-69 |
| Y | US 6,115,755 A (KRISHAN) 5 September 2000, column 3 lines 19-45, column 4 lines 54-67 | 1-69 |
| Y | US 6,085,236 A (LEA) 4 July 2000, column 18 lines 9-20, col 26 line 59-column 27 line 4, | 1-69 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 10 December 2002 (10.12.2002) | 15 JAN 2003 |
| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. (703)305-3230 | Authorized officer<br>Mark Powell<br>Telephone No. 703-305-9703 |

Form PCT/ISA/210 (second sheet) (July 1998)

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
13 September 2001 (13.09.2001)

PCT

(10) International Publication Number
WO 01/67264 A1

(51) International Patent Classification[7]: G06F 15/16

(21) International Application Number: PCT/US01/40264

(22) International Filing Date: 8 March 2001 (08.03.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/520,434 8 March 2000 (08.03.2000) US

(71) Applicant *(for all designated States except US)*: **STREAMCENTER, INC.** [US/US]; 1512 Wellington Place, Aberdeen, NJ 07747 (US).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **MOGHE, Pratyush** [US/US]; 3002 Cricket Circle, Edison, NJ 08820 (US).

(74) Agents: **DIPPERT, William, H.** et al.; Cowan, Liebowitz & Latman, P.C., 1133 Avenue of the Americas, 35th Fl., New York, NY 10036 (US).

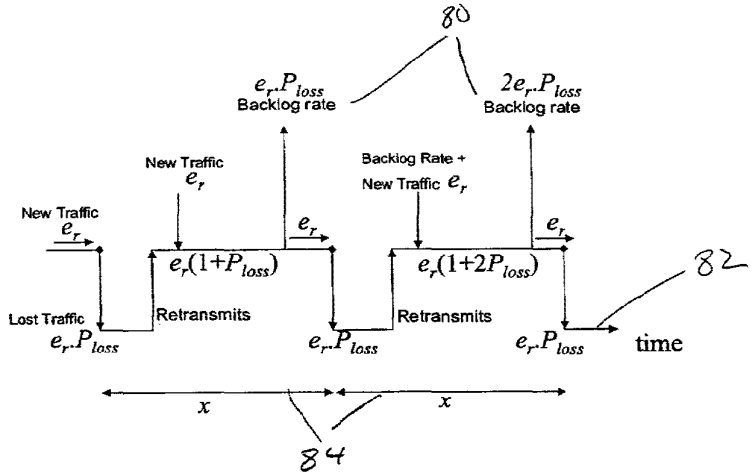
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published:**
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

*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.*

(54) Title: APPARATUS AND METHOD FOR PREDICTABLE AND DIFFERENTIATED DELIVERY OF MULTIMEDIA STREAMING ON THE INTERNET




(57) Abstract: The inventive method detects network congestion which interferes with streaming of multimedia audio and video packets from and reacts to it and guarantees delivery of packets. The streaming of the multimedia audio and video packets is performed when a server process executing on a sending computing device sends the packets to a player process executing on a receiving computing device via a network, such as the Internet. The detection of the network congestion is performed by communicating configuration information including network parameters from a service manager via the network to the at least one sending computing device and to the at least one receiving computing device. The network congestion (80) is then confirming by transmitting and retracting network probes. At least one buffer management technique is executed to limit degradation in the streaming of the packets. The end of the network congestion is detected by transmitting and retracting said network probes and the rate of streaming of the packets is configured accordingly (82, 84).

WO 01/67264 A1

# APPARATUS AND METHOD FOR PREDICTABLE AND DIFFERENTIATED DELIVERY OF MULTIMEDIA STREAMING ON THE INTERNET

## TECHNICAL FIELD

This invention relates to the field of multimedia audio and video streaming on the Internet, and more particularly, to an apparatus and method for predictable and differentiated delivery of multimedia streaming on the Internet.

## BACKGROUND OF THE INVENTION

Multimedia streaming involves broadcast of audio and video information from content providers called streaming servers or senders via the Internet to clients or receivers on user computing devices called streaming players. Real-time delivery of the multimedia streaming on the Internet is inherently uncontrollable and consequently unpredictable. When an Internet delivery path is congested, packets of multimedia streaming are typically dropped, thus causing degraded audio and video playback to be received by the streaming players. Typically, manifested forms of congestion can be classified into two types: instantaneous and sustained (longer-term). Instantaneous congestion is caused by random variations in the arrival patterns of packets of multimedia streaming at different Internet routers and switches, and due to the varying sizes of these packets.

These variations cause varying amounts of delay as the packets of multimedia streaming travel from the streaming server to the streaming receiver. If the delay accumulates beyond a certain point, the packets of multimedia streaming can get lost. This type of congestion typically causes sporadic delays and losses of over hundreds of milliseconds to a few seconds, and is hence referred to as "instantaneous congestion." In contrast, sustained congestion is longer-term and results during periods of excessive demand by the streaming players, e.g., demand for multimedia streaming from popular websites over the network paths on the Internet. During these periods, packet traffic surges can overwhelm the packet buffers in network routers, which are network traffic routing and forwarding computing devices, and packets of multimedia streaming can get

lost in bursts. This is similar to a rush-hour traffic scenario on highways at peak hours. Unlike instantaneous congestion, sustained congestion can last from tens of seconds up to a few minutes.

It is well known that instantaneous congestion is an easy problem to solve. The client or the streaming player can buffer incoming packets of multimedia streaming for a short duration before playback. This reduces the effect of short-term delay between packets of multimedia streaming. Additionally, by requesting that a lost packet be immediately retransmitted, the streaming player can counter the loss of packets of multimedia streaming due to instantaneous congestion. Several existing streaming systems use these techniques, i.e., short-term buffering along with retransmits of lost packets, to isolate the streaming player from the effects of instantaneous congestion. Examples of these systems include the Robust-User Datagram Protocol (UDP) feature in the Real system from Real Networks and the NetShow 3.0 MediaPlayer from Microsoft.

The problem of sustained congestion is harder to solve. This difficulty relates to the fact that the Internet delivery lacks a uniform real-time control. Several standardization and research efforts have proposed ways to introduce such control; however, none have succeeded in creating a global Internet standard. The referred to standardization and research efforts include the following:

1. L. Kleinrock, "On Flow Control in Computer Networks", International Conference on Communications (ICC'78), pages 27.2.1-27.2.5;
2. D.E. Comer, R. S. Yavatkar, "A Rate-based Congestion Avoidance and Control Scheme for Packet Switched Networks", The 10th International Conference on Distributed Computing Systems, pages 390-397, 1990;
3. K.K. Ramakrishnan, R. Jain, "A Binary Feedback Scheme for Congestion Avoidance in Computer Networks", ACM Transactions on Computer Systems, Vol. 8, No. 2, May 1990, Pages 158-181; and
4. D. Mitra, "Asympotically Optimal Design of Congestion Control for High Speed Data Networks", IEEE Transactions on Communications, Vol. 40, No. 2, February 1992.

For example, the RSVP effort, described in Braden, R., Zhang, L., Berson, S., Herzog, S., and Jamin, S., "Resource Reservation Protocol (RSVP) - Version 1

Functional Specification", RFC 2205, Proposed Standard, September 1997, seeks to add "quality of service" control within each network router and switch within the Internet. Another effort that seeks to create fast paths on the Internet is the "differentiated service" effort within the Internet Engineering Task Force (IETF) described in the following publications:

1) Nichols, K., Jacobson, V. and Zhang, L., "A Two-bit Differentiated Services Architecture for the Internet", Internet Draft, December 1997;
2) Ferguson, P., "Simple Differential Services: IP TOS and Precedence, Delay Indication, and Drop Preference", Internet Draft, November 1997; and
3) Clark, D. and Wroclawski, J., "An Approach to Service Allocation in the Internet", Internet Draft, July 1997.

The problem with these approaches is that they require structural changes throughout the Internet. This requirement assumes an explicit cooperation between various managers of the equipment comprising the Internet, which is an impractical assumption. Consequently, these efforts have stalled or are expected to have limited success. An alternative approach is to offer "adaptive applications". This approach proposes that application content be adapted based on the level of congestion. Methods based on this approach degrade the "experience" of an application in a controlled manner, but do not attempt to guarantee predictability or isolation from congestion effects. This approach is discussed in I. Busse, B. Deffner, H. Schulzrinne, "Dynamic QoS Control of Multimedia Applications based on RTP", May 30, 1995 and Real Networks, "White Paper on SureStream Technology", Available at http://www.real.com/devzone/library/whitepapers/surestrm.html.

What is needed is a "delivery framework" that will isolate streaming players from the effect of sustained congestion by providing a "predictable" delivery. Furthermore, there is also a need for a "differentiated streaming" framework that will provide for multiple levels of delivery isolation to the streaming players, without requiring structural changes in the Internet, as in K. Nichols et al., P. Ferguson and D. Clark, discussed above.

## SUMMARY OF THE INVENTION

The object of the present invention is to achieve a particular level of delivery isolation on particular streaming players. This level of delivery isolation may be based on factors like an importance "value" associated with particular streaming players, or the price the user of the streaming players are charged, etc. As an example, the streaming server may place specific streaming players in the high "value" category based on the demographic information on their owners, while other streaming players may be placed in the low "value" category.

Another object of the present invention is to ensure that the high value users of streaming players always receive consistent, predictable delivery of streaming content, even if there is an excessive user demand. If there is a situation of sustained congestion, wherein not all users can be satisfied, the content provider might want to ensure that the high value users are promised predictable delivery.

Accordingly, the present invention provides a method and an apparatus for predictable and differentiated streaming on the Internet. The system consists of software and random-access memory-based buffers installed at the streaming server and at the streaming players along with a service manager at a separate location. The method prescribes the manner in which the system is used to achieve predictable and differentiated delivery of streaming multimedia packets.

The invention is based on streaming multimedia packets between the software on the streaming server and the software on the streaming. The buffer sizes in the computing devices of the streaming player and of the streaming server are initialized based on the configuration information provided by the service manager software at the start of the execution of the inventive method. This configuration information includes:

a) the expected duration of sustained congestion periods,
b) the worst-case packet loss rate during the sustained congestion period,
c) the encoded bit-rate of streaming source information, and etc.

During the delivery of the streaming multimedia packets, the software on the streaming server relays the streaming packets to the software on the streaming player, which stores the packets in a playout buffer before playing them out. The playout buffer takes care of



Aylo Exhibit 1018
Page 2101 of 2308

delay variation that may arise due to instantaneous congestion on the network path. In case of short-term losses caused by instantaneous congestion, the software on streaming player immediately requests the server-end software to retransmit the lost information.

**Predictable Delivery Method**

To deal with sustained congestion ("congestion") the invention incorporates the following method. The software on the streaming player uses estimation techniques based on probes to detect and confirm the onset of sustained congestion. Once the congestion status is verified, the streaming player software informs the streaming server software about this event. The streaming server software then modifies the manner in which it streams packets to the streaming player software. In particular, the streaming server software ensures that the transmission rate of packets never exceeds the encoded bit-rate of the streaming source. Furthermore, it gives preemptive priority to the retransmitted packets over new packets. This creates a backlog of new packets at one of the streaming server buffers.

Meanwhile, the streaming player software continuously monitors the status of received packets and detects the end of congestion through estimation techniques based on probes. Once the end of congestion is confirmed, the streaming player software informs the streaming server software about this event. The streaming server software then begins to stream its backlog of new packets to the streaming player software. The transmission rate of this stream is increased based on the estimation information from the streaming player software along with feedback obtained from other streaming players in the network. This rate is carefully selected to ensure that the network is not flooded back into congestion. The buffer sizing at the streaming player and at the streaming server is based on the configuration information and ensures that the user experiences an uninterrupted playback during sustained congestion. This assumes that the configuration information is the "worst-case" scenario. If the actual service parameters turn out to be worse than the configuration information, the streaming player software contacts the service manager after the service. The configuration information at the service manager is now updated in a persistent manner with the actual worst-case parameters.

In one preferred embodiment, this update happens as follows. At the next service invocation, the buffers are sized based on the updated configuration information. The method thus automatically learns the worst-case behavior from the actual behavior of the network each time. Eventually, the method can guarantee a predictable delivery based on a non-interrupted playout in most cases. Various other embodiments are also possible, wherein the buffer size is fixed, but the encoding bit-rate of the stream is modified to choose the largest encoding bit-rate that leads to an uninterrupted playback.

**Differentiated Streaming Method**

The method for differentiated streaming involves identical operations as the predictable streaming method, except for the mechanism for streaming the backlog of packets from the streaming server software. For differentiated streaming, the streaming server software transmits the stream based on the "value" associated with the particular user, in addition to the information used for predictable streaming.

**Accounting Delivery Service**

Additionally, the methodology of the mentioned invention is utilized to offer the inventive method as an "accountable delivery service" to a large number of content providers, i.e., streaming servers, and users, i.e., streaming players. Such a service may deliver performance contract-based services to users of the streaming players on the Internet.

The service manager plays a central role in this service, by keeping and exchanging the state of several streaming players, delivery paths, and content providers/streaming servers in its database. The method of the present invention tracks the "actual" delivered viewing/listening experience of users of streaming servers by computing the delivery statistics including but not restricted to metrics that quantify "pauses or interruptions", "content throughput", and "content loss". In addition to the features of predictability and differentiation, the delivery service can also answer the question of "service feasibility". That is, at the beginning of a session, the service manager can estimate, based on the historical and instantaneous information, whether a

particular user can receive an "expected quality experience." While the present invention does not describe the details of this service, it should be obvious to those skilled in the art to build such a service around the framework of the present invention.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which the reference characters refer to like parts throughout and in which:

Figure 1 is a schematic diagram of the devices and programs comprising the invention.

Figure 2 is a schematic diagram of the components of the devices utilized by the invention.

Figure 3 is a schematic diagram of the operation of the invention during normal streaming.

Figure 4 is a schematic diagram of the operation of the invention during congestion.

Figure 5 is a schematic diagram of the recovery scheduling operation of the invention after congestion.

Figure 6 is a diagram of the modeling the backlog operation of the invention during congestion.

Figure 7 is a state transition diagram for streaming player module (normal streaming).

Figure 8 is a state transition diagram for streaming server module (normal streaming).

Figure 9 is diagram of a congestion processing protocol at the streaming player module (during and after congestion).

Figure 10 is a diagram of an congestion processing protocol at the streaming server module (during and after congestion).

# DETAILED DESCRIPTION OF THE INVENTION

## Architecture

The invention, shown in Figure 1, comprises at least one computing device 10 for executing a service manager process 12, at least one computing device 14 for executing streaming server process 16, and at least one computing device 18 for executing streaming player process 20. The service manager process 12 is shown as residing on the computing device 12 only for the clarity of presentation. It may be obvious to those skilled in the art that the service manager process 12 may reside on any computing devices 14 and 18. Furthermore, server processes 16 may be present on the computing devices 18 alongside player processes 20, and vice versa the player processes 20 may be present on the computing devices 14 alongside server processes 16. Each computing device 10, 14 and 18 are connected to a network 22 and establish data paths amongst each other. In the preferred embodiment, the network is the Internet.

The streaming server process 16 transmits a single multimedia stream to each streaming player process 20 and the streaming player process 20 receives that single multimedia stream. The streaming server process consists of three buffers:

a) Output buffer 24, used to transmit new packets from the server process 16 to the player process 20;
b) Backup buffer 26 , for maintaining temporary copies of the packets transmitted to the player process 20; and
c) Retransmit buffer 28, for maintaining retransmit requests received from the player process 20. The streaming player process 20 may comprise a player buffer 29.

Before a streaming session begins, the Service Manager process 12 downloads configuration information via the network 22 to both the computing device 14 for the use of the streaming server process 16 and to the computing device 18 for the use of the streaming player process 20. At the end of each streaming session, the configuration information on the computing device 10 is updated for the future use of the Service Manager process 12 via the network 22 by both the streaming server process 16 on the computing device 14 and the streaming player process 20 on the computing device 18.



Aylo Exhibit 1018
Page 2105 of 2308

The computing devices 10, 14, and 18 may take the configuration of any computer ranging from mainframes and personal computers (PCs) to digital telephones and hand held devices, e.g., palm pilots™. In one illustrative embodiment of this invention shown in Figure 2, such computing devices may comprise a bus 30, which is connected directly to each of the following:

1. a central processing unit (CPU) 32;
2. a memory 34;
3. a system clock 36;
4. a peripheral interface 38;
5. a video interface 40;
6. an input/output (I/O) interface 42;
7. a communications interface 44; and
8. a multimedia interface 46.

The common bus 30 is further connected

1. by the video interface 40 to a display 50;
2. by the I/O interface 42 to a storage device 52, which may illustratively take the form of memory gates, disks, diskettes, compact disks (CD), digital video disks (DVD), etc.;
3. by the multimedia interface 46 to any multimedia component 56;
4. by peripheral interface 38 to the peripherals 58, such as the keyboard, the mouse, navigational buttons, e.g., on a digital phone, a touch screen, and/or writing screen on full size and hand held devices, e.g., a palm pilot ™;
5. by the communications interface 44, e.g., a plurality of modems, to a network connection 60, e.g., an Internet Service Provider (ISP) and to other services, which is in turn connected to the network 22, whereby a data path is provided between the network 22 and the computing devices 10, 14, and 18 (Figure 1) and, in particular, the common bus 30 of these computing devices; and
6. furthermore, by the communications interface 44 to the wired and/or the wireless telephone system 54.

**Normal Conditions**

Turning now to Figure 3, the normal streaming operation is shown when there are either zero, i.e., no losses, or sporadic streaming losses, i.e., loss occurring due to instantaneous burst of streaming packets. The overall streaming sequence works as follows. Packets streamed from the streaming server process 16 are queued up in the streaming server output buffer 24 for transmission. The server process 16 is responsible for transmitting streaming packets 70 to the computing device 18 executing the player process 20. Periodically, this process 16 checks the output buffer 24 and the retransmit buffer 28 to determine if there are streaming packets 70 awaiting transmission or any requests form the player process. Any remaining streaming packets in the output buffer 24 are then transmitted. If retransmission requests are found, any streaming packets 70 requested for retransmission and found in the backup buffer 26 are transmitted. When streaming packets 70 are transmitted, a temporary backup copy of the transmitted streaming packets 70 is kept in the backup buffer.

The streaming player process 20 receives the streaming packets 70 and stores them at the tail-end of the player buffer 29. Periodically after a user-defined interval, the player process 20 examines the received streaming packets 70 to see if any streaming packets 70 are missing. If packets are missing, the player process 20 sends a request 72 to the server process 16 to retransmit the missing packets. After assuring that all the streaming packets 70 are received, the received streaming packets 70 are forwarded from the head-end of the player buffer to the streaming player process 20.

**Congested Conditions**

The invention detects congestion early on, and then may take steps so that the impact of congestion on the stream is minimized. A correctly configured framework can keep a stream completely transparent of sustained congestion, thus providing an effect equivalent to a "reservation." Two principles are at the basis of this framework, detection/reaction to congestion and congestion recovery.

1. Detecting and reacting to congestion

The invention detects congestion through probes launched by the player process 20. The probes are discussed in detail later. Once congestion is confirmed, the server process 16 reacts by using a technique called "constant bit-rate emulation." This name derives from the fact that the server process 16 tries to maintain a constant upper bound on the rate at which the streaming packets 70 are streamed to the player process 20. Typically, the upper bound is set equal to the encoding bit rate of the stream. In effect, the server process 16 emulates a constant bit-rate by substituting new server packets with packets that have been requested 72 for retransmission. Please recall that in congestion, the server has a large number of retransmit requests 72 issued from the player process 20. Figure 4 shows the flow of streaming packets 70 during this congestion situation. Two important reasons motivate the constant bit-rate emulation method:

a) The method demonstrates a "network-friendly" yet efficient behavior. The method is network-friendly, since it conserves bandwidth during congestion by lowering the upper bound of its streaming transmission rate. Additionally, the method is efficient for the following reasons. First, the upper bound on the transmission rate is set equal to the maximum encoding bit-rate of the source stream; this is not a restrictive setting. Unlike other schemes that voluntarily reduce the source rate during congestion, the present invention only reduces the transmission rate by the amount of incurred loss. This decision has an important implication in practice. Most practical congestion-processing algorithms will incur errors and delays in estimating and reacting to the start of congestion or end of congestion. Consequently, there will be temporary periods in which these algorithms "think" that the network is congested, when in practice, the network has cleared out of congestion. In situations like this, estimation errors do not degrade the streaming throughput. In fact, the invention delivers a throughput better or equal to the throughput of any other scheme, if there is no loss of streaming packets 70.

b) Assuming most connections sharing the network with streaming are using the Transmission Control Protocol (TCP), the constant bit-rate of the invention in congestion allows the TCP traffic on the same path to accurately sense the available bandwidth (most Internet or Web traffic uses TCP). An alternative design with

adapting bit-rate would confuse most other TCP connections and cause each to keep oscillating their TCP windows. If all TCP connections maintain a steady window-size, the performance of the network is much smoother in congestion. This behavior can drain out the congestion faster and reduce the estimation errors.

2. Detecting End-of-Congestion and Recovery from congestion

The invention detects the end of congestion through probes launched by the player process 20. Once the player process 20 confirms that congestion is over, the server process 16 enters a phase called "recovery scheduling". Figure 4 shows a recovery scheduling after congestion. To understand this phase, recall that in the previous state of congestion, the server transmits packets at a constant rate. By substituting new packets with older lost packets, the server is in effect creating a backlog of new packets in its output buffer. The idea in recovery scheduling is to exhaust the substantial backlog that may build up at the server output queue. Clearly, this backlog must not be cleared by flooding the network. Such action may cause significant losses in the intermediate switch buffers. In addition, if thousands of streams of packets 70 flood the backlog at the same time, this may cause certain network points to get congested again. Recovery scheduling is a procedure that configures the rate of streaming the backlog based on the network parameters. Additionally, recovery scheduling can also take into account the "premium" placed on the particular player process 20. The latter consideration allows the server process 16 to stream backlog of streaming packets at different priorities. "Higher value" users can receive backlog sooner than "lower value" users. This is the basic principle behind differentiated streaming.

**Buffer Design**

As described previously, the configuration information is downloaded to the computing devices 14 and 16 at the beginning of each streaming session. This configuration information includes the following parameters:

(1) Worst-case duration of congestion, $c*x$, where $x$ is a sampling or retransmission interval, and $c$ is a number of sampling intervals in a congestion period.

(2) Worst-case of loss of streaming packets 70 during congestion defined by $P_{loss}$

(3) Encoding bit-rate of the stream of streaming packets 70 defined by $e_r$

(4) Averaged and minimum service rate, $SR_{avg}$ and $SR_{min}$. This is the rate at which streaming packets 70 are actually transferred from the server process 16 to the player process 20. $SR_{min}$ is the minimum rate across the path via the Internet 22 from the server process 16 to the player process 20.

(5) Path bottleneck link bandwidth $B_{min}$ and the hop link capacities, where $B_{min}$ is the minimum physical bandwidth across all the hops, i.e., the routing devices between the server process 16 and the player process 20.

The parameters indicated in the list above may be obtained through historical measurements of the relevant values and through measurements made on streaming packets 70 at the computing device 14 of the server process 16. The parameters are in turn used to design the sizes of the buffers 24, 26, 28 and 29 of server process 16 and the player process 20. One preferred embodiment of achieving this is described immediately below. That embodiment ignores the upper bounds limits on the buffer sizes related to the available random-access memory 34 (Figure 2) in the computing devices 14 and 18.

Player Buffer-size ($b_c$)

The buffer on the computing device 18 used by the streaming player process 20 plays out the streaming packets 70 at the maximum rate of $e_r$ bits per second. During sustained congestion, the packet loss is approximately $P_{loss}$, and the maximum transmission rate from the server, as explained above is $e_r$. It follows that the rate of the player buffer 29 fill rate equals to $e_r * (1 - P_{loss})$ bits per second. Thus, the net drain on the player buffer 29 proceeds at the rate of $e_r * P_{loss}$ bits per second. To prevent the player buffer 29 from draining out completely within the congestion period $c * x$, the buffer-size of the player buffer 29 should satisfy the constraint defined as:

$$\frac{b_c}{e_r * P_{loss}} \geq c * x \quad \text{or} \quad b_c \geq c * x * e_r * P_{loss} \qquad \text{(Equation 1)}$$

Streaming Server Output Buffer-size ($b_o$)

Recall that the streaming server output buffer holds the backlog of new packets created during the congestion period. Consequently, the size of this buffer is dictated by the worst-case amount of backlog during the congestion period. To calculate the worst-case backlog of the streaming packets 70, a simple model may be built up. Figure 6 shows the approximate amount of backlog as a function of time 82 during sustained congestion. As indicated, the backlog rate 80 after two retransmission intervals 84 is $2 * e_r * P_{loss}$. By extension, after $c$ retransmission intervals 84, the backlog rate 80 will be $cx * e_r * P_{loss}$. This establishes the constraint on the size of the output buffer 14 (Figure 1) in the memory 34 (Figure 2) of the computing device 14 (Figure 1) executing streaming server process 16 (Figure 1).

$$b_o \geq c * x * e_r * P_{loss} \qquad \text{(Equation 2)}$$

Server Backup Buffer-size ($b_{backup}$)

The backup buffer 26 (Figure 1) holds temporary copies of the server packets that have been transmitted to the player process 20 (Figure 1). The copies must be held until the server is sure that the packets have been successfully received in the player buffer 29 (Figure 1). To estimate the size of this backup buffer 26 (Figure 1) again, an operational model is built. First, the transmission rate in packets per seconds is defined as $R_p$. At the start of the first retransmit 84, the approximate rate of loss of the streaming packets 70 (Figure 3) is $P_{loss} * R_p$. Assuming the loss affects new as well as retransmitted streaming packets 70 (Figure 3) equally, the approximate rate of loss for older unsuccessful streaming packets 70 (Figure 3) at the second retransmit 84 is $P_{loss}^2 * R_p$. Supposing now that the number of retransmits that will reduce the loss rate for older



Aylo Exhibit 1018
Page 2111 of 2308

packets to a negligibly small number, e.g., 0.1 packets for every retransmission interval is defined by $m$. This implies that:

$$P_{loss}^{m} * R_p \leq \frac{0.1}{x}, \quad \text{or that} \quad m \geq \frac{\log\left(0.1/R_p * x\right)}{\log P_{loss}}$$

Alternatively, if s is the packet size, the above equation may be expressed as:

$$m \geq \frac{\log\left(0.1 * s/e_r * x\right)}{\log P_{loss}}$$

The minimum required buffer size may be defined as equal to $m * x$. Consequently, the size constraint of the backup buffer 26 (Figure 1) is

$$b_{backup} \geq m * x \quad \geq x * \frac{\log\left(0.1 * s/e_r * x\right)}{\log P_{loss}} \qquad \text{(Equation 3)}$$

The detailed operational method underlying the invention is captured through a protocol called "Streaming Congestion Protocol" (SCP). In the section below the SCP sequences during different phases of streaming are described. Figures 6 and 7 show the detailed operational sequence at the streaming server process 16 (Figure 3) and the streaming player process 20 (Figure 3) during normal streaming of the streaming packets 70 (Figure 3). The operational sequences are described with the help of state diagrams. A state diagram shows various states and transitions between states. Each state captures a specific operational state, and the transitions between states capture the events that cause the operational states to change. Figure 7 shows the state diagram of events at the streaming server process 16 (Figure 1). Figure 8 shows the corresponding state diagram at the streaming player process 20.

**Processing during and after congestion**

Please refer to Figure 9, by default, the streaming player process 20 is in a normal state 100. The player process 20 may keep a track of the packet loss of a received stream at a periodic interval that may be user determined. If the amount of loss exceeds a



Aylo Exhibit 1018
Page 2112 of 2308

threshold, e.g., Threshold1, across a time-window of some number of seconds which may also be user determined, e.g., TW1, the player process 20 moves into the Likely Congestion state 102. At this point, the streaming player process 16 (Figure 1) launches congestion probes to determine whether the congestion symptoms are verified. These probes form a part of a test called confirm congestion test. If the test indicates that congestion is confirmed, the process moves to a Congestion Confirmed state 104. Immediately, the streaming player process 20 contacts its server counterpart and informs it about the new state change along with some other relevant information.

Note that the transition from a Likely Congested state 102 to Congestion Confirmed State 104 can happen in two other ways. First, the player process 20 may actually receive a Remote Congestion Confirmed report in state 106 from its server process 16 (Figure 1) indicating that some other player process 20 on a related network path is in the Congestion Confirmed state. If this happens, the player immediately moves to the Congestion Confirmed State 104 itself. If the player process 20 has already started conducting congestion probes before this notification, the player process 20 may halt them at the instant it receives the notification. Alternatively, the player process 20 may receive a Local Congestion Confirmed report in state 102 reporting that some other local player process 20 on the same streaming player module has verified congestion. If the Remote or local Congestion Confirmed reports have verified congestion within a past time-window not exceeding the time defined as Tcc, the player process 20 moves to a confirmed congestion state 104.

Once the streaming player process 20 (Figure 1) enters the congestion confirmed state 104, it periodically monitors the loss of the received stream of streaming packets 70 (Figure 3). If the packet loss is less than a second user defined threshold, e.g., Threshold2, across a second user defined time-window, e.g., TW2 seconds, the player process 20 enters the likely end-of-congestion (EOC) state 106. At this point, the player process 20 launches an EOC probe test that either confirms or invalidates the EOC decision. If the EOC probe test confirms congestion, the streaming player process 20 enters the EOC state 108 and sends an EOC report 110 to its server process 16 (Figure 1) counterpart. With this transition, the process re-enters the normal state 100. Note that

during transitions from the EOC state 110 back to the Normal State 100, the streaming player process 20 also needs to continually process the arriving packets in step 120 (Figure 7), check and request for retransmission of missing packets in step 122 (Figure 7), and forward packets to the streaming player for playback in step 124 (Figure 7). These activities are indicated in Figure 7 and are not shown in Figure 9 for purposes of clarity.

Figure 10 shows the SCP state-diagram of the server process 16. After initialization, the server process 16 enters the normal state 130. If the server process 16 receives a report from its streaming player process 20 (Figure 1) indicating congestion, the server moves to the Confirmed Congestion or Confirmed Congestion State 132. At this point, the server process 16 shares the Confirmed Congestion status information with other server processes 16 running on the same computing device 14 (Figure 1) in the Propagate Confirmed Congestion state 134, and potentially also from other computing device 14 (Figure 1) through interaction with the service manager 12 (Figure 1) via the network 22 (Figure 1). The idea behind this is to have selected server processes report the congestion to their player process so that these player processes can avoid doing the Confirmed Congestion probing test. This cuts down on the congestion reaction time and significantly cuts down the probing traffic. In general, each server process that receives the Confirmed Congestion status in the Receive the Confirmed Congestion status state 140 from other server processes 16, first determines whether the Confirmed Congestion status is relevant to its target player process 20 (Figure 1). If this is the case, the server processes notify their player process 20 (Figure 1). Notification is done through a special signaling scheme involving reliable transport protocol (RTP) messages, as discussed in Schulzrinne, Casner, Frederick, Jacobson, "RTP: A Transport Protocol for Real-time Applications", RFC 1889, Internet Engineering Task Force.

The streaming server process 16 will then make transitions from the Confirmed Congestion State 132. Starting with the Confirmed Congestion state 132, the server process 16 transmits streaming packets 70 (Figure 3) at a constant bit-rate. The server process 16 moves to the Recovery Scheduling State 136 as soon as it receives an End-of-congestion or EOC report from the player process 20 (Figure 1) targeted for the reception of

its content. Thereafter the server process 16 changes its mode of transmission, using recovery scheduling to drain its backlogged output buffer 24 (Figure 1) in an intelligent way. As soon as the backlog is over, the server process 16 moves back to the normal state 130.

While in the Normal State 130 the server process 16 may receive and filter information from other server processes 16 by entering the Receive Confirmed Congestion State 140. It may also notify the player processes 20 (Figure 1) about the confirmed congestion status through the in-band RTP signaling, by entering the Confirmed Congestion Notification state 138 from where the process 16 will return to the Normal state 130.

The server process 16 also needs to continually process the departing packets in step 150 (Figure 8), check and process the requests for retransmission of missing packets in step 152 (Figure 8), and backup packets to the backup buffer 26 (Figure 1) for playback. These activities are indicated in Figure 8 and are not shown in Figure 10 for purposes of clarity.

**Recovery scheduling algorithm**

Supposing that the server process 16 (Figure 1) streams of streaming packets 70 (Figure 3) are classified into K number of priority classes. Class 1 being the highest priority and class "K" being the lowest priority. Each priority class "j" is associated with a weighting function $\alpha^j$, where $0 < \alpha^K < \alpha^{K-1} < .. \alpha^j < .. < \alpha^1 = 1$. Considering the server process 16 (Figure 1) with priority equaling to "j", the rule for transmission rate $e_t$ of this process is:

$$e_t = \min(\alpha^j \times SR_{min}, \alpha^j \times \frac{B - \lambda_{other}}{\sum_{i=1}^{i=K} \alpha^i n^i})$$

(Equation 4)

In equation 4, all the terms are measured at the service bottleneck hop between the computing device 14 executing the server process 16 and the computing device 18 executing the player process 16. $B$ is the bottleneck link capacity at the bottleneck hop.

$\lambda_{other}$ is the aggregate packet rate carried at the hop from traffic not utilizing the inventive method. This rate can be estimated by obtaining the aggregate packet rate of the streaming packets 70 (Figure 3) of the inventive method $\lambda_{SME}$ from the service manager, and using the fact that $\lambda_{other} = B \times \rho - \lambda_{SME}$, where $\rho = 1 - \frac{SR_{\min}}{B}$ is the utilization of the bottleneck hop. The parameter $n^i$ is defined as the number of priority "i" streams carried at the bottleneck hop. The hop is a section of a network between two network-computing devices such as routers. This parameter may be obtained from the service manager 12 (Figure 1). The logic behind this equation is as follows. The first term indicates that the new transmission rate should be set equal to the minimum service rate along the path, in order to recover from the backlog. The second term takes into account the result of increasing the transmission rate on the utilization at the bottleneck hop. In other words, since the maximum utilization can be 100%, each computing device 14 executing server process 16 must carefully weigh the effects of increasing the transmission rate. The best rate is the maximum rate that does not congest the bottleneck bandwidth during recovery. Hence the min operator. Finally, the priorities within the equation 4 provide for differentiated streaming.

**Congestion Estimators**

Earlier on, we described the congestion estimation tests as part of the SCP algorithm. In principle, congestion can be estimated in a variety of ways, and the invention is not restricted to any one particular method of congestion estimation. A particular embodiment of the invention for estimating congestion based on a mix of passive and active probes will now be described. This method comprises a set of rules configured around the results of the probes. A specific congestion test e.g., an end of congestion test or a confirmed congestion test mentioned in earlier sections, combines these rules in a particular way.

The following are some of a variety of methods that may be used to compute the bottleneck bandwidth on a path between the streaming player 20 (Figure 1) and the

streaming server 16 (Figure 1). These methods are shown here for exemplary purposes only and not to indicate that only these methods must be used with the present invention.

**Capacity Probe**

This method is described in detail in Van Jacobson, "pathchar - A tool to infer characteristics of Internet paths", MSRI, April 21, 1997; and R. L. Carter and M.E. Crovella, "Measuring Bottleneck Link Speed in Packet-switched Networks", TR-96-006, Boston University Computer Science Department, March 15, 1996. This method is initiated by the player process 20 (Figure 1) at various stages of a streaming session. The steps of this exemplary method are as follows:

1. Do a traceroute and get hop identities marked by IP addresses.
2.

a) For every hop from one onwards, send a series of ICMP timestamp requests (type 13) from the player to the hop. Packet sizes of queries are changed in steps of 1024, 512, 256, 128, and 64, where each queries are sent out with a spacing of 3 seconds between them.

b) For every hop i between the player and the server, the player must record the ICMP timestamp response (type 14) and compute the time difference between the hop i transmit time $t_i$ and the player receive instant $t_1$.

c) Denote the time difference by $\tau_{i1} = t_i - t_1$.

d) Take four measurements for timestamp differences by varying packet size through five values. Discard the minimum and the maximum, and take average of the remaining two. Let s' and s'' denote the packet sizes of two selected queries to hop i. Let $\tau_{i1'}$ and $\tau_{i1''}$ denote the measurements for the respective packet sizes.

e) Calculate $X_{i1} = \dfrac{\tau_{i1'} - \tau_{i1''}}{s' - s''}$

It can be proved that link capacity $B_{i,i-1} = \dfrac{1}{X_{i1} - \left( \sum_{k=1}^{i-2} \dfrac{1}{B_{i-k,i-k-1}} \right)}$ can be computed recursively.

The path bottleneck bandwidth $B_{min} = \min_i B_{i,i-1}$. (Equation 5)

## Service Rate Probe

The "Service Rate probe" computes the approximate service rate of transferring packets between the server and the player, as discussed in Van Jacobson, "pathchar - A tool to infer characteristics of Internet paths", MSRI, April 21, 1997; and R. L. Carter and M.E. Crovella, "Measuring Bottleneck Link Speed in Packet-switched Networks", TR-96-006, Boston University Computer Science Department, March 15, 1996. The minimum service rate is the least service rate on the path, while the average service rate is the "expected" service rate on the path. . The steps of this exemplary method are as follows:

1. Obtain the hop list through traceroute. Suppose there are n-1 hops between the player and the server.
2. Periodically, the player initiates a cycle. In each cycle, the player sends n-1 queries, each spaced by ¼ second. The player forms timestamp differences between query responses from consecutive hops. The results are sent back to the server.
3. The server uses results from several cycles along with the link capacities to calculate the service rate.
   a) First, the server calculates $\tau_{m,m-1}^{min} = min(\tau_{m,1} - \tau_{m-1,1})$ where the min operator works over all collected cycle results. We approximate $\tau_{m,m-1}^{min}$ to be the base-line delay between node m and node m-1.
   b) Denote the maximum queuing delay between node m and node m-1 by $q_{m,m-1}^{max}$, where node is a computing device, e.g., a computer or a router connected to the network.

c) Then, $q_{m,m-1}^{max} = max(\tau_{m,m-1} - \tau_{m,m-1}^{min})$

d) Denote the average queuing delay between node m and node m-1 by $q_{m,m-1}^{avg}$.

e) Then, $q_{m,m-1}^{avg} = avg(\tau_{m,m-1} - \tau_{m,m-1}^{min})$

Finally, the minimum service rate is:

$$SR_{m,m-1}^{min} = \frac{s}{\frac{s}{B_{m,m-1}} + q_{m,m-1}^{max}},$$

and the average service rate is:

$$SR_{m,m-1}^{avg} = \frac{s}{\frac{s}{B_{m,m-1}} + q_{m,m-1}^{avg}} \qquad \text{(Equation 6)}$$

**Congestion Detection Rule (CC Test)**

A robust but responsive congestion detection mechanism is an essential part of the inventive method. It is important to respond quickly to congestion; this can reduce the congestion period and hence make it easier for the recovery scheduling to do its job in a shorter period of time. Ultimately this can allow the method to work with a reduced buffer size and hence a reduced connect lag. It is equally important to robustly distinguish a sustained congestion condition. False detection can lead to reduced throughput and performance. Recall that the inventive method treats sustained congestion by reducing the throughput of the newer packets, so that the throughput of older retransmitted packets is maximized.

The present invention uses the following congestion detection rule:

1. Packet losses exceeding a threshold for a consecutive time-window of duration $T_s$. $T_s$ is set to 10 seconds by default.
2. If condition 1 is triggered, three short service rate probes are sent, spaced 2 seconds apart, from the player to the $SR_{min}$ hop. Responses are averaged to form



Aylo Exhibit 1018
Page 2119 of 2308

$SR_{avg}$.

The player process 20 (Figure 1) computes the expected utilization $\rho = 1 - \frac{SR_{avg}}{B}$. If condition 1 is satisfied and the utilization from condition 2 is more than a specified utilization threshold, e.g., 95%, the player process 20 (Figure 1) declares sustained congestion (Confirmed Congestion), and asks the server to enter the constant bit-rate emulation mode. An alternative method may consists of a simple rule where if packet losses exceed a threshold for $N_1$ consecutive sampling time-windows, the player process 20 (Figure 1) declares sustained congestion and asks the server to enter the constant bit-rate emulation mode. By default, $N_1$ is set to 1, and time-window is set equal to 1 second.

**End of Congestion Rule (EOC Test)**

The end of congestion rule is analogous to the congestion detection rule:

1. No packet losses for a consecutive time-window of duration $T_e$. $T_e$ is set equal to 10 seconds by default.
2. If condition 1 is triggered, three short service rate probes are sent, spaced 2 seconds apart, from the player to the $SR_{min}$ hop. Responses are averaged to form $SR_{avg}$.

   The player computes the expected utilization $\rho = 1 - \frac{SR_{avg}}{B}$.

If condition 1 is satisfied and the utilization from condition 2 is less than a specified threshold, e.g., 90%, the player declares sustained congestion to be over, and asks the server to transition to the state of recovery scheduling. An alternative method may consists of a simple rule where if in a state of sustained congestion, no packet losses are manifest for $N_2$ consecutive sampling time-windows, the player declares sustained congestion to be over, and asks the server to transition to the state of recovery scheduling. By default, $N_2$ may be set equal to five, and the sampling time-window is set equal to 1 second.

Thus, an apparatus and method for predictable and differentiated delivery of multimedia streaming on the Internet is provided. One skilled in the art will appreciate that the present invention can be carried out in other ways and practiced by other than the described embodiments, yet not departing from the spirit and essential characteristics depicted herein. The present embodiments therefore should be considered in all respects as illustrative, and the present invention is limited only by the claims that follow.

# CLAIMS

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A method of streaming of multimedia audio and video packets from at least one sending computing device to an at least one receiving computing device via a network, said method comprising the steps of:

a) at a start of said streaming communicating configuration information from a service manager via the network to both an at least one sending computing device for use by an at least one server process and an at least one receiving computing device for use by an at least one player process, said at least one sending computing device comprising an at least one retransmit buffer, an at least one output buffer, an at least one backup buffer and said at least one server process, said at least one receiving computing device, comprising an at least one player buffer and an at least one player process;

b) queuing same packets in the at least one output buffer and to the at least one backup buffer;

c) determining if there are packets in the at least one output buffer and transmitting the packets from the at least one output buffer to the at least one receiving computing device via the network;

d) receiving the packets on the at least one receiving device and storing them in the at least one player buffer;

e) determining if there are omissions in the packets stored in the at least one player buffer and forwarding retransmission requests to the at least one sending computing device and storing them in the at least one retransmit buffer; and

f) determining if there are said retransmit requests in the at least one retransmit buffer and transmitting the packets from the at least one backup buffer to the at least one receiving computing device via the network.

2. The method of claim 1 wherein, the network is Internet.

3. The method of claim 2 wherein, a size of the at least one player buffer is $\geq c*x*e_r*P_{loss}$, where $c$ is a number of sampling intervals in a congestion period, $x$ is a sampling or retransmission interval, $c*x$ is a worst-case duration of congestion, $e_r$ is an encoding bit-rate of a stream of the packets and $P_{loss}$ is a worst case of loss of the packets.

4. The method of claim 3 wherein, a size of the at least one output buffer is $\geq c*x*e_r*P_{loss}$.

5. The method of claim 4 wherein, a size of the at least one backup buffer is $\geq m*x \geq x*\frac{\log\left(0.1*s/e_r*x\right)}{\log P_{loss}}$, where $m$ is a number of retransmits that will reduce the loss rate for older packets to a negligibly small number, and $m*x$ is a minimum required size of the at least one player buffer.

6. A method of detecting and reacting to a network congestion which interferes with streaming of multimedia audio and video packets from at least one sending computing device to an at least one receiving computing device via a network, said method comprising the steps of:

a) communicating configuration information including network parameters from a service manager via the network to the at least one sending computing device and to the at least one receiving computing device, the at least one sending computing device comprising at least one server process, the at least one receiving computing device comprising at least one player process;

b) confirming the network congestion by transmitting and retracting network probes;

c) executing at least one congestion control technique to limit degradation in the streaming of the packets;

d) detecting an end of the network congestion by transmitting and retracting said network probes;

e) configuring a rate of streaming of the packets according to said network parameters

7. The method of claim 6, wherein said at least one congestion control technique is the constant bit-rate emulation.

8. The method of claim 7, wherein said at least one congestion control technique only reduces a transmission rate of the packets by the amount of incurred loss of the packets.

9. The method of claim 7, further comprising the steps of:
detecting an end of congestion;
computing available bandwidth in the network; and
transmitting packets according to said bandwidth.

10. The method of claim 9, wherein some of the at least one player process are differentiated and protected from effects of said network congestion to a greater than others by receiving a stream backlog sooner.

11. The method of claim 10, wherein some of the at least one player process are differentiated and protected from effects of said network congestion to a greater than others by receiving a stream backlog sooner according to a rule for transmission rate of the packets

$$e_t = \min(\alpha^j \times SR_{min}, \alpha^j \times \frac{B - \lambda_{other}}{\sum_{i=1}^{i=K} \alpha^i n^i})$$

, where $e_t$ indicates said transmission rate of packets, $\alpha^j$ is a weighting function, for class $\{1 \ldots K\}$.

12. The method of claim 11, wherein said detecting of said end of the network congestion is performed according to the expected utilization $\rho = 1 - \frac{SR_{avg}}{B}$, where $SR_{avg}$ is the average rate at which the packets are transferred from the at least one server process to the at least one player process and $B$ is a bottleneck link capacity at a bottleneck hop.

13. The method of claim 12, wherein said network probes compute an approximate service rate of transferring the packets from said at least one server process to said at least one player process according to the following equation:

$$SR_{m,m-1}^{min} = \frac{s}{\frac{s}{B_{m,m-1}} + q_{m,m-1}^{max}}, \text{ and } \quad SR_{m,m-1}^{avg} = \frac{s}{\frac{s}{B_{m,m-1}} + q_{m,m-1}^{avg}},$$

where $SR_{avg}$ and $SR_{min}$ are averaged and minimum service rate, $q_{m,m-1}^{max}$ is the maximum queuing delay between a node m and a node m-1.

14. A method of guaranteed delivery of streaming multimedia audio and video packets from at least one sending computing device to an at least one receiving computing device via a network, said method comprising the steps of:

a) continuously processing arriving packets;
b) keeping track of loss of the packets at the at least one receiving computing device, said at least one receiving computing device comprising one or more player processes;
c) determining if said loss exceeds a first threshold during a first interval;
d) verifying congestion symptoms;
e) communicating said verified congestion symptoms to the at least one sending computing device, said at least one sending computing device comprising one or more server processes;

f) monitoring said loss and determining if said loss exceeds a second threshold during a second interval to determine an end of congestion; and

g) verifying congestion symptoms.

15. The method of claim 14, wherein said step of keeping track is performed at user define intervals.

16. The method of claim 15, wherein said first threshold, said second threshold, said first interval, and said second interval are user defined.

17. The method of claim 16, wherein said congestion symptoms are verified by receiving a remote congestion confirmed report.

18. The method of claim 17, wherein said congestion symptoms are verified by performing a congestion probe.



Aylo Exhibit 1018
Page 2126 of 2308

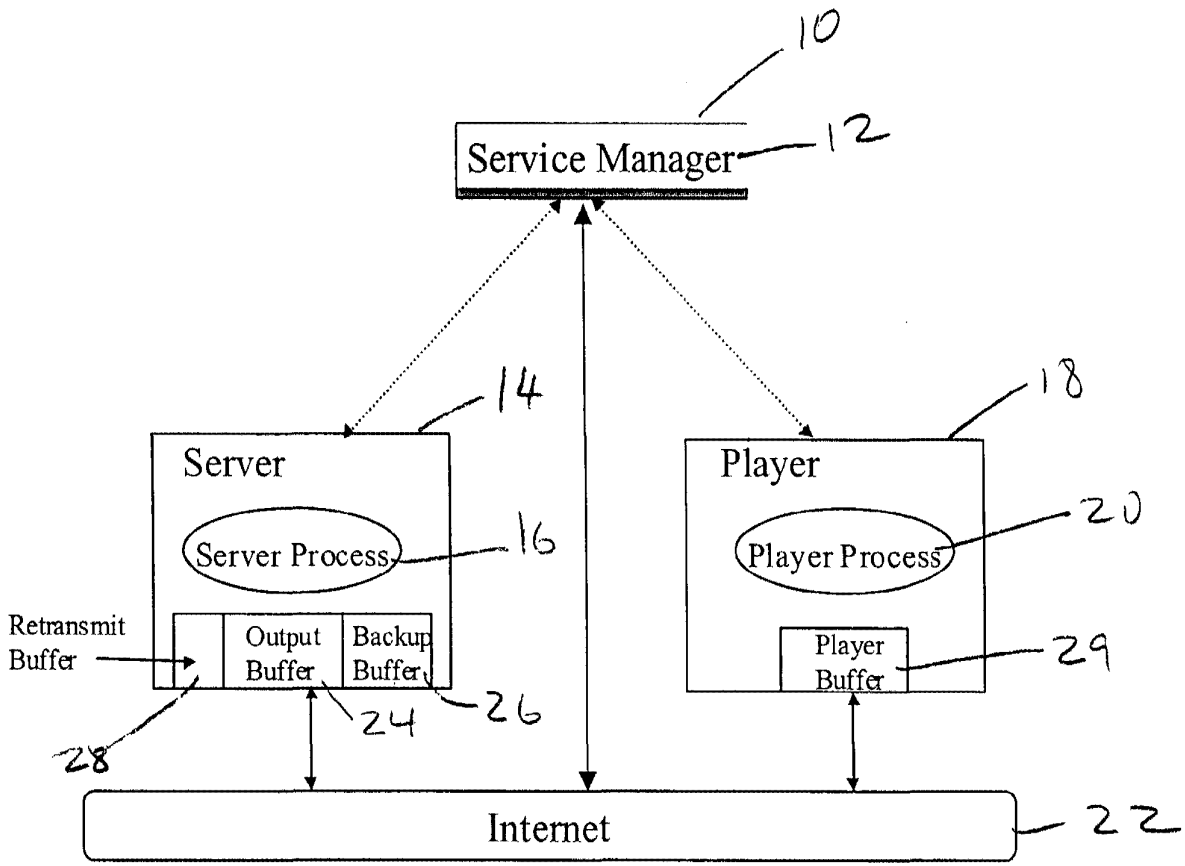

10
Service Manager
12
14
Server
Server Process
16
Retransmit Buffer
Output Buffer
Backup Buffer
24
26
28
18
Player
Player Process
20
Player Buffer
29
Internet
22

Figure 1

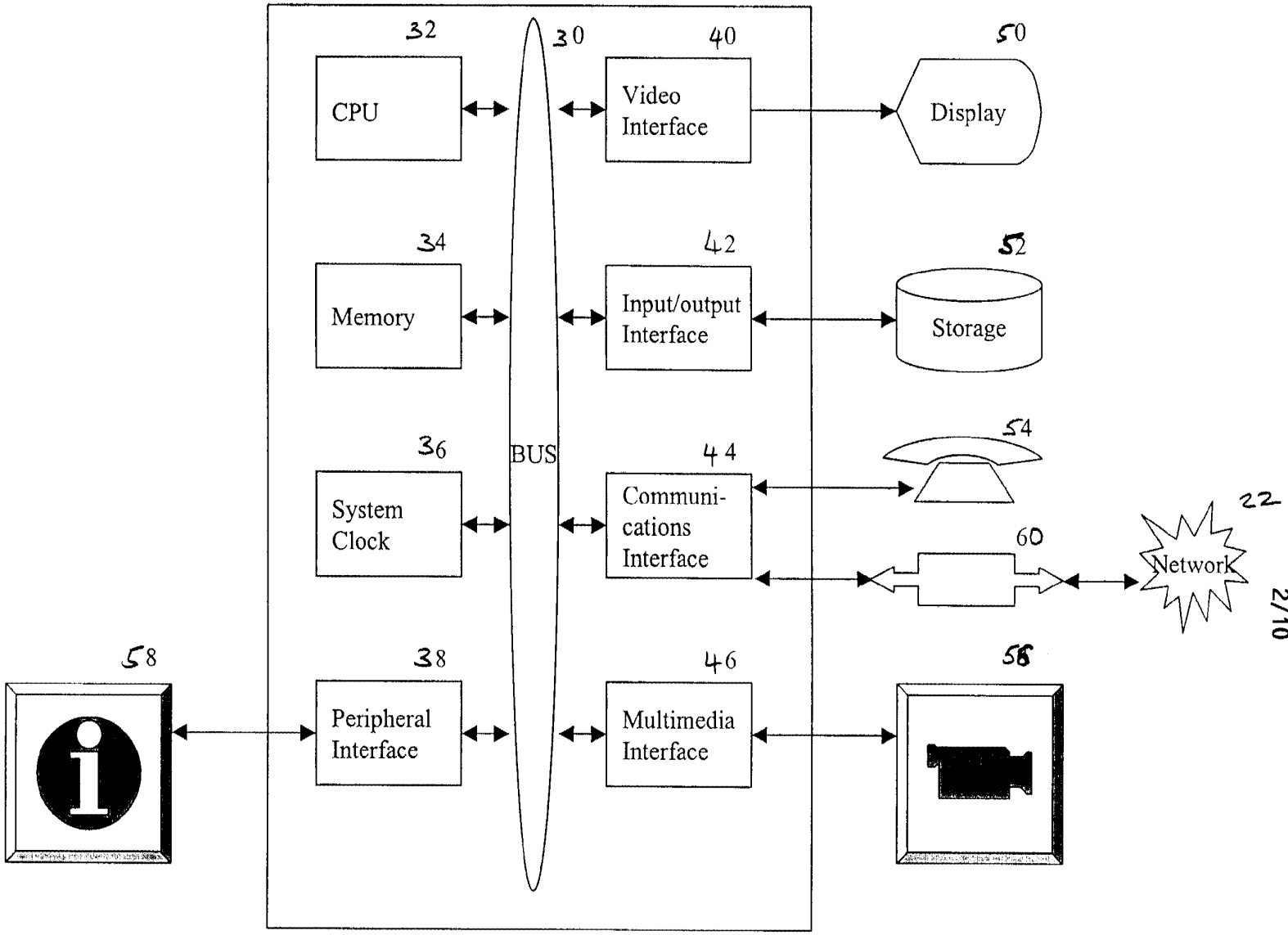

32
30
40
50
CPU
Video Interface
Display
34
42
52
Memory
Input/output Interface
Storage
36
BUS
44
54
System Clock
Communi-cations Interface
60
22
Network
58
38
46
56
Peripheral Interface
Multimedia Interface

Figure 2

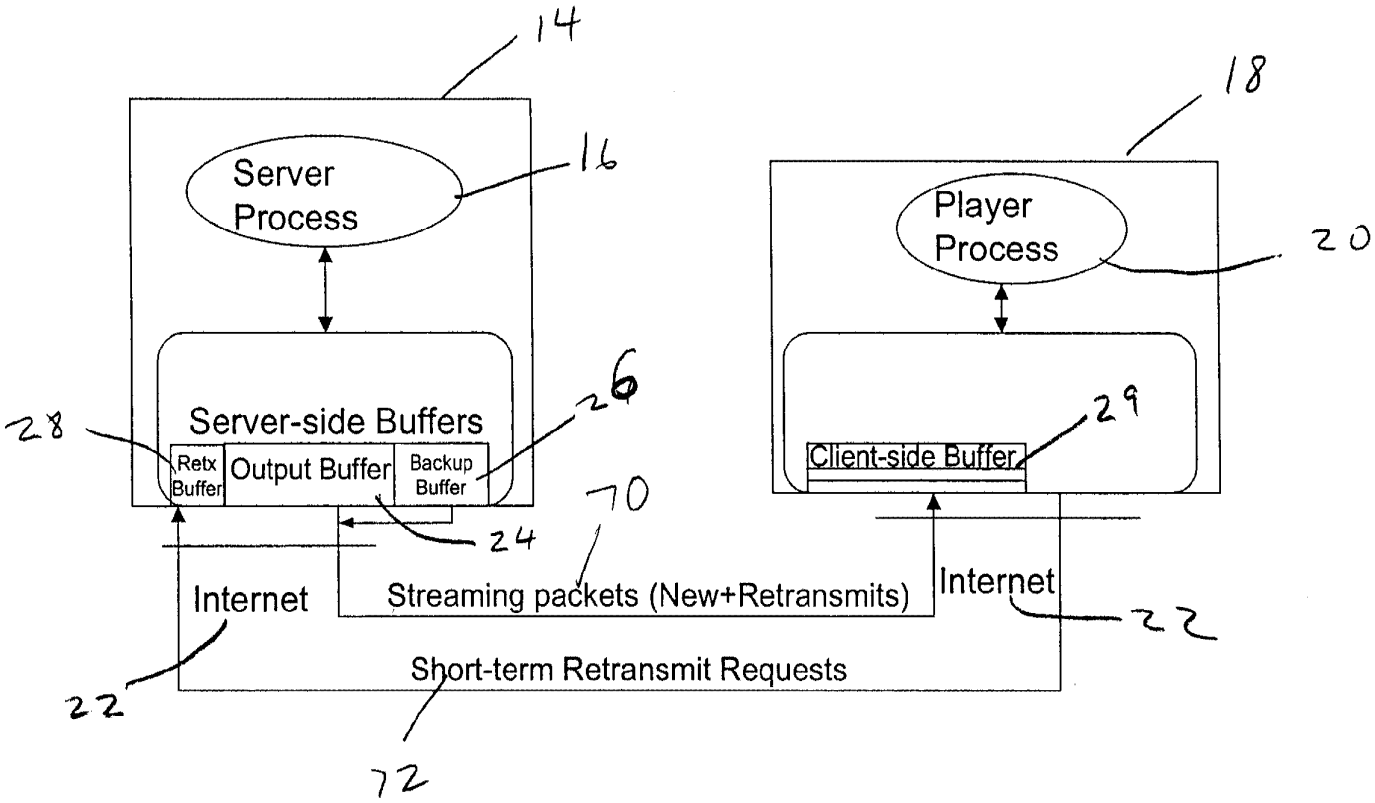

14
Server Process
16
Server-side Buffers
Retx Buffer
Output Buffer
Backup Buffer
28
26
24
18
Player Process
20
Client-side Buffer
29
70
Internet
Streaming packets (New+Retransmits)
Internet
22
22
Short-term Retransmit Requests
72

Figure 3

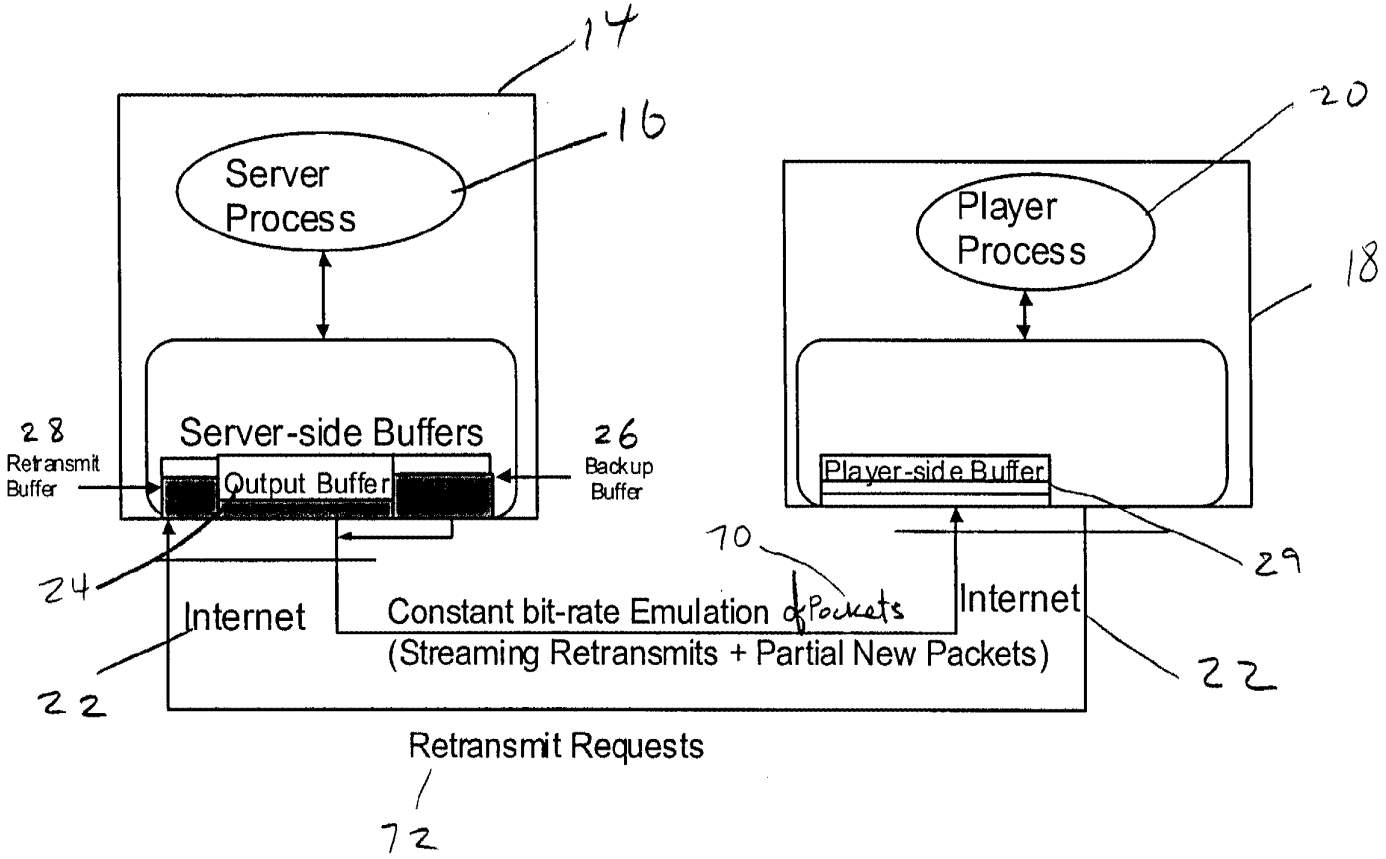

14
16
Server Process
Server-side Buffers
28
Retransmit Buffer
Output Buffer
26
Backup Buffer
24
Internet
22
Constant bit-rate Emulation of Packets
(Streaming Retransmits + Partial New Packets)
70
Retransmit Requests
72
20
Player Process
18
Player-side Buffer
29
Internet
22

Figure 4

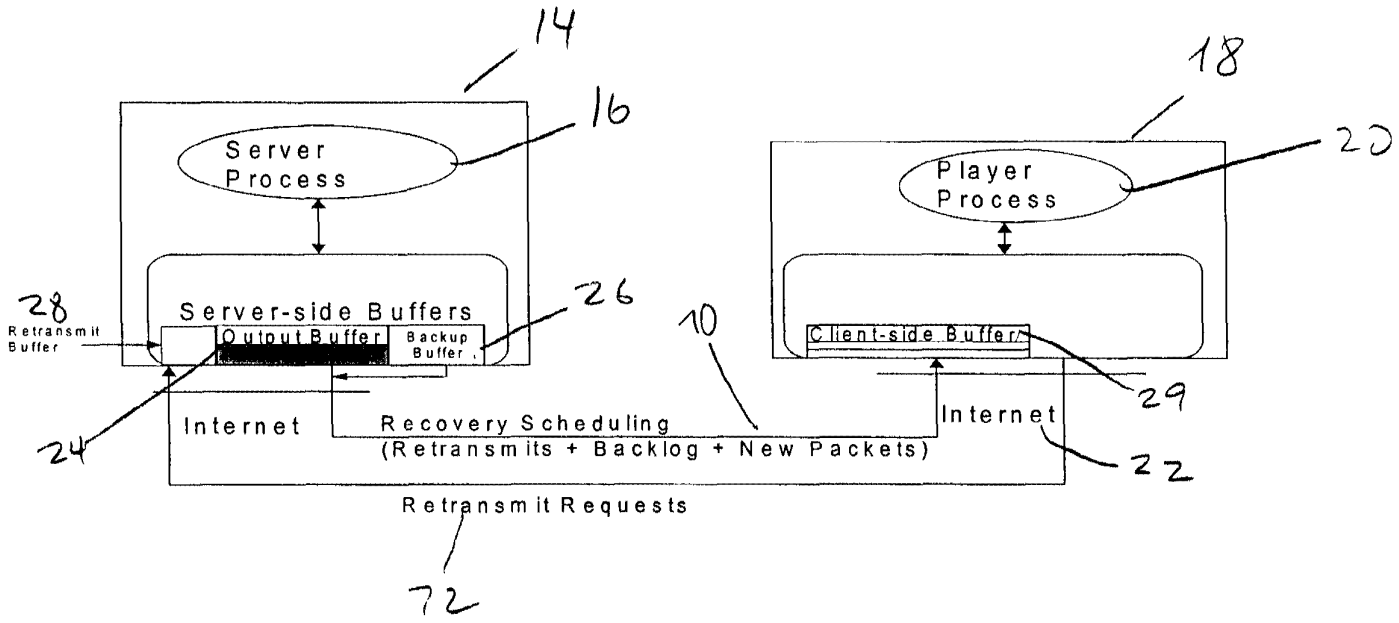

14
16
Server Process
Server-side Buffers
Output Buffer
Backup Buffer
28
Retransmit Buffer
26
24
Internet
Recovery Scheduling
(Retransmits + Backlog + New Packets)
10
Retransmit Requests
72
18
20
Player Process
Client-side Buffer
29
Internet
22

Figure 5

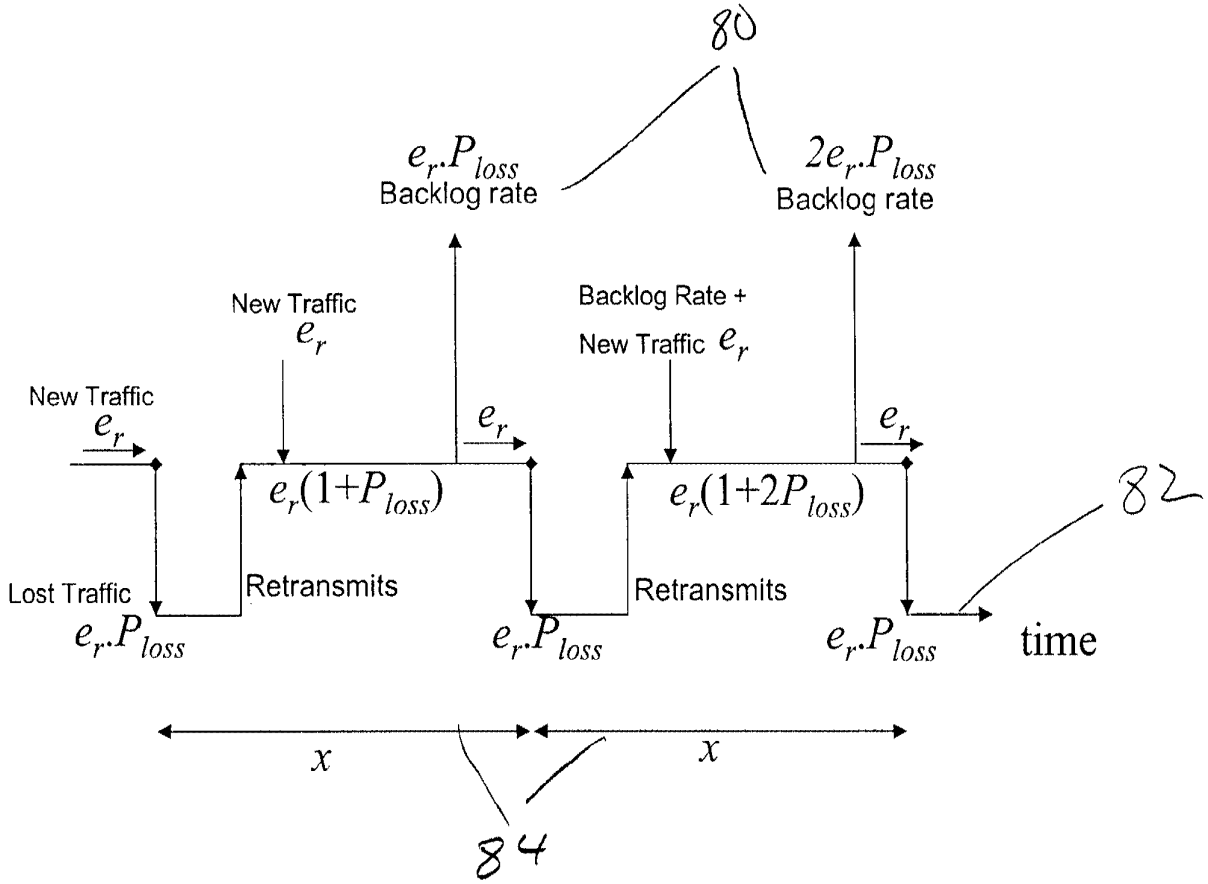

80
$e_r.P_{loss}$
Backlog rate
$2e_r.P_{loss}$
Backlog rate
New Traffic
$e_r$
Backlog Rate +
New Traffic $e_r$
New Traffic
$e_r$
$e_r$
$e_r$
$e_r(1+P_{loss})$
$e_r(1+2P_{loss})$
82
Lost Traffic
$e_r.P_{loss}$
Retransmits
$e_r.P_{loss}$
Retransmits
$e_r.P_{loss}$
time
x
x
84

Figure 6

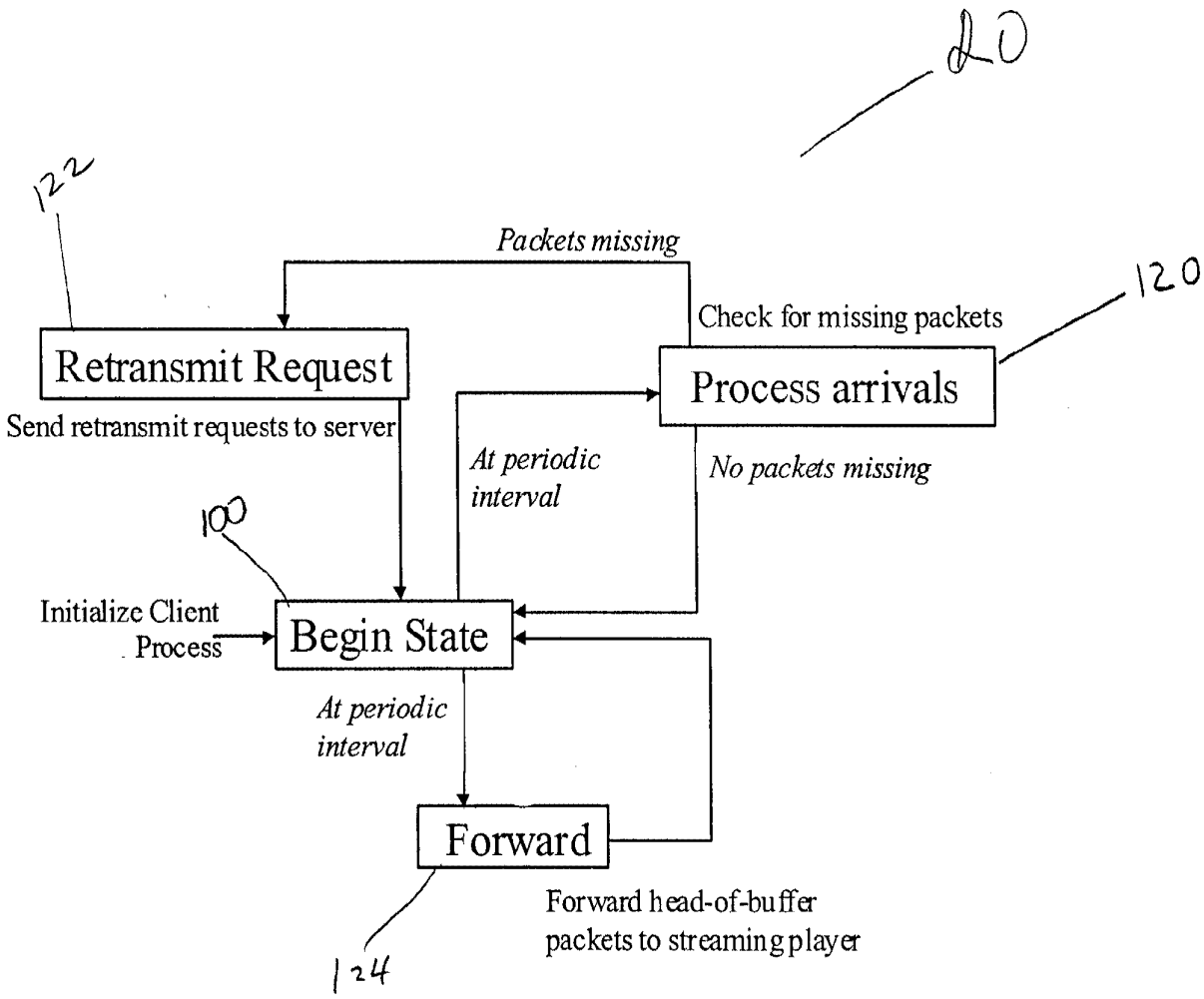

10
122
Packets missing
Check for missing packets
120
Retransmit Request
Process arrivals
Send retransmit requests to server
At periodic interval
No packets missing
100
Initialize Client Process
Begin State
At periodic interval
Forward
Forward head-of-buffer packets to streaming player
124

Figure 7

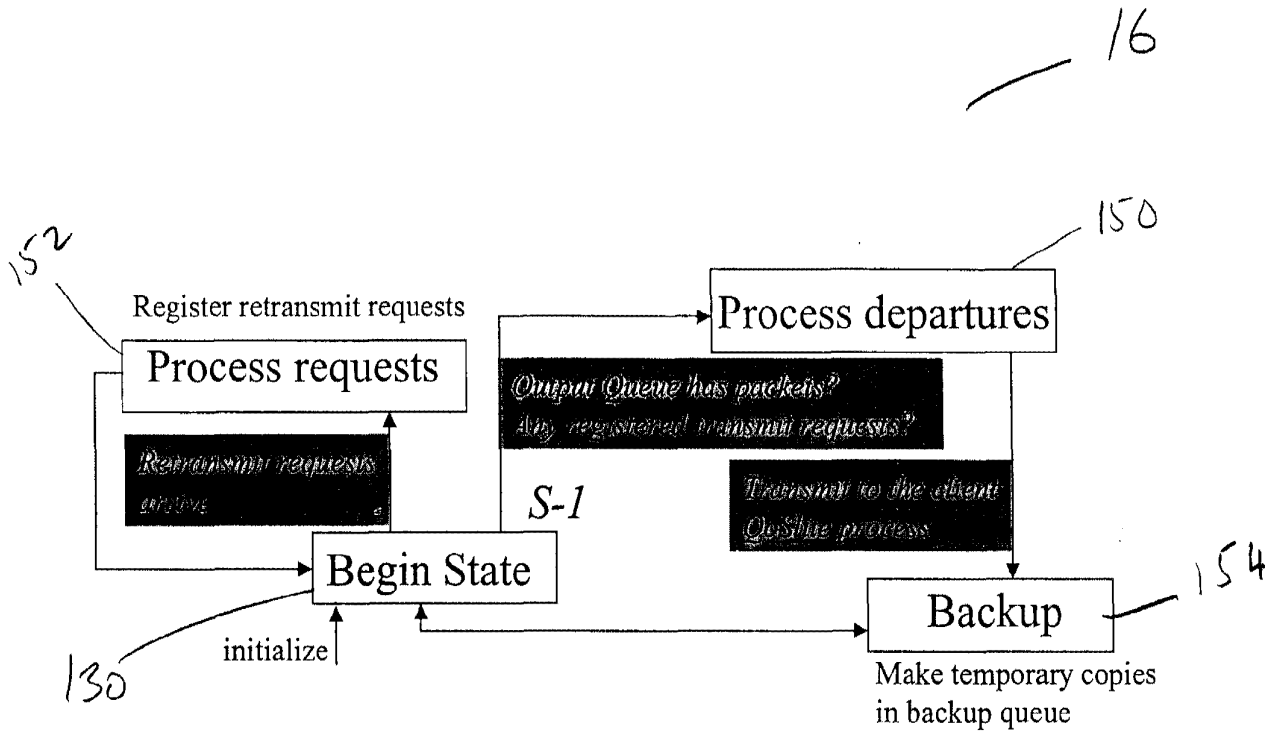

16
152
150
Register retransmit requests
Process requests
Process departures
Output Queue has packets?
Any registered transmit requests?
Retransmit requests arrive
Transmit to the client
QoSline process
S-1
Begin State
Backup
154
130
initialize
Make temporary copies
in backup queue

Figure 8

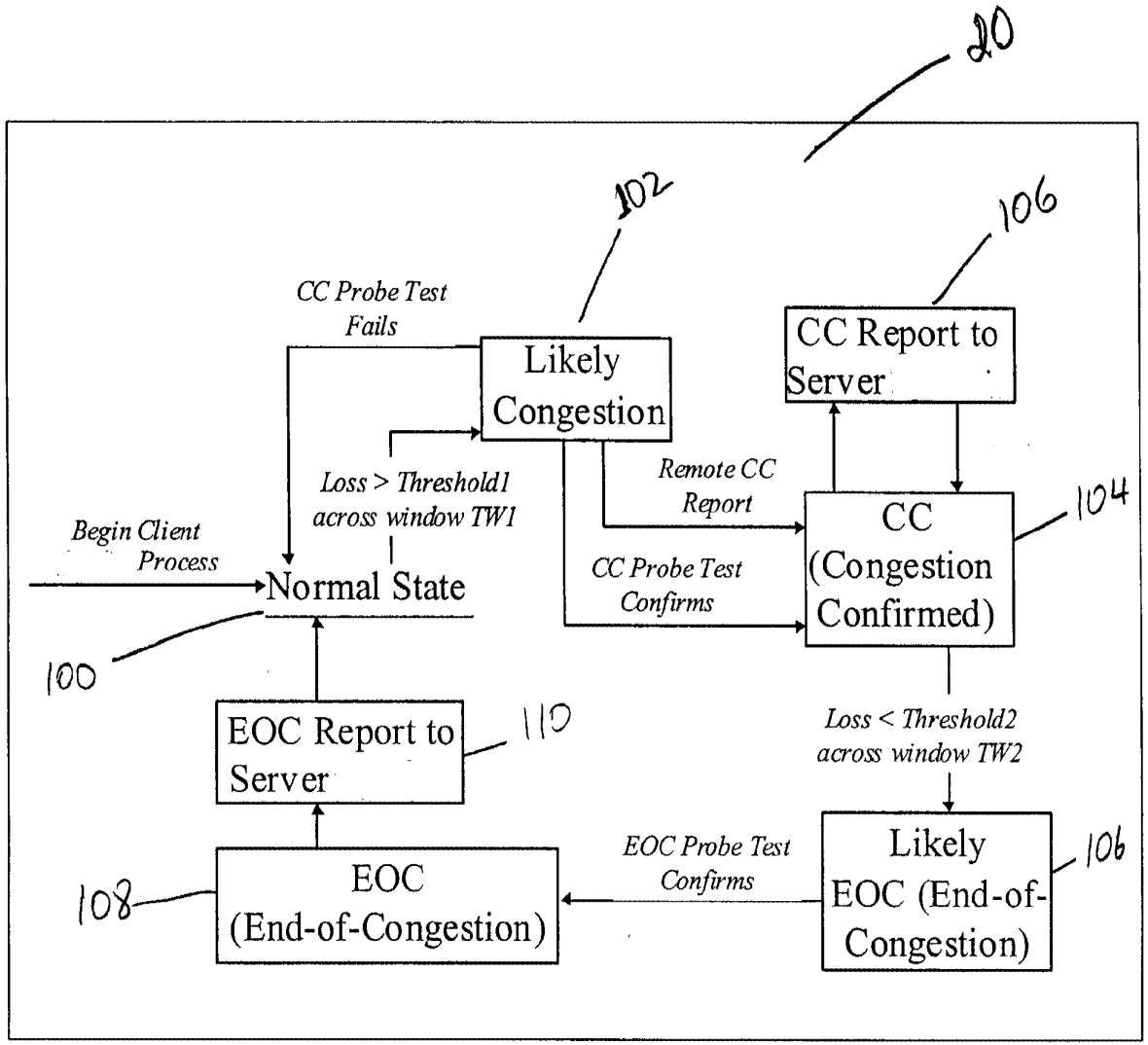

20
102
106
CC Probe Test Fails
Likely Congestion
CC Report to Server
Loss > Threshold1 across window TW1
Remote CC Report
104
Begin Client Process
Normal State
CC Probe Test Confirms
CC (Congestion Confirmed)
100
EOC Report to Server
110
Loss < Threshold2 across window TW2
EOC Probe Test Confirms
Likely EOC (End-of-Congestion)
106
108
EOC (End-of-Congestion)

Figure 9

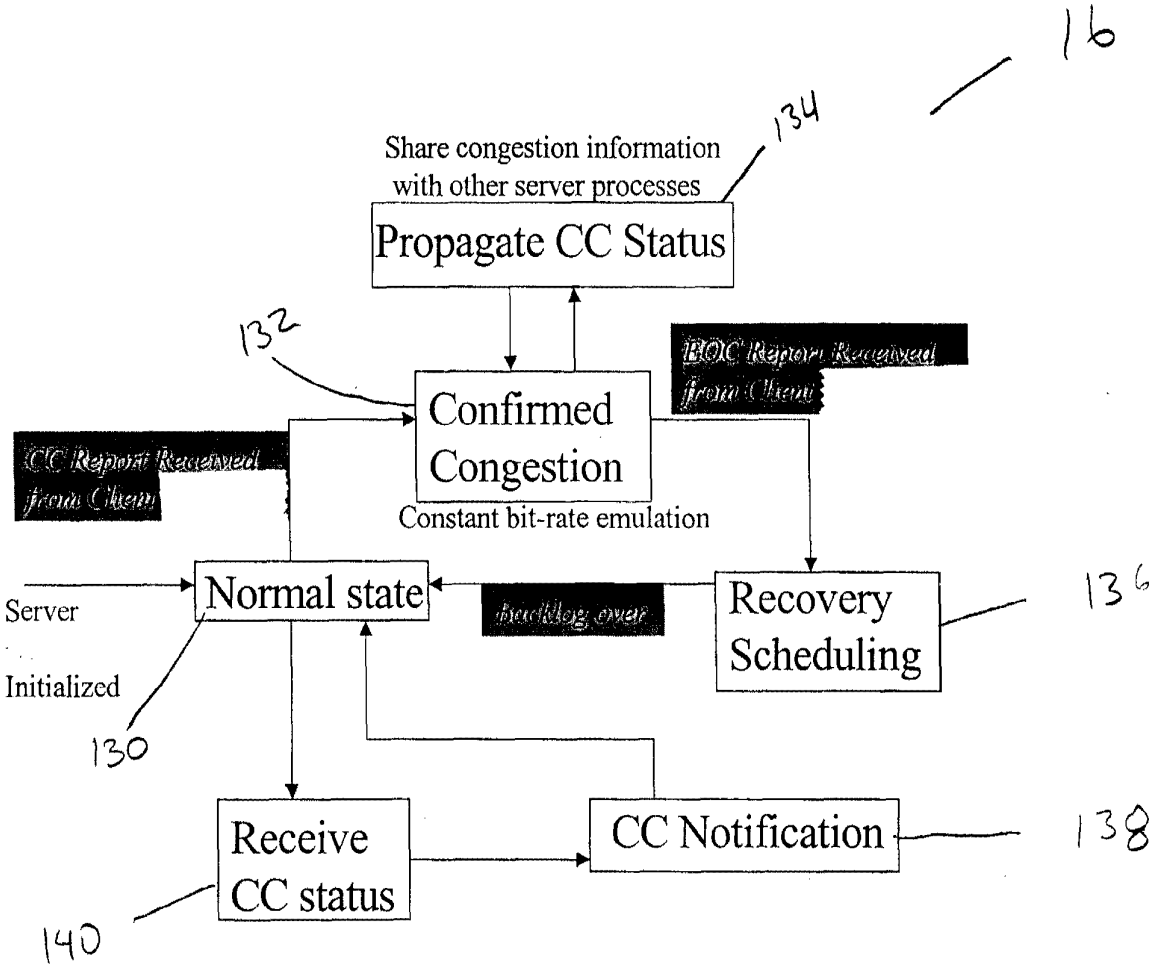

16
Share congestion information
with other server processes
134
Propagate CC Status
132
Confirmed
Congestion
Constant bit-rate emulation
[redacted]
[redacted]
Server
Initialized
Normal state
[redacted]
Recovery
Scheduling
136
130
Receive
CC status
CC Notification
138
140

Figure 10

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/40264

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :G06F 15/16
US CL :709/231, 232, 235
According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 709/231, 232, 235

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X, P | US 6,031,818 A (LO et al) 29 February 2000, col. 2, line 54-col. 5, line 28. | 1, 2 |
| X,P | US 6,018,515 A (SORBER) 25 January 2000, col. 4, line 18-col. 10, line 65. | 6-10, 14-18 |
| A, P | US 6,014,706 A (CANNON et al) 11 January 2000, see all. | 1-18 |
| A | US 5,339,392 A (RISBERG et al) 16 August 1994, see all. | 1-18 |

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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

| | |
|---|---|
| Date of the actual completion of the international search<br>06 JUNE 2001 | Date of mailing of the international search report<br>27 July 2001 (27.07.01) |
| Name and mailing address of the ISA/US<br>Commissioner of Patents and Trademarks<br>Box PCT<br>Washington, D.C. 20231<br>Facsimile No. (703) 305-3230 | Authorized officer Peggy Harwood<br>TOD KUPSTAS<br>Telephone No. 703-305-2655 |

Form PCT/ISA/210 (second sheet) (July 1998) ★

PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
U.S. Patent and Trademark Office; U.S DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[■] Practitioners associated with Customer Number: 70560

OR

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

| Name | Registration Number | Name | Registration Number |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[■] The address associated with Customer Number: 70560

OR

| | | | |
|---|---|---|---|
| [ ] Firm or Individual Name | | | |
| Address | | | |
| City | | State | Zip |
| Country | | | |
| Telephone | | Email | |

Assignee Name and Address: Echostar Technologies L.L.C.
100 Inverness Terrace East
Englewood, CO 80112

**A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.**

**SIGNATURE of Assignee of Record**

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

| | | | |
|---|---|---|---|
| Signature | | Date | 10/11/2012 |
| Name | Dean A. Manson | Telephone | 303.706.4554 |
| Title | Executive Vice President, General Counsel and Secretary | | |

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 11116783 |
| **Filing Date:** | 28-Apr-2005 |
| **Title of Invention:** | APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT |
| **First Named Inventor/Applicant Name:** | R. Drew Major |
| **Filer:** | Brett Carlson |
| **Attorney Docket Number:** | 066.0141 (P2004-04-01.1) |

Filed as Large Entity

## Utility under 35 USC 111(a) Filing Fees

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

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Miscellaneous:** | | | | |
| RCE - 2nd and Subsequent Request | 1820 | 1 | 1700 | 1700 |
| | | **Total in USD ($)** | | **1700** |

PTO/SB/96 (02-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: ECHOSTAR TECHNOLOGIES L.L.C.

Application No./Patent No.: 11/116,783 Filed/Issue Date: April 28, 2005

Titled: APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT

ECHOSTAR TECHNOLOGIES L.L.C., a limited liability company
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

**OR**

B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: DISH Digital L.L.C. To: EchoStar Technologies L.L.C.

The document was recorded in the United States Patent and Trademark Office at
Reel 033470, Frame 0726, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

| | |
|---|---|
| /BRETT A. CARLSON, REG. NO. 39928/ | August 20, 2014 |
| Signature | Date |
| Brett A. Carlson | Attorney of Record |
| Printed or Typed Name | Title |

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 19910924 |
| **Application Number:** | 11116783 |
| **International Application Number:** | |
| **Confirmation Number:** | 5535 |
| **Title of Invention:** | APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT |
| **First Named Inventor/Applicant Name:** | R. Drew Major |
| **Customer Number:** | 110240 |
| **Filer:** | Brett Carlson/Sharron Castillo |
| **Filer Authorized By:** | Brett Carlson |
| **Attorney Docket Number:** | 066.0141 (P2004-04-01.1) |
| **Receipt Date:** | 20-AUG-2014 |
| **Filing Date:** | 28-APR-2005 |
| **Time Stamp:** | 13:59:45 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Credit Card |
| Payment was successfully received in RAM | $1700 |
| RAM confirmation Number | 204 |
| Deposit Account | 502091 |
| Authorized User | CARLSON, BRETT A. |

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

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

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Request for Continued Examination (RCE) | 20140820_RCE_P2004-04-01-1.pdf | 697806<br>3f538d9d1ec23c574b0806fc99fcbc06300c9ff4 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Information Disclosure Statement (IDS) Form (SB08) | 20140820_IDS_P2004-04-01-1.pdf | 622803<br>5faf9c5af0565f42f3c98af24c6689f8fdb94ade | no | 25 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Transmittal Letter | 20140820_IDSCert_P2004-04-01-1.pdf | 94670<br>c41a2a53e48520d663c0f4652854ac423d8e68c4 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Foreign Reference | EP1202487A2.pdf | 1169542<br>e3961c13249effa85f97034caddedff4dbedc77d | no | 21 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 5 | Foreign Reference | EP1298931A2.pdf | 564750<br>17988c97c90278abafab90acccb307ac133ea832 | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 6 | Foreign Reference | EP1395014A1.pdf | 430935<br>5bd3cb3cce066c412e84ceb0db005d86ebc13605 | no | 11 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 7 | Foreign Reference | GB2367219A.pdf | 1022882<br>4b911a5301386066f2eb7560e4982065ed5cfef6d | no | 24 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 8 | Foreign Reference | JP2000201343.pdf | 21958041<br>852daf4ae4a533b5a36984e992609dbc8888bebb | no | 14 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 9 | Foreign Reference | JP2001092752.pdf | 9449147<br>3115b20d4cc1a9898d8742728f2946d9e91da1b7 | no | 12 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 10 | Foreign Reference | JP2004054930.pdf | 7662878<br>7215a4460b43c2d5f49cd2e80dcb034a81c3604b | no | 36 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 11 | Foreign Reference | JP2011004225A.pdf | 2693988<br>c96187633b1948096c41bf2f2558ceb94073c945 | no | 11 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 12 | Foreign Reference | WO2001067264.pdf | 1561090<br>14ea9fe21f267c32636564e07838fe524ecef3c8 | no | 41 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 13 | Foreign Reference | WO2003003760.pdf | 2622813<br>40ea384993705bc0f97d2b4db0cc677369e25769 | no | 87 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 14 | Foreign Reference | WO2003027876.pdf | 5592281<br>937b4925b48acf8bed9f4226067eb00e31f2dcf8 | no | 97 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 15 | Foreign Reference | WO2004025405.pdf | 825266<br>e160c7648ab3c92ae53aad7efe41ffe5c6b0ebc9 | no | 20 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 16 | Foreign Reference | WO2004036824.pdf | 1597410<br>20a96cbb41a14278a3c60b1b5236e3ae012280f0 | no | 41 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 17 | Foreign Reference | WO2006010113.pdf | 5663204<br>6e292580427daf9fc8f17d85c0318e226cf0bd6a | no | 118 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 18 | Foreign Reference | WO20003009581.pdf | 826054<br>99622cbf7cd9f4e0b6bc5216aae980d2282bd893 | no | 21 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 19 | Non Patent Literature | NPL_AustraliaFirstExamRpt20111017_2011213730.pdf | 27546<br>795a661c5ca609878f5c957bb8b15d556c8271c1 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 20 | Non Patent Literature | NPL_CanadaOA20121015_2564861.pdf | 263323<br>73b61068d8859ee06f177b151517158507 3e244e | no | 5 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 21 | Non Patent Literature | NPL_CanadaOA20130909_2564861.pdf | 202703<br>3d8f8a42328da94a7d28048ccef3ec8978661d18 | no | 4 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 22 | Non Patent Literature | NPL_Clement_MoveClosesFunding.pdf | 172934<br>c65a317075d6d88f73613f212b13b4e09646ea79 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 23 | Non Patent Literature | NPL_EuropeExtSrchRpt20140710_12154559.pdf | 1844529<br>380cc4633ad5f0a18a11207e5e7cbeceddc08c59 | no | 11 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 24 | Non Patent Literature | NPL_Fujisawa_ImplementationOfEfficientAcdess.pdf | 511563<br>91dff145bd502cbcca14ed40adf4002af21abab7 | no | 10 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 25 | Non Patent Literature | NPL_Guo_DirectStream.pdf | 7958674<br>612e3ca1a57a5f239df3d1d3d3235b392d47e87b | no | 22 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 26 | Transmittal Letter | NPL_IntlSrchRptPCTUS0809281_20081105.pdf | 702188<br>e54822cc1d944d018ede70f2e776c29629d4c2d8 | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 27 | Non Patent Literature | NPL_IntlSrchRptPCTUS0861035_20081212.pdf | 572640<br>d2cc221e0b33cab41ecf754d09a3d4f72f9a6757 | no | 8 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 28 | Non Patent Literature | NPL_JPInterrogation20121106_2007511070.pdf | 4923875<br>ccdd5d93559e144eaf0d083e2725122e6f55148e | no | 24 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 29 | Non Patent Literature | NPL_JPNtcOfReject20110426_2007511070.pdf | 11221634<br>cbdd88f13ae97d297a47f32aa0eb08a141d1bcb9 | no | 13 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 30 | Non Patent Literature | NPL_JPOA20120228_2007511070.pdf | 1719065<br>490d56a11aa22798c9d5097086d7e9f75df6397c | no | 6 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 31 | Non Patent Literature | NPL_Kozamernik_MediaStreaming.pdf | 6407225<br>7f5c49521521198a912e04f054f8405ed84f9614 | no | 15 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 32 | Non Patent Literature | NPL_KROA20110728_1020067025274.pdf | 283253<br>a519519fe766d2f1062733b2fa400e76dcbef021 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 33 | Non Patent Literature | NPL_Lienhart_DistributedVideo.pdf | 11245900<br>37342a4029d40ede417d94095bbd90befa4931d5 | no | 29 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 34 | Non Patent Literature | NPL_Liu_AdaptiveVideoMulticast.pdf | 5897378<br>6d1568a810d08f4e566bfcc4b02748abfa471b64 | no | 12 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 35 | Non Patent Literature | NPL_Liu_PeerToPeerInternetVideo.pdf | 1125709<br>1dbfd7983420ecb8f68943b0539a4d344045f5fb | no | 12 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 36 | Non Patent Literature | NPL_MoveNetworks_NextGeneration.pdf | 1128862<br>446af274461f93a7d60548a003fcc17a6c5e4a0f | no | 21 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 37 | Non Patent Literature | NPL_Nguyen_MultipleSenderDistVideo.pdf | 1053500<br>af974412420b4c476c2c59e0e76443e17141b1bb | no | 12 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 38 | Non Patent Literature | NPL_NOA20140624_13757571.pdf | 873532<br>5af7d70921b96be007abc0a25e5399863d602287 | no | 16 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 39 | Non Patent Literature | NPL_OA20130913_13757571.pdf | 1418297<br>94f483bfda2f69a58937df26fd2e02470cc4151c | no | 36 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 40 | Non Patent Literature | NPL_OA20140807_14106051.pdf | 3247593<br>d022383de49b57b0c1db511f3db35b099a3b66ae | no | 84 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 41 | Non Patent Literature | NPL_Rejaie_ArchitecturalConsiderations.pdf | 3252815<br>d638402b4b84964353e12f7de0a6dc071af47d63 | no | 6 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 42 | Non Patent Literature | NPL_Roy_SystemArchitecture.pdf | 2812918<br>7e9c5ee17749c18ea0bd37428a2cfaa78b62fddc | no | 6 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 43 | Non Patent Literature | NPL_Tsuru_RecentEvolution.pdf | 1522645<br>c5225e2e26324cd4748599f0753210c21c47441b | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 44 | Non Patent Literature | NPL_WeblioDictionaryPgs.pdf | 525676<br>eec0a963413300c3b5fb79ab7eacbae55666efc2 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 45 | Non Patent Literature | NPL_Xu_PeerToPeer.pdf | 4454232<br>01dcd4f73c5fcba31a2d951f592bf59eaebca748 | no | 10 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 46 | Non Patent Literature | NPL_Yoshimura_MobileStreamingMedia.pdf | 378918<br>aac54a2603ed446586676ed16c15022af1acc1eb | no | 20 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 47 | Foreign Reference | NPL_Zhang_CoolStreaming.pdf | 293506<br>79257b4aeb9b9510bf46f97c437f91285abb9784 | no | 14 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 48 | Power of Attorney | 20140820_POA_P2004-04-01-1.pdf | 108457<br>8d94544b4138745512d15aea41385f405931aa88 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 49 | Assignee showing of ownership per 37 CFR 3.73. | 20140820_Stmt373b_P2004-04-01-1.pdf | 435001<br>30264538176621ad0b160e5190e928bf1bbd1564 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 50 | Assignee showing of ownership per 37 CFR 3.73. | 20140820_Stmt373bAddlSheet_P2004-04-01-1.pdf | 432436<br>d33c0c028f21e71b4dc482341532d8cc2317932d | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 51 | Fee Worksheet (SB06) | fee-info.pdf | 30480<br>d7413bb6f5112dba1784ac498a196f7c4a55aa7e | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | | **Total Files Size (in bytes):** | 142104567 | |

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

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

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

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

PTO/SB/96 (02-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: ECHOSTAR TECHNOLOGIES L.L.C.

Application No./Patent No.: 11/116,783 Filed/Issue Date: April 28, 2005

Titled: APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT

ECHOSTAR TECHNOLOGIES L.L.C., a limited liability company
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy therefore is attached.

**OR**

B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: R. Drew Major, Mark B. Hurst To: Move Networks, Inc.
The document was recorded in the United States Patent and Trademark Office at
Reel 018020, Frame 0750, or for which a copy thereof is attached.

2. From: Move Networks, Inc. To: EchoStar Advanced Technologies L.L.C.
The document was recorded in the United States Patent and Trademark Office at
Reel 025570, Frame 0047, or for which a copy thereof is attached.

3. From: EchoStar Advanced Echnologies L.L.C. To: DISH Digital L.L.C.
The document was recorded in the United States Patent and Trademark Office at
Reel 029894, Frame 0512, or for which a copy thereof is attached.

☒ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

| | |
|---|---|
| /BRETT A. CARLSON, REG. NO. 39928/ | August 20, 2014 |
| Signature | Date |
| Brett A. Carlson | Attorney of Record |
| Printed or Typed Name | Title |

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

# REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
## (Submitted Only via EFS-Web)

| Application Number | 11116783 | Filing Date | 2005-04-28 | Docket Number (if applicable) | 066.0141 (P2004-04-01.1) | Art Unit | 2444 |
|---|---|---|---|---|---|---|---|
| First Named Inventor | R. Drew Major | | | Examiner Name | Ninos Donabed | | |

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the orde in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

### MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

### FEES

**The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 502091

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Signature of Registered U.S. Patent Practitioner | | | |
|---|---|---|---|
| Signature | /BRETT A. CARLSON/ | Date (YYYY-MM-DD) | 2014-08-20 |
| Name | Brett A. Carlson | Registration Number | 39928 |

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is t file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Tim will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions fo reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Privacy Act Statement

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

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

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

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

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

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

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

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

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

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record ma 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.

UNITED STATES PATENT AND TRADEMARK OFFICE

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

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 11/116,783 | 04/28/2005 | R. Drew Major | 066.0141 (P2004-04-01.1) |

**CONFIRMATION NO. 5535**

**POA ACCEPTANCE LETTER**

70560
INGRASSIA FISHER & LORENZ, P.C. (EchoStar)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

*OC000000070369889*

Date Mailed: 08/28/2014

## NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/20/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/zabraha/

---

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 11/116,783 | 04/28/2005 | R. Drew Major | 066.0141 (P2004-04-01.1) |

**CONFIRMATION NO. 5535**

**POWER OF ATTORNEY NOTICE**

110240
Ingrassia Fisher & Lorenz, P.C. (DISH Digital)
7010 East Cochise Road
Scottsdale, AZ 85253

*OC000000070369882*

Date Mailed: 08/28/2014

## NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 08/20/2014.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/zabraha/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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

# NOTICE OF ALLOWANCE AND FEE(S) DUE

70560 7590 09/12/2014
INGRASSIA FISHER & LORENZ, P.C. (EchoStar)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

| EXAMINER |
|---|
| DONABED, NINOS |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2444 | |

DATE MAILED: 09/12/2014

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 11/116,783 | 04/28/2005 | R. Drew Major | 066.0141 (P2004-04-01.1) | 5535 |

TITLE OF INVENTION: APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0 | $0 | $480 | 12/12/2014 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**



PTOL-85 (Rev. 02/11)

# PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

70560 7590 09/12/2014
INGRASSIA FISHER & LORENZ, P.C. (EchoStar)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 11/116,783 | 04/28/2005 | R. Drew Major | 066.0141 (P2004-04-01.1) | 5535 |

TITLE OF INVENTION: APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0 | $0 | $480 | 12/12/2014 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| DONABED, NINOS | 2444 | 709-231000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
❑ Issue Fee
❑ Publication Fee (No small entity discount permitted)
❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
❑ A check is enclosed.
❑ Payment by credit card. Form PTO-2038 is attached.
❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 11/116,783 | 04/28/2005 | R. Drew Major | 066.0141 (P2004-04-01.1) | 5535 |

70560 7590 09/12/2014
INGRASSIA FISHER & LORENZ, P.C. (EchoStar)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

| EXAMINER |
|---|
| DONABED, NINOS |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2444 | |

DATE MAILED: 09/12/2014

**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.



PTOL-85 (Rev. 02/11)

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 11/116,783 | Applicant(s) MAJOR ET AL. | |
|---|---|---|---|
| | Examiner NINOS DONABED | Art Unit 2444 | AIA (First Inventor to File) Status No |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *and RCE filed 8/20/2014 - board descision dated 7/23/2014*.
   ☐ 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 *20,21,23-26,35-38 and 40-50*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 8/20/2014
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 _____.

/NINOS DONABED/
Primary Examiner, Art Unit 2444



Aylo Exhibit 1018
Page 2162 of 2308

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

***Information Disclosure Statement***

The IDS filed on 7/29/2014 has been considered.

**REASONS FOR ALLOWANCE**

The following is an examiner's statement of reasons for allowance: Claims 20,21,23-26,35-38 and 40-50 are allowable over the prior art of record: the closest prior art of record (Birney "Intelligent Streaming") does not teach or suggest in detail "streaming by a media player operating on an end user station a video from a set of one or more servers, wherein each of a plurality of different copies of the video encoded at different bit rates is stored as multiple files on the set of servers, wherein each of the multiple files yields a different portion of the video on playback, wherein the multiple files across the different copies yield the same portions of the video on playback, each of said files having a time index such that the files whose playback is the same portion of the video for each of the different copies have the same time index in relation to the beginning of the video, and wherein the streaming comprises: requesting by the media player a plurality of sequential ones of the files of one of the copies from the set of servers over a plurality of Transmission Control Protocol (TCP) connections based on the time indexes; automatically requesting by the media player from the set of servers over the plurality of TCP connections subsequent portions of the video by requesting for each such portion one of the files from one of the copies dependent upon successive determinations by the media player to shift the playback quality to a higher or lower

quality one of the different copies, said automatically requesting including, repeatedly generating a set of one or more factors indicative of the current ability to sustain the streaming of the video using the files from different ones of the copies, wherein the set of one or more factors relate to the performance of the network; and making the successive determinations to shift the playback quality based on at least one of the set of factors to achieve continuous playback of the video using the files of the highest quality one of the copies determined sustainable at that time; and presenting the video by playing back with the media player on the end user station the requested files in order of ascending playback time" in combination with all the elements of the independent claim as argued by the Applicant.

Birney teaches multiple copies of the same stream being stored on a server at different bit rates with the same time index used to switch between the stream based on network bandwidth limitations. Whereas, stated above, Applicant's claimed invention states "streaming by a media player operating on an end user station a video from a set of one or more servers, wherein each of a plurality of different copies of the video encoded at different bit rates is stored as multiple files on the set of servers, wherein each of the multiple files yields a different portion of the video on playback, wherein the multiple files across the different copies yield the same portions of the video on playback, each of said files having a time index such that the files whose playback is the same portion of the video for each of the different copies have the same time index in relation to the beginning of the video, and wherein the streaming comprises: requesting by the media player a plurality of sequential ones of the files of one of the copies from

the set of servers over a plurality of Transmission Control Protocol (TCP) connections based on the time indexes; automatically requesting by the media player from the set of servers over the plurality of TCP connections subsequent portions of the video by requesting for each such portion one of the files from one of the copies dependent upon successive determinations by the media player to shift the playback quality to a higher or lower quality one of the different copies, said automatically requesting including, repeatedly generating a set of one or more factors indicative of the current ability to sustain the streaming of the video using the files from different ones of the copies, wherein the set of one or more factors relate to the performance of the network; and making the successive determinations to shift the playback quality based on at least one of the set of factors to achieve continuous playback of the video using the files of the highest quality one of the copies determined sustainable at that time; and presenting the video by playing back with the media player on the end user station the requested files in order of ascending playback time." So as indicated in the above statements. Applicant's arguments have been considered persuasive, in light of the claims limitation as well as the enabling portions of the specification.

Examiner also notes the board decision and reversal on 7/23/2014.

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.”

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NINOS DONABED whose telephone number is (571)272-8757. The examiner can normally be reached on Monday-Friday, 7:30 AM-5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter-Anthony Pappas can be reached on (571) 272-7646. 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.

/NINOS DONABED/
Primary Examiner, Art Unit 2444

| Notice of References Cited | Application/Control No. 11/116,783 | Applicant(s)/Patent Under Reexamination MAJOR ET AL. | |
|---|---|---|---|
| | Examiner NINOS DONABED | Art Unit 2444 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| * | A | US-8,135,852 | 03-2012 | Nilsson et al. | 709/231 |
| | B | US- | | | |
| | C | US- | | | |
| | D | US- | | | |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
|---|---|---|---|---|---|---|
| | N | | | | | |
| | O | | | | | |
| | P | | | | | |
| | Q | | | | | |
| | R | | | | | |
| | S | | | | | |
| | T | | | | | |

**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 11116783 | MAJOR ET AL. |
| | **Examiner** | **Art Unit** |
| | NINOS DONABED | 2444 |

**CPC**

| Symbol | | | | | Type | Version |
|---|---|---|---|---|---|---|
| H04N | | 21 | / | 84 | F | 2013-01-01 |
| H04N | | 21 | / | 25808 | I | 2013-01-01 |
| H04N | | 21 | / | 2662 | I | 2013-01-01 |
| H04N | | 21 | / | 643 | I | 2013-01-01 |
| H04N | | 21 | / | 64769 | I | 2013-01-01 |
| H04N | | 21 | / | 64792 | I | 2013-01-01 |
| H04N | | 21 | / | 845 | I | 2013-01-01 |
| | | | / | | | |
| | | | / | | | |
| | | | / | | | |
| | | | / | | | |
| | | | / | | | |
| | | | / | | | |
| | | | / | | | |
| | | | / | | | |

**CPC Combination Sets**

| Symbol | | | | | Type | Set | Ranking | Version |
|---|---|---|---|---|---|---|---|---|
| | | | / | | | | | |
| | | | / | | | | | |

| | | | |
|---|---|---|---|
| NONE<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>21 | |
| /NINOS DONABED/<br>Primary Examiner.Art Unit 2444<br><br>(Primary Examiner) | 09/05/2014<br><br>(Date) | O.G. Print Claim(s)<br>20 | O.G. Print Figure<br>7 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 11116783 | MAJOR ET AL. |
| | **Examiner** | **Art Unit** |
| | NINOS DONABED | 2444 |

| US ORIGINAL CLASSIFICATION | | INTERNATIONAL CLASSIFICATION | |
|---|---|---|---|
| CLASS | SUBCLASS | CLAIMED | NON-CLAIMED |
| 709 | 231 | G 0 6 F 15 / 16 (2006.01.01) | |

| CROSS REFERENCE(S) | | | | | |
|---|---|---|---|---|---|
| CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | |
| 709 | 246 | | | | |

| | | | |
|---|---|---|---|
| NONE<br><br>(Assistant Examiner) (Date) | | Total Claims Allowed:<br>21 | |
| /NINOS DONABED/<br>Primary Examiner.Art Unit 2444<br><br>(Primary Examiner) | 09/05/2014<br><br>(Date) | O.G. Print Claim(s)<br>20 | O.G. Print Figure<br>7 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 11116783 | MAJOR ET AL. |
| | **Examiner** | **Art Unit** |
| | NINOS DONABED | 2444 |

☐ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | 1 | - | 17 | - | 33 | 20 | 49 | | | | | | | | |
| - | 2 | - | 18 | - | 34 | 21 | 50 | | | | | | | | |
| - | 3 | - | 19 | 7 | 35 | | | | | | | | | | |
| - | 4 | 1 | 20 | 8 | 36 | | | | | | | | | | |
| - | 5 | 2 | 21 | 9 | 37 | | | | | | | | | | |
| - | 6 | - | 22 | 10 | 38 | | | | | | | | | | |
| - | 7 | 3 | 23 | - | 39 | | | | | | | | | | |
| - | 8 | 4 | 24 | 11 | 40 | | | | | | | | | | |
| - | 9 | 5 | 25 | 12 | 41 | | | | | | | | | | |
| - | 10 | 6 | 26 | 13 | 42 | | | | | | | | | | |
| - | 11 | - | 27 | 14 | 43 | | | | | | | | | | |
| - | 12 | - | 28 | 15 | 44 | | | | | | | | | | |
| - | 13 | - | 29 | 16 | 45 | | | | | | | | | | |
| - | 14 | - | 30 | 17 | 46 | | | | | | | | | | |
| - | 15 | - | 31 | 18 | 47 | | | | | | | | | | |
| - | 16 | - | 32 | 19 | 48 | | | | | | | | | | |

| | | | |
|---|---|---|---|
| NONE<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>21 | |
| /NINOS DONABED/<br>Primary Examiner.Art Unit 2444<br><br>(Primary Examiner) | 09/05/2014<br><br>(Date) | O.G. Print Claim(s)<br>20 | O.G. Print Figure<br>7 |

A test-bed for the dynamic **adaptive streaming** over HTTP featuring session mobility
C Müller, C Timmerer - Proceedings of the second annual ACM ..., 2011 - dl.acm.org
Abstract In this paper, we present a multimedia test-bed enabling session mobility in the context of the emerging ISO/IEC MPEG standard, Dynamic **Adaptive Streaming** over HTTP (DASH). In general, session mobility is defined as the transfer of a running **streaming ...**
Cited by 21 Related articles All 8 versions Cite Save

Low overhead container format for **adaptive streaming**
H Riiser, P Halvorsen, C Griwodz... - Proceedings of the first ..., 2010 - dl.acm.org
Abstract Current segmented HTTP **streaming** systems provide scalable and quality **adaptive** video delivery services to a huge number of users. However, while they support a wide range of bandwidths and enable arbitrary content-based composition, their current formats **...**
Cited by 20 Related articles All 9 versions Cite Save

Client intelligence for **adaptive streaming** solutions
D Jarnikov, T Özçelebi - Signal Processing: Image Communication, 2011 - Elsevier
In state-of-the-art **adaptive streaming** solutions, to cope with varying network conditions, the client side can switch between several video copies encoded at different bit-rates during **streaming**. Each video copy is divided into chunks of equal duration. To achieve **...**
Cited by 21 Related articles All 7 versions Cite Save

Parallel **adaptive** HTTP media **streaming**
C Liu, I Bouazizi, M Gabbouj - Computer Communications and ..., 2011 - ieeexplore.ieee.org
3GPP have paved the way to the development of media **streaming** over HTTP. The traditional HTTP **streaming** relies on a series of request segments and receive segments sequentially. In the current Internet media segments can be delivered through distributed **...**
Cited by 18 Related articles All 4 versions Cite Save

An end-to-end architecture for quality **adaptive streaming** applications in the internet
R Rejaie - 1999 - cs.usc.edu
The Internet has been experiencing explosive growth of audio and video **streaming**. Such applications are delay-sensitive, semi-reliable and rate-based. Thus they require isochronous processing and quality-of-service (QoS) from the end-to-end point of view. **...**
Cited by 24 Related articles All 2 versions Cite Save More

**Adaptive streaming** of MPEG-based audio/video content over wireless networks
M Burza, J Kang, P Stok - Journal of Multimedia, 2007 - academypublisher.com
Abstract This paper describes a method for robust **streaming** of combined MPEG audio/video content (encoded either with MPEG-2 or MPEG-4/H. 264) over in-home wireless networks. We make use of currently used content distribution format (MPEG Transport **...**
Cited by 18 Related articles All 12 versions Cite Save

Using scalable video coding for dynamic **adaptive streaming** over HTTP in mobile environments
C Muller, D Renzi, S Lederer, S Battista... - ..., 2012 Proceedings of ..., 2012 - ieeexplore.ieee.org
ABSTRACT Dynamic **Adaptive Streaming** over HTTP (DASH) is a convenient approach to transfer videos in an **adaptive** and dynamic way to the user. As a consequence, this system provides high bandwidth flexibility and is especially suitable for mobile use cases where **...**
Cited by 15 Related articles All 5 versions Cite Save

System and method for providing an **adaptive streaming** flow control mechanism between the TCP and IP layers of the TCP/IP suite of protocols
L Denecheau, D Esteve, JP Marce... - US Patent 6,880,017, 2005 - Google Patents
In a data communication network operated under the TCP/IP suite of protocols the invention adds an **adaptive streaming** (AS) layer, inserted between the IP and the TCP protocol layers, in which the received data packets of each open TCP connection are temporarily queued **...**
Cited by 18 Related articles All 2 versions Cite Save

A personalized HTTP **adaptive streaming** WebTV
RS Cruz, MS Nunes, JE Gonçalves - User Centric Media, 2010 - Springer
Abstract This paper presents a HTTP based multimedia content **streaming** architecture able to provide large scale WebTV services to end users connected over several access network technologies. The architecture features smooth Rate Adaptation, context Personalization **...**
Cited by 13 Related articles All 4 versions Cite Save

**Adaptive streaming** of audiovisual content using MPEG DASH

TC Thang, QD Ho, JW Kang... - ... , IEEE Transactions on, 2012 - ieeexplore.ieee.org
Abstract—HTTP **streaming** has become a cost effective means for multimedia delivery nowadays. In this paper, we study the use of MPEG DASH standard to stream audiovisual content. We first describe a novel estimation method for connection throughput. Then, **...**
Cited by 18 Related articles Cite Save

## Industry and Standards
I Sodagar - 2011 - mobile.computer.org
**...** MPEG-Dynamic **Adaptive Streaming** (DASH) was developed to do just that. **...** Iraj Sodagar Microsoft Corporation Editor's Note MPEG has recently finalized a new standard to enable dynamic and **adaptive streaming** of media over HTTP. **...**
Cited by 119 Related articles All 10 versions Cite Save

## Watching video over the web: Part 1: **Streaming** protocols
AC Begen, T Akgul, M Baugher - Internet Computing, IEEE, 2011 - ieeexplore.ieee.org
**...** Page 3. 3 QuickTime and Adobess Flash as well as the emerging **adaptive streaming** technologies such as Microsoftss Smooth **Streaming**, Appless HTTP Live **Streaming** and Adobess HTTP Dynamic **Streaming** run over mostly unmanaged, ie, bestĞeffort, networks. **...**
Cited by 87 Related articles All 5 versions Cite Save

## Interactions between HTTP **adaptive streaming** and TCP
J Esteban, SA Benno, A Beck, Y Guo, V Hilt... - Proceedings of the 22nd ..., 2012 - dl.acm.org
Abstract HTTP **adaptive streaming** (HAS) is quickly becoming a popular mechanism for delivering on-demand video content over the Internet. The chunked transmission and application-layer adaptation create a very different traffic pattern than traditional **...**
Cited by 15 Related articles Cite Save

## End-to-end frame-rate **adaptive streaming** of video data
C Fung, SC Liew - Multimedia Computing and Systems, 1999. ..., 1999 - ieeexplore.ieee.org
Abstract We propose a best-eflort video delivery scheme that can be deployed on networks in use today, including Ethernet LAN's or the Internet. This scheme detects congestion by m) easuring the buffer occupancy and loss rate and estimate available channel bandwidth by **...**
Cited by 13 Related articles All 7 versions Cite Save

## Advances in channel **adaptive** video **streaming**
B Girod, M Kalman, YJ Liang... - ... and Mobile Computing, 2002 - Wiley Online Library
Abstract Despite the well-known challenges of variations in throughput, delay, and packet loss over the Internet, video **streaming** has experienced phenomenal growth, owing to the extensive research in video coding and transmission. In this paper, we review several **...**
Cited by 156 Related articles All 16 versions Cite Save

## **Adaptive** stereoscopic 3D video **streaming**
CG Gurler
ABSTRACT This paper presents a comparative analysis of scalable stereoscopic video coding strategies for **adaptive streaming**. In particular, we compare scalable simulcast coding of both views using SVC with scalable coding of one view with SVC and non- **...**
Cited by 13 Related articles All 3 versions Cite Save

## Rate adaptation for dynamic **adaptive streaming** over HTTP in content distribution network
C Liu, I Bouazizi, MM Hannuksela... - Signal Processing: Image ..., 2012 - Elsevier
Recently the 3rd Generation Partnership Project (3GPP) and the Moving Picture Experts Group (MPEG) specified Dynamic **Adaptive Streaming** over HTTP (DASH) to cope with the shortages in progressive HTTP based downloading and Real-time Transport Protocol ( **...**
Cited by 19 Related articles All 7 versions Cite Save

## Http **adaptive streaming** in practice
M Watson - Proceedings of the ACM Multimedia Systems ..., 2011
Cited by 15 Related articles Cite Save

## PALS: peer-to-peer **adaptive** layered **streaming**
R Rejaie, A Ortega - Proceedings of the 13th international workshop on ..., 2003 - dl.acm.org
Abstract This paper presents a new framework for Peer-to-Peer **Adaptive** Layered **Streaming**, called PALS. PALS is a receiver-driven approach for quality **adaptive** playback of layer encoded **streaming** media from a group of congestion controlled sender peers to a **...**
Cited by 237 Related articles All 18 versions Cite Save

**Adaptive streaming** on heterogeneous networks

M Bernaschi, F Cacace, R Clementelli... - Proceedings of the 1st ..., 2005 - dl.acm.org

Abstract Specific network protocols, like MobileIP, offer seamless connectivity to mobile systems. However, the QoS requirements of **streaming** applications and video conferencing systems require an approach that spans across different layers of the network stack. In this **...**

Cited by 13 Related articles All 3 versions Cite Save

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 4780 | (upconvert$3 or upshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L2 | 4780 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L3 | 0 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near3 copi$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L4 | 16 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L5 | 256 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L6 | 247 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) and network | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L7 | 23173 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L8 | 760253 | ((multiple or plurality or many or | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | three or two) near5 (version or format$4 or copies or cop$4)) | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:42 |
| L9 | 23173 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L10 | 2360 | L9 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L11 | 2360 | L9 and "709"/$$$.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L12 | 745 | L9 and "709"/231.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L13 | 8 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L14 | 44 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L15 | 21 | L14 and (Stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L16 | 5 | L14 and (Stream$3 or (video with stream$3)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/08/21 22:42 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| L17 | 260 | L9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L18 | 260 | L9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L19 | 0 | L9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" same (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L20 | 260 | L9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L21 | 8168 | L9 and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L22 | 191 | L9 and @ad<"20040430" and (upshift$3 or upconvert$3 or downshift$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L23 | 10 | L22 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L24 | 1 | L22 and "709"/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L25 | 1 | L22 and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/08/21 22:42 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L26 | 20864 | "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L27 | 43 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L28 | 43 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L29 | 18 | (real near2 network).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L30 | 202 | (sure-stream or sure adj stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:42 |
| L31 | 45 | (sure-stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L32 | 4 | "7054948".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L33 | 1 | "7054948".pn. and surestream | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L34 | 11 | "7406527".pn. | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L35 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L36 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L37 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L38 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L39 | 107 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L40 | 0 | L39 and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L41 | 0 | L39 and (upconvert$3 or upshift$3 or downshift$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L42 | 140 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | @ad<"20040430") | IBM_TDB | | | |
| L43 | 0 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L44 | 4 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L45 | 23 | ((dynamically) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L46 | 0 | ((dynamical) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L47 | 47 | ((dynamic$5) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L48 | 24 | L47 not L45 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L49 | 927 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L50 | 166 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L51 | 88 | (((multiple or plurality or many or | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/$$$.ccls. | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L52 | 32 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L53 | 20864 | "709""/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L54 | 3588 | (multi-rate and (stream$3 or (video with stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L55 | 49 | (multi-rate and (stream$3 or (video with stream$3))).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L56 | 8 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L57 | 44 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L58 | 21 | L57 and (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| L59 | 1 | L57 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L60 | 4 | L57 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3 or quality or (high and low))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L61 | 1173017 | (plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L62 | 1239 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4 or dynamic$5) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L63 | 138 | L62 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L64 | 68 | L62 and "709"/$$$.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L65 | 5 | L62 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L66 | 741 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L67 | 742 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5 or (bit adj2 rate or bit-rate))) with ((automatic$4) near5 (switch$3 or | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | DERWENT; IBM_TDB | | | |
| L68 | 5 | L67 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L69 | 23849 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near8 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L70 | 13449 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L71 | 73 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L72 | 0 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L73 | 3 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/230-234.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L74 | 14726 | 709/231-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L75 | 6098 | 709/231-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L76 | 851 | L75 and ((multiple or plurality or many or three) near5 files) | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L77 | 733 | L75 and ((multiple or plurality or many or three) near3 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L78 | 276 | L75 and ((multiple or plurality or many or three) near3 copies) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L79 | 1 | L75 and ((multiple or plurality or many or three) near3 copies) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L80 | 18 | L75 and ((multiple or plurality or many or three) near3 (copies or files)) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L81 | 1 | L75 and ((multiple or plurality or many or three) near3 (copies))with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L82 | 1 | L75 and ((multiple or plurality or many or three) near3 (copies)) with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L83 | 276 | L75 and ((multiple or plurality or many or three) near3 (copies)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L84 | 1 | L75 and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L85 | 8 | @ad<"20050408" and ((multiple or | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L86 | 905 | (dynamic near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L87 | 315 | (dynamic near5 stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L88 | 16 | (dynamic near5 stream$3).ti. and @ad<"20050408" and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L89 | 3 | "5832300".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L90 | 0 | (dautomatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L91 | 728 | (automatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L92 | 358 | @ad<"20050408" and L91 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L93 | 0 | (automatic$4 near5 stream$3 with (upshif$3 or downshif$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L94 | 0 | (automatic$4 near5 stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L95 | 0 | (automatic$4 with stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L96 | 5 | ( stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L97 | 0 | ( stream$3 with (video with stream$3)).ti. and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L98 | 0 | ( stream$3 with (video with stream$3)) and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L99 | 2163208 | (dynamic$3 and switch$3 and stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L100 | 525324 | (dynamic$3 and switch$3 and stream$3 or video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L101 | 1 | (dynamic$3 and switch$3 and stream$3 and video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L102 | 1 | (dynamic$3 and switch$3 and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| L103 | 1 | (dynamic$3 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L104 | 14 | (automatic$4 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L105 | 15 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L106 | 245 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L107 | 9 | (automatic$4 near5 (switch$3 or shift$3 or upshift$3) near5 (stream$3 and video)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L108 | 2 | (automatic$4 near5 (copies or files or versions) near5 (stream$3 and video)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L109 | 30 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L110 | 956 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L111 | 118 | L110 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L112 | 223139 | (multiple or many or three or plurality) near5 ((files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L113 | 2953 | L112 and 709/230-234.ccls. | US-PGPUB; USPAT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L114 | 1281 | L112 and 709/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L115 | 28 | L112 and 709/230-234.ccls. and (upshift$3 or downshift$3 or upcovert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L116 | 12 | L112 and 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L117 | 18 | 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L118 | 28 | ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L119 | 100721 | microsoft.as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L120 | 1733 | microsoft.as. and (stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L121 | 753 | microsoft.as. and (stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| L122 | 7 | microsoft.as. and (stream$3 with quality).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L123 | 0 | (automatica$3 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L124 | 0 | (automatic$5 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L125 | 0 | (automatic$5 near5 switch$3 near5 ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L126 | 1 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L127 | 6 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L128 | 2 | "20050262257".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L129 | 0 | "20050262257".pn. and (ration or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L130 | 1 | "20050262257".pn. and (ratio or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| L131 | 0 | "20050262257".pn. and (sub-parts or subparts) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L132 | 1 | "20050262257".pn. and (safe$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L133 | 2 | "2002174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L134 | 2 | "20020174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L135 | 2 | "20020144276".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L136 | 11 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L137 | 1 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. and clip$4 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L138 | 1 | "20020188745".pn. and play$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L139 | 0 | "20020188745".pn. and tcp | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L140 | 0 | "20020188745".pn. and http | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L141 | 1 | "20020188745".pn. and web | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L142 | 2 | "20020188745".pn. and internet | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L143 | 8077890 | ((plurality or mutiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L144 | 8078220 | ((plurality or multiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L145 | 4637 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L146 | 120 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L147 | 64 | (((plurality or multiple) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L148 | 0 | "20020188745".pn. and cache | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L149 | 0 | "20020188745".pn. and operator | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L150 | 1 | "20020188745".pn. and separate | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L151 | 1 | "20050262257".pn. and (cache) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L152 | 1 | "20050262257".pn. and (saf$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L153 | 4780 | (upconvert$3 or upshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L154 | 4780 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L155 | 0 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near3 copi$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L156 | 16 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L157 | 256 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L158 | 247 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) and network | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L159 | 23173 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L160 | 760253 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L161 | 23173 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L162 | 2360 | L161 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L163 | 2360 | L161 and "709"/$$$.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L164 | 745 | L161 and "709"/231.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L165 | 8 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| L166 | 44 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L167 | 21 | L166 and (Stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L168 | 5 | L166 and (Stream$3 or (video with stream$3)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L169 | 260 | L161 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L170 | 260 | L161 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L171 | 0 | L161 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" same (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L172 | 260 | L161 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L173 | 8168 | L161 and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L174 | 191 | L161 and @ad<"20040430" and | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (upshift$3 or upconvert$3 or downshift$3 or downconvert$3) | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L175 | 10 | L174 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L176 | 1 | L174 and "709"/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L177 | 1 | L174 and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L178 | 20864 | "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L179 | 43 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L180 | 43 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L181 | 18 | (real near2 network).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L182 | 202 | (sure-stream or sure adj stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L183 | 45 | (sure-stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L184 | 4 | "7054948".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L185 | 1 | "7054948".pn. and surestream | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L186 | 11 | "7406527".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L187 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L188 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L189 | 2279 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L191 | 107 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L192 | 0 | L191 and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| L193 | 0 | L191 and (upconvert$3 or upshift$3 or downshift$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L194 | 140 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L195 | 0 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L196 | 4 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L197 | 23 | ((dynamically) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L198 | 0 | ((dynamical) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L199 | 47 | ((dynamic$5) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L200 | 24 | L199 not L197 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L201 | 927 | (((multiple or plurality or many or | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L202 | 166 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L203 | 88 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L204 | 32 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L205 | 20864 | "709""/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L206 | 3588 | (multi-rate and (stream$3 or (video with stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L207 | 49 | (multi-rate and (stream$3 or (video with stream$3))).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L208 | 8 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L209 | 44 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L210 | 21 | L209 and (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L211 | 1 | L209 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L212 | 4 | L209 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3 or quality or (high and low))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L213 | 1173017 | (plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L214 | 1239 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4 or dynamic$5) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L215 | 138 | L214 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L216 | 68 | L214 and "709"/$$$.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L217 | 5 | L214 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L218 | 741 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L219 | 742 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5 or (bit adj2 rate or bit-rate))) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L220 | 5 | L219 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L221 | 23849 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near8 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L222 | 13449 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L223 | 73 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L224 | 0 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L225 | 3 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/230-234.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L226 | 14726 | 709/231-234.ccls. | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L227 | 6098 | 709/231-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L228 | 851 | L227 and ((multiple or plurality or many or three) near5 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L229 | 733 | L227 and ((multiple or plurality or many or three) near3 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L230 | 276 | L227 and ((multiple or plurality or many or three) near3 copies) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L231 | 1 | L227 and ((multiple or plurality or many or three) near3 copies) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L232 | 18 | L227 and ((multiple or plurality or many or three) near3 (copies or files)) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L233 | 1 | L227 and ((multiple or plurality or many or three) near3 (copies))with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L234 | 1 | L227 and ((multiple or plurality or many or three) near3 (copies)) with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L235 | 276 | L227 and ((multiple or plurality or many or three) near3 (copies)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L236 | 1 | L227 and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L237 | 8 | @ad<"20050408" and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L238 | 905 | (dynamic near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L239 | 315 | (dynamic near5 stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L240 | 16 | (dynamic near5 stream$3).ti. and @ad<"20050408" and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L241 | 3 | "5832300".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L242 | 0 | (dautomatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L243 | 728 | (automatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| L244 | 358 | @ad<"20050408" and L243 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L245 | 0 | (automatic$4 near5 stream$3 with (upshif$3 or downshif$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L246 | 0 | (automatic$4 near5 stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L247 | 0 | (automatic$4 with stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L248 | 5 | ( stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L249 | 0 | ( stream$3 with (video with stream$3)).ti. and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L250 | 0 | ( stream$3 with (video with stream$3)) and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L251 | 2163208 | (dynamic$3 and switch$3 and stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L252 | 525324 | (dynamic$3 and switch$3 and stream$3 or video).ti. | US-PGPUB; USPAT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L253 | 1 | (dynamic$3 and switch$3 and stream$3 and video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L254 | 1 | (dynamic$3 and switch$3 and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L255 | 1 | (dynamic$3 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L256 | 14 | (automatic$4 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L257 | 15 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L258 | 245 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L259 | 9 | (automatic$4 near5 (switch$3 or shift$3 or upshift$3) near5 (stream$3 and video)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L260 | 2 | (automatic$4 near5 (copies or files or versions) near5 (stream$3 and video)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L261 | 30 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | DERWENT | OR | ON | 2014/08/21 22:43 |
| L262 | 956 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| L263 | 118 | L262 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L264 | 223139 | (multiple or many or three or plurality) near5 ((files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L265 | 2953 | L264 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L266 | 1281 | L264 and 709/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L267 | 28 | L264 and 709/230-234.ccls. and (upshift$3 or downshift$3 or upcovert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L268 | 12 | L264 and 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L269 | 18 | 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L270 | 28 | ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L271 | 100721 | microsoft.as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| L272 | 1733 | microsoft.as. and (stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L273 | 753 | microsoft.as. and (stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L274 | 7 | microsoft.as. and (stream$3 with quality).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L275 | 0 | (automatica$3 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L276 | 0 | (automatic$5 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L277 | 0 | (automatic$5 near5 switch$3 near5 ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L278 | 1 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L279 | 6 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L280 | 2 | "20050262257".pn. | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L281 | 0 | "20050262257".pn. and (ration or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L282 | 1 | "20050262257".pn. and (ratio or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L283 | 0 | "20050262257".pn. and (sub-parts or subparts) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L284 | 1 | "20050262257".pn. and (safe$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L285 | 2 | "2002174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L286 | 2 | "20020174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L287 | 2 | "20020144276".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L288 | 11 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L289 | 1 | ("20020078209" \| "20040117459" \| | US-PGPUB; | OR | ON | 2014/08/21 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | "20050021616" \| "20060031523").PN. and clip$4 | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 22:43 |
| L290 | 1 | "20020188745".pn. and play$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L291 | 0 | "20020188745".pn. and tcp | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L292 | 0 | "20020188745".pn. and http | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L293 | 1 | "20020188745".pn. and web | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L294 | 2 | "20020188745".pn. and internet | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L295 | 8077890 | ((plurality or mutiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L296 | 4637 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L297 | 120 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| L298 | 64 | (((plurality or multiple) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L299 | 0 | "20020188745".pn. and cache | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L300 | 0 | "20020188745".pn. and operator | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L301 | 1 | "20020188745".pn. and separate | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L302 | 1 | "20050262257".pn. and (cache) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L303 | 1 | "20050262257".pn. and (saf$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L304 | 103 | ((R) near2 (Major)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2014/08/21 22:43 |
| L305 | 19 | ((Mark) near2 (Hurst)).INV. | US-PGPUB | OR | ON | 2014/08/21 22:43 |
| L306 | 57 | (709/246.ccls.) and L296 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L307 | 67 | ((Mark) near2 (Hurst)).INV. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/08/21 22:43 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| L308 | 1 | ((Mark) near2 (Hurst)).INV. and tcp.clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 22:43 |
| L309 | 103 | ((R) near2 (Major)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2014/08/21 22:43 |
| L314 | 129563 | 35 ( (H04N21/84 OR H04N21/6125 OR H04N21/47202 OR H04N21/482 OR H04W84/045 OR H04W12/06 OR H04W76/023 OR H04L65/80 OR H04L65/1016 OR H04L65/607).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 23:19 |
| L315 | 524 | 35 and ( (H04N21/84 OR H04N21/6125 OR H04N21/47202 OR H04N21/482 OR H04W84/045 OR H04W12/06 OR H04W76/023 OR H04L65/80 OR H04L65/1016 OR H04L65/607).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 23:19 |
| L316 | 524 | 38 and ( (H04N21/84 OR H04N21/6125 OR H04N21/47202 OR H04N21/482 OR H04W84/045 OR H04W12/06 OR H04W76/023 OR H04L65/80 OR H04L65/1016 OR H04L65/607).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 23:19 |
| L317 | 177 | 49 and ( (H04N21/84 OR H04N21/6125 OR H04N21/47202 OR H04N21/482 OR H04W84/045 OR H04W12/06 OR H04W76/023 OR H04L65/80 OR H04L65/1016 OR H04L65/607).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/08/21 23:19 |
| S1 | 899 | (upconvert$3 or upshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:04 |
| S2 | 899 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:04 |
| S3 | 0 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near3 copi$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:05 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S4 | 2 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:06 |
| S5 | 85 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:06 |
| S6 | 81 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) and network | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:06 |
| S7 | 12707 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:08 |
| S8 | 441696 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:08 |
| S9 | 12707 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:08 |
| S10 | 1044 | S9 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:09 |
| S11 | 1044 | S9 and "709"/$$$.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:09 |
| S12 | 299 | S9 and "709"/231.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2009/02/09 17:09 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S13 | 6 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:12 |
| S14 | 32 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:12 |
| S15 | 21 | S14 and (Stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:13 |
| S16 | 5 | S14 and (Stream$3 or (video with stream$3)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:13 |
| S17 | 229 | S9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:15 |
| S18 | 229 | S9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:15 |
| S19 | 0 | S9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" same (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:16 |
| S20 | 229 | S9 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:16 |
| S21 | 7262 | S9 and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; | OR | ON | 2009/02/09 17:18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S22 | 186 | S9 and @ad<"20040430" and (upshift$3 or upconvert$3 or downshift$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:19 |
| S23 | 10 | S22 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:19 |
| S24 | 1 | S22 and "709"/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:20 |
| S25 | 1 | S22 and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:20 |
| S26 | 7913 | "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:20 |
| S27 | 7 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:21 |
| S28 | 7 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:22 |
| S29 | 14 | (real near2 network).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:32 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S30 | 142 | (sure-stream or sure adj stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:35 |
| S31 | 26 | (sure-stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:35 |
| S32 | 2 | "7054948".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:37 |
| S33 | 1 | "7054948".pn. and surestream | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 17:37 |
| S34 | 9 | "7406527".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:01 |
| S35 | 855 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:02 |
| S36 | 855 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:03 |
| S37 | 855 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:03 |
| S38 | 855 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. and | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2009/02/09 18:03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | @ad<"20040430" | DERWENT; IBM_TDB | | | |
| S39 | 94 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:04 |
| S40 | 0 | S39 and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:08 |
| S41 | 0 | S39 and (upconvert$3 or upshift$3 or downshift$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 18:08 |
| S42 | 121 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:25 |
| S43 | 0 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:30 |
| S44 | 0 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:31 |
| S45 | 2 | ((dynamically) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:33 |
| S46 | 0 | ((dynamical) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:34 |
| S47 | 5 | ((dynamic$5) with (((multiple or plurality or many or three or two) | US-PGPUB; USPAT; | OR | ON | 2009/02/09 19:34 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S48 | 3 | S47 not S45 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:36 |
| S49 | 782 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:45 |
| S50 | 146 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:56 |
| S51 | 78 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 19:58 |
| S52 | 29 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 20:01 |
| S53 | 7913 | "709""/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 20:02 |
| S54 | 1660 | (multi-rate and (stream$3 or (video with stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 20:04 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S55 | 11 | (multi-rate and (stream$3 or (video with stream$3))).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/09 20:04 |
| S56 | 6 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:44 |
| S57 | 32 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:45 |
| S58 | 21 | S57 and (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:45 |
| S59 | 1 | S57 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:46 |
| S60 | 4 | S57 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3 or quality or (high and low))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:47 |
| S61 | 670510 | (plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:51 |
| S62 | 662 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4 or dynamic$5) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 14:52 |
| S64 | 72 | S62 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2009/02/11 15:02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| S65 | 62 | S62 and "709"/$$$.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:05 |
| S66 | 5 | S62 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:06 |
| S67 | 424 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:07 |
| S68 | 425 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5 or (bit adj2 rate or bit-rate))) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:08 |
| S69 | 5 | S68 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:09 |
| S70 | 12589 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near8 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:10 |
| S71 | 6937 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:10 |
| S72 | 26 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:11 |
| S73 | 0 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) | US-PGPUB; USPAT; | OR | ON | 2009/02/11 15:11 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | near4 automat$5) and 709/231.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S74 | 2 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/230-234.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:12 |
| S75 | 5236 | 709/231-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:12 |
| S76 | 4485 | 709/231-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:12 |
| S77 | 691 | S76 and ((multiple or plurality or many or three) near5 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:13 |
| S78 | 591 | S76 and ((multiple or plurality or many or three) near3 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:14 |
| S79 | 233 | S76 and ((multiple or plurality or many or three) near3 copies) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:14 |
| S80 | 1 | S76 and ((multiple or plurality or many or three) near3 copies) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:15 |
| S81 | 9 | S76 and ((multiple or plurality or many or three) near3 (copies or files)) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:25 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S82 | 1 | S76 and ((multiple or plurality or many or three) near3 (copies))with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:27 |
| S83 | 1 | S76 and ((multiple or plurality or many or three) near3 (copies)) with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:27 |
| S84 | 233 | S76 and ((multiple or plurality or many or three) near3 (copies)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:28 |
| S85 | 1 | S76 and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:28 |
| S86 | 6 | @ad<"20050408" and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:29 |
| S87 | 251 | (dynamic near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:32 |
| S88 | 169 | (dynamic near5 stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:34 |
| S89 | 10 | (dynamic near5 stream$3).ti. and @ad<"20050408" and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:34 |
| S90 | 2 | "5832300".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2009/02/11 15:40 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S91 | 0 | (dautomatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:41 |
| S92 | 326 | (automatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:41 |
| S93 | 241 | @ad<"20050408" and S92 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:42 |
| S94 | 0 | (automatic$4 near5 stream$3 with (upshif$3 or downshif$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:43 |
| S95 | 0 | (automatic$4 near5 stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:43 |
| S96 | 0 | (automatic$4 with stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:43 |
| S97 | 3 | ( stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:43 |
| S98 | 0 | ( stream$3 with (video with stream$3)).ti. and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:52 |
| S99 | 0 | ( stream$3 with (video with stream$3)) and (automatic$4 near4 switch$3 near4 different near4 | US-PGPUB; USPAT; USOCR; | OR | ON | 2009/02/11 15:52 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | quality) | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S100 | 1081374 | (dynamic$3 and switch$3 and stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:57 |
| S101 | 271819 | (dynamic$3 and switch$3 and stream$3 or video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:58 |
| S102 | 0 | (dynamic$3 and switch$3 and stream$3 and video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:58 |
| S103 | 0 | (dynamic$3 and switch$3 and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:59 |
| S104 | 0 | (dynamic$3 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:59 |
| S105 | 5 | (automatic$4 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:59 |
| S106 | 6 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 15:59 |
| S107 | 108 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)) | DERWENT | OR | ON | 2009/02/11 16:00 |
| S108 | 6 | (automatic$4 near5 (switch$3 or shift$3 or upshift$3) near5 (stream$3 and video)) | DERWENT | OR | ON | 2009/02/11 16:02 |
| S109 | 1 | (automatic$4 near5 (copies or files or | DERWENT | OR | ON | 2009/02/11 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | versions) near5 (stream$3 and video)) | | | | 16:02 |
| S110 | 11 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | DERWENT | OR | ON | 2009/02/11 16:03 |
| S111 | 365 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:04 |
| S112 | 37 | S111 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:04 |
| S113 | 108249 | (multiple or many or three or plurality) near5 ((files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:10 |
| S114 | 1240 | S113 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:11 |
| S115 | 1038 | S113 and 709/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:11 |
| S116 | 11 | S113 and 709/230-234.ccls. and (upshift$3 or downshift$3 or upcovert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:12 |
| S117 | 3 | S113 and 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:14 |
| S118 | 3 | 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2009/02/11 16:14 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| S119 | 7 | ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:15 |
| S120 | 50419 | microsoft.as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:15 |
| S121 | 981 | microsoft.as. and (stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:16 |
| S122 | 650 | microsoft.as. and (stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:16 |
| S123 | 6 | microsoft.as. and (stream$3 with quality).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:17 |
| S124 | 0 | (automatica$3 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:19 |
| S125 | 0 | (automatic$5 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:20 |
| S126 | 0 | (automatic$5 near5 switch$3 near5 ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:20 |
| S127 | 0 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2009/02/11 16:20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| S128 | 6 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/11 16:22 |
| S129 | 2 | "20050262257".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:34 |
| S130 | 0 | "20050262257".pn. and (ration or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:38 |
| S131 | 1 | "20050262257".pn. and (ratio or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:39 |
| S132 | 0 | "20050262257".pn. and (sub-parts or subparts) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:39 |
| S133 | 1 | "20050262257".pn. and (safe$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:43 |
| S134 | 2 | "2002174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:49 |
| S135 | 2 | "20020174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 17:49 |
| S136 | 2 | "20020144276".pn. | US-PGPUB; USPAT; | OR | ON | 2009/02/13 17:51 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S137 | 8 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 18:33 |
| S138 | 1 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. and clip$4 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 18:33 |
| S139 | 1 | "20020188745".pn. and play$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 18:37 |
| S140 | 0 | "20020188745".pn. and tcp | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:00 |
| S141 | 0 | "20020188745".pn. and http | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:00 |
| S142 | 1 | "20020188745".pn. and web | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:00 |
| S143 | 2 | "20020188745".pn. and internet | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:01 |
| S144 | 4765975 | ((plurality or mutiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S145 | 4766104 | ((plurality or multiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:03 |
| S146 | 2131 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:03 |
| S147 | 30 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:04 |
| S148 | 12 | (((plurality or multiple) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:07 |
| S149 | 0 | "20020188745".pn. and cache | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:22 |
| S150 | 0 | "20020188745".pn. and operator | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:22 |
| S151 | 1 | "20020188745".pn. and separate | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:25 |
| S152 | 1 | "20050262257".pn. and (cache) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2009/02/13 19:25 |
| S153 | 1 | "20050262257".pn. and (saf$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2009/02/13 19:36 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S154 | 4705 | (upconvert$3 or upshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S155 | 4705 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S156 | 0 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near3 copi$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S157 | 16 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) same ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S158 | 253 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S159 | 244 | (upconvert$3 or upshift$3) with (stream$3 or (video with stream$3)) and ("709"/$$$.ccls. or "725"/$$$.ccls.) and network | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S160 | 23030 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) same (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S161 | 756102 | ((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S162 | 23030 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (stream$3 or (video with stream$3)) | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S163 | 2345 | S162 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S164 | 2345 | S162 and "709"/$$$.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S165 | 738 | S162 and "709"/231.ccls. and (stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S166 | 8 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S167 | 44 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S168 | 21 | S167 and (Stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S169 | 5 | S167 and (Stream$3 or (video with stream$3)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S170 | 260 | S162 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S171 | 260 | S162 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S172 | 0 | S162 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" same (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S173 | 260 | S162 and "709"/231.ccls. and (stream$3 or video) and @ad<"20040430" and (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S174 | 8168 | S162 and (stream$3 or video) and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S175 | 191 | S162 and @ad<"20040430" and (upshift$3 or upconvert$3 or downshift$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S176 | 10 | S175 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S177 | 1 | S175 and "709"/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S178 | 1 | S175 and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S179 | 20509 | "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S180 | 42 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with strem$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S181 | 42 | "709"/230-234.ccls. and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S182 | 18 | (real near2 network).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S183 | 202 | (sure-stream or sure adj stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S184 | 45 | (sure-stream or surestream) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S185 | 4 | "7054948".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S186 | 1 | "7054948".pn. and surestream | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S187 | 11 | "7406527".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S188 | 2259 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (stream$3 or (video with stream$3)) same server | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S189 | 2259 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S190 | 2259 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S191 | 2259 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and709/231.ccls. and @ad<"20040430" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S192 | 107 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S193 | 0 | S192 and (upconvert$3 or upshift$3 or downshift$3) with (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S194 | 0 | S192 and (upconvert$3 or upshift$3 or downshift$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S195 | 140 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S196 | 0 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server and (709/231.ccls. and @ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S197 | 4 | ((dynamically near3 chang$4) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S198 | 23 | ((dynamically) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S199 | 0 | ((dynamical) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S200 | 46 | ((dynamic$5) with (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4)))) same3 (stream$3 or (video with stream$3)) same server | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S201 | 23 | S200 not S198 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S202 | 927 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S203 | 166 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S204 | 88 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S205 | 32 | (((multiple or plurality or many or three or two) near5 (version or format$4 or copies or cop$4))) same3 (stream$3 or (video with stream$3)) same server and (@ad<"20040430") and ((dynamic$5 or automatical$5) near3 (upshift$3 or downshift$3 or upconvert$3 or downcovnert$3 or chan$4)) and "709"/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S206 | 20509 | "709""/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S207 | 3562 | (multi-rate and (stream$3 or (video with stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S208 | 49 | (multi-rate and (stream$3 or (video with stream$3))).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S209 | 8 | ("20020174434" \| "20030067872" \| "20040030797").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S210 | 44 | ("20020174434" \| "20030067872" \| "20040030797").PN. or ("20020073167" \| "20050123058" \| "20070024705" \| "20080028428" \| "20080056373" \| "6091775" \| "6091777" \| "6510553" \| "6731600" \| "6732183" \| "6968387" \| "7075986" \| "7349976").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S211 | 21 | S210 and (stream$3 or (video with stream$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S212 | 1 | S210 and (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S213 | 4 | S210 and (stream$3 or (video with | US-PGPUB; | OR | ON | 2014/07/31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | stream$3)) and ((plurality or many or multiple) near5 (version or format or cop$3 or quality or (high and low))) | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 00:31 |
| S214 | 1166673 | (plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S215 | 1235 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4 or dynamic$5) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S216 | 138 | S215 and "709"/$$$.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S217 | 68 | S215 and "709"/$$$.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S218 | 5 | S215 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S219 | 739 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5)) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S220 | 740 | ((plurality or many or three or two or multiple) near5 (file or cop$3 or version or format$3 or compress$5 or (bit adj2 rate or bit-rate))) with ((automatic$4) near5 (switch$3 or chang$3 or upshift$3 or downshift$3 or upconvert$3 or downconvert$3)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S221 | 5 | S220 and "709"/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| S222 | 23672 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near8 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S223 | 13352 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S224 | 73 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S225 | 0 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/231.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S226 | 3 | (stream$3 or (video with stream$3)) and ((plurality or many or multiple) near4 automat$5) and 709/230-234.ccls. and (upshift$3 or downshift$3 or upconvert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S227 | 14464 | 709/231-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S228 | 6072 | 709/231-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S229 | 851 | S228 and ((multiple or plurality or many or three) near5 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S230 | 733 | S228 and ((multiple or plurality or many or three) near3 files) | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| S231 | 276 | S228 and ((multiple or plurality or many or three) near3 copies) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S232 | 1 | S228 and ((multiple or plurality or many or three) near3 copies) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S233 | 18 | S228 and ((multiple or plurality or many or three) near3 (copies or files)) near5 (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S234 | 1 | S228 and ((multiple or plurality or many or three) near3 (copies))with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S235 | 1 | S228 and ((multiple or plurality or many or three) near3 (copies)) with (encod$3 or bit-rate or qualilty) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S236 | 276 | S228 and ((multiple or plurality or many or three) near3 (copies)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S237 | 1 | S228 and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S238 | 8 | @ad<"20050408" and ((multiple or plurality or many or three) near3 (copies)) near5 (bit adj3 rate) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S239 | 898 | (dynamic near5 stream$3).ti. | US-PGPUB; USPAT; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S240 | 315 | (dynamic near5 stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S241 | 16 | (dynamic near5 stream$3).ti. and @ad<"20050408" and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S242 | 3 | "5832300".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S243 | 0 | (dautomatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S244 | 727 | (automatic$4 near5 stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S245 | 358 | @ad<"20050408" and S244 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S246 | 0 | (automatic$4 near5 stream$3 with (upshif$3 or downshif$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S247 | 0 | (automatic$4 near5 stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S248 | 0 | (automatic$4 with stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S249 | 5 | ( stream$3 with (upshift$3 or downshift$3 or upconvert$3 or downconvert$3)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S250 | 0 | ( stream$3 with (video with stream$3)).ti. and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S251 | 0 | ( stream$3 with (video with stream$3)) and (automatic$4 near4 switch$3 near4 different near4 quality) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S252 | 2150270 | (dynamic$3 and switch$3 and stream$3 or video) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S253 | 523542 | (dynamic$3 and switch$3 and stream$3 or video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S254 | 1 | (dynamic$3 and switch$3 and stream$3 and video).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S255 | 1 | (dynamic$3 and switch$3 and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S256 | 1 | (dynamic$3 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | DERWENT; IBM_TDB | | | |
| S257 | 13 | (automatic$4 and (switch$3 or shivt$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S258 | 14 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S259 | 241 | (automatic$4 and (switch$3 or shift$3 or upshift$3) and (stream$3 and video)) | DERWENT | OR | ON | 2014/07/31 00:31 |
| S260 | 9 | (automatic$4 near5 (switch$3 or shift$3 or upshift$3) near5 (stream$3 and video)) | DERWENT | OR | ON | 2014/07/31 00:31 |
| S261 | 2 | (automatic$4 near5 (copies or files or versions) near5 (stream$3 and video)) | DERWENT | OR | ON | 2014/07/31 00:31 |
| S262 | 29 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | DERWENT | OR | ON | 2014/07/31 00:31 |
| S263 | 945 | (multiple or many or three or plurality) near5 ((files or version) near5 (quality or bit-rate or bit adj rate)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S264 | 117 | S263 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S265 | 221423 | (multiple or many or three or plurality) near5 ((files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S266 | 2932 | S265 and 709/230-234.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S267 | 1281 | S265 and 709/230-234.ccls. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S268 | 28 | S265 and 709/230-234.ccls. and (upshift$3 or downshift$3 or upcovert$3 or downconvert$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S269 | 12 | S265 and 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S270 | 17 | 709/230-234.ccls. and ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S271 | 27 | ((upshift$3 or downshift$3 or upcovert$3 or downconvert$3) with (quality with (video or stream$3))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S272 | 100080 | microsoft.as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S273 | 1724 | microsoft.as. and (stream$3).ti. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S274 | 753 | microsoft.as. and (stream$3).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S275 | 7 | microsoft.as. and (stream$3 with quality).ti. and @ad<"20050408" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S276 | 0 | (automatica$3 near5 switch$3 near5 | US-PGPUB; | OR | ON | 2014/07/31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | (different near5 qualit$5) near5 (files or version)) | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 00:31 |
| S277 | 0 | (automatic$5 near5 switch$3 near5 (different near5 qualit$5) near5 (files or version)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S278 | 0 | (automatic$5 near5 switch$3 near5 ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S279 | 1 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((different near5 qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S280 | 6 | ((automatic$5 near5 (switch$3 or upshift$3 or downshift$3 or upconvert$3)) with ((qualit$5) near5 (files or version))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S281 | 2 | "20050262257".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S282 | 0 | "20050262257".pn. and (ration or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S283 | 1 | "20050262257".pn. and (ratio or average) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S284 | 0 | "20050262257".pn. and (sub-parts or subparts) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| S285 | 1 | "20050262257".pn. and (safe$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S286 | 2 | "2002174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S287 | 2 | "20020174434".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S288 | 2 | "20020144276".pn. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S289 | 11 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S290 | 1 | ("20020078209" \| "20040117459" \| "20050021616" \| "20060031523").PN. and clip$4 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S291 | 1 | "20020188745".pn. and play$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S292 | 0 | "20020188745".pn. and tcp | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S293 | 0 | "20020188745".pn. and http | US-PGPUB; USPAT; USOCR; FPRS; EPO; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | JPO; DERWENT; IBM_TDB | | | |
| S294 | 1 | "20020188745".pn. and web | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S295 | 2 | "20020188745".pn. and internet | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S296 | 8046629 | ((plurality or mutiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S297 | 8046958 | ((plurality or multiple or two or threee or many) near5 tcp mear5 connection) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S298 | 4601 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S299 | 119 | (((plurality or multiple or two or threee or many) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S300 | 64 | (((plurality or multiple) near5 (tcp near5 connection))) and 709/231.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S301 | 0 | "20020188745".pn. and cache | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S302 | 0 | "20020188745".pn. and operator | US-PGPUB; USPAT; | OR | ON | 2014/07/31 00:31 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S303 | 1 | "20020188745".pn. and separate | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S304 | 1 | "20050262257".pn. and (cache) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S305 | 1 | "20050262257".pn. and (saf$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:31 |
| S306 | 103 | ((R) near2 (Major)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2014/07/31 00:32 |
| S307 | 19 | ((Mark) near2 (Hurst)).INV. | US-PGPUB | OR | ON | 2014/07/31 00:32 |
| S308 | 57 | (709/246.ccls.) and S298 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 00:33 |
| S309 | 67 | ((Mark) near2 (Hurst)).INV. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 01:14 |
| S310 | 1 | ((Mark) near2 (Hurst)).INV. and tcp.clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2014/07/31 01:15 |
| S311 | 103 | ((R) near2 (Major)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2014/07/31 01:15 |

**EAST Search History (Interference)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| L310 | 0 | (media player video playback multipl tcp connection subsequent).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/08/21 22:43 |
| L311 | 1 | (media player video playback multiple tcp connection subsequent).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/08/21 22:43 |
| L312 | 1 | (media player video playback multiple tcp connection subsequent).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/08/21 22:43 |
| L313 | 0 | (media player video playback multiple tcp connection subsequent generat$5).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/08/21 22:43 |
| S312 | 0 | (media player video playback multipl tcp connection subsequent).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/07/31 01:19 |
| S313 | 1 | (media player video playback multiple tcp connection subsequent).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/07/31 01:19 |
| S314 | 1 | (media player video playback multiple tcp connection subsequent).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/07/31 01:19 |
| S315 | 0 | (media player video playback multiple tcp connection subsequent generat$5).clm. | US-PGPUB; USPAT; UPAD | AND | ON | 2014/07/31 01:20 |

**8/21/2014 11:19:46 PM**
**C:\Users\ndonabed\Documents\EAST\Workspaces\11116783_amendment.wsp**

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 11116783 | MAJOR ET AL. |
| | **Examiner** | **Art Unit** |
| | NINOS DONABED | 2444 |

## CPC- SEARCHED

| Symbol | Date | Examiner |
|---|---|---|
| | | |

## CPC COMBINATION SETS - SEARCHED

| Symbol | Date | Examiner |
|---|---|---|
| | | |

## US CLASSIFICATION SEARCHED

| Class | Subclass | Date | Examiner |
|---|---|---|---|
| 709 | 246 | 05/07/2008 | ND |

## SEARCH NOTES

| Search Notes | Date | Examiner |
|---|---|---|
| See EAST Search History | 05/07/2008 | ND |
| Conducted double patenting search | 05/07/2008 | ND |
| Consulted with SPE William Vaughn | 11/13/2008 | ND |
| See updated EAST search | 12/13/2009 | ND |
| Consulted with SPE William Vaughn regarding Final | 02/12/2009 | ND |
| Consulted with SPE William Vaughn regarding Advisory | 03/29/2009 | ND |
| Consulted with SPE William Vaughn regarding Advisory | 5/7/2009 | ND |
| Consulted with Primary Paul Kang | 02/10/2009 | ND |
| See updated east search | 7/30/2009 | ND |
| Consulted with SPe William Vaughn regarding search | 7/30/2009 | ND |
| Consulted SPE William Vaughn regarding Final | 2/4/2010 | nd |
| Consulted SPE William Vaughn regarding Appeal | 1/27/2011 | nd |
| Consulted with Qas Mark Radtke regarding IDS | 7/30/2014 | nd |
| Conducted 101 claim analysis | 7/31/2014 | nd |
| Conducted 112 2nd paragraph analysis | 7/31/2014 | nd |
| Conducted 112 6th paragraph claim analysis | 7/31/2014 | nd |
| Conducted double patenting search (EAST, eDAN, PALM) *Inventor **Assignee | 7/31/2014 | nd |
| East Search | 7/31/2014 | nd |

## SEARCH NOTES

| Search Notes | Date | Examiner |
|---|---|---|
| Plus Serch | 7/31/2014 | nd |
| NPL Seach (Google, Google Scholar) | 7/31/2014 | nd |
| 709/246,231 + texted searched1 | 7/31/2014 | nd |
| Conducted double patenting search (EAST, eDAN, PALM) *Inventor **Assignee | 8/21/2014 | nd |
| East Search | 8/21/2014 | nd |
| Plus Search | 8/21/2014 | nd |
| NPL Seach (Google, Google Scholar) | 8/21/2014 | nd |
| 709/246,231 + texted searched1 | 8/21/2014 | nd |
| (H04N21/84 OR H04N21/6125 OR H04N21/47202 OR H04N21/482 OR H04W84/045 OR H04W12/06 OR H04W76/023 OR H04L65/80 OR H04L65/1016 OR H04L65/607).CPC. + texted searched | 8/21/2014 | nd |

## INTERFERENCE SEARCH

| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
|---|---|---|---|
| | Conducted Interference Search - See EAST Search History | 7/28/2014 | nd |
| | Conducted Interference Search - See EAST Search History | 8/21/2014 | nd |

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 11116783 |
| | Filing Date | 2005-04-28 |
| | First Named Inventor | R. Drew Major |
| | Art Unit | 2444 |
| | Examiner Name | Donabed, Ninos J. |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) |

| 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 |
| | 1 | 7523181 | B2 | 2009-04-21 | Swildens et al. | |
| | 2 | 6976090 | B2 | 2005-12-13 | Ben-Shaul et al. | |
| | 3 | 7240100 | B1 | 2007-07-03 | Wein et al. | |
| | 4 | 6850965 | B2 | 2005-02-01 | Allen | |
| | 5 | 7334044 | B1 | 2008-02-19 | Allen | |
| | 6 | 7760801 | B2 | 2010-07-20 | Ghanbari et al. | |
| | 7 | 7099954 | B2 | 2006-08-29 | Li et al. | |
| | 8 | 7054911 | B1 | 2006-05-30 | Lango et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 9 | 7349358 | B2 | 2008-03-25 | Hennessey et al. | |
| | 10 | 7797439 | B2 | 2010-09-14 | Cherkasova et al. | |
| | 11 | 7477688 | B1 | 2009-01-13 | Zhang et al. | |
| | 12 | 7054774 | B2 | 2006-05-30 | Batterberry et al. | |
| | 13 | 6760772 | B2 | 2004-07-06 | Zou et al. | |
| | 14 | 5168356 | | 1992-12-01 | Acampora et al. | |
| | 15 | 7546355 | B2 | 2009-06-09 | Kalnitsky | |
| | 16 | 7174385 | B2 | 2007-02-06 | Li | |
| | 17 | 7376747 | B2 | 2008-05-20 | Hartop | |
| | 18 | 7719985 | B2 | 2010-05-18 | Lee et al. | |
| | 19 | 8683066 | B2 | 2014-03-25 | Hurst et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 20 | 5768527 | | 1998-06-16 | Zhu et al. | |
| | 21 | 7274740 | B2 | 2007-09-25 | van Beek et al. | |
| | 22 | 6185736 | B1 | 2001-02-06 | Ueno | |
| | 23 | 6845107 | B1 | 2005-01-18 | Kitazawa et al. | |
| | 24 | 6874015 | B2 | 2005-03-29 | Kaminsky et al. | |
| | 25 | 7093001 | B2 | 2006-08-15 | Yang et al. | |
| | 26 | 7599307 | B2 | 2009-10-06 | Seckni et al. | |
| | 27 | 7788395 | B2 | 2010-08-31 | Bowra et al. | |
| | 28 | 7536469 | B2 | 2009-05-19 | Chou et al. | |
| | 29 | 7412531 | B2 | 2008-08-12 | Lango et al. | |
| | 30 | 7295520 | B2 | 2007-11-13 | Lee et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 31 | 6795863 | B1 | 2004-09-21 | Doty, Jr. | |
| | 32 | 7609652 | B2 | 2009-10-27 | Kellerer et al. | |
| | 33 | 7325073 | B2 | 2008-01-29 | Shao et al. | |
| | 34 | 6374289 | B2 | 2002-04-16 | Delaney et al. | |
| | 35 | 7194549 | B1 | 2007-03-20 | Lee et al. | |
| | 36 | 7054365 | B2 | 2006-05-30 | Kim et al. | |
| | 37 | 6122660 | | 2000-09-19 | Baransky et al. | |
| | 38 | 7391717 | B2 | 2008-06-24 | Klemets et al. | |
| | 39 | 7260640 | B1 | 2007-08-21 | Kramer et al. | |
| | 40 | 7310678 | B2 | 2007-12-18 | Gunaseelan et al. | |
| | 41 | 7593333 | B2 | 2009-09-22 | Li et al. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 42 | 6618752 | B1 | 2003-09-09 | Moore et al. | |
| | 43 | 6721723 | B1 | 2004-04-13 | Gibson et al. | |
| | 44 | 6859839 | B1 | 2005-02-22 | Zahorjan et al. | |
| | 45 | 7779135 | B2 | 2010-08-17 | Hudson et al. | |
| | 46 | 7369610 | | 2008-05-06 | Xu et al. | |
| | 47 | 7330908 | | 2008-02-12 | Jungck | |
| | 48 | 7577750 | | 2009-08-18 | Shen et al. | |
| | 49 | 7328243 | | 2008-02-05 | Yeager et al. | |
| | 50 | 7116894 | | 2006-10-03 | Chatterton | |
| | 51 | 7653735 | | 2010-01-26 | Mandato et al. | |
| | 52 | 8135852 | B2 | 2012-03-13 | Nilsson et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 53 | 5841432 | | 1998-11-24 | Carmel et al. | |
| | 54 | 5404446 | | 1995-04-04 | Bowater et al. | |
| | 55 | 6449719 | B1 | 2002-09-10 | Baker | |
| | 56 | 7817985 | B2 | 2010-10-19 | Moon | |
| | 57 | 8209429 | B2 | 2012-06-26 | Jacobs et al. | |
| | 58 | 7733830 | B2 | 2010-06-08 | Curcio et al. | |
| | 59 | 7660906 | B1 | 2010-02-09 | Armour | |
| | 60 | 8036265 | B1 | 2011-10-11 | Reynolds et al. | |
| | 61 | 5267334 | | 1993-11-30 | Normille et al. | |
| | 62 | 8370514 | B2 | 2013-02-05 | Hurst et al. | |
| | 63 | 8612624 | B2 | 2013-12-17 | Frueck et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 64 | 6654790 | B2 | 2003-11-25 | Ogle et al. | |
| | 65 | 6675199 | B1 | 2004-01-06 | Mohammed et al. | |
| | 66 | 6697072 | B2 | 2004-02-24 | Russell et al. | |
| | 67 | 6792449 | B2 | 2004-09-14 | Colville et al. | |
| | 68 | 6801947 | B1 | 2004-10-05 | Li | |
| | 69 | 6885471 | B1 | 2005-04-26 | Minowa et al. | |
| | 70 | 7031700 | B1 | 2006-04-18 | Weaver et al. | |
| | 71 | 7046805 | B2 | 2006-05-16 | Fitzhardinge et al. | |
| | 72 | 7111044 | B2 | 2006-09-19 | Lee | |
| | 73 | 7124164 | B1 | 2006-10-17 | Chemtob | |
| | 74 | 7176957 | B2 | 2007-02-13 | Ivashin et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 75 | 7177642 | B2 | 2007-02-13 | Sanchez Herrero et al. | |
| | 76 | 7190670 | B2 | 2007-03-13 | Varsa et al. | |
| | 77 | 7313236 | B2 | 2007-12-25 | Amini et al. | |
| | 78 | 7529541 | B2 | 2009-05-05 | Cho et al. | |
| | 79 | 6552227 | B2 | 2003-04-22 | Mendelovici et al. | |
| | 80 | 7555464 | B2 | 2009-06-30 | Candelore | |
| | 81 | 7558472 | B2 | 2009-07-07 | Locket et al. | |
| | 82 | 7631039 | B2 | 2009-12-08 | Eisenberg | |
| | 83 | 7761609 | B1 | 2010-07-20 | Srinivasan et al. | |
| | 84 | 7873040 | B2 | 2011-01-18 | Karlsgodt | |
| | 85 | 7818444 | B2 | 2010-10-19 | Brueck et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 86 | 8402156 | B2 | 2013-03-19 | Brueck et al | |

If you wish to add additional U.S. Patent citation information please click the Add button. Add

**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 |
|---|---|---|---|---|---|---|
| | 1 | 20040083283 | A1 | 2004-04-29 | Sundaram et al. | |
| | 2 | 20080219151 | A1 | 2008-09-11 | Ma et al. | |
| | 3 | 20020152318 | A1 | 2002-10-17 | Menon et al. | |
| | 4 | 20060080718 | A1 | 2006-04-13 | Gray et al. | |
| | 5 | 20050120107 | A1 | 2005-06-02 | Kagan et al. | |
| | 6 | 20040103444 | A1 | 2004-05-27 | Weinberg et al. | |
| | 7 | 20050188051 | A1 | 2005-08-25 | Sneh | |
| | 8 | 20030154239 | A1 | 2003-08-14 | Davis et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 9 | 20080133766 | A1 | 2008-06-05 | Luo | |
| | 10 | 20070079325 | A1 | 2007-04-05 | de Heer | |
| | 11 | 20030014684 | A1 | 2003-01-16 | Kashyap | |
| | 12 | 20060206246 | A1 | 2006-09-14 | Walker | |
| | 13 | 20050076136 | A1 | 2005-04-07 | Cho et al. | |
| | 14 | 20030018966 | A1 | 2003-01-23 | Cook et al. | |
| | 15 | 20040030599 | A1 | 2004-02-12 | Sie et al. | |
| | 16 | 20050262257 | A1 | 2005-11-24 | Major et al. | |
| | 17 | 20030140159 | A1 | 2003-07-24 | Campbell et al. | |
| | 18 | 20010047423 | A1 | 2001-11-29 | Shao et al. | |
| | 19 | 20030021166 | A1 | 2003-01-30 | Soloff | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 20 | 20020176418 | A1 | 2002-11-28 | Hunt et al. | |
| | 21 | 20020169926 | A1 | 2002-11-14 | Pinckney, III et al. | |
| | 22 | 20020178330 | A1 | 2002-11-28 | Schlowsky-Fischer et al. | |
| | 23 | 20050084166 | A1 | 2005-04-21 | Bonch et al. | |
| | 24 | 20020091840 | A1 | 2002-07-11 | Pulier et al. | |
| | 25 | 20040117427 | A1 | 2004-06-17 | Allen et al. | |
| | 26 | 20040030547 | A1 | 2004-02-12 | Leaning et al. | |
| | 27 | 20060165166 | A1 | 2006-07-27 | Chou et al. | |
| | 28 | 20020097750 | A1 | 2002-07-25 | Gunaseelan et al. | |
| | 29 | 20020152317 | A1 | 2002-10-17 | Wang et al. | |
| | 30 | 20080037527 | A1 | 2008-02-14 | Chan et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 31 | 20040168052 | A1 | 2004-08-26 | Clisham et al. | |
| | 32 | 20050066063 | A1 | 2005-03-24 | Grigorovitch et al. | |
| | 33 | 20050204046 | A1 | 2005-09-15 | Watanabe | |
| | 34 | 20060059223 | A1 | 2006-03-16 | Klemets et al. | |
| | 35 | 20060168295 | A1 | 2006-07-27 | Batterberry et al. | |
| | 36 | 20080281803 | A1 | 2008-11-13 | Gentric | |
| | 37 | 20050185578 | A1 | 2005-08-25 | Padmanabhan et al. | |
| | 38 | 20070280255 | A1 | 2007-12-06 | Tsang et al. | |
| | 39 | 20100098103 | A1 | 2010-04-22 | Xiong et al. | |
| | 40 | 20090210549 | A1 | 2009-08-20 | Hudson et al. | |
| | 41 | 20090055547 | A1 | 2009-02-26 | Hudson et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 42 | 20080205291 | A1 | 2008-08-28 | Li et al. | |
| | 43 | 20070094405 | A1 | 2007-04-26 | Zhang | |
| | 44 | 20060184688 | A1 | 2006-08-17 | Ganguly et al. | |
| | 45 | 20080263180 | A1 | 2008-10-23 | Hurst et al. | |
| | 46 | 20090055471 | A1 | 2009-02-26 | Kozat et al. | |
| | 47 | 20040260701 | A1 | 2004-12-23 | Lehikoinen et al. | |
| | 48 | 20060168290 | A1 | 2006-07-27 | Doron | |
| | 49 | 20070030833 | A1 | 2007-02-08 | Pirzada et al. | |
| | 50 | 20070067480 | A1 | 2007-03-22 | Beek et al. | |
| | 51 | 20060133809 | A1 | 2006-06-22 | Chow et al. | |
| | 52 | 20040049780 | A1 | 2004-03-11 | Gee | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 53 | 20030065803 | A1 | 2003-04-03 | Heuvelman | |
| | 54 | 20020161911 | A1 | 2002-10-31 | Pinckney, III et al. | |
| | 55 | 20060236219 | A1 | 2006-10-19 | Grigorovitch et al. | |
| | 56 | 20080046939 | A1 | 2008-02-21 | Lu et al. | |
| | 57 | 20060130118 | A1 | 2006-06-15 | Damm | |
| | 58 | 20070204310 | A1 | 2007-08-30 | Hua et al. | |
| | 59 | 20020176418 | A1 | 2002-11-28 | Hunt et al. | |
| | 60 | 20050223087 | A1 | 2005-10-06 | Van Der Stok | |
| | 61 | 20040010613 | A1 | 2004-01-15 | Apostolopoulos et al. | |
| | 62 | 20030204602 | A1 | 2003-10-30 | Hudson et al. | |
| | 63 | 20010013128 | A1 | 2001-08-09 | Hagai et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 64 | 20050055425 | | 2005-03-10 | Lango et al. | |
| | 65 | 20050015509 | | 2005-01-20 | Sitaraman, Ramesh K. | |
| | 66 | 20020131496 | | 2002-09-19 | Vasudevan et al. | |
| | 67 | 20020161898 | | 2002-10-31 | Hartop et al. | |
| | 68 | 20040220926 | | 2004-11-04 | Lamkin et al. | |
| | 69 | 20100158101 | A1 | 2010-06-24 | Wu et al. | |
| | 70 | 20090132721 | A1 | 2009-05-21 | Soroushian et al. | |
| | 71 | 20090132599 | A1 | 2009-05-21 | Soroushian et al. | |
| | 72 | 20090055417 | A1 | 2009-02-26 | Hannuksela | |
| | 73 | 20090049186 | A1 | 2009-02-19 | Agnihotri et al. | |
| | 74 | 20090006538 | A1 | 2009-01-01 | Risney, JR. et al. | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 75 | 20060277564 | A1 | 2006-12-07 | Jarman | |
| | 76 | 20040153458 | A1 | 2004-08-05 | Noble et al. | |
| | 77 | 20020087634 | A1 | 2002-07-04 | Ogle et al. | |
| | 78 | 20020118809 | A1 | 2002-08-29 | Eisenberg | |
| | 79 | 20020122491 | A1 | 2002-09-05 | Karczewicz et al. | |
| | 80 | 20020133547 | A1 | 2002-09-19 | Lin | |
| | 81 | 20020136406 | A1 | 2002-09-26 | Fitzhardinge et al. | |
| | 82 | 20020138619 | A1 | 2002-09-26 | Ramaley et al. | |
| | 83 | 20020146102 | A1 | 2002-10-10 | Lang | |
| | 84 | 20020178138 | A1 | 2002-11-28 | Ender et al. | |
| | 85 | 20020184391 | A1 | 2002-12-05 | Phillips | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| | | | | | | |
|---|---|---|---|---|---|---|
| | 86 | 20020194608 | A1 | 2002-12-19 | Goldhor | |
| | 87 | 20030007464 | A1 | 2003-01-09 | Balani | |
| | 88 | 20030037103 | A1 | 2003-02-20 | Salmi et al. | |
| | 89 | 20030078972 | A1 | 2003-04-24 | Tapissier et al. | |
| | 90 | 20030220972 | A1 | 2003-11-27 | Montet et al. | |
| | 91 | 20040098748 | A1 | 2004-05-20 | Bo et al. | |
| | 92 | 20050009520 | A1 | 2005-01-13 | Herrero et al. | |
| | 93 | 20050024487 | A1 | 2005-02-03 | Chen | |
| | 94 | 20050050152 | A1 | 2005-03-03 | Penner et al. | |
| | 95 | 20050066063 | A1 | 2005-03-24 | Grigorovitch et al. | |
| | 96 | 20050204385 | A1 | 2005-09-15 | Sull et al. | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 97 | 20050254508 | A1 | 2005-11-17 | Aksu et al. | |
| | 98 | 20060047779 | A1 | 2006-03-02 | Deshpande | |
| | 99 | 20060218264 | A1 | 2006-09-28 | Ogawa et al. | |
| | 100 | 20060242315 | A1 | 2006-10-26 | Nichols | |
| | 101 | 20060270404 | A1 | 2006-11-30 | Tuohino et al. | |
| | 102 | 20060282540 | A1 | 2006-12-14 | Tanimoto | |
| | 103 | 20060288099 | A1 | 2006-12-21 | Jefferson et al. | |
| | 104 | 20070037599 | A1 | 2007-02-15 | Tillet et al. | |
| | 105 | 20070078768 | A1 | 2007-04-05 | Dawson | |
| | 106 | 20080060029 | A1 | 2008-03-06 | Park et al. | |
| | 107 | 20080091838 | A1 | 2008-04-17 | Miceli | |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 108 | 20140207966 | A1 | 2014-07-24 | Hurst et al. | |

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

**FOREIGN PATENT DOCUMENTS** Remove

| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] ¡ | 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] |
|---|---|---|---|---|---|---|---|---|
| | 1 | 2006010113 | WO | A2 | 2006-01-26 | Network Foundation Technologies, LLC | | ☐ |
| | 2 | 200192752 | JP | | 2001-04-06 | Hitachi Information Systems Ltd. | | ☒ |
| | 3 | 2003009581 | WO | A1 | 2003-01-30 | British Telecommunications Public Limited Company | | ☐ |
| | 4 | 2004036824 | WO | A1 | 2004-04-29 | Nokia corporation | | ☐ |
| | 5 | 2004054930 | JP | | 2004-02-19 | Microsoft Corporation | | ☒ |
| | 6 | 2001067264 | WO | A1 | 2001-09-13 | Streamcenter, Inc. | | ☐ |
| | 7 | 2003003760 | WO | A2 | 2003-01-09 | Burst.com | | ☐ |
| | 8 | 2003027876 | WO | A1 | 2003-04-03 | Reynolds et al. | | ☐ |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 9 | 2004025405 | WO | A2 | 2004-03-25 | Thomson Licensing S.A. | | ☐ |
| | 10 | 1298931 | EP | A2 | 2003-02-04 | Oplayo | | ☐ |
| | 11 | 1202487 | EP | A2 | 2001-10-31 | Kabushiki Kaisha Toshiba | | ☐ |
| | 12 | 1395014 | EP | A1 | 2002-08-27 | Matsushita Electric Industrial Co. | | ☐ |
| | 13 | 2367219 | GB | A | 2000-09-20 | Vintage Global | | ☐ |
| | 14 | 2011004225 | JP | A | 2011-01-06 | NEC Infronta Corp. | | ☒ |
| | 15 | 2000201343 | JP | A | 2000-07-18 | Toshiba Corp. | | ☒ |

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

**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] |
|---|---|---|---|
| | 1 | USPTO "International Search Report" mailed December 12, 2008; International Appln. No. PCT/US2008/061035, filed April 21, 2008. | ☐ |
| | 2 | AUSTRALIAN GOVERNMENT "Examiner's First Report" dated October 17, 2011; Australian Patent Appln. No. 2011213730. | ☐ |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 11116783 - GAU: 2444 |
|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 |
| | First Named Inventor | R. Drew Major |
| | Art Unit | 2444 |
| | Examiner Name | Donabed, Ninos J. |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) |

| | | | |
|---|---|---|---|
| | 3 | KOREAN INTELLECTUAL PROPERTY OFFICE "Official Notice of Preliminary Rejection" issued July 28, 2011; Korean Patent Appln. No. 10-2006-7025274. | ☒ |
| | 4 | JAPAN PATENT OFFICE "Notice of Rejection Ground" mailed April 26, 2011; Japanese Patent Appln. No. 2007-511070. | ☒ |
| | 5 | FUJISAWA, HIROSHI ET AL. "Implementation of Efficient Access Mechanism for Multiple Mirror-Servers" IPSJ SIG Technical Report, vol. 2004, no. 9 (2004-DPS-116), January 30, 2004, Information Processing Society of Japan, pp. 37-42 | ☒ |
| | 6 | LIU, JIANGCHUAN ET AL. "Opportunities and Challenged of Peer-to-Peer Internet Video Broadcast," School of Computing Science, Simon Fraser University, British Columbia, Canada | ☐ |
| | 7 | USPTO INTERNATIONAL SEARCHING AUTHORITY "International Search Report and Written Opinion," mailed November 5, 2008; International Appln. No. PCT/US2008/009281, filed August 1, 2008. | ☐ |
| | 8 | ZHANG, XINYAN ET AL. "CoolStreaming/DONet: A Data-Driven Overlay Network for Peer-to-Peer Live Media Streaming" IEEE 2005. | ☐ |
| | 9 | GUO, YANG "DirectStream: A Directory-Based Peer-To-Peer Video Streaming Service" LexisNexis, Elsevier B.V. 2007. | ☐ |
| | 10 | LIU, JIANGCHUAN ET AL. "Adaptive Video Multicast Over the Internet" IEEE Computer Society, 2003. | ☐ |
| | 11 | REJAIE, REZA ET AL. "Architectural Considerations for Playback of Quality Adaptive Video Over the Internet" University of Southern California, Information Sciences Institute, 1998.) | ☐ |
| | 12 | ROY, SUMIT ET AL. "A System Architecture for Managing Mobile Streaming Media Services" Streaming Media Systems Group, Hewlett-Packard Laboratories, 2003. | ☐ |
| | 13 | XU, DONGYAN ET AL. "On Peer-to-Peer Media Streaming" Department of Computer Sciences, Purdue University, 2002. | ☐ |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | |
|---|---|---|---|
| | 14 | KOZAMERNIK, FRANC "Media Streaming Over the Internet - An Over of Delivery Technologies" EBU Technical Review, October 2002. | ☐ |
| | 15 | LIENHART, RAINER ET AL. "Challenges in Distributed Video Management and Delivery" Intel Corporation, EECS Dept., UC Berkeley, 2000-2002. | ☐ |
| | 16 | JAPAN PATENT OFFICE "Final Office Action" mailed February 28, 2012 in Patent Application No. 2007-511070 filed on October 26, 2006. | ☒ |
| | 17 | JAPAN PATENT OFFICE "Interrogation" mailed November 06, 2012 in Patent Application No. 2007-511070 filed on October 26, 2006. | ☒ |
| | 18 | CANADIAN INTELLECTUAL PROPERTY OFFICE "Office Action" mailed September 09, 2013 in Patent Application No. 2,564,861 filed on October 30, 2006. | ☐ |
| | 19 | USPTO "Office Action" mailed September 13, 2013 in Patent Application No. 13/757,571 filed on February 01, 2013. | ☐ |
| | 20 | USPTO "Notice of Allowance" mailed June 24, 2014 in Patent Application No. 13/757.571, filed on February 01, 2013. | ☐ |
| | 21 | EUROPEAN PATENT OFFICE "Extended Search Report" dated July 10, 2014 in Patent Application No. 12154559.4 filed on September 20, 2002. | ☐ |
| | 22 | NGUYEN, Thinh, "Multiple Sender Distributed Video Streaming" in IEEE Transactions on Multimedia, Volume 6, No. 2, Published April 2, 2004. | ☐ |
| | 23 | WEBLIO, The Meaning of Performance Factor --- English-Japanese Weblio Dictionary, [online], February 24, 2012; retrieved from the internet - URL:http://ejje, weblio.jp/content/performance+factor | ☐ |
| | 24 | MASATO TSURU ET AL., Recent Evolution of the Internet Measurement and Inference Techniques, IEICE Technical Report, vol. 103, no. 123 (IN2003-16 to 23), IEICE, June 12, 2003, pp. 37 to 42, ISSN: 0913-05685. | ☐ |



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

| | | | |
|---|---|---|---|
| | 25 | TAKESHI YOSHIMURA ET AL., Mobile Streaming Media CDN Enabled by Dynamic SMIL, WWW2002, May 7-11, 2002; retrieved from the Internet at http://www2002.org/CDROM/refereed/515/ | ☐ |
| | 26 | CANADIAN INTELLECTUAL PROPERTY OFFICE, Office Action, mailed October 15, 2012 for Patent Application No. 2,564,861. | ☐ |
| | 27 | CLEMENT, B., Move Networks Closes $11.3 Million on First Round VC Funding, Page One PR, Move Networks, Inc. Press Releases, February 7, 2007, http://www.move.tv/press/press20070201.html. | ☐ |
| | 28 | MOVE NETWORKS, INC., The Next Generation Video Publishing System, April 11, 2007; http://www.movenetworks.com/wp-content/uploads/move-networks-publishing-system.pdf. | ☐ |
| | 29 | U.S. Patent and Trademark Office, Non-Final Office Action, dated August 7, 2014 for U.S. Patent Application No. 14/106,051. | ☐ |

If you wish to add additional non-patent literature document citation information please click the Add button **Add**

**EXAMINER SIGNATURE**

| Examiner Signature | /Ninos Donabed/ | Date Considered | 08/21/2014 |
|---|---|---|---|

*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.



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

| Receipt date: 08/20/2014 | Application Number | 11116783 | 11116783 - GAU: 2444 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2005-04-28 | |
| | First Named Inventor | R. Drew Major | |
| | Art Unit | 2444 | |
| | Examiner Name | Donabed, Ninos J. | |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) | |

**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.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

**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 | /BRETT A. CARLSON/ | Date (YYYY-MM-DD) | 2014-08-20 |
|---|---|---|---|
| Name/Print | Brett A. Carlson | Registration Number | 39928 |

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.**



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

## Privacy Act Statement

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

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

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

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.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.D

**Adaptive streaming** and rendering of large terrains using strip masks
J Pouderoux, JE Marvie - ... of the 3rd international conference on ..., 2005 - dl.acm.org
Abstract Terrain rendering is an important factor in the rendering of virtual scenes. If they are large and detailed, digital terrains can represent a huge amount of data and therefore of graphical primitives to render in real-time. In this paper we present an efficient technique ...
Cited by 41 Related articles All 7 versions Cite Save

A VLC media player plugin enabling dynamic **adaptive streaming** over HTTP
C Müller, C Timmerer - Proceedings of the 19th ACM international ..., 2011 - dl.acm.org
Abstract This paper describes the implementation of a VLC media player plugin enabling Dynamic **Adaptive Streaming** over HTTP (DASH). DASH is an emerging ISO/IEC MPEG and 3GPP standard for HTTP **streaming**. It aims to standardize formats enabling segmented ...
Cited by 37 Related articles All 4 versions Cite Save

Layer-encoded video in scalable **adaptive streaming**
M Zink, J Schmitt, R Steinmetz - Multimedia, IEEE Transactions ..., 2005 - ieeexplore.ieee.org
Abstract—Combining the concepts of caching and transmis-sion control protocol (TCP)-friendly **streaming** of layer-encoded video bears the problem that those videos might not be cached in full quality. Therefore, we focus in this work on the scheduling of ...
Cited by 40 Related articles All 7 versions Cite Save

Global messaging with distributed **adaptive streaming** control
Y Lee, C Chao, R Ngai, M Chiang... - US Patent ..., 2002 - freepatentsonline.com
Abstract: A software implementable approach capable of creating, delivering, reassembling, rendering, and storing asynchronous and synchronous multimedia message. This approach integrates video/audio **streaming** with existing Internet/Intranet e-mail messaging and ...
Cited by 47 Related articles Cite Save More

System and method for **adaptive streaming** of predictive coded video data
C Anantharamu, D Manoranjan - 2001 - Google Patents
This invention provides an **adaptive** transcoder which streams predictive coded video data over variable bandwidth networks and to devices having varying processing capabilities. The invention dynamically and continuously determines an available network bandwidth ...
Cited by 35 Related articles All 2 versions Cite Save

**Adaptive** systems for improved media **streaming** experience
J Chakareski, P Frossard - Communications Magazine, IEEE, 2007 - ieeexplore.ieee.org
ABSTRACT Supporting **streaming** media applications over current packet network infrastructures represents a challenging task in many regards. For one, the lack of quality of service (QoS) guarantees in existing networks such as the Internet means that time- ...
Cited by 33 Related articles All 6 versions Cite Save

of Sports Videos
SF Chang, D Zhong, R Kumar, RTCBA **Streaming** - ... of the IEEE Workshop on Content ..., 2001
Cited by 15 Related articles Cite Save

What happens when HTTP **adaptive streaming** players compete for bandwidth?
S Akhshabi, L Anantakrishnan, AC Begen... - Proceedings of the 22nd ..., 2012 - dl.acm.org
Abstract With an increasing demand for high-quality video content over the Internet, it is becoming more likely that two or more **adaptive streaming** players share the same network bottleneck and compete for available bandwidth. This competition can lead to three ...
Cited by 40 Related articles All 9 versions Cite Save

IIS smooth **streaming** technical overview
A Zambelli - Microsoft Corporation, 2009 - bogotobogo.com
... 6 HTTP-Based **Adaptive Streaming**..... 7 ... Introduction In October 2008, Microsoft announced that Internet Information Services (IIS) 7.0 would feature a new HTTP-based **adaptive streaming** extension: Smooth **Streaming**. ...
Cited by 158 Related articles All 6 versions Cite Save More

**Adaptive streaming** of high-quality video over wireless LANs
P Van Beek, S Deshpande... - Electronic ..., 2004 - proceedings.spiedigitallibrary.org
abstract We address the problem of robust **streaming** of high-quality video over wireless local area networks in a home environment. By robust **streaming**, we mean maintaining the highest possible video quality and preventing interruptions to the video under varying ...

Cited by 30 Related articles All 8 versions Cite Save

Multimedia over IP and wireless networks: compression, networking, and systems
M Van der Schaar, PA Chou - 2011 - books.google.com
... Coding and Error Concealment Strategies for Audio Communication 59 Dinei Florêncio Mechanisms for Adapting Compressed Multimedia to Varying Bandwidth Conditions 81 Antonio Ortega and Huisheng Wang Scalable Video Coding for **Adaptive Streaming** Applications 117 ...
Cited by 138 Related articles All 4 versions Cite Save More

Low-latency **adaptive streaming** over TCP
A Goel, C Krasic, J Walpole - ACM Transactions on Multimedia ..., 2008 - dl.acm.org
Abstract Media **streaming** over TCP has become increasingly popular because TCP's congestion control provides remarkable stability to the Internet. **Streaming** over TCP requires adapting to bandwidth availability, but unforunately, TCP can introduce significant latency ...
Cited by 29 Related articles All 7 versions Cite Save

Adaptation algorithm for **adaptive streaming** over HTTP
K Miller, E Quacchio, G Gennari... - Packet Video Workshop ..., 2012 - ieeexplore.ieee.org
Abstract—Internet video makes up a significant part of the Internet traffic and its fraction is constantly growing. In order to guarantee best user experience throughout different network access technologies with dynamically varying network conditions, it is fundamental to ...
Cited by 30 Related articles All 2 versions Cite Save

**Adaptive** scalable video **streaming** in wireless networks
S Xiang, L Cai, J Pan - Proceedings of the 3rd multimedia systems ..., 2012 - dl.acm.org
Abstract In this paper, we investigate the optimal **streaming** strategy for dynamic **adaptive streaming** over HTTP (DASH). Specifically, we focus on the rate adaptation algorithm for **streaming** scalable video (H. 264/SVC) in wireless networks. We model the rate ...
Cited by 24 Related articles Cite Save

A comparison of quality scheduling in commercial **adaptive** http **streaming** solutions on a 3g network
H Riiser, HS Bergsaker, P Vigmostad... - Proceedings of the 4th ..., 2012 - dl.acm.org
Abstract There are many available commercial **streaming** solutions that perform quality adaption. An important issue with respect to users' perceived quality is how the system schedules the quality levels to match the available network resources. In this study, we ...
Cited by 25 Related articles All 12 versions Cite Save

Channel sharing by rate-**adaptive streaming** applications
N Argiriou, L Georgiadis - Performance Evaluation, 2004 - Elsevier
There are various techniques for adapting the transmission rate of an application while maintaining the perceived quality at the receiver at acceptable levels. Shared-channel systems can use this rate adaptation capability to increase the number of concurrent ...
Cited by 25 Related articles All 10 versions Cite Save

Quality of experience estimation for **adaptive** HTTP/TCP video **streaming** using H. 264/AVC
KD Singh, Y Hadjadj-Aoul... - ... Conference (CCNC), 2012 ..., 2012 - ieeexplore.ieee.org
ABSTRACT Video services are being adopted widely in both mobile and fixed networks. For their successful deployment, the content providers are increasingly becoming interested in evaluating the performance of such traffic from the final users' perspective, that is, their ...
Cited by 23 Related articles All 10 versions Cite Save

**Adaptive** low-bitrate **streaming** over IEEE 802.15. 4 low rate wireless personal area networks (LR-WPAN based on link quality indication
S Deshpande - Proceedings of the 2006 international conference on ..., 2006 - dl.acm.org
Abstract The IEEE 802.15. 4 Low-Rate Wireless Personal Area Network (LR-WPAN)[1] working group defines physical layer (PHY) and medium access control layer (MAC) standards specifications for low data rate wireless connections operating in the personal ...
Cited by 20 Related articles All 2 versions Cite Save

Securing media for **adaptive streaming**
C Venkatramani, P Westerink, O Verscheure... - Proceedings of the ..., 2003 - dl.acm.org
Abstract This paper describes the ARMS system which enables secure and **adaptive** rich media **streaming** to a large-scale, heterogeneous client population. The secure **streaming** algorithms ensure end-to-end security while the content is adapted and streamed via ...
Cited by 20 Related articles All 9 versions Cite Save

**Streaming** multimedia data with **adaptive** QoS characteristics

C Bouras, A Gkamas - Protocols for Multimedia Systems, 2000 - ru6.cti.gr

ABSTRACT In this paper, we describe the design and the implementation of an **adaptive streaming** architecture, which is based on real time protocols. The **adaptive streaming** application, which we have developed, can be used for **streaming** multimedia data over **...**

Cited by 20 Related articles All 4 versions Cite Save More

Multimedia proxy caching mechanism for quality **adaptive streaming** applications in the internet
R Rejaie, H Yu, M Handley... - ... 2000. Nineteenth Annual ..., 2000 - ieeexplore.ieee.org
Absrrmr-The Internet has witnessed a rapid growth in deployment of Web-based **streaming** applications during recent years. In these applications, server should be able to perform end-to-end congestion control and quality adaptation to match the delivered stream quality to ...
Cited by 289 Related articles All 33 versions Cite Save

Dynamic **adaptive streaming** over HTTP--: standards and design principles
T Stockhammer - Proceedings of the second annual ACM conference on ..., 2011 - dl.acm.org
Abstract In this paper, we provide some insight and background into the Dynamic **Adaptive Streaming** over HTTP (DASH) specifications as available from 3GPP and in draft version also from MPEG. Specifically, the 3GPP version provides a normative description of a ...
Cited by 245 Related articles All 8 versions Cite Save

An experimental evaluation of rate-adaptation algorithms in **adaptive streaming** over HTTP
S Akhshabi, AC Begen, C Dovrolis - Proceedings of the second annual ..., 2011 - dl.acm.org
Abstract **Adaptive** (video) **streaming** over HTTP is gradually being adopted, as it offers significant advantages in terms of both user-perceived quality and resource utilization for content and network service providers. In this paper, we focus on the rate-adaptation ...
Cited by 214 Related articles All 16 versions Cite Save

Quality-**adaptive** media **streaming** by priority drop
C Krasic, J Walpole, W Feng - ... of the 13th international workshop on ..., 2003 - dl.acm.org
Abstract This paper presents a general design strategy for **streaming** media applications in best effort computing and networking environments. Our target application is video on demand using personal computers and the Internet. In this scenario, where resource ...
Cited by 122 Related articles All 18 versions Cite Save

A survey of application layer techniques for **adaptive streaming** of multimedia
B Vandalore, W Feng, R Jain, S Fahmy - Real-Time Imaging, 2001 - Elsevier
Though the integrated services model and resource reservation protocol (RSVP) provide support for quality of service, in the current Internet only best-effort traffic is widely supported. New high-speed technologies such as ATM (asynchronous transfer mode), gigabit ...
Cited by 89 Related articles All 11 versions Cite Save

**Adaptive streaming** of MPEG video over IP networks
RS Ramanujan, JA Newhouse... - Local Computer ..., 1997 - ieeexplore.ieee.org
Abstract We present the design of an **adaptive** service for **streaming** MPEG video over a best-effort IP network environment. The **adaptive** video **streaming** service exploits the inherent adaptiveness of video applications to pelform controlled and graceful adjustments to the ...
Cited by 87 Related articles All 8 versions Cite Save

Real-time content-based **adaptive streaming** of sports videos
SF Chang, D Zhong, R Kumar - Content-Based Access of ..., 2001 - ieeexplore.ieee.org
Abstract In this paper, we present a real-time software system for filtering live video content and then adaptively **streaming** the video over resource limited networks or devices. The rate adaptation is content-based and dynamically varied according to the event structure and ...
Cited by 77 Related articles All 5 versions Cite Save

Method and system for indexing and content-based **adaptive streaming** of digital video content
SF Chang, A Jaimes, R Kumar, D Zhong - 2001 - Google Patents
The present invention discloses systems and methods for automatically parsing digital video content into segments corresponding to fundamental semantic units, events, and camera views, and **streaming** parsed digital video content to users for display and browsing. The ...
Cited by 91 Related articles All 4 versions Cite Save

Dynamic **adaptive streaming** over HTTP dataset
S Lederer, C Müller, C Timmerer - Proceedings of the 3rd Multimedia ..., 2012 - dl.acm.org
Abstract The delivery of audio-visual content over the Hypertext Transfer Protocol (HTTP) got lot of attention in recent years and with dynamic **adaptive streaming** over HTTP (DASH) a standard is now available. Many papers cover this topic and present their research results, ...
Cited by 64 Related articles All 5 versions Cite Save

**Adaptive streaming** within the 3GPP packet-switched **streaming** service
P Frojdh, U Horn, M Kampmann, A Nohlgren... - Network, ..., 2006 - ieeexplore.ieee.org

Abstract The 3GPP Packet-Switched **Streaming** Service (PSS) is a standard for audio and video **streaming** to handheld 2.5 G and 3G terminals and provides a complete **streaming** and download framework for commercial content. This article gives an overview of the **...**
Cited by 59 Related articles All 6 versions Cite Save

## Quality of experience for HTTP **adaptive streaming** services

O Oyman, S Singh - Communications Magazine, IEEE, 2012 - ieeexplore.ieee.org
ABSTRACT The growing consumer demand for mobile video services is one of the key drivers of the evolution of new wireless multimedia solutions requiring exploration of new ways to optimize future wireless networks for video services towards delivering enhanced **...**
Cited by 61 Related articles All 5 versions Cite Save

## **Adaptive streaming** of stored video in a TCP-friendly context: Multiple versions or multiple layers?

P de Cuetos, D Saparilla, KW Ross - in Proc. Packet Video Workshop, 2001 - Citeseer
Abstract Video transmission over the current best-effort Internet should be made fair to competing TCP traffic. Because the available bandwidth to a TCP-friendly stream changes significantly over medium and long time scales, it is desirable to adapt the **streaming** rate **...**
Cited by 35 Related articles Cite Save More

## On performance bounds for the integration of elastic and **adaptive streaming** flows

T Bonald, A Proutière - ACM SIGMETRICS Performance Evaluation ..., 2004 - dl.acm.org
Abstract We consider a network model where bandwidth is fairly shared by a dynamic number of elastic and **adaptive streaming** flows. Elastic flows correspond to data transfers while **adaptive streaming** flows correspond to audio/video applications with variable rate **...**
Cited by 51 Related articles All 8 versions Cite Save

## 3GPP compliant **adaptive** wireless video **streaming** using H. 264/AVC

T Schierl, T Wiegand... - Image Processing, 2005. ..., 2005 - ieeexplore.ieee.org
Abstract—In 3GPP a standard for multimedia **streaming** over mobile networks called PSS (Packet-switched **Streaming** Service) has been specified. In order to deal with changing transmission characteristics like varying link bit-rate or handover, **adaptive streaming ...**
Cited by 43 Related articles All 10 versions Cite Save

## An evaluation of dynamic **adaptive streaming** over http in vehicular environments

C Müller, S Lederer, C Timmerer - Proceedings of the 4th Workshop on ..., 2012 - dl.acm.org
Abstract MPEGs' Dynamic **Adaptive Streaming** over HTTP (MPEG-DASH) is an emerging standard designed for media delivery over the top of existing infrastructures and able to handle varying bandwidth conditions during a **streaming** session. This requirement is very **...**
Cited by 49 Related articles All 5 versions Cite Save

## An experimental investigation of the Akamai **adaptive** video **streaming**

L De Cicco, S Mascolo - 2010 - Springer
Abstract Akamai offers the largest Content Delivery Network (CDN) service in the world. Building upon its CDN, it recently started to offer High Definition (HD) video distribution using HTTP-based **adaptive** video **streaming**. In this paper we experimentally investigate **...**
Cited by 49 Related articles All 8 versions Cite Save

## **Adaptive** live video **streaming** by priority drop

J Huang, C Krasic, J Walpole - 2003 - pdxscholar.library.pdx.edu
Abstract In this paper we explore the use of Priority-progress **streaming** (PPS) for video surveillance applications. PPS is an **adaptive streaming** technique for the delivery of continuous media over variable bit-rate channels. It is based on the simple idea of **...**
Cited by 42 Related articles All 14 versions Cite Save

## Implementation of **adaptive streaming** of stored MPEG-4 FGS video over TCP

P de Cuetos, P Guillotel, KW Ross... - Multimedia and Expo, ..., 2002 - ieeexplore.ieee.org
ABSTRACT This paper presents an implementation of an end-to-end application for **streaming** stored MPEG-4 Fine-Grained Scalable (FGS) videos over the best-effort Intemet. Our current implementation ms over TCP but can also be run over TCP-friendly RTPNDP **...**
Cited by 36 Related articles All 2 versions Cite Save

## An evaluation of TCP-based rate-control algorithms for **adaptive** Internet **streaming** of H. 264/SVC

R Kuschnig, I Kofler, H Hellwagner - Proceedings of the first annual ACM ..., 2010 - dl.acm.org
Abstract Recent work in TCP video **streaming** indicates that multimedia **streaming** via TCP provides satisfactory performance when the achievable TCP throughput is approximately twice the media bit rate. However, these conditions may not be achievable on the Internet, **...**

Cited by 45 Related articles All 6 versions Cite Save

iDASH: improved dynamic **adaptive streaming** over HTTP using scalable video coding

Y Sánchez de la Fuente, T Schierl, C Hellge… - Proceedings of the …, 2011 - dl.acm.org

Abstract HTTP-based delivery for Video on Demand (VoD) has been gaining popularity within recent years. Progressive Download over HTTP, typically used in VoD, takes advantage of the widely deployed network caches to relieve video servers from sending ...

Cited by 44 Related articles All 5 versions Cite Save

# PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

70560 7590 09/12/2014
INGRASSIA FISHER & LORENZ, P.C. (EchoStar)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 11/116,783 | 04/28/2005 | R. Drew Major | 066.0141 (P2004-04-01.1) | 5535 |

TITLE OF INVENTION: APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | SMALL | $480 | $0 | $0 | $480 | 12/12/2014 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| DONABED, NINOS | 2444 | 709-231000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☒ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☒ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Ingrassia Fisher & Lorenz, P.C.
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: EchoStar Technologies L.L.C.
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Englewood, CO

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 50-2091 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /BRETT A. CARLSON/ Date September 18, 2014
Typed or printed name Brett A. Carlson Registration No. 39928

PTO/SB/47 (03-09)
Approved for use through 03/31/2012. OMB 0651-0016
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.

# "FEE ADDRESS" INDICATION FORM

**Address to:**
**Mail Stop M Correspondence**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, VA 22313-1450**

**- OR -**

**Fax to:**
**571-273-6500**

**INSTRUCTIONS:** The issue fee must have been paid for application(s) listed on this form. In addition, only an address represented by a Customer Number can be established as the fee address for maintenance fee purposes (hereafter, fee address). A fee address should be established when correspondence related to maintenance fees should be mailed to a different address than the correspondence address for the application. **When to check the first box below**: If you have a Customer Number to represent the fee address. **When to check the second box below**: If you have no Customer Number representing the desired fee address, in which case a completed Request for Customer Number (PTO/SB/125) must be attached to this form. For more information on Customer Numbers, see the Manual of Patent Examining Procedure (MPEP) § 403.

For the following listed application(s), please recognize as the "Fee Address" under the provisions of 37 CFR 1.363 the address associated with:

☑ Customer Number: 000197

***OR***

☐ The attached Request for Customer Number (PTO/SB/125) form.

| PATENT NUMBER (if known) | APPLICATION NUMBER |
|---|---|
| | 11/116,783 |

Completed by (check one):

☐ Applicant/Inventor

☑ Attorney or Agent of record 39928 (Reg. No.)

☐ Assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☐ Assignee recorded at Reel _____ Frame_____

/BRETT A. CARLSON/
Signature

Brett A. Carlson
Typed or printed name

480.385.5060
Requester's telephone number

September 18, 2014
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more that one signature is required, see below*.

☑ *** Total of 1 forms are submitted.**

This collection of information is required by 37 CFR 1.363. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1. 11 and 1.14. This collection is estimated to take 5 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 COMPLETED FORMS TO THIS ADDRESS.
**SEND TO: Mail Stop M Correspondence, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 20181010 |
| **Application Number:** | 11116783 |
| **International Application Number:** | |
| **Confirmation Number:** | 5535 |
| **Title of Invention:** | APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT |
| **First Named Inventor/Applicant Name:** | R. Drew Major |
| **Customer Number:** | 70560 |
| **Filer:** | Brett Carlson/Sharron Castillo |
| **Filer Authorized By:** | Brett Carlson |
| **Attorney Docket Number:** | 066.0141 (P2004-04-01.1) |
| **Receipt Date:** | 18-SEP-2014 |
| **Filing Date:** | 28-APR-2005 |
| **Time Stamp:** | 17:28:15 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Credit Card |
| Payment was successfully received in RAM | $960 |
| RAM confirmation Number | 4144 |
| Deposit Account | 502091 |
| Authorized User | CARLSON, BRETT A. |

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

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

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | 20140918_IssueFee_P2004-04-01-1.pdf | 1603923<br>643a155853bfc36a83cb49979b1020ebd2ba1c93 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Miscellaneous Incoming Letter | 20140918_FeeAddress_P2004-04-01-1.pdf | 312348<br>e86f80e6519c96174c6ff19675fddac15170f317 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Change of Address | 20140918_ChgOfAddress_P2004-04-01-1.pdf | 1315499<br>2ce437d87c5f76c02a95cd742f181d2fcfce9b82 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Fee Worksheet (SB06) | fee-info.pdf | 32283<br>e376a7ba0f923cd50f0207e39d1a5597228f492f | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 3264053 | | |

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

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

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

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

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 11116783 |
| **Filing Date:** | 28-Apr-2005 |
| **Title of Invention:** | APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT |
| **First Named Inventor/Applicant Name:** | R. Drew Major |
| **Filer:** | Brett Carlson |
| **Attorney Docket Number:** | 066.0141 (P2004-04-01.1) |

Filed as Large Entity

## Utility under 35 USC 111(a) Filing Fees

| 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 | 1501 | 1 | 960 | 960 |
| Publ. Fee- Early, Voluntary, or Normal | 1504 | 1 | 0 | 0 |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **960** |

PTO/SB/122 (11-08)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# CHANGE OF CORRESPONDENCE ADDRESS
## *Application*

Address to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

| | |
|---|---|
| Application Number | 11116783 |
| Filing Date | 2005-04-28 |
| First Named Inventor | R. Drew Major |
| Art Unit | 2444 |
| Examiner Name | Ninos Donabed |
| Attorney Docket Number | 066.0141 (P2004-04-01.1) |

Please change the Correspondence Address for the above-identified patent application to:

☑ The address associated with Customer Number: 54583

***OR***

☐ Firm or Individual Name

Address

| City | State | Zip |
|---|---|---|

Country

| Telephone | Email |
|---|---|

This form cannot be used to change the data associated with a Customer Number. To change the data associated with an existing Customer Number use "Request for Customer Number Data Change" (PTO/SB/124).

I am the:

☐ Applicant/Inventor

☐ Assignee of record of the entire interest.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☑ Attorney or agent of record. Registration Number 39928.

☐ Registered practitioner named in the application transmittal letter in an application without an executed oath or declaration. See 37 CFR 1.33(a)(1). Registration Number_____.

Signature /BRETT A. CARLSON/

Typed or Printed Name Brett A. Carlson

| Date September 18, 2014 | Telephone 480.385.5060 |
|---|---|

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Change(s) applied
to document,
/A.A./
9/19/2014

0070
[~~0072~~] Due to multiple simultaneous streamlet processing, and in order to better judge the central tendency of the performance ratio *r*, the agent ~~control~~controller module 402 may calculate a geometric mean, or alternatively an equivalent averaging algorithm, across a window of size *m*, and obtain a performance factor φ:

$$\varphi_{current} = \left( \prod_{j=1}^{m} r_j \right)^{\frac{1}{m}}.$$

0071
[~~0073~~] The policy determination about whether or not to upshift 710 playback quality begins by comparing $\varphi_{current}$ with a trigger threshold $\Theta_{up}$. If $\varphi_{current} \geq \Theta_{up}$, then an up shift to the next higher quality stream may be considered 716. In one embodiment, the trigger threshold $\Theta_{up}$ is determined by a combination of factors relating to the current read ahead margin (i.e. the amount of contiguously available streamlets that have been sequentially arranged by the staging module 409 for presentation at the current playback time index), and a minimum safety margin. In one embodiment, the minimum safety margin may be 24 seconds. The smaller the read ahead margin, the larger $\Theta_{up}$ is to discourage upshifting until a larger read ahead margin may be established to withstand network disruptions. If the agent controller module 402 is able to sustain 716 upshift quality, then the agent controller module 402 will upshift 717 the quality and subsequently request higher quality streams. The determination of whether use of the higher quality stream is sustainable 716 is made by comparing an estimate of the higher quality stream's performance factor, $\varphi_{higher}$, with $\Theta_{up}$. If $\varphi_{higher} \geq \Theta_{up}$ then use of the higher quality stream is considered sustainable. If the decision of whether or not the higher stream rate is sustainable 716 is "no," the agent ~~control~~controller module 402 will not attempt to upshift 717 stream quality. If the end of the stream has been reached 714, the method 618 ends 716.

Change(s) applied
to document,
/A.A./
9/19/2014

## AMENDMENTS

Amendments to the Specification:

Please amend the following paragraph as follows:

0064
[~~0066~~] Figure 5 is a schematic flow chart diagram illustrating one embodiment of a method 500 for processing content in accordance with the present invention. In one embodiment the method 500 starts 502, and the content module 112 receives 504 content from the publisher 110. Receiving content 504 may comprise receiving 504 a digital copy of the content file 200, or digitizing a physical copy of the content file 200. Alternatively, receiving 504 content may comprise capturing a radio or television broadcast. Once received 504, the stream module 302 generates 506 a plurality of streams 202, each stream 202 having a different quality. The quality may be predefined, or automatically set according to end user bandwidth, or in response to pre-designated publisher guidelines.

Please amend the following paragraph as follows:

0066
[~~0068~~] Figure 6 is a schematic flow chart diagram illustrating one embodiment of a method 600 for viewing a plurality of streamlets in accordance with the present invention. The method 600 starts and an agent ~~control~~controller module 402 is provided 604 and associated with a viewer 408 and provided with a staging module 409. The agent controller module 402 then requests 606 a streamlet from the streamlet cache module 404. Alternatively, the agent controller module 402 may simultaneously request 606 a plurality of streamlets from the streamlet cache module 404. If the streamlet is stored 608 locally in the streamlet cache 410, the streamlet cache module 404 retrieves 610 the streamlet and sends the streamlet to the agent controller module 402. Upon retrieving 610 or receiving a streamlet, the agent controller module 402 makes 611 a determination of whether or not to shift to a higher or lower quality stream 202. This determination will be described below in greater detail with reference to Figure 7.

Please amend the following paragraph as follows:

UNITED STATES PATENT AND TRADEMARK OFFICE

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

| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 11/116,783 | 10/21/2014 | 8868772 | 066.0141 (P2004-04-01.1) | 5535 |

54583 7590 10/01/2014
EchoStar Technologies, L.L.C.
Legal Department
100 Inverness Terrace East
ENGLEWOOD, CO 80112

# 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 2167 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):

R. Drew Major, Orem, UT;
Mark B. Hurst, Cedar Hills, UT;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IR103 (Rev. 10/09)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

---

| | | | |
|---|---|---|---|
| Serial. No.: | 11/116,783 | Confirmation No.: | 5535 |
| Filed: | April 28, 2005 | Customer No.: | 54583 |
| Art Unit: | 2444 | | |
| Examiner: | Ninos Donabed | | |
| Title: | APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT | | |

Attorney Docket No.: 066.0141 (P2004-04-01.1)

---

**CORRESPONDENCE TO BE PLACED IN FILE**

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

****Filed electronically using the EFS system***

Commissioner:

Enclosed is a copy of a Canadian Office Action for Canadian Application No. 2,564,861 ("Office Action"), which is a counterpart application, as well as the following reference cited therein:

EP1298931A2 2003-04-02 Oplayo Oy

We make no representation as to this document's materiality to the claims under review, but we respectfully request that the document be placed in the file.

An Information Disclosure Statement citing the Office Action, as well as the reference cited therein, is also being submitted at this time. Should the Examiner have any questions about this matter, the undersigned would welcome a telephone call at 480.385.5069.

*No official fee is believed to be due in connection with this Correspondence, other than the fees that are addressed elsewhere in this submittal. In the unlikely event that the Patent Office determines for any reason that an extension and/or other relief is required for entry of this Correspondence, the Patent Owner hereby petitions for any required relief, including any extension of time, and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 50-2091*

Respectfully submitted,

**INGRASSIA FISHER & LORENZ, P.C.**

Dated: October 8, 2014

By: /BRETT A. CARLSON/
Brett A. Carlson
Reg. No. 39,928
(480)385-5060

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | 11116783 |
| Filing Date | 2005-04-28 |
| First Named Inventor | R. Drew Major |
| Art Unit | 2444 |
| Examiner Name | Ninos Donabed |
| Attorney Docket Number | 066.0141 (P2004-04-01.1) |

**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 |
|---|---|---|---|---|---|---|
| | 1 | | | | | |

If you wish to add additional U.S. Patent citation information please click the Add button. Add

**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 |
|---|---|---|---|---|---|---|
| | 1 | | | | | |

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

**FOREIGN PATENT DOCUMENTS** Remove

| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] ¡ | 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] |
|---|---|---|---|---|---|---|---|---|
| | 1 | 1298931 | EP | A2 | 2003-04-02 | Oplayo Oy | | ☐ |

If you wish to add additional Foreign Patent Document citation information please click the Add button Add

**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] |
|---|---|---|---|

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | Application Number | 11116783 |
|---|---|---|
| | Filing Date | 2005-04-28 |
| | First Named Inventor | R. Drew Major |
| | Art Unit | 2444 |
| | Examiner Name | Ninos Donabed |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) |

| | | | |
|---|---|---|---|
| | 1 | Canadian Intellectual Property Office, Office Action, dated September 10, 2014 for Canadian Application No. 2564861. | ☐ |

If you wish to add additional non-patent literature document citation information please click the Add button Add

**EXAMINER SIGNATURE**

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*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 | 11116783 |
| | Filing Date | 2005-04-28 |
| | First Named Inventor | R. Drew Major |
| | Art Unit | 2444 |
| | Examiner Name | Ninos Donabed |
| | Attorney Docket Number | 066.0141 (P2004-04-01.1) |

**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 | /BRETT A. CARLSON/ | Date (YYYY-MM-DD) | 2014-10-08 |
| Name/Print | Brett A. Carlson | Registration Number | 39928 |

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.**

# Privacy Act Statement

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

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

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

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.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 298 931 A2

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
02.04.2003 Bulletin 2003/14

(51) Int Cl.7: **H04N 7/24**

(21) Application number: 02396145.1

(22) Date of filing: 20.09.2002

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 20.09.2001 FI 20011856

(71) Applicant: Oplayo Oy
00180 Helsinki (FI)

(72) Inventor: Ala-Honkola, Pekka
00180 Helsinki (FI)

(74) Representative: Savela, Antti-Jussi
Patent Agency Compatent Ltd.
Hämeentie 29, 4th. Fl.
00500 Helsinki (FI)

(54) **Adaptive media stream**

(57) This invention relates to media streams transmitted in a network, such as the Internet. The idea is to change the source of the content of a media stream when an available transmission speed rate changes. Each source contains essentially the same information (such as video and voice), but the suitability of each source for transmission has been adjusted to a certain speed rate.

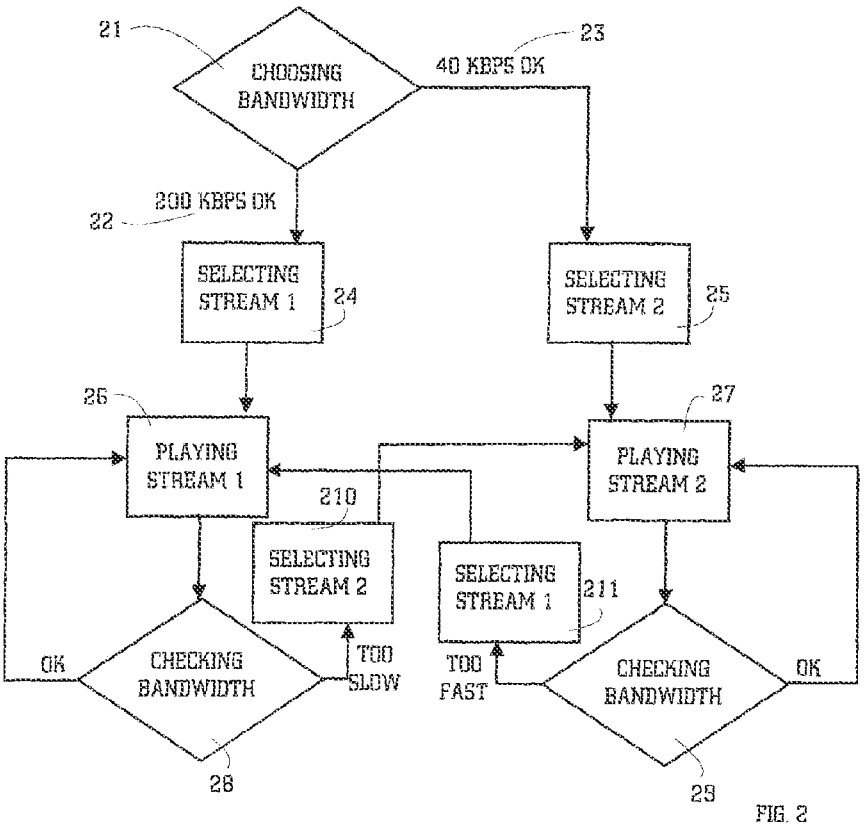



FIG. 2

EP 1 298 931 A2

Printed by Jouve, 75001 PARIS (FR)

## Description

### FIELD OF THE INVENTION

**[0001]** This invention relates to media streams transmitted in a network, such as the Internet. Especially, the invention relates to media streams concerning video pictures and voice.

### BACKGROUND OF THE INVENTION

**[0002]** When media streams that contain continuous data, for example video pictures and voice, are transmitted in a network, such as the Internet, the speeds of the media streams have to be adjusted with the speed of the transmission connection available at the time. Often, in the case of video pictures, the adjustment is made by changing the visual quality of the pictures. The speed of a transmission connection in the Internet depends strongly on a user's Internet terminal. Some terminals support technically higher speed rates than others (usually older terminals). Thus, speed adjusted media streams must be offered for a variety of terminals.

**[0003]** Transmission speed may also vary with time. For example, when congestion happens in the network, the transmission speed may decrease considerably. After the congestion, the transmission speed returns to the normal speed rate.

**[0004]** Nowadays, most of the content of the Internet is in WWW servers, which use the HTTP protocol for transmitting desired contents to users. Originally, the HTTP protocol was not designed for continuous media streams (video, voice). The problem of the known solutions is that when a media stream has to be adjusted for a changed transmission condition, i.e. to be an adaptive media stream, a special software or protocol must be used, instead of the HTTP protocol. Real Server® (RealNetworks Inc, Seattle, Washington), Quicktime® Server (Apple Computers, Cupertino California), and Windows Media Server® (Microsoft, Redmond, Washington) are commercial server software, which support adaptive media streams. These software packages use special protocols, such as RTP (Real-Time Transport Protocol) and RTSP (Real Time Streaming Protocol), which are designed for the adaptive media streams.

**[0005]** However, using these software packages usually requires a user to invest and maintain parallel devices and software in addition to the WWW server that is used to serve other Internet content, such as web pages. User communities such as corporations require support staff which must be educated to use these systems. For a service provider this means in practice that a special media stream server must be maintained. The goal of this invention is to eliminate these drawbacks. This is achieved in a way described in the claims.

### SUMMARY OF THE INVENTION

**[0006]** The following definitions should be kept in mind when reading these specifications:

Connection: A transport layer virtual circuit established between two programs for the purpose of communication. A connection can have varying transmission speed rates.

HTTP transport: An application layer transmission of data from a file on a server computer to a user terminal using HTTP 1.1 protocol. One HTTP 1.1 connection can consist of one or several HTTP 1.1 transports.

Stream: A continuous transmission of data over for example HTTP transport

**[0007]** An important aspect of the invention is to change the source of an adaptive media stream when an available connection speed rate changes. Each source contains essentially the same information (such as video and voice), but the suitability of each source for transmission has been adjusted to a certain connection speed rate. The coding of the source information can be different among the sources, which affects the speed rate. The picture information can be black-and-white instead of a color picture. The picture size can be smaller or larger. The video can be with or without voice. When the source is changed, also a new HTTP transmission for the new source is started for a new stream containing the information of the new source. In other words, the adaptive media stream, i.e. the adaptive stream, comprises at least one media stream for transmitting information.

**[0008]** In an arrangement according to the invention a source file is formed. The source file contains a plurality of sources intended for different media streams, according to such parameters as bandwidth, computing capability of the receiving terminal, etc. At the beginning of the transmission the optimal transmission speed rate at the time is chosen according to an information transfer condition. The source in the source file, which corresponds to the available speed rate, is selected to be the source of the adaptive media stream. When the available transmission speed rate changes, either to be faster or slower, a command for changing the source of the adaptive media stream, is sent from the user's terminal to the service provider's server, i.e. the source server, wherein the file of the service is. Preferably commands are sent using an HTTP protocol. When the available transmission speed rate changes again, a new command for changing the source is sent from the user's terminal to the source server. The commands are sent when it is possible to use a higher speed rate or when a lower speed rate must be used.

**[0009]** In one aspect, the invention thus provides a method for providing an adaptive media stream between a sending terminal and a user's terminal wherein



Aylo Exhibit 1018
Page 2298 of 2308

the adaptive media stream comprises at least one media stream and the method comprises the steps of choosing a transmission speed rate for the media stream, selecting a suitable data source for the media stream among sources containing essentially the same information content, each source intended for a certain information transfer condition and playing the media stream. During such playing, checking the suitability of the actual transmission speed rate, and continuing playing the media stream if the transmission speed is still suitable or selecting a new data source, which is suitable at the moment as a response for the selection of the new data source, playing a new media stream. Those selection actions continue until the played stream stops.

**[0010]** Optionally, the step of choosing comprises the phase of reading a header field of a file, which contains at least two data sources, the header indicating the starting points of the sources and to which transmission speed rate each source is indented. Yet another option calls for the selecting step to include the phase of starting to read from the starting point of the selected source.

**[0011]** Other aspect of the invention provide for the step of monitoring to include the phase of monitoring a filling degree of a buffer for incoming data in the user's terminal, e.g. if the buffer is becoming empty or full, then selecting to continue to play the present media stream or to start playing another media stream. The information of the selection of the new data source may transmitted from the user's terminal to the sending terminal using a GET method of an HTTP protocol with an optional RANGE field. When a new stream is played, an optional phases of terminating the old media stream after starting to play the new media stream and creating the new media stream before playing the new media stream is also contemplated.

**[0012]** If a new stream is selected, according to another aspect of the invention, the step of reading timing marks in said adaptive media stream for defining the right point to start playing the new media stream is also performed. Further, the step of selecting the initial speed may comprise the phase of reading a header field of files, where each contains one data source, the header indicating the starting points of the source and to which transmission speed rate the source is indented.

**[0013]** An arrangement for providing an adaptive media stream between a sending terminal and a user's terminal, is also contemplated, wherein the adaptive media stream comprises at least one media stream and the arrangement comprises:

a) Means in the client terminal for choosing a transmission speed rate for the media stream,

b) A data structure in the sending terminal comprising at least two data sources containing essentially the same information, each source intended for a certain transmission speed rate,

c) Means in the client terminal and the sending terminal for selecting a suitable data source from among the sources for the media stream,

d) Means in the user's terminal for checking the suitability of the transmission speed rate when the media stream is played,

e) Means in the user's terminal for reselecting a suitable data source from among the sources for a new media stream.

**[0014]** An arrangement as described above may further comprise means for playing the data structure in a way that the playing is started from the right point of the data structure. Preferably, means a) comprises means for reading a message from the user's terminal, which defines alternative transmission speed rates. Further preferably, each source comprises timing marks, which indicate the corresponding point in the other sources. More preferably, the arrangement further comprises a GET method of an HTTP protocol with an optional RANGE field for transmitting the information of the reselection of the suitable data source from the user's terminal to the sending terminal. In another preferable embodiment, means d) comprises means for monitoring a filling degree of a buffer for incoming data in the user's terminal. It also preferable that the data structure is a file containing the data sources. Alternatively, the data structure may be a number of files, each of them containing one data source.

**[0015]** Means c) may further comprise means for reading a header of the data structure, which indicates the starting points of the sources and to which transmission speed rate each source is intended. Means c) may further comprise means for reading headers of the files, which indicate the starting point of the source and to which transmission speed rate the source is intended.

**[0016]** In yet another aspect, the invention teaches a method for storing adaptive media stream data comprising the steps of storing a plurality of media streams, each representing a substantially similar information content, and each adapted for a different set of information transfer conditions; and providing a plurality of pointers into a first of said media streams, said pointers associated with a source location in one of said media streams and pointing to at least one target location in a second of said media streams; wherein the information content of said target location is substantially a continuation of the information content prior to said source location.

**[0017]** Preferably, said plurality of media streams is contained in a single file. Said pointers are preferably embedded within said adaptive media stream data, and comprise target locations pointer comprises a byte offset into said single file. Alternatively, said target location pointer comprises an offset into said second source stream, within said single file. Another alternative teaches that said target locations pointers comprise a pointer to another file containing said second media stream or a portion thereof. Optionally in this case, said target location pointer further comprises a byte offset into said



Aylo Exhibit 1018
Page 2299 of 2308

other file.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0018]** In the following the invention is described in more detail by means of Figs. **1 - 3** in the attached drawings where.

FIG. **1** illustrates an example of the structure of a file according to the invention,

FIG. **2** illustrates an example of a flow chart describing the function of the inventive arrangement,

FIG. **3** illustrates an example of an arrangement according to the invention.

## DETAILED DESCRIPTION OF THE INVENTION

**[0019]** FIG. **1** describes an example of a file structure according to the invention. The file is in the service provider's server (source server) from where users can stream it. For example the file contains a video in two different formats. At the beginning of the file there exists a header **1**, which contains starting bytes for two different media sources - the sources for the media stream. Source 1, called stream 1 contains video data in a resolution of 320*240, for a speed rate 200 kbps (kilobit per second) **2**. The starting byte **4** for that video data is byte 2000 in the file. Source 2, called stream 2 contains video data in a resolution of 160*120 optimized for a speed rate 40 kbps **3**. The starting byte of that video data **5** in the file is at byte 800000. If the network and a user's terminal support the transmission speed rate 200 kbps then stream 1 is sent to the user - otherwise stream 2 is sent. In this embodiment, all data feeds are assumed to support communication at a speed of at least 40 kbps. It should be noted that stream 1 and 2 are sources i.e. the parts of the file structures in this example, and a media stream is a continuous transmission of data of a source over a transmission protocol. The transmission protocol used can be any protocol, in this text the HTTP protocol is used.

**[0020]** Stream 1 is sent, i.e. streamed, to the user. Stream 1 (and the media stream for it as well) contains timing marks **6, 7, 8, 9**. The timing marks are embedded in stream 1 at a various locations, and correlate the information in the two separate resolution streams. Thus the timing marks of stream 1 in the example of Fig. 1 indicate the byte of the file where the stream is running at the time and the corresponding byte **6A, 7A, 8A, 9A,** in stream 2. If for some reason, the network can not transmit stream 1 with 200 kbps, or the user's terminal can not receive at this speed rate, the transmission of the video is changed to stream 2. For example, when the need to change the speed rate to a lower one is noticed and the most recently received (or alternatively the next) timing mark is, let's say, the mark **7** indicating time 1000 ms, it tells the corresponding byte 805000 in stream 2 to where the source of the transmission of the video transfers **11.**

**[0021]** Similarly, stream 2 (and the media stream for it) contains timing marks **10, 11, 12, 13**, which point to the location of corresponding information in stream 1, as shown by the corresponding byte **10A, 11A, 12A, 13A**, in stream 1. When the capability of transmitting 200 kbps is noticed during the transmission at 40 kbps rate, the transmission of the video is changed to stream 1. For example, when the availability of the higher speed rate is noticed and the next timing mark is the mark **13** indicating time 3000 ms, the corresponding byte 77000, located in stream 1, points to the location of corresponding information in stream 1 so the source of transmission is shifted to stream 1, using data stored in location **9** onwards.

**[0022]** FIG. **2** shows an example of a flow chart, which illustrates a function and method of the invention. FIG. **3** shows an example of the inventive arrangement. When a user visits a home page of a service provider, he/she may find something he wants to order, such as a video show. The video player client running in the user terminal sends **34** a request message from the terminal **33** to the service provider's server **31** through the network **32**, such as the Internet, to get the show using a GET method, which is one of the methods defined in the HTTP1.1 protocol. Let the request be:

GET http://www.serviceprovider.com/video/music/song1.video. **HTTP/1.1**

**[0023]** Often, the connection speed rate depends on the available (and optional) connection and processing speeds of the terminal. At the beginning, the first stream which is sent works like a test stream. The test stream, i.e. the first stream preferably forms the first part of the file structure, which preferably contains data for the lowest bandwidth. Thus the first stream over the HTTP transport also contains a list of alternative speed rates. The player in the client terminal chooses **21** one of the supported speed rate from the list. (It should be noted that the server can be informed of the capability of a terminal or the available bandwidth using other techniques and the specific method of learning the link capabilities is a matter of technical choice to one skilled in the art.) In this example, the user's terminal supports speed rates of 200 kbps and 40 kbps. Let's assume that the desired file **36** is the file in FIG. **1**. If the speed rate of 200 kbps **22** is available, stream 1 is selected **24**. Otherwise, the speed rate of 40 kbps **23** is chosen and stream 2 is selected **25**. (Notice that the higher speed rate means the higher bandwidth.)

**[0024]** In the selection of the speed rate of 200 kbps the server starts to play **26** stream 1 beginning at byte (2000) of the file. The data and the timing marks are sent **35** to the user's terminal during the play. The terminal checks **28** frequently that the currently available bandwidth is sufficient for the selected stream. If the bandwidth is sufficient, playing stream 1 is continued. If the bandwidth becomes unavailable for stream 1, stream 2 is selected **210** and stream 2 starts to play **27, 311** be-



Aylo Exhibit 1018
Page 2300 of 2308

ginning at the byte of the file defined by the latest timing mark. The bandwidth of stream 2 is checked **29** similarly as the bandwidth of stream 1, and when the bandwidth is again available for the speed rate of 200 kbps, stream 1 is selected **211**.

**[0025]** In the selection of the speed rate of 40 kbps the server starts to play **25** stream 2 from the right byte (800000) of the file. The data and the timing marks are sent **35** to the user's terminal during the play. The terminal checks **29** frequently that the bandwidth is okay for the selected stream. If the bandwidth is still restricted to 40 kbps, playing stream 2 is continued. If the bandwidth rise to a level sufficient to support 200 kbps transmission, stream 1 is selected **211** and stream 1 starts to play **26**, and is sent **311** to the terminal **33** beginning at the byte of the file defined by the latest timing mark. The bandwidth of stream 1 is checked **28** similarly as the bandwidth of stream 2, and when the bandwidth is again too slow for the speed rate of 200 kbps, stream 2 is selected **210**.

**[0026]** The checking of the bandwidth of the streams can be made, for example, measuring a filling degree of a buffer for incoming data connection in the user's terminal. When the buffer is becoming empty, the required bandwidth for current stream is too high compared to what is available through the network connection, and the speed rate should be dropped. When the buffer is becoming full, bandwidth for current stream is lower than what is available through the network connection, and the speed rate can be raised. After the measurement, the suitable stream source is selected **210, 211** and a GET command with an additional field RANGE is sent **310** from the user's terminal to the server for changing the stream. For example, let the GET command be GET http://www.serviceprovider.com/video/music/song3video RANGE: bytes= 805000- when the transmission speed rate changes from 200 kbps to 40 kbps.

**[0027]** It is worth noting that preferably, when a stream is changed, a new HTTP transport (and naturally a new media stream) is started and the old media stream is terminated after the new media stream starts playing. From the view of the user the desired file, such as a video show, seems to continue without any break because the new stream starts playing from the byte indicated by the timing mark, thus the information continuity is maintained, despite the media stream switch. So, when the source is changed, also a new HTTP transport is created for the new stream, i.e. media stream, instance and for the new source. Thus the adaptive media stream, i. e. the adaptive stream, is made up of one media stream or several consecutive media streams. Since the consecutive media streams carry essentially the same data, a user gets a visual impression of continuous shows. In other words, the adaptive media stream comprises at least one media stream for transmitting information. The HTTP 1.1 protocol provides a feature called Persistent Connections. Persistent Connection means that several requests (such as GET), can be sent via one TCP connection. Thus one connection may carry several consecutive streams. However, it should be noted that several TCP connections may be needed or used for transmitting consecutive streams.

**[0028]** Furthermore, it may be said that the adaptive media stream comprises several (or one if the speed rate remains the same during the whole transmission) instances (separate streams) of the same object (the adaptive media stream containing information such as video). Naturally, there are more ways to model the adaptive media stream, but common for these models are that transmission of information of the adaptive stream, (the stream of a continuous data, such as video over one or several connections) happens in one or several consecutive media streams over a transport protocol, each media stream adapted for certain conditions, and certain links or pointers periodically connect or cross connect the media streams in essentially content coherent fashion. Thus varying transmission conditions may dictate how many suitable media streams are sent forming together the adaptive stream.

**[0029]** For creating the inventive arrangement an initial selection module **39** (i.e. means) for choosing an original transmission speed rate and selecting a suitable source in a service provider's server is needed. In a user's terminal another estimation module **37** (i.e. means for checking transmission rate) is needed, for checking the suitability of the transmission speed rate as reselection module **38** (i.e. means) for reselecting a suitable source are needed.

**[0030]** Although, the processing and network connection speed of a user's terminal is mostly the decisive element when selecting a suitable transmission speed rate, it may happen that the network itself becomes congested. In congestion, the available speed rate decreases and the transmission speed rate must be lowered. On the other hand, if the network allows a higher speed, the transmission speed rate may be increased.

**[0031]** Using the inventive arrangement, an adaptive media stream can be served from with a common HTTP server. Therefore, there is no need for the use of a special media stream server, or parallel devices and software. Remarkable cost savings are achieved, since usually service providers and users support the HTTP protocol. Also the reliability of the system increases because of fewer sources of faults.

**[0032]** It is clear that inventive arrangement can be implemented in many ways. For example, the time period between two timing marks can be different than in the example of this text. It can be any suitable period depending on the features of a solution, such as 2 or 4 seconds. The format of the inventive file can be any suitable format as well, such as MPEG or another.

**[0033]** The inventive file may comprise more than two different streams (containing the same content), from which the most suitable stream is selected at any given time. Therefore, timing marks must contain a number of references for the corresponding byte in the other data



Aylo Exhibit 1018
Page 2301 of 2308

sources.

**[0034]** All the sources do not have to be in the same file, but each source can be a separate file. However, the use of this kind of structure is not as efficient when attempting to use as little processing power as possible compared to the use of one file structure. In the structure of several files, timing marks must indicate the right file with the corresponding byte.

**[0035]** Although, a sending terminal have been described to be a server in the examples above, it is clear that the sending terminal can be another terminal capable of sending information.

**[0036]** Similarly other mechanisms are known and suitable to measure and select the most appropriate source. Such methods may be server based or user terminal based, or even utilize intermediate network nodes to estimate network congestion and bandwidth, and similar measurements that are indicative of total node to node capacity, as well as specific node capabilities, and the selection of sources (and media streams) may be carried out in various ways that will provide the best end-user experience according to varying conditions.

**[0037]** According to the above-mentioned matters, it is evident that the invention is not restricted to the solutions described in this text, but it can be modified for various solutions, in the scope of the inventive idea.

## Claims

1. A method for providing an adaptive media stream between a sending terminal and a user's terminal **characterized in that** the adaptive media stream comprises at least one media stream and the method comprises the steps of:

   a) choosing a transmission speed rate for the media stream,
   b) selecting a suitable data source for the media stream among sources containing essentially the same information, each source intended for a certain transmission speed rate,
   c) playing the media stream,
   d) checking the suitability of the transmission speed rate,
   e) either continuing playing the media stream if the transmission speed is still suitable or,
   f) selecting a new data source, which is suitable at the moment,
   g) as a response for the selection of the new data source, playing a new media stream,
   h) repeating steps d) to g) until the stream, which is played, stops.

2. A method according to claim 1 **characterized in that** step b) comprises the phase of reading a header field of a file, which contains at least two data sources, the header indicating the starting points of the sources and to which transmission speed rate each source is intended.

3. A method according to claim 2 **characterized in that** step c) comprises the phase of starting to read from the starting point of the selected source.

4. A method according to claim 1 or 3 **characterized in that** step d) comprises the phase of monitoring a filling degree of a buffer for incoming data in the user's terminal.

5. A method according to claim 4 **characterized in that** if the buffer is becoming empty or full, then step f) is chosen, else step e) is chosen.

6. A method according to claim 1 or 5 **characterized in that** the information of the selection of the new data source is transmitted from the user's terminal to the sending terminal using a GET method of an HTTP protocol with an optional RANGE field.

7. A method according to claim 1 **characterized in that** step g) comprises phases of terminating the old media stream after starting to play the new media stream and creating the new media stream before playing the new media stream.

8. A method according to claim 1 or 7, **characterized in that** step g) further comprises the phase of reading timing marks in the data source for defining the right point to start playing the new media stream.

9. A method according to claim 1 **characterized in that** step b) comprises the phase of reading a header field of files, where each contains one data source, the header indicating the starting points of the source and to which transmission speed rate the source is intended.

10. An arrangement for providing an adaptive media stream between a sending terminal and a user's terminal, **characterized in that** the adaptive media stream comprises at least one media stream and the arrangement comprises:

    a) means in the sending terminal for choosing a transmission speed rate for the media stream,
    b) a data structure in the sending terminal comprising at least two data sources containing essentially the same information, each source intended for a certain transmission speed rate,
    c) means in the sending terminal for selecting a suitable data source from among the sources for the media stream,
    d) means in the user's terminal for checking the suitability of the transmission speed rate when the media stream is played,



Aylo Exhibit 1018
Page 2302 of 2308

e) means in the user's terminal for reselecting a suitable data source from among the sources for a new media stream.

11. An arrangement according to claim 10, **characterized in that** the arrangement further comprises means for playing the data structure in a way that the playing is started from the right point of the data structure.

12. An arrangement according to claim 11, **characterized in that** means a) comprises means for reading a message from the user's terminal, which defines alternative transmission speed rates.

13. An arrangement according to claim 11, **characterized in that** each source comprises timing marks, which indicate the corresponding point in the other sources.

14. An arrangement according to claim 13, **characterized in that** the arrangement further comprises a GET method of an HTTP protocol with an optional RANGE field for transmitting the information of the reselection of the suitable data source from the user's terminal to the sending terminal.

15. An arrangement according to claim 11, **characterized in that** means d) comprises means for monitoring a filling degree of a buffer for incoming data in the user's terminal.

16. An arrangement according to claim 11, **characterized in that** the data structure is a file containing the data sources.

17. An arrangement according to claim 16, **characterized in that** means c) comprises means for reading a header of the data structure, which indicates the starting points of the sources and to which transmission speed rate each source is intended.

18. An arrangement according to claim 11, **characterized in that** the data structure is a number of files, each of them containing one data source.

19. An arrangement according to claim 18, **characterized in that** means c) comprises means for reading headers of the files, which indicate the starting point of the source and to which transmission speed rate the source is intended.



Aylo Exhibit 1018
Page 2303 of 2308

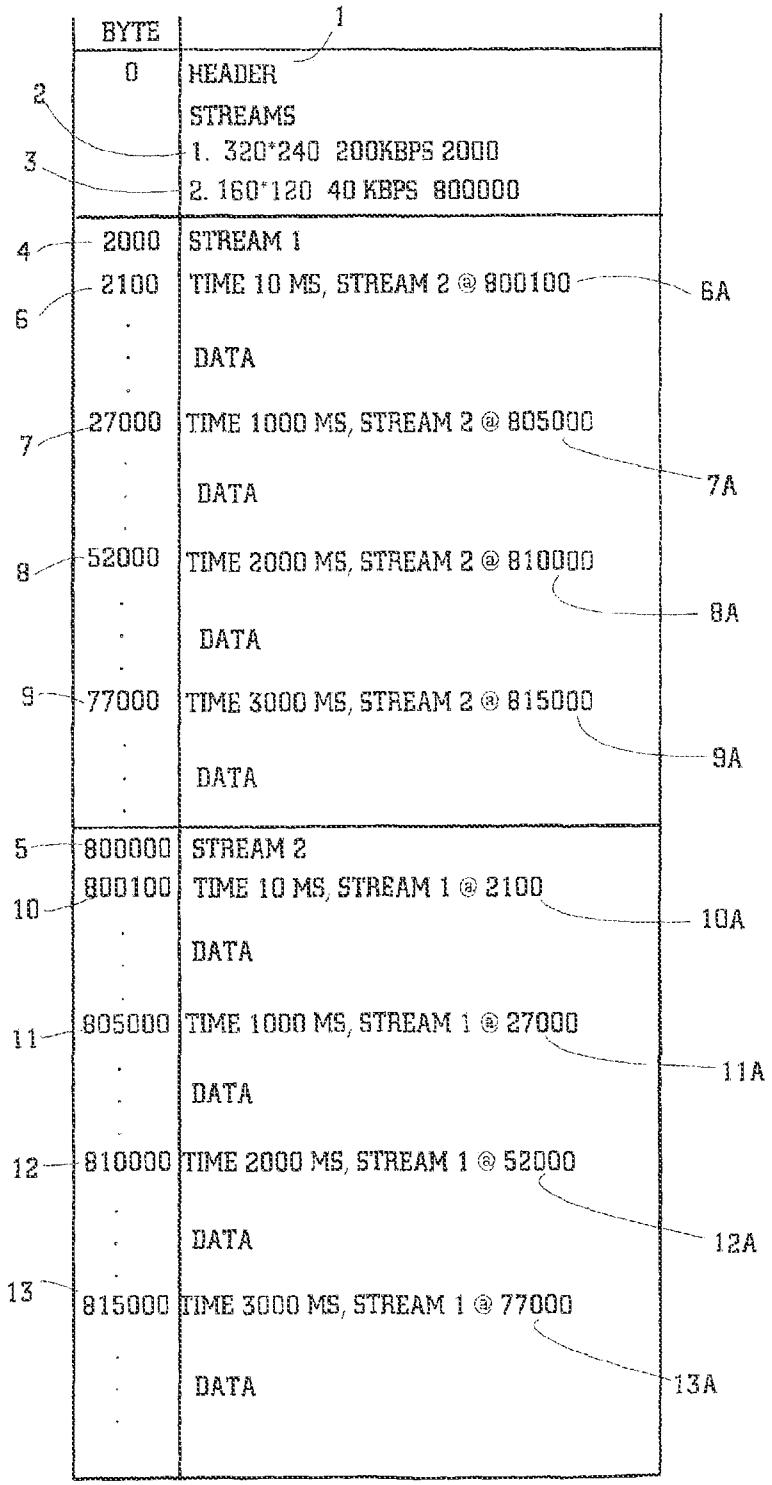



FIG. 1



Aylo Exhibit 1018
Page 2304 of 2308

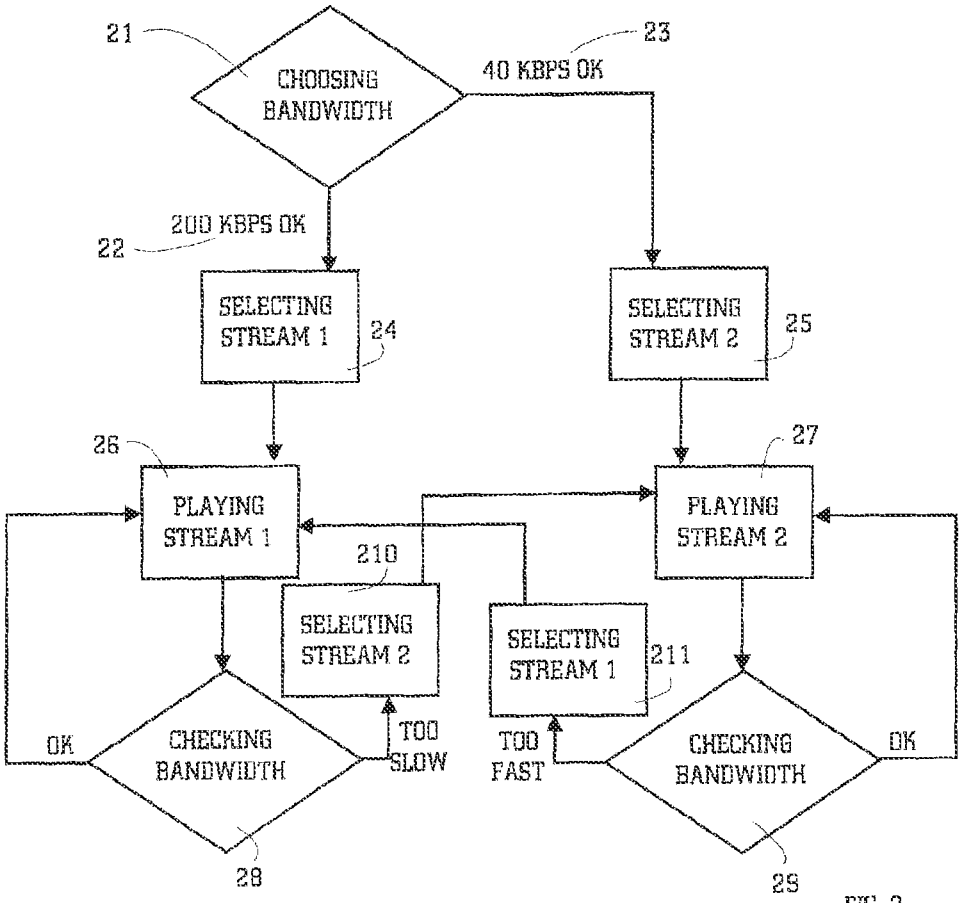

21
CHOOSING BANDWIDTH
23
40 KBPS OK
200 KBPS OK
22
SELECTING STREAM 1
24
SELECTING STREAM 2
25
26
PLAYING STREAM 1
27
PLAYING STREAM 2
210
SELECTING STREAM 2
SELECTING STREAM 1
211
OK
CHECKING BANDWIDTH
TOO SLOW
TOO FAST
CHECKING BANDWIDTH
OK
28
29

FIG. 2

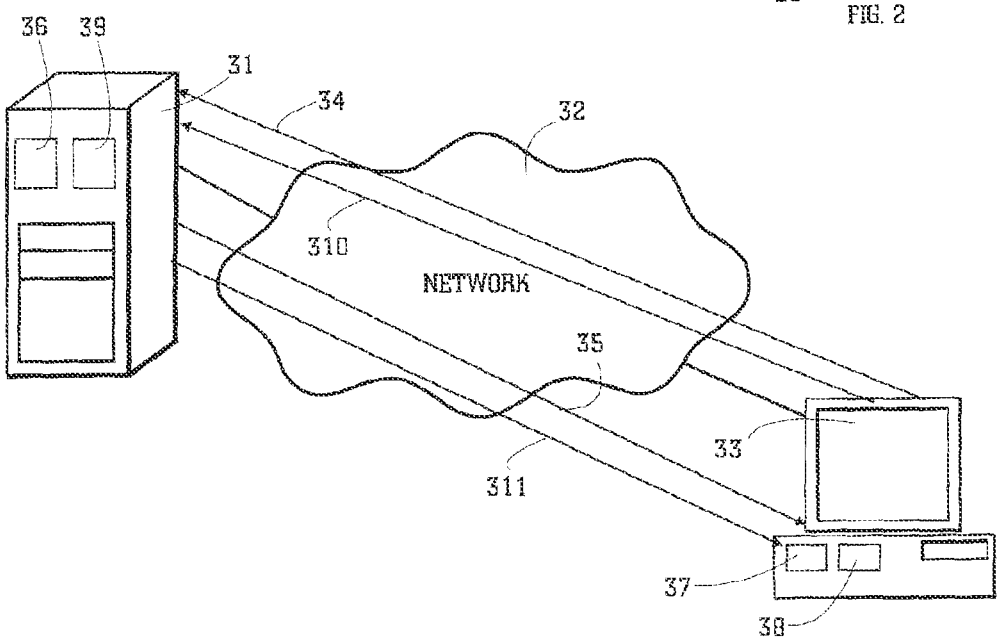

36
39
31
34
32
310
NETWORK
35
33
311
37
38

FIG. 3

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 20365927 |
| **Application Number:** | 11116783 |
| **International Application Number:** | |
| **Confirmation Number:** | 5535 |
| **Title of Invention:** | APPARATUS, SYSTEM, AND METHOD FOR ADAPTIVE-RATE SHIFTING OF STREAMING CONTENT |
| **First Named Inventor/Applicant Name:** | R. Drew Major |
| **Customer Number:** | 54583 |
| **Filer:** | Brett Carlson/Sharron Castillo |
| **Filer Authorized By:** | Brett Carlson |
| **Attorney Docket Number:** | 066.0141 (P2004-04-01.1) |
| **Receipt Date:** | 08-OCT-2014 |
| **Filing Date:** | 28-APR-2005 |
| **Time Stamp:** | 17:10:20 |
| **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 | Miscellaneous Incoming Letter | 20141008_CorrespToBePlacedInFile_P2004-04-01-1.pdf | 74624<br>b184b23499ea9c47e8aae661727cd54c1b33d8cc | no | 2 |

**Warnings:**

**Information:**

| | | | | | |
|---|---|---|---|---|---|
| 2 | Information Disclosure Statement (IDS) Form (SB08) | 20141008_IDS_P2004-04-01-1.pdf | 612312<br>bd113f677dee959ae8c42c4e068777abe32ae5ca | no | 4 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems. | | | | | |
| 3 | Non Patent Literature | NPL_CanadaOfficeAction20140910_2564861.pdf | 182062<br>92eeb3bfd68891889301c704d5fcd645b69d7920 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Foreign Reference | EP1298931A2.pdf | 12447319<br>ca20833f0a2d1251fe29baa3613403e3cd71dc0e | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | | **Total Files Size (in bytes):** | 13316317 | |

**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.**

Large Entity Declaration

**PATENT**
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**Application Number:** 11/116783 **Current Date** : April 13, 2017

**Filing Date:** 28-Apr-05

**Patent Number:** 8868772

**Issue Date:** 21-Oct-14

**CHANGE OF ENTITY STATUS PURSUANT TO 37 C.F.R. §1.27 (g)(2)**

Commissioner for Patents
Mail Stop M Correspondence
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This communication hereby notifies the United States Patent and Trademark Office that small entity status is no longer applicable for the above-identified patent.

**COMPANY or FIRM NAME AND ADDRESS:**

EchoStar Technologies L.L.C.

Respectfully submitted,

**Signature**

Max Gratton
**Printed Name**

Director & Sr Corp Counsel
**Title**

**OR**
**Reg. # if US Attorney** 56,541