In step 176 the server consults its network topology database and devises a connection address list having the greatest number of connection links to a prospective parent node. That is, the server checks its information regarding the nodes in the level furthest from the server (i.e., the lowest downtree) to determine whether there are any potential parent nodes with space available for the new user node. If there are no potential parent nodes with space available, then the database is checked regarding nodes in the level one link closer to the server, and so on until a level is found having at least one potential parent node with space available for the new user node. In this manner, user nodes having limited or no reliable re-transmission capability may be started off as far from the server as possible and will have a reduced effect on the overall capacity of the distribution network.

As indicated above, and as discussed more fully below, one or more reconfiguration events may have transpired since the server's topology database was last updated. As a result, the first prospective parent node which is actually present on the distribution network for the new user node to contact may not have room for the new user node. By way of example (which example is intended to be illustrative and not restrictive), when node X tries to join the distribution network having the topology shown in FIG. 12A, the server provides node X with the following connection address list: C-B-A-S. If node C had disappeared from the network between the last update of the server's topology database and node X's attempting to contact node C, then node E, by virtue of a reconfiguration event, would be connected, in this example, to node B as shown in FIG. 12D. Then node X, in performing the Prospective Child Node's Connection Routine discussed in connection with FIGS. 14 and 15, would contact node B. Node B, in the Prospective Parent Node's Connection Routine, discussed in connection with FIG. 16, would have to answer the query of step 162 in the negative and go to step 164, in which it performs the Fully Occupied Parent's Connection Instruction Routine.

Referring now to FIG. 18, a flow diagram associated with this example illustrating that routine is shown. It is similar to the Server's Connection Instruction Routine. Since the fully occupied parent node has already determined that it has no room for the new user node (or connection requesting user node), the Fully Occupied Parent's Connection Instruction Routine does not need to include a step in which a determination is made regarding whether there is room for the new user node (or connection requesting node). In the Fully Occupied Parent's Connection Instruction Routine the fully occupied parent node, acting as an instructing node, first performs step 181 in which it interrogates the new user node for its bandwidth rating and performance rating. In step 182, the fully occupied parent node determines whether the potential re-transmission rate of the new user node is greater than

DISH EXHIBIT 2002, Page 501
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

zero. (If only the bandwidth rating is considered, then it determines whether the bandwidth rating is greater than zero (i.e., the connection requesting node is a high-bandwidth node).) If the answer is "yes," then the fully occupied parent node goes to step 183 in which the fully occupied parent node consults its topology database, which contains the latest information available to that node regarding the links from the fully occupied parent node back to the server and regarding the fully occupied parent node's own progeny (i.e., its children, grandchildren etc.,) and devises a new connection address list having the fewest number of connection links to a new prospective parent node. That is, the fully occupied parent node checks its information regarding the nodes in the level closest to the fully occupied parent node (but not closer to the server) to determine whether there are any potential parent nodes with space available for the new user node. If there are no potential parent nodes with space available, then the database is checked regarding nodes in the level one link further from the fully occupied parent node (and further from the server), and so on until a level is found having at least one potential parent node with space available for the new user node. That is, the fully occupied parent node determines which new prospective parent node with unused capacity for a child node is closest to the fully occupied parent node, and devises the connection address list from such new prospective parent node through the fully occupied parent node and on to the server. The fully occupied parent node then goes to step 184 in which it provides the new user node with the new connection address list and disconnects the new user node from the fully occupied parent.

If the answer to the query in step 182 is no (i.e., either (i) one of the bandwidth rating and performance rating is zero or (ii) if only the bandwidth rating is considered, the bandwidth rating is zero (i.e., the connection requesting node is a low-bandwidth node)), the fully occupied parent node goes to step 185. In step 185 the fully occupied parent node consults its network topology database and devises a connection address list having the greatest number of connection links to a new prospective parent node. That is, the fully occupied parent node checks its information regarding the nodes in the level furthest from it (and farther from the server than it is) to determine whether there are any potential parent nodes with space available for the new user node. If there are no potential parent nodes with space available, then the database is checked regarding nodes in the level one link closer to the fully occupied parent node, and so on until a level is found having at least one potential parent node with space available for the new user node. As discussed above, this helps assure that new user nodes having limited or no reliable re-transmission capability are started off as far from the server as possible. After the fully occupied parent node devises the connection

DISH EXHIBIT 2002, Page 502
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

address list from such new prospective parent node through the fully occupied parent node and on to the server, the fully occupied parent node then goes to step 184 where it performs as discussed above.

In another embodiment of the invention, the distribution software could be designed such that a fully occupied parent performs an abbreviated Fully Occupied Parent's Connection Instruction Routine, in which steps 181, 182 and 185 are not performed. That is, it could be presumed that the server has done the major portion of the work needed to determine where the new user node should be placed and that the fully occupied parent user node need only redirect the new user node to the closest available new prospective parent. In such event, only steps 183 and 184 would be performed.

In the example discussed above in which node C had disappeared from the network when new user node X had been given, by the server, connection address C-B-A-S, and in which node B is a fully occupied parent node as shown in FIG. 12D, node B would appear to have the choice of devising either connection address list D-B-A-S or E-B-A-S regardless of whether the full or abbreviated Fully Occupied Parent's Connection Instruction Routine were performed.

In this regard, to determine which connection address list to choose when there are two or more prospective parent nodes in a particular level having space for a new user node, the distribution software could have an additional subroutine as part of steps 175, 176, 183 and 185. An example of this subroutine, called the Multi-Node Selection Subroutine is illustrated in FIG. 19.

In step 191 the server or fully occupied parent node deciding where to send a new user node determines whether any of the potential new parent nodes is partially occupied. As discussed earlier, in one example a partially occupied potential parent node may be preferred over an unoccupied potential parent node. In this case, if any of the potential parent nodes is partially occupied, then the server or fully occupied parent node goes to step 192. In step 192 the partially occupied prospective parent node with the highest utility rating is selected as the new prospective parent node. If there were only a single partially occupied potential parent node, then that node is selected.

If in step 191 it is determined that there are no partially occupied potential parent nodes, then the server or fully occupied parent node goes to step 193. In step 193 the unoccupied prospective parent node with the highest utility rating is selected as the new prospective parent node.

DISH EXHIBIT 2002, Page 503
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

In another example (which example is intended to be illustrative and not restrictive),the software engineer could have step 193 follow an affirmative response to the query in step 191 and step 192 follow a negative response; in such event, unoccupied prospective parent nodes would be selected ahead of partially occupied prospective parent nodes (all other things being equal, it may be advantageous to select nodes that have zero children over nodes that already have one child; while it is true that this may increase the number of repeat nodes, what the inventors have found is that by filling the frontier in an "interlaced" fashion, connecting nodes build up their buffers more quickly (allowing a reduction in the incidence of stream interruptions).

After whichever of steps 192 and 193 is completed, the server or fully occupied parent node returns to the step from which it entered the Multi-Node Selection Subroutine (i.e., step 175, 176, 183 or 185), and completes that step.

So, in the example shown in FIG. 12D, where node C left the network thereby leaving node B with the chore of devising a new connection address list for node X, node B would perform the Fully Occupied Parent's Connection Instruction Routine. Regardless of the bandwidth and performance ratings of node X, node B would be choosing between nodes D and E in the third level. In step 191 node B would determine that neither D nor E is partially occupied, and therefore node B would go to step 193. Assuming that nodes E and D have equal bandwidth and performance ratings and that node D was connected to the network longer than node E, node D would be selected because it would have the higher utility rating since it was connected to the network longer than node E. Node B would then go to step 194 and then return to the step from which it entered the Multi-Node Selection Subroutine. When node B returns to step 183 or 185, it completes that step and moves on to step 184. In that step, node B provides new user node X with new connection address list D-B-A-S and node X connects to the distribution network as shown in FIG. 12E.

Referring now to an "Alternative Distribution Network Construction" example (which example is intended to be illustrative and not restrictive), it is noted that under this example the length of the distribution chains (i.e., the number of levels of user nodes linked through each other to the server) is aimed to be kept as small as possible.

Also under this example, user nodes having the highest bandwidth capabilities are aimed to be kept closer to the server (e.g., in order to allow the greatest expansion of the distribution system). However, it is possible that zero bandwidth rated nodes may nevertheless appear relatively far uptree (thereby stunting the growth of that chain). The following method may be used in constructing the distribution network both by servers and

DISH EXHIBIT 2002, Page 504
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

by prospective parents which are actually completely occupied, either of which may be thought of as an instructing node (that is, software enabling the routines discussed below could be installed on servers and user nodes alike).

More particularly, in the distribution system of this example, each child node reports directly to (or is tested by) its parent node with respect to information relating to the child node's bandwidth rating, performance rating, potential re-transmission rating and utility rating. In turn, each parent node reports all the information it has obtained regarding its child nodes on to its own parent node (a parent node also reports to each of its child nodes the address list from that parent back to the server, which list forms what may be referred to as the ancestor portion of the topology database – in addition, a parent node reports to each of its child nodes the addresses of their siblings). The reports occur during what may be referred to as a utility rating event. Utility rating events may occur, for example, on a predetermined schedule (e.g., utility rating events may occur as frequently as every few seconds). As a result of all the reporting, each node stores in its topology database the topology of the tree (including all its branches) extending below that node, and the server stores in its topology database the topology of all the trees extending below it. This may be referred to as the descendant portion (or descendant database) 133 of the topology database (see FIG. 13). The descendant database of a particular node may include a descendant list, a list of the addresses of all the nodes cascadingly connected below that particular node. Included in the topology database information may be the utility ratings of the nodes below the node in which that particular topology database resides.

After each reporting event in this example, each parent node (including the server), acting as an instructing node, devises two lists of prospective (or recommended) parent nodes. In this example, the first list, or Primary Recommended Parent List ("PRPL"), stored in the Primary Recommended Parent List buffer 123 (see FIG. 13), lists all the nodes in the descendant portion of that node's topology database which have bandwidth available to support another child node (in one example (which example is intended to be illustrative and not restrictive), in a binary tree system, all nodes in the descendant portion of the topology database having (i) a bandwidth rating of at least one and (ii) less than two child nodes would be listed). They would be listed with those node's which are closest to the node in which that particular topology database resides at the top of the list, and those nodes which are in the same level would be ranked such that the node with the highest utility rating would be listed first, the node with the second highest utility rating would be listed second and so on. By way of example (which example is intended to be illustrative and not restrictive), the PRPL of a

DISH EXHIBIT 2002, Page 505
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

second level node would list a third level node with available bandwidth ahead of a fourth level node with available bandwidth even if the fourth level node's utility rating were higher than that of the third level node.

The second list in this example, or Secondary Recommended Parent List ("SRPL"), stored in the Secondary Recommended Parent List buffer 124 (see FIG. 13), lists all the nodes in the descendant portion of that node's topology database which have the ability to re-transmit content data to child nodes but are fully occupied, and at least one of its child nodes is incapable of re-transmitting content data to another child node (in one example (which example is intended to be illustrative and not restrictive), in a binary tree system, all nodes in the descendant portion of the topology database having (i) a bandwidth rating of at least one and (ii) at least one child node having a bandwidth rating less than one (i.e., being incapable of re-transmitting content data to two child nodes) would be listed). Like the nodes in the PRPL, the nodes in the SRPL would be listed with those node's which are closest to the node in which that particular topology database resides at the top of the list, and those nodes which are in the same level would be ranked such that the node with the highest utility rating would be listed first, the node with the second highest utility rating would be listed second and so on.

Of note, in this example the SRPL lists those parent nodes having the growth of their branches (i.e., their further progeny) blocked or partially blocked by a low-bandwidth child node. This may lead to an unbalanced growth of the distribution system, and a limitation on the total capacity of the system.

Of further note, to the extent that a node (including a server) has room for another child node or is the parent of a low bandwidth node, it may be listed on its own PRPL or SRPL.

Referring now to FIGS. 20A and 20B, an example flow diagram illustrating what may be referred to as the Universal Connection Address Routine is shown. As indicated above, a server or a fully occupied prospective parent node receiving a connection request may be referred to as an "instructing node." When a new node (here node N) approaches an instructing node, the instructing node performs step 201, it receives a connection request. It then goes to step 202 in which it interrogates or tests node N to determine whether it is a low-bandwidth node ("low-bandwidth" may mean, for example, either or both: (1) a node that is incapable of broadcasting two copies of its incoming stream on to its children; and (2) a node that is incapable of rebroadcasting its stream because it is firewalled). In the binary tree system of one example, a low-bandwidth node is a node with a bandwidth rating less than

DISH EXHIBIT 2002, Page 506
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

one. If node N is a low bandwidth node, the instructing node proceeds to step 203 in which the instructing node determines whether there are any available prospective parent nodes which are not fully occupied. Sometimes the distribution network may be fully occupied. If it is, the instructing node's PRPL will be empty. If it is empty, the response to the query in step 203 would be yes. Then the instructing node goes to step 209 in which the new node is sent back to the server to start the connection process from the beginning. If the response to the query in step 203 is no, then the instructing node goes to step 204 in which it selects a prospective (or recommended) parent node for node N. The instructing node then moves on to step 205 in which it consults its topology database and devises a connection address list from the recommended parent node back to the server, and provides such connection address list to node N. (If the instructing node is a user node, then the connection address list leads back to the server through the instructing node.) At this point, node N performs the Prospective Child Node's Connection Routine discussed above in connection with FIG. 14.

As part of step 205, the instructing node inserts node N into its topology database as a child of the recommended parent node. It does this because other new nodes may seek connection instructions prior to the next utility rating event (i.e., before reports providing updated information regarding the topology of the distribution network are received by the instructing node), and such new nodes should not be sent to a prospective parent which the instructing node could know is fully occupied. In this regard, the instructing node then goes to step 206 in which it checks its topology database to determine whether the recommended parent, with node N presumptively docked to it as a child node, is fully occupied (in the example here of a binary tree network, whether it has two child nodes). If the answer is no, then the instructing node has finished this routine. If the answer is yes, then the instructing node goes to step 207 in which it removes the recommended parent from the PRPL and inserts it into the SRPL, and the instructing node has finished the routine.

If the answer to the query in step 202 is no (e.g., node N is not a low-bandwidth node; in the binary tree network example it is a high-bandwidth node capable of re-transmitting content data to two child nodes), the instructing node moves on to step 208. There it determines whether both the PRPL and SRPL are empty (which may occur under certain circumstances, such as, for example, when the number of levels in a distribution system is capped and at least all the nodes on all but the last level are fully occupied with high-bandwidth nodes). If so, the instructing node goes to step 209 in which the new node is sent back to the server to start the connection process from the beginning. If the response to the query in step 208 is no, then the instructing node goes to step 210 in which it selects a

DISH EXHIBIT 2002, Page 507
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

prospective (or recommended) parent node for node N from the PRPL and an alternate recommended parent node from the SRPL (if either the PRPL or SRPL is empty, the instructing node will make a "nil" selection from that list – the instructing node knows from step 208 that at least one of the lists will not be empty). The instructing node then goes to step 211 in which it determines whether the alternate recommended parent node is closer to the server (i.e., higher uptree) than the recommended parent node derived from the PRPL. If the alternate recommended parent node is on the same level as, or on a lower level than the recommended parent node derived from the PRPL (or if the selection from the SRPL is nil), then the answer to the query in step 211 is no.

In such event, the instructing node goes to step 212 in which it consults its topology database and devises a connection address list from the recommended parent node back to the server, and provides such connection address list to node N (if the instructing node is a user node, then the connection address list leads back to the server through the instructing node).

As in step 205 discussed above, at this point, node N performs the Prospective Child Node's Connection Routine discussed above in connection with FIG. 14, and in step 212, the instructing node inserts node N into its topology database as a child of the recommended parent node.

The instructing node moves to step 213 in which it adds node N to an appropriate position on the PRPL. It does this because, as a result of step 202, it knows that the node N is capable of re-transmitting content data to its own child nodes.

The instructing node then goes to step 214 in which it checks its topology database to determine whether the recommended parent, with node N presumptively docked to it as a child node, is fully occupied (in the example here of a binary tree network, whether it has two child nodes). If the answer is no, then the instructing node has finished this routine. If the answer is yes, then the instructing node goes to step 215 in which it removes the recommended parent from the PRPL because it is now deemed to not be an available prospective parent node.

Then the instructing node goes to step 216 in which it consults its topology database to determine whether any of the recommended parent node's children is a low-bandwidth node (in this example, knowing that node N is not a low-bandwidth node and knowing that the recommended parent node has two child nodes, the question is whether the child node other than node N is a low-bandwidth node.) If the answer is no (i.e., all the recommended parent node's children are high-bandwidth nodes), then the instructing node has finished the routine.

DISH EXHIBIT 2002, Page 508
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

If the answer is yes, then the growth of the recommended parent node's line of progeny is partially blocked by a low-bandwidth child node. The instructing node moves on to step 217 in which it adds the recommended parent to the SRPL.

If the answer to the query in step 211 is yes (i.e., the alternate recommended parent (selected from the SRPL) is: (i) on a higher level than the recommended parent (selected from the PRPL) or (ii) the selection from the PRPL is nil), then the instructing node moves to step 218. In that step the instructing node consults its topology database to determine: (i) which of the alternate recommended parent node's child nodes is a low-bandwidth node or (ii) if they both are low-bandwidth nodes, which of the child nodes has been connected to the system a shorter period of time. In one example (which example is intended to be illustrative and not restrictive), the instructing node may send a disconnect signal to that child node with instructions to return to the server to start the connection process from the beginning (as a new user node (or connection requesting user node)). In another example (which example is intended to be illustrative and not restrictive), the bumped node may climb its path to its grandparent which gives it a new connection path – rather than returning to the root server (doing so typically means that the incoming node that bumped the non-repeat-capable node ends up being that node's new parent).

The instructing node moves on to step 219 in which it consults its topology database and devises a connection address list from the alternate recommended parent node back to the server, and provides such connection address list to node N (if the instructing node is a user node, then the connection address list leads back to the server through the instructing node).

As in steps 205 and 212 discussed above, at this point, node N performs the Prospective Child Node's Connection Routine discussed above in connection with FIG. 14, and in step 219, the instructing node inserts node N into its topology database as a child of the alternate recommended parent node.

The instructing node moves to step 220 in which it adds node N to an appropriate position on the PRPL. It does this because, as a result of step 202, it knows that the node N is capable of re-transmitting content data to its own child nodes.

The instructing node then goes to step 221 in which it checks its topology database to determine whether all the child nodes of the alternate recommended parent are high-bandwidth nodes. If the answer is no, then the instructing node has finished this routine. If the answer is yes, then the instructing node goes to step 222 in which it removes the alternate recommended parent from the SRPL because it is now deemed to not be an available

DISH EXHIBIT 2002, Page 509
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

alternative prospective parent node since the growth of its progeny line is not even partially blocked by one of its own children. At this point the instructing node has finished the routine.

With the routines discussed in connection with the above examples, the distribution network will be built with each new node assigned to the shortest tree (or chain), and those with the fewest number of links between it and the server. However, low-bandwidth nodes, which would tend to block the balanced growth of the distribution network, would be displaced by high-bandwidth nodes and moved to the edges of the network where they would have reduced effect on the growth of the network.

Referring now to FIG. 21, this FIG. may be used as an example to illustrate how the Universal Connection Address Routine works. It shows primary server 11 with node A as first level node 12, its child nodes B and C as second level nodes 13, their child nodes D, E, F and G as third level nodes 14, node D and G's child nodes H, I, J and K as fourth level nodes 15, and node I's child nodes L and M as fifth level nodes 17. Assume for this example that all available docking links directly to the server 11 are occupied by high-bandwidth nodes, and that all trees are at full capacity other than that rooted to the server 11 through first level node A. The utility rating for each node is set forth in FIG. 21 under its letter designation. Low-bandwidth nodes (in this example, those nodes having a bandwidth rating less than one) are shown with a bandwidth rating of "Ω," which indicates in this example that such nodes will not have any child nodes assigned to them. Nodes A, B, C, D, E, G, I, J and K are high-bandwidth nodes (or repeater nodes (i.e., they are capable of re-transmitting the content data they receive from their respective parent nodes to their respective child nodes, if any)).

A new user node (or other connection requesting user node), here referred to as "node N", may be directed to node A as a result of various reconfiguration events. When node A receives a connection request from node N, node A will, in this example, either consult both of its PRPL and SRPL buffers, if node N is a high-bandwidth node, or consult just its PRPL buffer (if node N is a low-bandwidth node).

Nodes F, H, L, and M will not appear on any list in this example since they are low-bandwidth nodes. Nodes B, C, D, G, I and A itself will not appear on the PRPL in this example since these nodes are fully occupied. However, nodes C, D, and I will appear on the SRPL in this example because they each have at least one low bandwidth child node.

Using the rules discussed above (i.e., ranking prospective parent nodes by level and within levels by utility rating) the PRPL would be as follows in this example:

- PRPL

DISH EXHIBIT 2002, Page 510
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

- o E (a third level node with available capacity)
  - o J (the fourth level node with available capacity having the highest utility rating)
- o K (a fourth level node with available capacity)

The SRPL in this example would be as follows:

- SRPL
  - o C (the fully occupied second level node with a low-bandwidth child node)
  - o D (the fully occupied third level node with a low-bandwidth child node)
  - o I (the fully occupied fourth level node with a low-bandwidth child node)

If node N is a low-bandwidth node, node A will give, in this example, node N the following as its new connection address list:

- E-B-A-S.

Since node E would not have two child nodes, it would remain on the PRPL.

If node N is a high-bandwidth node, node A will compare (step 211 of FIG. 20B) the first node on the PRPL (the recommended parent node) with the first node on the SRPL (the alternate recommended parent node). Here, node C, the first node on the SRPL is a higher level node than node E, the first node on the PRPL. So, node A will send a disconnect signal (step 218 of FIG. 20B) to node F, node C's low-bandwidth child node. Then it will provide node N with the following new connection address list and add node N to the PRPL (step 219 of FIG. 20B):

- C-A-S.

Since node C would now have two high-bandwidth child nodes (nodes N and G), node C would be removed from the SRPL (step 222 of FIG. 20B).

Further, in this example wherein node N is a high-bandwidth node, when node F returns to the server 11 (or, in another example, goes to Node A) for a new connection, the

DISH EXHIBIT 2002, Page 511
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

server (or Node A) will also use the Universal Connection Address Routine (Node F may go to Node A rather than the server because (in one example) when a node is "kicked" it may climb its internal connection path rather than jumping directly to the root server). Since node F is a low-bandwidth node, the server (or Node A) will give node F the following as its new connection address list:

- E-B-A-S.

FIG. 22 illustrates the new topology. As can be seen, absent intervening events, low-bandwidth node F will end up moving down from the third level to the fourth level and the bandwidth capacity of the third level will increase from six child nodes to eight (its maximum in this binary tree example). The potential bandwidth capacity of the fourth level would also increase, from ten child nodes to twelve.

Referring now to a "Distribution Network Reconfiguration" example (which example is intended to be illustrative and not restrictive), it is noted that under this example the user nodes are free to exit the distribution network at will. And, of course, user nodes may exit the distribution network due to equipment failures between the user node and the communication network (the Internet in the examples discussed herein). This was first discussed in connection with FIGS. 10A-E.

Under this example the present invention may handle the reconfiguration required by a user node departure by having certain user nodes in the same tree as the departing node perform a Propagation Routine. The results of the propagation routine of this example are illustrated in FIGS. 23 and 24. There a tree rooted to the server through first level user node P is illustrated. Node P has two child nodes, second level nodes Q and X. Through node X, P has two grandchild nodes, third level nodes A and B. Based on the relative utility ratings of nodes Q and X, P has sent signals to its children instructing them to set the color of the flag represented by the information in their respective reconfiguration flag buffers to "green" and "red," respectively. The use of colors as designators is merely discretionary. In reality they represent relative ratings of siblings for purposes of determining their roles in a reconfiguration event, and may be referred to as "propagation ratings." In addition, instead of colors, numbers (e.g., 1 and 2) could be used, as well as any of many other nomenclature schemes to describe the grades of propagation ratings. The "red" "green" ratings discussed herein shall be deemed representative of all such schemes. The number of grades of propagation ratings assigned by a parent node may be equal to the number of children each

DISH EXHIBIT 2002, Page 512
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

parent node has. For example, for a branch factor "n" system, the maximum number of grades of propagation ratings may be "n." Since the distribution network in the examples discussed herein is a binary tree distribution network, a parent node will be required to assign at most up to two grades of propagation ratings.

In the example shown in FIG. 23, node P, during the most recent utility rating measurement event, discerned that node Q has a higher utility rating than node X, and therefore P has assigned node Q a green rating, represented by the solid-lined circle surrounding the letter Q in FIG. 23. P has assigned node X a red rating, represented by the dashed-lined circle surrounding the letter X in FIG. 23. In a similar manner, node X has assigned green and red ratings to third level nodes A and B, respectively. In this example (which example is intended to be illustrative and not restrictive), at the same time that a parent node assigns a propagation rating to a child node, it may also provide to such child node the address of the child node's sibling, if there is any. A child node may store information about its sibling (or siblings) in the sibling portion (or sibling database) 134 of its topology database (see FIG. 13). The sibling database includes a sibling list, a list of the addresses of a node's siblings (the data relating to the siblings' addresses may also contain information regarding the propagation ratings of the siblings (e.g., in the event that the distribution system has a branch factor greater than two)). In the example shown in FIG. 23, nodes Q and X know that they are each other's siblings and nodes A and B know that they are each other's siblings.

In another example (which example is intended to be illustrative and not restrictive), nodes do not store information about their siblings. In other words, in this example, a node generally does not know who its sibling is. Instead, cross connections between a red node and its green sibling are implemented via a "priority join" message sent to a red child that includes the IP address of the green sibling as the first entry in the connection path list.

In the event that node X were to leave the distribution network, nodes A and B would of course stop receiving content data from node X. Nodes A and B would consult their topology databases for the address of their grandparent, and each would interrogate node P for instructions. Since node X is out of the distribution network, node P would send out a reconfiguration event signal (sometimes referred to as a "propagation signal") to the nodes which had been node X's children (i.e., the nodes which were node P's grandchildren through node X) and node P would send an upgrade propagation rating signal to its remaining child, here node Q.

DISH EXHIBIT 2002, Page 513
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

In response to the upgrade propagation rating signal, node P's remaining child, node Q, would set its reconfiguration flag buffer 136 (see FIG. 13) to the next highest available propagation rating grade. Since in the example illustrated in FIG. 23, node Q's reconfiguration flag buffer already is set for the highest propagation rating grade (here green), node Q could either do nothing or reset its propagation rating in response to the upgrade propagation rating signal. The result would be the same, node Q's propagation rating would remain green. If node Q's propagation rating were red, then it would set its propagation rating to green in response to the upgrade propagation rating signal. Node Q would do nothing else in response to the upgrade propagation rating signal (note that as a matter of design choice, the software engineer could have the parent of the departed node (here node P is the parent of departed node X) send no upgrade propagation rating signal to its remaining child node (here node Q) if its remaining child node already is at the highest propagation rating).

In this example, the recipients of the propagation signal (i.e., the children of the missing node) would respond thereto as follows. First they would check their own respective propagation ratings. If the propagation signal's recipient has the highest propagation rating grade (here green), it would reset its propagation rating to the lowest rating grade (here red); re-transmit the propagation signal to its own child nodes (if there are any); disconnect the child node which did not have the highest propagation rating prior to its receipt of the propagation signal if the propagation signal's recipient with the green rating has more than one child node; allow its sibling to dock with it as a child node for the purpose of transmitting content data to that child node; and dock (or remained docked), for purposes of receiving content data, with the node sending the propagation signal to it (in systems having a branch factor of more than two, the propagation signal recipient whose propagation rating had been the highest would disconnect its child nodes which did not have the highest propagation rating, prior to the receipt of the propagation signal just sent, and it would allow its (i.e., the formerly green node's) siblings to dock with it as child nodes).

If the propagation signal's recipient has other than the highest propagation rating (i.e., just prior to the receipt of the propagation signal), it would upgrade its propagation rating to the next highest rating grade; dock with its sibling which had the highest rating grade; and begin receiving content data from it. If the propagation signal's recipient has other than the highest propagation rating, it does not re-transmit the propagation signal to its own child nodes.

In the example illustrated in FIG. 23, nodes A and B receive the propagation signal from node P. Since node A has the highest propagation rating grade, here green, it: (i) sets its

DISH EXHIBIT 2002, Page 514
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

reconfiguration flag buffer 136 (see FIG. 13) so that it has the lowest propagation rating grade, here red; and (ii) docks with node P (becoming a second level node 13) to begin receiving content data from node P. Node B changes its propagation rating from red to the next higher propagation rating (and since this example is a binary tree (or branch factor two) system, the next higher rating is the highest, green) and docks with node A to receive content data. The resulting topology is shown in FIG. 24. Note that node B remains a third level node 14.

FIGS. 25 and 26 illustrate what happens in this example when the departing node is green. In FIG. 25, node X is the departing node and it is green. When node P sends the upgrade propagation rating signal to node Q, it changes its propagation rating from red to green. In other respects the reconfiguration event proceeds essentially as described in the paragraph immediately above, and results in the topology shown in FIG. 26 (which is the same as the topology in FIG. 24).

FIG. 27 is a flow diagram associated with an example showing the Child Node's Propagation Routine, the routine which is followed by a child node upon receiving a propagation signal. Of note, this example is provided for illustration only, and is not restrictive, and other examples are of course possible (e.g., the color of a node may assigned by its parent such that nodes assign and know the color of their children but not of themselves).

In any case, still referring to FIG. 27, the child node first performs step 271 wherein it determines whether it has received such a signal. If it has not, then it does nothing. If it has received a propagation signal, it proceeds to step 272 wherein it checks its propagation rating grade in reconfiguration flag buffer 136 (see FIG. 13) . If its propagation rating is at the highest grade (i.e., it is a "green" node in this example), then it proceeds to step 273 where it sets its reconfiguration flag buffer to the lowest propagation rating grade. It then proceeds to step 274 in which it re-transmits the propagation signal to its own child nodes, and which results in the undocking of all its child nodes except for the one with the highest propagation rating. The child node (i.e., the child node referred to in the second sentence of this paragraph) then performs step 275 in which it determines whether it is already docked with the node which sent the propagation signal. If it is not (i.e., it received the propagation signal from its grandparent), then it proceeds to step 276. In that step it: (i) devises a new connection address list, which is the ancestor portion of its topology database with the current nominal parent node removed, resulting in the grandparent node becoming the first node on the connection address list; and (ii) then performs the Prospective Child Node's Connection

DISH EXHIBIT 2002, Page 515
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Routine (i.e., it goes to step 141 discussed above in connection with FIGS. 14 and 15). The Prospective Child Node's Connection Routine is performed because some likelihood exists that even the grandparent node may have departed from the distribution system between the moment it sent out the propagation signal and the moment that its highest rated grandchild from its missing child attempted to dock with it.

If the answer to the query in step 275 is in the affirmative (i.e., the child node is receiving a propagation signal which has been re-transmitted by its parent), then the child node does nothing more (or as illustrated in FIG. 27, it performs step 277 which is to remain docked to its parent node).

If the answer to the query in step 272 is in the negative (i.e., it does not have the highest propagation rating (it is a "red" node in this example)), then it proceeds to step 278 in which it: (i) sets its reconfiguration flag buffer so that its propagation rating is the next higher grade (in this binary tree system the rating is upgraded from red to green); (ii) undocks from the parent with which it was docked before receiving the propagation signal (if it was docked with a parent before receiving such signal); and (iii) either (a) waits a predetermined period of time during which the node's sibling which was green prior to their receipt of the propagation signal should have re-transmitted the propagation signal to its own child nodes (thereby causing any red child nodes to undock from it) or (b) confirms that the node's sibling which was green prior to their receipt of the propagation signal actual did re-transmit the propagation signal to its child nodes (if it has any). Then the child node performs step 279 in which it: (i) devises a new connection address list, which is the ancestor portion of its topology database with its sibling node having the highest propagation rating placed in front of the previous parent as the first node on the connection address list; and (ii) then performs the Prospective Child Node's Connection Routine (i.e., it goes to step 141 discussed above in connection with FIGS. 14 and 15). The Prospective Child Node's Connection Routine is performed because some likelihood exists that the sibling may have departed from the distribution system between the moment that the propagation signal had been sent to the child node and the moment that the child node attempted to dock with its sibling.

In another example (which example is intended to be illustrative and not restrictive), part (iii) of step 278 may be handled using the "priority join" mechanism. More particularly, in this example, a priority join from a node X cannot be refused by a target node T – it must accept (dock) the incoming node. If the target node T already had two children G & R, the target node T instructs its red child R to connect (via "priority join") to the green node G. The node T then disconnects from its red child R immediately prior to accepting the incoming

DISH EXHIBIT 2002, Page 516
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

node X. The bumped node R then sends a priority join to its own green sibling A as the target. These actions cause the reconfiguration events to cascade until the edge of the tree is reached (of note, the algorithm described in this paragraph may have essentially the same effect as illustrated in Figures 28 and 29 – under certain circumstances the algorithm described in this paragraph may be somewhat more reliable).

FIG. 28 illustrates an example distribution system comprising node P as a first level node 12; nodes Q and X as second level nodes 13; nodes A and B as third level nodes 14; nodes C, D, E an F as fourth level nodes 15; nodes G and H as fifth level nodes 17; nodes I and J as sixth level nodes 20; nodes K and L as seventh level nodes 21 and nodes M and N as eighth level nodes 22. Nodes Q, B, C E, H, I, L and M have red propagation ratings, as symbolized by the dashed circles, and the remaining nodes have green propagation ratings as symbolized by the solid circles. As a result of node X's departing from the system, node P sends out an upgrade propagation rating signal to node Q and a propagation signal to the children of node P's departed child node X (i.e., nodes A and B).

In another example (which example is intended to be illustrative and not restrictive), during a graceful depart of node x, node x may send out messages to its parent and children immediately prior to its departure – rather than the parent of node x initiating these messages as described above.

In any case, continuing the example of FIG. 28, node Q changes its propagation rating to green. Further, in this example nodes A and B begin the Child Node's Propagation Routine. With respect to node A, it answers the query of step 271 in the affirmative. Since its rating is green, it also answers the query of step 272 in the affirmative. In step 273 node A changes the setting of its reconfiguration flag buffer to show a red propagation rating. In step 274 it re-transmits the propagation signal to its child nodes C and D. It answers the query of step 275 in the negative because it is not docked for purposes of receiving content data with node P. Node A then goes to step 276 wherein it consults the ancestor portion of its topology database and creates a new connection address list starting with its grandparent. The new connection address list is P-S. Then node A performs the Prospective Child Node's Connection Routine, starting with step 141. (See FIG. 14.) Assuming that no other intervening events have occurred, node A will successfully dock with node P.

Node B answers the query of step 271 in the affirmative and, because its propagation rating was red when it received the propagation signal, it answers the query of step 272 in the negative. From there it goes to step 278 in which it changes its propagation rating to green. Then in step 279 node B consults the ancestor portion of its topology database and creates a

DISH EXHIBIT 2002, Page 517
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

new connection address list with its sibling, node A, placed in front of node X as the first address on the new connection address list. The new connection address list is A-X-P-S. Then node B performs the Prospective Child Node's Connection Routine, starting with step 141. Assuming that no other intervening events have occurred, node B will successfully dock with node A (if node A has disappeared, node B would attempt to dock with node X, but since it is not there, it would move on to node P.)

Node A, which had the higher propagation rating of the two child nodes of departed node X, moves up one level to become a second level node 13. Since it is a "new" entry to the second level, its initial utility rating and its propagation rating will be lower than that of node Q. As time goes by, at subsequent utility rating measurement events node A's utility rating (and hence its propagation rating) may become higher than that of node Q.

Node B, which had the lower propagation rating of the two child nodes of departed node X, does not re-transmit the propagation signal to its child nodes (nodes E and F), and they will follow B wherever it goes in the distribution system. In the example discussed here, node B becomes the child of node A while remaining third level node 14. At least initially, it will be node A's child with the higher utility rating and propagation rating.

As a result of node A's performing step 274, its child nodes C and D (which were fourth level nodes 15 in FIG. 28 when node X was still in the system) receive a propagation signal. Since node C has a red propagation rating, it, like node B, will remain in its level, change its propagation rating to green and dock with its sibling, with the result being that node D becomes its parent.

Since node D had a green propagation rating when it received the propagation signal, it answers the queries of steps 271 and 272 in the affirmative and changes its propagation rating to red in step 274. It answers the query of step 275 in the affirmative, and remains docked with node A. As a result, node D moves up a level and becomes an third level node 14 (with, at least until the next utility rating event, a lower utility rating and propagation rating than its new sibling, node B).

This process proceeds down the tree, with each child of a node which moves up a level doing one of the following under this example: (i) if it is a node having a green propagation rating, it remains docked with its parent, thereby itself moving up a level, changes its propagation rating to red and re-transmits the propagation signal to its child nodes; or (ii) if it is a node having a red propagation rating, it docks with the node which was its sibling, thereby staying in the same level, and changes its propagation rating to green.

DISH EXHIBIT 2002, Page 518
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

The resulting topology after the reconfiguration event caused by node X's departure is illustrated in FIG. 29.

Of note, it is believed that reconfiguration using the Child Node's Propagation Routine of this example when a node departs the system does not necessarily result, in the long run, in significantly more inter-node reconnection events than any other reconfiguration method (and may result in fewer reconnection events). Moreover, it is believed that reconfiguration using the Child Node's Propagation Routine of this example helps assure that the more reliable nodes are promoted up the distribution network even if many reconfiguration events occur close in time to each other in a particular tree.

Referring now to a specific example of pseudo-code (which example is intended to be illustrative and not restrictive), it is noted that a propagation routine may be set forth as follows (wherein node X is the node departing from the distribution system):

```
Departs(X)
Begin
 If (X.Parent.GreenChild == X)  /* the departing node is green*/
 {
  X.Parent.GreenChild := X.Parent.RedChild
  X.Parent.RedChild := X.GreenChild
 }
 Else /* the departing node is already red */
 {
  X.Parent.RedChild :=X.GreenChild
 }
 Propagate(X.GreenChild, X.RedChild)
End
```

Referring now to another specific example of pseudo-code (which example is intended to be illustrative and not restrictive), it is noted that a propagation routine may be set forth as follows (wherein node promotion during the network reconfiguration event is precipitated by node X's departure):

```
Propagate (X, RedSibling)
Begin
 OriginalGreenChild := X.GreenChild
```


DISH EXHIBIT 2002, Page 519
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

```
OriginalRedChild := X.RedChild
X.RedChild := X.GreenChild
X.GreenChild := RedSibling
If (OriginalGreenChild <> null)
{
  Propagate(OriginalGreenChild, OriginalRedChild)
}
End
```

Referring now to a "Malfunctioning Nodes" example (which example describes a voting system between grandchildren and grandparents about a potentially malfunctioning parent and is intended to be illustrative and not restrictive), it is noted that what happens when a node leaves the distribution network was discussed in the above example (e.g., when a node leaves the network, its parent will, at the next utility rating event, report that it has room for a new node, except when the parent has been contacted about the missing node by its grandchild node or nodes, in which event, a reconfiguration event will proceed as described above). Sometimes, however, a node intends to remain in the network, but there is a failure of communication.

In this regard, each node's topology database may include information regarding that node's ancestors and descendants. In the event that a child node stops receiving signals from its parent node, the child may, in one example, send a "complaint" message to its grandparent. The grandparent may check whether the parent is still there. If it is not, then the grandparent may send a propagation signal to the child nodes of the missing parent.

Further, if the grandparent detects that the parent node is actually still there, then the grandparent node may send a disconnect signal to the parent node (e.g., sending it back to the server to begin the connection process again). This may occur, for example, when one of the two following conditions is exists: (i) the child node is the only child node of the parent, or (ii) the child and its sibling(s) are complaining to the grandparent.

In this example, the grandparent would also send a propagation signal to the child nodes of the disconnected parent, and a reconfiguration event would occur.

However, if the child node has siblings and they are not sending complaint signals to the grandparent, then the grandparent may assume that the problem is with the complaining child node. Thus, grandparent may send a disconnect signal to the complaining child node (e.g., sending it back to the server to begin the connection process again). If the complaining

DISH EXHIBIT 2002, Page 520
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

child node had its own child nodes, they would contact the departed child node's parent to complain, starting a reconfiguration event (in another example (which example is intended to be illustrative and not restrictive), the grandparent would send out signals to the malfunctioning parent (instructing it to depart) and to the children (instructing the green child to climb its path to its grandparent and instructing the red child to cross connect to the green child).

The foregoing example (which example is intended to be illustrative and not restrictive) can be described in connection with FIG. 30 (which depicts a tree in a binary system having a primary server 11, in which node A, a first level node 12, has two child nodes B and B' (which are second level nodes 13); node B has two child nodes C and C' (which are third level nodes 14); node C has two child nodes D and D' (which are fourth level nodes 15); and node D has two child nodes E and E' (which are fifth level nodes 17)) and FIG. 31 (which is a flow diagram showing an example Grandparent's Complaint Response Routine).

Who does node C complain to in this example when node C no longer gets satisfactory service from node B? Node C complains to its grandparent, node A. If node C does not hear back from node A within a predefined amount of time (e.g., if node A has left the network), node C will then exit the network and immediately reconnect as a new node by going to the primary server S for assignment.

What does node A do in response to a complaint from node C in this example? When node A receives a complaint from grandchild node C about node C's parent node B (i.e., node A's child node B), node A will choose to either remove its child node B or its grandchild node C. A will make this determination based on whether node C alone, or both node C and its sibling node C' are experiencing problems with node B, together with the knowledge of whether node A is continuing to receive satisfactory service reports from node B. If node A is continuing to get satisfactory service reports from node B and there is no indication that node C' (the sibling of node C) is experiencing problems with node B, then node A will assign the "fault" to node C and issue a disconnect order for its removal. At this point the green child of node C (i.e., node D or D') will move up a level connecting to parent B, and the red child of node C (the other of node D or D') will connect as a child of its former sibling. The reconfiguration event will then propagate as discussed above.

If, on the other hand, node A is not getting satisfactory service reports in this example from node B and/or a complaint from node C's sibling arrives within a `window` of node C's complaint, then node A will assign the "fault" to node B and issue a disconnect order for its

DISH EXHIBIT 2002, Page 521
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

removal. At this point the green child of node B (i.e., node C or C') will move up a level connecting to grandparent node A, and the red child of node B (the other of node C or C'), will connect as a child of its former sibling. The reconfiguration event will then propagate as discussed above.

An exception to the above is the case where node C is the only child of node B. Under these circumstances node B may be disconnected in this example by node A based solely on the recommendation of node C. In another example, the system will not disconnect a node with one child based solely on the complaint of that child (in this case there may be insufficient data to accurately assign blame - disconnecting the node being complained against and promoting the complainer may have the potential to promote a node that is experiencing problems).

Referring now to FIG. 31 (showing a flowchart associated with this example), node A receives a complaint from node C about node B in step 311. Node A then goes to step 312 in which it checks its topology database to determine whether node C is the only child of node B. If the answer is no (as shown in FIG. 30), then node A goes to step 313 in which node A determines whether there is a communication problem between it and node B. If the answer is no, then node A proceeds to step 314 in which it determines whether it has received a similar complaint about node B from node C' within a predetermined period of time of node A's having received the complaint from node C. If the answer to that query is no, then node A goes to step 315 in which it sends a disconnect signal to node C. At that point node A has completed the Grandparent's Complaint Response Routine (in one example a propagation signal does not necessarily have to sent by node A to node C's child nodes - if any exist, they will complain to node B which, upon discerning that node C is no longer in the distribution network, will send a propagation signal to such complaining nodes).

If the response to any of the queries in steps 312, 313 and 314 is yes in this example, then node A proceeds to step 316 in which it disconnects node B. Node A then proceeds to step 317 in which it sends a propagation signal to its grandchild nodes (here nodes C and C') and a reconfiguration event will occur as described above.

The method of this example described above takes a "2 out of 3" approach on the question of node removal. In this regard, it is believed that many interior nodes in a binary tree distribution network constructed pursuant the present invention will have direct connections to three other nodes: their parent, their green child, and their red child. The connections between a node and its three "neighbor" nodes can be thought of as three separate communications channels. In this example a node is removed from the network

DISH EXHIBIT 2002, Page 522
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

when there are indications of failure or inadequate performance on two of these three channels. When there are indications that two of the channels are working normally, the complaining node is presumed to be "unhealthy" and is removed.

In the case where an interior node has only a single child, the "complaint" of that child to its grandparent is sufficient, in this example, to remove the parent node - even when the node to be removed is communicating perfectly well with it's own parent. In other words, given the communication chain A-B-C where node A is the parent of node B and node B is the parent of node C, and given that node C has no siblings, then a complaint of node C to node A will cause node A to remove node B in this example regardless of the fact that node A and node B are not having communication problems (this course of action may help ensure that a potentially unreliable node does not move up the hierarchy of nodes, even at the cost of occasionally sending a "healthy" node back to the edge of the distribution chain based on uncorroborated complaints of its child). Of course, as mentioned above, there are examples where the system will not disconnect a node with one child based solely on the complaint of that child.

In another example of voting (which example is intended to be illustrative and not restrictive), instead of (or in conjunction with) nodes voting on the behavior of other nodes, nodes may continually grade their own performance and if they detect that there is insufficient bandwidth on two or more of their links (links to their parent and their children) the node will perform a graceful depart from the network (initiating a reconfiguration as described elsewhere) and then the node will either climb its path to an ancestor node (or go directly to the server) to request a connection path to the edge of the tree. This system allows nodes to "step aside" when they detect connection / bandwidth related issues.

Referring now to a "Stepped Delay of Playing Content Data" example (which example is intended to be illustrative and not restrictive) it is noted that in order to have all the user nodes experience the playing of the content data at approximately the same time, regardless of the level in which the node resides, the content data buffer 125 shown in FIG. 13 of a user node may be larger the higher uptree it is in a distribution chain (i.e., the closer it is to the root server). The larger the buffer, the greater the amount of time between a particular event (or from the node's receiving the content data), and the node's actually playing the content data in its content data buffer. To the extent that the content data buffer of a node is sized to vary the time that the playing of the content data is started, the content data buffer is a delay. Alternatively, the delay may be a timer or a delay buffer 126 as shown in

DISH EXHIBIT 2002, Page 523
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG. 13, or a combination of elements. The delay's purpose may be to help assure that all users experience the play of the content data approximately simultaneously.

For a distribution network having n levels of user nodes cascadingly connected to a server node, where n is a number greater than one (and therefore the distribution network comprises the server node and first through nth level user nodes), the period of time (i.e., the delay time) between:

(i) the moment content data is received by a node or, from a predetermined moment such as, for example, a reporting event or utility rating event (the occurrence of which may be based on time periods as measured by a clock outside of the distribution system and would occur approximately simultaneously for all nodes); and

(ii) the playing of the content data by the node;

is greater for a node the higher uptree the node is on the distribution chain. That is, the delays in first level nodes create greater delay times than do the delays in second level nodes, the delays in second level nodes create greater delay times than the delays in third level nodes and so on. Described mathematically, in an n level system, where x is a number from and including 2 to and including n, the delay time created by a delay in an (x-1) level node is greater than the delay time created by a delay in an x level node.

By way of example (which example is intended to be illustrative and not restrictive), first level nodes could have a built in effective delay time in playing content data of one-hundred-twenty seconds, second level nodes could have a built in effective delay time of one-hundred-five seconds, third level nodes could have a built in effective delay time of ninety seconds, fourth level nodes could have a built in effective delay time of seventy-five seconds, fifth level nodes could have a built in effective delay time of sixty seconds, sixth level nodes could have a built in effective delay time of forty-five seconds, seventh level nodes could have a built in effective delay time of thirty seconds, and eighth level nodes could have a built in effective delay time of fifteen seconds.

The delays may take advantage of the fact that transmission of the packets forming the content data from one node to another may take less time than the actual playing of such packets. This may allow for essentially simultaneous playing of the content data throughout all the levels of the distribution network. The delays may also allow nodes to handle reconnection and reconfiguration events without any significant loss of content data.

In another example (which example is intended to be illustrative and not restrictive), the system may not endeavor to have buffers closer to the server contain more data than buffers of nodes that are further away. Instead, every node may have a buffer that can hold,

DISH EXHIBIT 2002, Page 524
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

for example, approximately two minutes worth of A/V content. The system may endeavor to fill every node's buffer as rapidly as possible, regardless of the node's distance from the server, in order to give each node the maximum amount of time possible to deal with network reconfiguration and uptree node failure events.

Of note, nodes may receive a "current play time index" when they connect to the server. This value may be used to keep all nodes at approximately the same point in the stream – to have all nodes playing approximately the same moment of video at the same time – by telling them, essentially, begin playing A/V content at this time index. The play time index may be, for example, approximately two minutes behind "real time" – allowing for nodes to buffer locally up to two minutes of content (the present invention may permit drift between nodes within the buffer (e.g., two minute buffer) or the present invention may reduce or eliminate this drift to keep all nodes playing closer to "lock step").

Turning now to a general description of an example process for Node X to enter a network including server Node S, Node X must contact Node S to initiate the process. For illustrative purposes, in the following example (which example is intended to be illustrative and not restrictive) each node in the network may have no more than two connections, and the root server (i.e., the highest node in the tree) shall be referred to as Node S.

The process of this example begins with Node X making a request of Node S to join the network.

If Node S has an open connection (e.g., including one or more connected bumpable non-repeat-capable nodes which may be replaced due to an incoming connection request from a repeat-capable node), Node S can accept Node X's request to join the network, and Node X becomes a child of Node S.

If, on the other hand, Node S does not have an open connection, Node S may reject Node X's request, and may provide to Node X a node-by-node path from Node S to Node P, which Node S understands to be in the network, and under which, as determined by Node S, Node X may be able to join the network.

The process of this example continues with Node X making a request of Node P to join the network.

If Node P does not respond – regardless of why Node P does not respond – Node X may request connection from the next higher node in the path. For the purpose of this illustration, thereafter the next higher node is now considered Node P. Node X may make such a request of successive Node Ps, until Node X receives a response.

DISH EXHIBIT 2002, Page 525
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

If a particular Node P has an open connection, that Node P can accept Node X's request to join the network, and Node X becomes a child of that particular Node P.

If, on the other hand, a particular Node P does not have an open connection, that particular Node P may reject Node X's request, and may provide to Node X a node-by-node path from that particular Node P to Node P', which the instructing Node P understands to be in the network, and under which, as determined by the instructing Node P, Node X may be able to join the network.

If Node X receives a further rejection, Node X may then treat the Node P' as a Node P and continue the process.

In general, under this example the process is continued until Node X finds a connection.

Referring now more specifically to a "Registration Process" example involving two arbitrary Nodes X and N (neither of which is necessarily a server), FIG. 32 shows Node X sending a request to Node N for acceptance into the distribution network tree (of which Node N is part).

In this example, Node N (which may be thought of as an instructing node) may generally return one of three codes (or messages): Accept, Path, or Reject. FIGS. 33A-33C show example messaging between Node X and Node N under this example. More particularly:

- FIG. 33A shows Node X sending a Register message to Node N and Node N responding to the Register message with an Accept message
- FIG. 33B shows Node X sending a Register message to Node N and Node N responding to the Register message with a Path message (e.g., identifying a path from Node N to a new instructing node)
- FIG. 33C shows Node X sending a Register message to Node N and Node N responding to the Register message with a Reject message (i.e., rejecting Node X's request for a connection to Node N).

In another example, the registration process may be extended to include some system maintenance or configuration activities. Such maintenance or configuration activities may include "flood testing" (discussed in detail below), identification of a bad protocol, and/or Firewall Status (discussed in detail below).

In this regard, FIG. 34A shows the messaging (in connection with registration with a flood test) between Node X, a node requesting to join the network, Node S, a server node

DISH EXHIBIT 2002, Page 526
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

within the network, and Node R (e.g., a random (or predetermined) node that may, but not need be, within the network).

Further, FIG. 34B shows the messaging (in connection with registration with a bad protocol version) between Node X and Node S, a server node within the network. Of note, such a bad protocol message may be sent by the server to a connection requesting node to inform that node that it is running an obsolete version of the client software and must upgrade to the current version before being allowed to join the network.

Further still, FIG. 34C shows the messaging (in connection with registration with standard response) between Node X and Node S, a server node within the network (wherein such standard response includes, for example, Accept / Reject / Path).

Referring now in more detail to the "flood test" example shown in FIG. 34A, this example process begins, as above, with Node X making a request to Node S to join the network. Node S then sends Node X a Meta message (such a Meta message may be sent by the server to a connection requesting node to inform that node of certain characteristics of the network such as, for example: the streaming bandwidth rate used by the network, the server's public key for authenticating that secure packets originated from this server, and any other information the architects of the network might deem necessary or desirable for nodes to know when connecting to the network). Node S may also require that Node X undergo performance or flood testing before being accepted or placed within the network. In such an event, Node S responds to Node X's request to join the network with an instruction that Node X undergo a flood test (e.g., of Node X's upstream channel). Such an instruction may be accompanied by an address of Node R, the illustrative flood test target. Note that any node within or without the network may conduct the flood test. One purpose of the flood test may be to permit Node S to be aware of Node X's upstream capability before determining where (or if) to assign Node X in the network.

Where Node S requires that Node X undergo performance or flood testing before being accepted or placed within the network, Node S provides a message so informing Node X, shown as "DoFlood" in FIG 34A. The DoFlood message may provide to Node X the address of the flood test target, but the flood test target could be Node S itself, or a predetermined flood test target.

In response to the DoFlood message, Node X sends an InitFlood message to the flood test target. In one embodiment, Node X would await an acknowledgement (not shown) of its InitFlood message, but in another embodiment, awaiting an acknowledgement is not

DISH EXHIBIT 2002, Page 527
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

necessary. Node X would then begin transmitting FloodData messages, as shown in FIG 34A.

Since, in this example, FloodData messages are transmitted for a purpose of determining Node X's upstream bandwidth, in one embodiment, Node X would transmit an amount of FloodData to the flood test target as shown in FIG 34A. In various embodiments, the maximum amount of FloodData may be limited to a fixed number of FloodData messages, to a fixed amount of data transmitted within FloodData messages, or to transmission of FloodData or FloodData messages over a fixed period of time.

To protect the flood test target from being inundated with FloodData (e.g., where Node X has a very high upstream bandwidth capability), Node X may cap (e.g., be so directed by Node S) the FloodData transmission to, e.g., 100 Kbits/sec, 200 Kbits/sec, or some other data rate that would be a desired data transmission rate for a node on the particular network of interest.

Thus, by receiving the FloodData messages, the flood test target can determine, for example, an upstream capability rating of Node X (provided that the flood test target has the same or more bandwidth in the downstream channel compared to the upstream capability of Node X.

In another example, both the target and the sender will know the bandwidth of the sender at the conclusion of the flood test. More particularly, the present invention may use TCP/IP (rather than UDP), and all packets sent may receive an acknowledgement. In this example, Node X, the node sending out the flood packets, sends out the next flood packet only after receipt of the first packet has been acknowledged by the target of the flood test. Thus, the number of flood data packets Node X is able to send per unit time (along with the size of those packets) may allow Node X to calculate its upstream bandwidth.

In another example, the target of the "flood test" may be any node including the server but excluding any firewalled or low-bandwidth nodes.

After the "flood test", Node X may then connect with Node S (or be instructed to go to another node if Node S can not/will not accept Node X). Of note, if Node X fails the "flood test", Node X may be sent far downtree or may be refused entry into the network entirely. Further, if node N is accepted under these circumstances it will be deemed a "bumpable" non-repeat-capable node.

Referring now in more detail to the "Firewall Status" example shown in FIG. 34C, this example process begins, as above, with Node X making a request to Node S to join the network. Node S then send Node X a Meta message. A firewall status message is a message

DISH EXHIBIT 2002, Page 528
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

sent over a new connection from (in the case of Figure 34C) Node S to Node X. If Node X receives this message, over a communications channel initiated by Node S, Node X will know that it is not firewalled. Failure to receive a firewall status message when a node is expecting such a message allows that node to conclude that it is in fact firewalled. Thus, if Node X is expecting to receive a firewall status message over new connection initiated by some other node and that message does not arrive, Node X can conclude (with a high degree of likelihood of being correct) that it is firewalled. Also, since (in one example) the present invention uses the TCP/IP messaging protocol the sender, Node S, will also know whether the firewall status message was successfully received by Node X and thus Node S will also know whether Node X is or is not firewalled (one or more other nodes may also receive data regarding the firewall status).

After receiving the firewall status report (not shown) Node S will then respond with a standard response (accept, path, reject) as discussed above.

To now give a specific example of the use of both the "flood test" and the "firewall status" mechanisms during registration of a new node, FIG. 35A shows a state of the network before Node X joins the network and FIG. 35B shows a state of the network after Node X joins the network. Further, FIG. 36 shows the messaging among Node X, Node S, Node B and Node R. More particularly:

- Node X sends a Register message to Node S and Node S responds with a Meta message (providing Node X with basic information about the network) and a DoFlood message (which requests Node X to determine its bandwidth and report back to Node S when Node X has that information). Node S knows to send a "DoFlood" to Node X because the initial Register message sent by Node X to Node S contains an indication that Node X does not yet know its current upstream bandwidth capacity. The DoFlood message will contain the address of a target node (Node R), selected by Node S, that Node X should flood against.
- Node X sends an InitFlood message to Node R and then "floods" Node R with data for some period of time (e.g., 15 seconds). At the conclusion of this test Node X will be able to compute its upstream bandwidth based on the number and size of data packets it was able to successfully transmit to Node R.

DISH EXHIBIT 2002, Page 529
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

- Node X sends another Register message to Node S and Node S responds with a Meta message. Contained within this second Register message is the result of Node X's "flood test" which gives an indication of Node X's upstream bandwidth capacity.
- Node S now tests whether external nodes can initiate communication with Node X by sending Node X a Firewall Status message over a new connection. If this message is successfully received by Node X (and acknowledgement received by Node S), both Nodes X and S will know that Node X is not firewalled (on a network communication port).
- Node S sends a Path message to Node X. This message will include a list of nodes that X should attempt connection with, beginning with the preferred target node (e.g., Node B). As described elsewhere in the application, the choice of target node, and hence the contents of the path, may be influenced by both the current configuration of the network and whether or not Node X is repeat-capable (based on the results of the "flood test" and "firewall test").
- Node X sends a Register message to Node B and Node B responds with an Accept message.

Referring now to a "Firewall Request / Firewall Status" example involving two arbitrary Nodes A and B (neither of which is necessarily a server), FIG. 37 shows a portion of a network including Node A and Node B. In this example (as shown in FIG. 38), a Firewall Request message is sent by Node B to request that the recipient of the message, Node A, test Node B's Firewall Status. The receiving Node A may send (e.g., over a new connection), the Firewall Status message to Node B. If Node B timely receives and interprets the Firewall Status message it can be certain that it is a non-firewalled node. If Node B does not timely receive a Firewall Status message from Node A then Node B may assume that it is firewalled.

In another example (which example is intended to be illustrative and not restrictive), if Node A fails to connect to Node B or to send the Firewall Status message no further action is needed on the part of Node A.

Node B may also augment its assumption about its Firewall Status by using a three strikes (i.e., three attempts) method before considering itself to be firewalled (of course, three strikes is provided as an example only, and any desired number of "strikes" or attempts may be used).

DISH EXHIBIT 2002, Page 530
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

In another example (which example is intended to be illustrative and not restrictive), the multiple attempts may be carried out within a predetermined time "window" (after which receiving no Firewall Status message Node B may consider itself firewalled).

In another example (which example is intended to be illustrative and not restrictive), Firewall Requests may be sent out by all nodes (e.g., at regular time intervals) in order to maintain a current and accurate picture of their Firewall Status.

In another example (which example is intended to be illustrative and not restrictive), Firewall Requests may be sent out by certain node(s) (e.g., at regular time intervals) in order to maintain a current and accurate picture of their Firewall Status.

In another example (which example is intended to be illustrative and not restrictive), the Firewall Status message may be sent by the server on initial registration (e.g., without the need for a Firewall Request message and both the sender (the server) and the receiving node (the node that is registering) may use the successful delivery of the Firewall Status message as an indicator of the connecting node's Firewall Status.

Referring now to a "Propagate Path / Down" example (which example is intended to be illustrative and not restrictive), FIG. 39A shows a portion of a network including Node A and Node B. Further, FIG. 39B shows an example of nodes in a tree sending Propagate Path / Down messages downtree to their children (e.g., at regular time intervals).

In one example (which example is intended to be illustrative and not restrictive), the Propagate Path / Down message may include topology information containing a path back to the root server and the time interval for sending such message may be calculated on a node-by-node and/or level-by-level basis relative to the amount of data to be sent in the Propagate Path / Down message (wherein the amount of data in the Propagate Path / Down message is related to a particular node's (or level's) downtree position relative to the root server). Note, that although this time interval may not be very important for Propagate Path / Down, since the amount of data for each successive downtree node (or level) may increase relatively slowly (e.g., linearly), the time period may be of critical importance for Propagate NTM / Up (which is discussed below), since the amount of data for each successive uptree node (or level) may increase relatively quickly (e.g., exponentially). Of note, the acronym "NTM" refers to the Network Topology Model.

In any case, FIG. 40 shows the messaging between Node A and Node B in connection with a Propagate Path / Down message (i.e., Node A sends a Propagate Path message downtree to Node B).

DISH EXHIBIT 2002, Page 531
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Referring now to a "Propagate NTM / Up" example (which example is intended to be illustrative and not restrictive), FIG. 41A shows a portion of a network including Node A and Node B. Further, FIG. 41B shows an example of nodes in a tree sending Propagate NTM / Up messages uptree to their parents (e.g., at regular time intervals).

In one example (which example is intended to be illustrative and not restrictive), the Propagate NTM / Up message may include information containing the topology of the subtree(s) below a particular node and the time interval for sending such message may be calculated on a node-by-node and/or level-by-level basis relative to the amount of data being sent in the Propagate NTM / Up message (wherein the amount of data in the Propagate NTM / Up message is related to a particular node's (or level's) uptree position relative to tree height (e.g., the height of a particular node above its lowest leaf level)). Note that in this example (which example is intended to be illustrative and not restrictive), the NTM data that the node sends up is rooted at itself and contains both its children.

In any case, FIG. 42 shows the messaging between Node A and Node B in connection with a Propagate NTM / Up message (i.e., Node B sends a Propagate NTM message uptree to Node A).

In another embodiment, the following process may be employed when a node enters the network. More particularly, when the server adds a node X to the system (gives it a connection path to node Y) the server will add node X to its network topology model as a child of node Y. In other words, the server will assume that the connection will take place normally with no errors. The reason why doing so may be critical to the functioning of the system in this embodiment is that if the server failed to account for the fact that node X is now (probably) a child of node Y, using the "keep the tree balanced" approach embodied in the Universal Connection Address Routine, all new nodes connecting to the system would be assigned as children of node Y up until the point where a propagate up arrives indicating that node X was successfully added to the tree. If the tree is large and node Y is many levels removed from the server it could be some time (e.g., a minute or more, in very large trees several minutes) before confirmation arrives that node X truly connected to node Y as its child.

Now, in addition to simply placing node X into the server's NTM (Network Topology Model) and being done with the matter, in this embodiment the system must account for the fact that it may take a number of propagate NTM/up cycles for the true status of node X to be reported back to the server. Thus, for some number of propagate cycles (or some amount of time) the server may compare the newly propagated (updated) NTM it is receiving from its

DISH EXHIBIT 2002, Page 532
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

children to the list of "recently added nodes". If a recently added node is not in the propagated NTM it will be re-added to the NTM as a child of node Y. At some point node X will no longer be considered "recently added" and the server will cease adding node X back into its NTM. In other words, the server will assume that, for whatever reason, node X never successfully connected to the network.

In another embodiment, the following process may be employed when a node gracefully exits the system. More particularly, when a node (node X) leaves the network by performing a graceful exit (e.g., the user selects "exit" or clicks the "x" or issues some other command to close the application) the node will send signals to its parent and child nodes (if any) immediately prior to actually shutting down. Upon receipt of such a "depart" message, the parent of the departing node (node P) will modify its internal NTM (Network Topology Model) to a configuration that corresponds to the predicted shape of the network after the departing node exits. In this embodiment, node P will assume that its NTM is accurate and that the entire cascade of reconfiguration events initiated by the departure of node X will happen normally. As such, node P will now expect the former green child of node X (node XG -- if such a child exists) to connect – essentially taking node X's place in the network.

At this point, node P's NTM represents a prediction of the (anticipated) state of the network rather than the actual reported configuration. In order to indicate that node P does not (yet) have a physical connection to node XG, node P will mark node XG as "soft" in its NTM – meaning node XG is expected to take up this position in the network but has not yet physically done so. Node P will report this "predicted" NTM (along with node XG's status as a soft node) up during its propagate NTM/Up cycles, until node P physically accepts a child connection in node XG's "reserved" spot and receives an actual report of the shape of the downtree NTM from that child, via propagate NTM/ups.

Of note, the above actions may be taken in order to have the propagated NTM's reflect, as accurately as possible, the topology of the network.

Of further note, because of the distributed nature of a network according to the present invention, a complete and accurate picture of the current shape of the network at any instance in time can never be guaranteed. In fact, though the root server has the "widest" view of the network, without the heuristics described herein, that view would be the "most dated" of any node in the network. Thus, heuristics such as those just described may be vital to producing NTM's that are as close to complete and accurate as possible (e.g., so that the Universal Connection Address Routine can position incoming nodes so as to keep the distribution tree as nearly balanced as possible).

DISH EXHIBIT 2002, Page 533
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Referring now to a "Banned List" example (which example is intended to be illustrative and not restrictive), it is noted that such a "banned list" (or "banished list") may be used for keeping certain nodes off of the network, removing certain nodes from the network, and/or keeping certain nodes as far downtree as possible (e.g., in the case of a binary tree network keeping certain nodes as "red" nodes).

More particularly, FIG. 43 shows a portion of a network including Node A, Node B, Node C and Node D and FIG. 44 shows the messaging between Node A, Node B, Node C and Node D in connection with Banned List messages (i.e., in this FIG. 44, Node A sends a Banned List message to Node B and Node B sends a Banned List message to Nodes C and D).

In one example (which example is intended to be illustrative and not restrictive), nodes receiving this message should re-transmit the message downtree to all children in an unaltered fashion.

In another example (which example is intended to be illustrative and not restrictive), the Banned List messages may include IP lists and/or URL's.

In another example (which example is intended to be illustrative and not restrictive), the Banned List messages may originate at the server.

In another example (which example is intended to be illustrative and not restrictive), Banned List messages may be sent and/or originated by any desired node(s).

In another example (which example is intended to be illustrative and not restrictive), Banned List messages and may be sent using a Secure Packet format.

In another example (which example is intended to be illustrative and not restrictive), node(s) may store the content of the message (e.g., the banned list itself) for future use.

In another example (which example is intended to be illustrative and not restrictive), the server (or any other desired node(s)) may send out and/or originate the Banned List messages at regular time intervals.

Referring now to a "Bumpable Node" embodiment, it is noted that this "bumpable node" mechanism may be used to "bump" (or send downtree) a particular node (e.g., when a new node is added). More particularly, in one example (which example is intended to be illustrative and not restrictive), a server may instruct Node X to connect with Node P and Node P may know to "bump" its child, Node C, by: (a) instructing Node C to disconnect from Node P; (b) allowing Node X to connect to Node P; and (c) instructing Node C to re-connect as a child of Node X. Of note, such a "bumping" operation may be carried out, for example (which example is intended to be illustrative and not restrictive), because the

DISH EXHIBIT 2002, Page 534
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

bumped node is firewalled and/or because the bumped node has failed an upstream and/or downstream bandwidth test (which test may be carried out by the server or by any other node(s)).

Of note, as used in this application, the terms "bumpable nodes" or "bumpable non-repeat-capable nodes" or "non-repeat-capable nodes" are nodes which either: (a) have insufficient bandwidth to act as repeaters in the network or (b) are firewalled.

Of further note, in one example the more inclusive "is bumpable" test may replace the "is low bandwidth" test in the Universal Connection Address Routine of Figure 20.

Referring now to a "Load Manager" embodiment, it is noted that this "load manager" mechanism may be used to rate limit (i.e., slow or stop) the addition of new nodes to the network. Such rate limiting may be useful because the larger the network grows, the more nodes can join per unit of time.

In one example (which example is intended to be illustrative and not restrictive), the rate limited addition of new nodes may be carried out by a server (or connection server) and may be based upon the length of time that it takes for the buffers associated with one or more nodes (or levels) of the existing network to fill (or reach a certain value). In a more specific example, the rate limited addition of new nodes may be based upon the length of time that it takes for the buffers associated with potential parents of the new nodes to fill (or reach a certain value).

In another example (which example is intended to be illustrative and not restrictive), the rate limited addition of new nodes may be carried out by any desired node(s) (e.g., one or more user nodes and/or a combination of one or more user nodes and a server (or connection server) node).

Referring now to a "Node Interlacing" embodiment, it is noted that this "node interlacing" mechanism may be used to add new nodes to the network by interlacing the new nodes on a level-by-level basis as shown in FIG. 45.

More particularly, as seen in this FIG. 45, new nodes may be added in the order indicated (as can be seen below, this example (which example is intended to be illustrative and not restrictive) relates to a binary tree network). That is, Node 1 may first be added as a child of the server followed by Node 2 as a child of the server – this will fully populate the first level; Node 3 may next be added as a child of Node 1, followed by Node 4 as a child of Node 2, followed by Node 5 as a child of Node 1, followed by Node 6 as a child of Node 2 – this will fully populate the second level; Node 7 may next be added as a child of Node 3, followed by Node 8 as a child of Node 5, followed by Node 9 as a child of Node 4, followed

DISH EXHIBIT 2002, Page 535
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

by Node 10 as a child of Node 6, followed by Node 11 as a child of Node 3, followed by Node 12 as a child of Node 5, followed by Node 13 as a child of Node 4, followed by Node 14 as a child of Node 6 – this will fully populate the third level, etc.

Of note, such node interlacing may be used to efficiently fill (or bring to a certain value) the buffers associated with one or more nodes (or levels) of the existing network while new nodes are added.

Of further note, such node interlacing may help prevent adding a second child to a parent until the first child's buffer is full (or brought to a certain value).

Of still further note, such node interlacing may help to: (a) prevent taxing the parent's downtree channel; and/or (b) prevent two children being left with partially filled buffers in the event that their parent departs.

Of still further note, such node interlacing may be used, for example, in conjunction with or as an alternative to the load balancing mechanism discussed above.

In another embodiment the present invention may be used when a plurality of computer systems are connected (e.g., to the Internet) by one or more of an ISDN line, a DSL (e.g., ADSL) line, a cable modem, a T1 line and/or an even higher capacity link.

In another embodiment a distribution network for the distribution of data from a server node to a plurality of user nodes connected to the server node, wherein each of the user nodes has associated therewith a buffer is provided, which distribution network comprises: a mechanism for rate limiting the addition of new user nodes to the distribution network, wherein the rate limited addition of new user nodes to the distribution network is based at least in part upon the length of time that it takes for at least one buffer associated with at least one user node to reach a predetermined percentage of capacity, wherein the predetermined percentage of capacity is greater than zero.

In another embodiment a distribution network for the distribution of data from a server node to a plurality of user nodes connected to the server node, wherein each of the user nodes is in one of a plurality of levels located downtree from the server node is provided, which distribution network comprises: a mechanism for adding new user nodes to the distribution network in an interlaced manner, wherein the interlacing provides that each sibling user node in a given level of the distribution network is associated with just one child before any siblings in the given level are associated with two children.

The following embodiments will now describe a number of additional example algorithms which may be utilized in whole or in part to implement the present invention:

DISH EXHIBIT 2002, Page 536
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

In one embodiment a process for docking a connection requesting user node with a distribution network is provided, said process including the following steps:

(a) having an instructing node receive a connection request from said connection requesting user node;

(b) forming an instructing node topology database indicating, at a point in time:

(i) which, if any, user nodes are docked with said instructing node as child nodes; which, if any, user nodes are docked with each of said child nodes as grandchild nodes of said instructing node; which, if any, user nodes are docked with each of said grandchild nodes as great-grandchild nodes of said server node; and so on; and

(ii) said docked user nodes respective bandwidth capacities;

(c) selecting from a group of nodes including the instructing node and said docked user nodes a recommended parent node for said connection requesting user node, wherein said recommended parent node has apparent available capacity to transmit content data to said connection requesting user node and is at least as close (i.e., in terms of network topology) to said instructing node as any other docked user node having apparent available capacity to transmit content data to said connection requesting user node (of note, placement may also or alternatively depend, as described elsewhere in the present application, in whole or in part on whether the connection requesting node is repeat-capable or not (i.e., whether it can support children)); and

(d) providing a connection address list to said connection requesting user node, said connection address list listing each node in said instructing node's topology database from said recommended parent node back to said instructing node.

In one example, the process may further comprise the following steps:

(e) having said connection requesting user node go to (or attempt to go to) the node at the top of said connection address list;

(f) having said connection requesting user node determine whether the node at the top of said connection address list is part of the distribution network;

(g) if the node at top of said connection address list is not part of the distribution network, deleting such node from said connection address list and repeating steps (e) and (f) with respect to the next node at the top of said connection address list;

(h) if the node at the top of said connection address list is part of said distribution network, having said connection requesting user node dock with said node at the top of said connection address list.

DISH EXHIBIT 2002, Page 537
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

In another example, step (d) may further comprise the following step:

(i) if said instructing node is not a server node, including in said connection address list a list of nodes cascadingly connected with each other from the instructing node back to said server node.

In another example, the process may further comprise the following steps:

(e) having said connection requesting user node go to (or attempt to go to) the node at the top of said connection address list;

(f) having said connection requesting user node determine whether the node at the top of said connection address list is part of the distribution network;

(g) if the node at the top of said connection address list is not part of the distribution network, deleting such node from said connection address list and repeating steps (e) and (f) with respect to the next node at the top of said connection address list;

(h) if the node at the top of said connection address list is part of said distribution network, determining whether said node at the top of said connection address list has available capacity to transmit content data to said connection requesting user node; and

(i) if the node at the top of said connection address list is part of said distribution network and has available capacity to transmit content data to said connection requesting user node, having said connection requesting user node dock with the node at the top of said connection address list.

In another example, the process may further comprise the following steps:

(j) if the node at the top of connection address list is part of said distribution network and said node at the top of said connection address list does not have available capacity to transmit content data to said connection requesting user node, repeating steps (a)-(d), with said node at the top of connection address list being said instructing node and a new connection address list being the product of steps (a)-(d).

In another example, the process may further comprise the steps of counting the times that step (j) is performed and, when step (j) is performed a predetermined number of times, having said connection requesting user node repeat steps (a)-(d) with said primary server being the instructing node.

In another embodiment a process for docking a connection requesting user node with a distribution network is provided, said process including the following steps:

(a) having an instructing node receive a connection request from said connection requesting user node;

(b) forming an instructing node topology database indicating, at a point in time:

DISH EXHIBIT 2002, Page 538
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(i) which, if any, user nodes are docked with said instructing node as child nodes; which, if any, user nodes are docked with each of said child nodes as grandchild nodes of said instructing node; which, if any, user nodes are docked with each of said grandchild nodes as great-grandchild nodes of said server node; and so on; and

(ii) said docked user nodes' respective bandwidth capacities;

(c) assigning utility ratings to each of the docked user nodes, said utility ratings being a function of at least the bandwidth capacity of the docked user node and the elapsed time that the docked user node has been docked with the distribution network;

(d) selecting from a group of nodes including the instructing node and said docked user nodes a recommended parent node for said connection requesting user node, wherein said recommended parent node has apparent available capacity to transmit content data to said connection requesting user node and is at least as close (i.e., in terms of network topology) to said instructing node as any other docked user node having apparent available capacity to transmit content data to said connection requesting user node, and when the closest (i.e., in terms of network topology) docked user node with apparent available capacity to transmit content data to said connection requesting user node is equidistant (i.e., in terms of network topology) to said instructing node with at least one other docked user node with apparent available capacity to transmit content data to said connection requesting user node, said recommended parent node is the docked user node having the highest utility rating among such equidistant (i.e., in terms of network topology) docked user nodes with apparent available capacity; and

(e) providing a connection address list to said connection requesting user node, said connection address list listing each node in said instructing node's topology database from said recommended parent node back to said instructing node and, if said instructing node is not a primary server node, back to said primary server node.

In another embodiment a process for docking a connection requesting user node with a distribution network is provided, said process including the following steps:

(a) having an instructing node receive a connection request from said connection requesting user node;

(b) forming an instructing node topology database indicating, at a point in time:

(i) which, if any, user nodes are docked with said instructing node as child nodes; which, if any, user nodes are docked with each of said child nodes as grandchild nodes of said instructing node; which, if any, user nodes are docked with

DISH EXHIBIT 2002, Page 539
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

each of said grandchild nodes as great-grandchild nodes of said instructing node; and so on; and

(ii) said docked user nodes' respective bandwidth capacities, including a designation of whether said respective docked user node's bandwidth capacity is below a predetermined threshold (e.g., said respective docked user node is a low-bandwidth node) or at least said predetermined threshold (e.g., said respective docked user node is a high-bandwidth node);

(c) forming a primary recommended parent node list ("PRPL") comprised of the instructing node (if it has available capacity to transmit content data to said connection requesting user node) plus those docked user nodes having apparent available capacity to transmit content data to said connection requesting user node, with said instructing node being placed first on the PRPL (if it is on the PRPL) and said docked user nodes having apparent available capacity to transmit content date to said connection requesting user node being ranked with those docked nodes which are closer (i.e., in terms of network topology) to the instructing node being ranked higher than those docked nodes which are further away (i.e., in terms of network topology) and with equidistant (i.e., in terms of network topology) docked user nodes being ranked such that those docked nodes which have the higher utility ratings being ranked higher than docked nodes having lower utility ratings;

(d) forming a secondary recommended parent node list ("SRPL") comprised of the instructing node (if it has no available capacity to transmit content data to said connection requesting user node but does have at least one low-bandwidth node docked directly to it) plus said docked user nodes which (i) are high-bandwidth nodes with no available capacity to transmit content data to said connection requesting user node and (ii) have at least one low-bandwidth node docked directly to it, with said instructing node being placed first on the SRPL (if it is on the SRPL) and said docked user nodes on the SRPL being ranked with those docked nodes which are closer (i.e., in terms of network topology) to the instructing node being ranked higher than those docked nodes which are further away (i.e., in terms of network topology) and with equidistant (i.e., in terms of network topology) docked user nodes being ranked such that those docked nodes which have the higher utility ratings being ranked higher than docked nodes having lower utility ratings;

(e) determining whether the connection requesting user node is a low-bandwidth node;

(f) if the connection requesting user node is a low-bandwidth node:

DISH EXHIBIT 2002, Page 540
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(i) selecting the highest ranked node on the PRPL as a recommended parent node; and

(ii) providing a connection address list to said connection requesting user node, said connection address list listing each node in said instructing node's topology database from said recommended parent node back to said instructing node and, if said instructing node is not a primary server node, back to said primary server node; and

(g) if the connection requesting user node is a high-bandwidth node:

(i) selecting the highest ranked node on the PRPL as a recommended parent node;

(ii) selecting the highest ranked node on the SRPL as an alternate recommended parent node;

(iii) determining whether the alternate recommended parent node is closer (i.e., in terms of network topology) to the server node than the recommended parent node;

(iv) if the alternate recommended parent node is not closer (i.e., in terms of network topology) to the server node than the recommended parent node, providing a connection address list to said connection requesting user node, said connection address list listing each node in said instructing node's topology database from said recommended parent node back to said instructing node and, if said instructing node is not the primary server node, back to said primary server node;

(v) if the alternate recommended parent node is closer (i.e., in terms of network topology) to the server node than the recommended parent node, (1) forcing the disconnection of a low-bandwidth node from the alternate recommended parent node and (2) providing a connection address list to said connection requesting user node, said connection address list listing each node in said instructing node's topology database from said alternate recommended parent node back to said instructing node and, if said instructing node is not the primary server node, back to said primary server node.

In one example, step (f)(ii) may include the following steps:

(1) adding said connection requesting user node to the topology database as a child of the recommended parent node; and

DISH EXHIBIT 2002, Page 541
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(2) if said recommended parent node would have no apparent available capacity to transmit content data to an additional node with said connection requesting user node docked with it, deleting the recommended parent node from the PRPL and adding it to the SRPL.

In another example, step (g)(iv) may include the following steps:

(1) adding said connection requesting user node to the topology database as a child of the recommended parent node;

(2) if said recommended parent node would have no apparent available capacity to transmit content data to an additional node with said connection requesting user node docked with it, deleting the recommended parent node from the PRPL; and

(3) if said recommended parent node is deleted from the PRPL but has at least one low-bandwidth node docked directly to it, adding the recommended parent node to the SRPL.

In another example, step (g)(v) may include the following steps:

(3) adding said connection requesting user node to the topology database as a child of the alternate recommended parent node; and

4) if said alternate recommended parent node would have no apparent available capacity to transmit content data to an additional node with said connection requesting user node docked with it, deleting the alternate recommended parent node from the SRPL.

In another example, the process may further comprise the following steps:

(h) having said connection requesting user node go to (or attempt to go to) the node at the top of said connection address list;

(i) having said connection requesting user node determine whether the node at the top of said connection address list is part of the distribution network;

(j) if the node at top of connection address list is not part of the distribution network, deleting such node from connection address list and repeating steps (h) and (i) with respect to the next node at the top of connection address list; and

(k) if the node at top of connection address list is part of said distribution network, having said connection requesting user node dock with said node at the top of connection address list.

In another example, the process may further comprise the following steps:

(h) having said connection requesting user node go to (or attempt to go to) the node at the top of connection address list;

(i) having said connection requesting user node determine whether the node at the top of said connection address list is part of the distribution network;

DISH EXHIBIT 2002, Page 542
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(j) if the node at top of connection address list is not part of the distribution network, deleting such node from connection address list and repeating steps (h) and (i) with respect to the next node at the top of connection address list;

(k) if the node at the top of connection address list is part of said distribution network, determining whether said node at the top of connection address list has available capacity to transmit content data to said connection requesting user node; and

(l) if the node at the top of said connection address list is part of said distribution network and has available capacity to transmit content data to said connection requesting user node, having said connection requesting user node dock with the node at the top of said connection address list.

In another example, the process may further comprise the following steps:

(m) if the node at the top of said connection address list is part of said distribution network and the node at the top of said connection address list does not have available capacity to transmit content data to said connection requesting user node, repeating steps (a)-(g), with the node at the top of said connection address list being said instructing node and a new connection address list being the product of steps (a)-(g).

In another example, the process may further comprise the steps of counting the times that step (m) is performed and, when step (m) is performed a predetermined number of times, having said connection requesting user node repeat steps (a)-(g) with said primary server being the instructing node.

In another embodiment a process for docking a connection requesting user node with a distribution network is provided, said process including the following steps:

(a) having an instructing node receive a connection request from said connection requesting user node;

(b) determining whether said connection requesting user node's bandwidth capacity is below a predetermined threshold (e.g., said connection requesting user node is a low-bandwidth node) or at least said predetermined threshold (e.g., said connection requesting user node is a high-bandwidth node);

(c) forming an instructing node topology database indicating, at a point in time:

(i) which, if any, user nodes are docked with said instructing node as child nodes; which, if any, user nodes are docked with each of said child nodes as grandchild nodes of said instructing node; which, if any, user nodes are docked with each of said grandchild nodes as great-grandchild nodes of said server node; and so on; and

DISH EXHIBIT 2002, Page 543
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(ii) said docked user nodes' respective bandwidth capacities;

(d) if said connection requesting user node is a high-bandwidth user node, selecting from a group of nodes including the instructing node and said docked user nodes a recommended parent node for said connection requesting user node, wherein said recommended parent node has apparent available capacity to transmit content data to said connection requesting user node and is at least as close (i.e., in terms of network topology) to said instructing node as any other docked user node having apparent available capacity to transmit content data to said connection requesting user node;

(e) if said connection requesting user node is a low-bandwidth user node, selecting from a group of nodes including the instructing node and said docked user nodes a recommended parent node for said connection requesting user node, wherein said recommended parent node has apparent available capacity to transmit content data to said connection requesting user node and is at least as far (i.e., in terms of network topology) from said instructing node as any other docked user node having apparent available capacity to transmit content data to said connection requesting user node; and

(f) providing a connection address list to said connection requesting user node, said connection address list listing each node in said instructing node's topology database from said recommended parent node back to said instructing node.

In one example, step (f) may further comprise the following step: (i) if said instructing node is not a server node, including in said connection address list a list of nodes cascadingly connected with each other from the instructing node back to said server node.

In another embodiment a process for connecting a connection requesting user node to a computer information distribution network having a primary server node and user nodes docked therewith in a cascaded relationship is provided, said process further comprising the following steps:

(a) providing said connection requesting user node with a connection address list which sets forth a list of user nodes docked in series with each other back to said primary server;

(b) having said connection requesting user node go to (or attempt to go to) the node at top of said connection address list;

(c) having said connection requesting user node determine whether the node at the top of said connection address list is part of the distribution network;

DISH EXHIBIT 2002, Page 544
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(d) if the node at the top of said connection address list is not part of the distribution network, deleting such node from said connection address list and repeating steps (b) and (c) with respect to the next node at the top of connection address list; and

(e) if the node at the top of said connection address list is part of said distribution network, having said connection requesting user node dock with the node at the top of said connection address list.

In another embodiment a process for connecting a connection requesting user node to a computer information distribution network having a primary server node and user nodes docked therewith in a cascaded relationship is provided, said process further comprising the following steps:

(a) providing said connection requesting user node with a connection address list which sets forth a list of user nodes docked in series with each other back to said primary server;

(b) having said connection requesting user node go to (or attempt to go to) the node at the top of said connection address list;

(c) having said connection requesting user node determine whether the node at the top of said connection address list is part of the distribution network;

(d) if the node at the top of said connection address list is not part of the distribution network, deleting such node from connection address list and repeating steps (b) and (c) with respect to the next node at the top of said connection address list;

(e) if the node at the top of said connection address list is part of said distribution network, determining whether the node at the top of said connection address list has available capacity to transmit content data to said connection requesting user node; and

(f) if the node at the top of said connection address list is part of said distribution network and has available capacity to transmit content data to said connection requesting user node, having said connection requesting user node dock with the node at the top of said connection address list.

In another embodiment relating to a computer information distribution network comprising a primary server node and user nodes docked therewith in a cascaded relationship, wherein each user node may have no more than a predetermined maximum number of child nodes docked with it, a process for reconfiguring the network in the event of a user node's departure therefrom is provided, said process including the following steps:

(a) providing information at a point in time to a node in the distribution network as follows:

DISH EXHIBIT 2002, Page 545
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(i) the node's propagation rating if it is a user node having a parent node which is a user node, wherein a propagation rating is one of a predetermined number of grades ranging from highest to second highest to third highest and so on, with the number of grades being equal to said predetermined maximum number;

(ii) an ancestor list setting forth the node's ancestor nodes' addresses (if it has any ancestor nodes) back to the primary server node, with the node's parent node being atop the ancestor list;

(iii) a sibling list of the node's sibling nodes' addresses (if it has any sibling nodes) and their respective propagation ratings (of note, in another example (which example is intended to be illustrative and not restrictive), nodes may not have data about their sibling (i.e., nodes do not know who their sibling is); instead, the mechanism used to get a red node to connect to its green sibling may be for the parent of those two nodes (or a proxy for that parent) to send the red child: (1) a connection path with that red child's green sibling at the top of the path; and (2) a command to "priority join" to that green child - when the green child node accepts the incoming "priority join" connection request from its former red sibling, the green node will kick its own red child (if such a child exists) instructing that red child to join as a child of its own green sibling (these actions will cause a chain reaction of reconfigurations which will cascade until the edge of the tree is reached)); and

(iv) a child list of the node's child nodes' addresses (if it has any child nodes) and their respective propagation ratings;

(b) having a first node send a propagation signal to each former child node of a departed node, wherein said first node is an ancestor of said former child node of said departed node;

(c) with respect to each child node receiving the propagation signal which did not have the highest propagation rating prior to its receiving the propagation signal (hereinafter referred to as a "red node"), upon its receiving the propagation signal:

(i) setting the propagation rating of the red node to the next higher grade above the propagation rating of that red node before it received the propagation signal;

(ii) having the red node undock from its parent node (if it was docked with its parent node before it received the propagation signal); and

(iii) having the red node dock with its sibling node which had the highest propagation rating prior to the red node's receiving the propagation signal;

DISH EXHIBIT 2002, Page 546
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(d) with respect to each child node receiving the propagation signal which had the highest propagation rating prior to its receiving a propagation signal (hereinafter referred to as a "green node"), upon its receiving the propagation signal:

(i) setting the propagation rating of that green node to the lowest grade;

(ii) having the green node retransmit the propagation signal to its child nodes (if it has any); and

(iii) determining whether the green node is docked with the node from which the green node received the propagation signal and if it is, having the green node remain docked with said node from which the green node received the propagation signal, and if it is not, having the green node dock with said node from which the green node received the propagation signal; and

(e) repeating steps (c) and (d) with respect to each user node which receives a retransmitted propagation signal.

In another embodiment relating to a computer information distribution network comprising a primary server node and user nodes docked therewith in a cascaded relationship, wherein each user node may have no more than a predetermined maximum number of child nodes docked with it, a process for reconfiguring the network in the event of a user node's departure therefrom is provided, said process including the following steps:

(a) providing information at a point in time to a node in the distribution network as follows:

(i) the node's propagation rating if it is a user node having a parent node which is a user node, wherein a propagation rating is one of a predetermined number of grades ranging from highest to second highest to third highest and so on, with the number of grades being equal to said predetermined maximum number;

(ii) an ancestor list setting forth the node's ancestor nodes' addresses (if it has any ancestor nodes) back to the primary server node, with the node's parent node being atop the ancestor list;

(iii) a sibling list of the node's sibling nodes' addresses (if it has any sibling nodes) and their respective propagation ratings; and

(iv) a child list of the node's child nodes' addresses (if it has any child nodes) and their respective propagation ratings;

(b) having a first node send a propagation signal to each former child node of a departed node, wherein said first node is an ancestor of said former child node of said departed node;

DISH EXHIBIT 2002, Page 547
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(c) with respect to each child node receiving the propagation signal which did not have the highest propagation rating prior to its receiving the propagation signal (hereinafter referred to as a "red node"), upon its receiving the propagation signal:

(i) setting the propagation rating of the red node to the next higher grade above the propagation rating of that red node before it received the propagation signal;

(ii) having the red node undock from its parent node (if it was docked with its parent node before it received the propagation signal);

(iii) devising a first connection address list comprising the address of the red node's sibling node which had the had the highest propagation rating prior to the red node's receiving the propagation signal followed by the red node's ancestor list;

(iv) having said red node go to (or attempt to go to) the node at the top of said first connection address list;

(v) having said red node determine whether the node at the top of said first connection address list is part of the distribution network;

(vi) if the node at the top of said first connection address list is not part of the distribution network, deleting such node from said first connection address list and repeating steps (c)(iv) and (c)(v) with respect to the next node at the top of said first connection address list;

(vii) if the node at the top of said first connection address list is part of said distribution network, determining whether the node at the top of said first connection address list has available capacity to transmit content data to said red node; and

(viii) if the node at the top of said first connection address list is part of said distribution network and has available capacity to transmit content data to said red node, having said red node dock with the node at the top of said first connection address list (with regard to these steps (vii) and (viii), in another example (which example is intended to be illustrative and not restrictive), when a red node connects to a green node as part of a network reconfiguration event, it does not matter whether there is "available capacity" or not for the green node to accept its incoming red sibling – the green node has no choice but to accept the node (these actions are facilitated in this example by the red node issuing a "priority join" to the green node; if the green node does not have "available capacity" it has to kick its own red child to make room for the incoming green node));

DISH EXHIBIT 2002, Page 548
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(d) with respect to each child node receiving the propagation signal which had the highest propagation rating prior to its receiving a propagation signal (hereinafter referred to as a "green node"), upon its receiving the propagation signal:

(i) setting the propagation rating of that green node to the lowest grade;

(ii) having the green node retransmit the propagation signal to its child nodes (if it has any);

(iii) determining whether the green node is docked with the node from which the green node received the propagation signal and if it is, having the green node remain docked with said node from which the green node received the propagation signal, and if it is not, devising a second connection address list starting with said node from which the green node received the propagation signal and followed by that portion of said green node's ancestor list extending back to the primary server from said node from which the green node received the propagation signal;

(iv) having said green node go to (or attempt to go to) the node at the top of said second connection address list;

(v) having said green node determine whether the node at the top of said second connection address list is part of the distribution network;

(vi) if the node at the top of said second connection address list is not part of the distribution network, deleting such node from said second connection address list and repeating steps (d)(iv) and (d)(v) with respect to the next node at the top of said second connection address list;

(vii) if the node at the top of said second connection address list is part of said distribution network, determining whether said node at the top of said second connection address list has available capacity to transmit content data to said green node; and

(viii) if the node at the top of said second connection address list is part of said distribution network and has available capacity to transmit content data to said green node, having said green node dock with the node at the top of said second connection address list; and

(e) repeating steps (c) and (d) with respect to each user node which receives a retransmitted propagation signal.

In one example, step (c)(iii) may include the following additional step: (1) waiting a predetermined period of time so as to allow the red node's sibling with the highest

DISH EXHIBIT 2002, Page 549
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

propagation rating prior to the red node's receipt of the propagation signal (hereinafter the "green node") to retransmit the propagation signal to the green node's child nodes (if any).

In another embodiment relating to a computer information distribution network comprising an instructing node having a fist user node docked with said instructing node to receive content data therefrom and a second user node docked with said first user node to receive content data therefrom, a process for handling a purported communication interruption between said first user node and said second user node is provided, said process including the following steps:

(a) having said instructing node receive a first complaint about said first user node from said second user node;

(b) if the second user node is the only user node docked with said first user node at a point in time, if said instructing node receives another complaint about the first user node from another user node within a predetermined period of time from when said instructing node received said first complaint or if said instructing node experiences a communication problem between it and said first user node during said predetermined period of time: (i) disconnecting said first user node from said instructing node; and

(c) if said instructing node has not experienced a communication problem between it and said first user node during said predetermined period of time and if a plurality of user nodes are docked with said first user node at said point in time and said instructing node has not received another complaint about said first user node from a user node other than said second user node within said predetermined period of time: (i) disconnecting said second user node from said first user node.

In one example, step (b) may include the following step: (ii) sending a signal to the user nodes docked with said first user node indicating the departure of said first user node from said network.

In another example, each user node may have no more than a predetermined maximum number of child nodes docked with it, and wherein step (b) may include the following steps

(ii) providing information at said point in time to each of said second user node, the other user nodes which had been docked with said first user node (if any) and at least one of any user nodes cascadingly connected in the distribution network under said first user node prior to said first user node's being disconnected from said instructing node (if any) as follows:

DISH EXHIBIT 2002, Page 550
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(1) the node's propagation rating, wherein a propagation rating is one of a predetermined number of grades ranging from highest to second highest to third highest and so on, with the number of grades being equal to said predetermined maximum number;

(2) an ancestor list setting forth the node's ancestor nodes' addresses (if it has any ancestor nodes) back to the instructing node, with the node's parent node being atop the ancestor list;

(3) a sibling list of the node's sibling nodes' addresses (if it has any sibling nodes) and their respective propagation ratings; and

(4) a child list of the node's child nodes' addresses (if it has any child nodes) and their respective propagation ratings;

(iii) having said instructing node send a propagation signal to each of said second user node and the other user nodes which had been docked with said first user node (if any);

(iv) with respect to each user node receiving the propagation signal which did not have the highest propagation rating prior to its receiving the propagation signal (hereinafter referred to as a "red node"), upon its receiving the propagation signal:

(1) setting the propagation rating of the red node to the next higher grade above the propagation rating of that red node before it received the propagation signal;

(2) having the red node undock from its parent node (if it was docked with its parent node before it received the propagation signal); and

(3) having the red node dock with its sibling node which had the highest propagation rating prior to the red node's receiving the propagation signal;

(v) with respect to each user node receiving the propagation signal which had the highest propagation rating prior to its receiving a propagation signal (hereinafter referred to as a "green node"), upon its receiving the propagation signal:

(1) setting the propagation rating of that green node to the lowest grade;

(2) having the green node retransmit the propagation signal to its child nodes (if it has any); and

(3) determining whether the green node is docked with the node from which the green node received the propagation signal and if it is, having the green node remain docked with said node from which the green node received the propagation signal, and if it is not, having the green node dock with said node from which the green node received the propagation signal; and

DISH EXHIBIT 2002, Page 551
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(vi) repeating steps (iv) and (v) with respect to each user node which receives a retransmitted propagation signal.

In another embodiment a distribution network for the distribution of content data from a server node to user nodes, wherein said user nodes are connected to said server and each other in cascaded relationship is provided, wherein:

(a) at least one of said user nodes is a repeater node connected directly to said server node, wherein said repeater node retransmits content data received by it to a user node docked to it for purpose of receiving content data from said repeater node (hereinafter referred to as a "child node"); and

(b) wherein each repeater node has the ability to provide to a user node which is attempting to dock with said repeater node connection address instructions.

In one example, each repeater node may include a descendant database indicating:

(i) which child nodes, if any, at a point in time, are docked with it so as to receive content data from said repeater node, and

(ii) which user nodes, if any, at said point in time, are purportedly docked with each of said child nodes.

In another example, the connection address instructions may refer said user node which is attempting to dock with said repeater node to a node in said descendant database.

In another example, each user node may include an ancestor database indicating to which node said user node is docked so that said user node may receive content data therefrom (hereinafter referred to as a "parent node"), and to which node, if any, at said point in time, said parent node is docked so that it may receive content data therefrom.

In another example, if said parent node of said user node departs from said distribution network, said user node may contact another node on its ancestor database.

In another example, each child node of a repeater node may include a sibling database indicating which user nodes, if any, are also child nodes of said repeater node.

In another embodiment a distribution network for the distribution of content data from a server node to user nodes is provided, wherein n levels of user nodes are cascadingly connected to said server node, wherein n is a number greater than one, wherein each user node includes a delay which causes the playing of content data by such node to be delayed a period of time (hereinafter "delay time") from a point in time, and wherein delays in higher level nodes create greater delay times than do delays in lower level nodes.

In another embodiment a distribution network for the distribution of content data from a server node to user nodes is provided, wherein n levels of user nodes are cascadingly

DISH EXHIBIT 2002, Page 552
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

connected to said server node, wherein n is a number greater than one, wherein each user node includes a delay which causes the playing of content data by such node to be delayed a period of time (hereinafter "delay time") from a point in time, wherein x is a number from and including 2 to and including n, and wherein delays in (x-1) level nodes create greater delay times than do delays in x level nodes.

In one example, said point in time is an event experienced approximately simultaneously by substantially all user nodes.

In another example, said point in time is when said node receives content data.

While a number of embodiments and examples of the present invention have been described, it is understood that these embodiments and examples are illustrative only, and not restrictive, and that many modifications may become apparent to those of ordinary skill in the art. For example, any desired branch factor may be used (*see*, e.g., FIG. 46A showing a branch factor of 1 (i.e., each parent node may have only one child node); FIG. 46B showing a branch factor of 2 (i.e., each parent node may have one or two children nodes); and FIG. 46C showing a branch factor of 3 (i.e., each parent node may have one, two or three children nodes)). Of course, other branch factors (e.g., 4, 5, 6, etc) may be used and, as discussed above, the distribution network may be a hybrid network utilizing subtrees having different branch factors). Further still, a modified Utility Rating may be determined as follows: Utility Rating = Time (of connection) x Bandwidth Rating. Further still, a node ID may be based upon: (a) an IP address (external/internal/DHCP); (b) a URL; and/or (c) a Port. Further still, the root server may propagate "its" time upon assignment of a connection and the user node may get a "delta" (i.e., difference) from its clock to use (in the event of a reset the user node may re-acquire the time from the server (or from another time-providing source)). Further still, the various time intervals discussed herein may be predetermined time intervals (e.g., .5 sec., 1 sec, 1 min.) and/or the time intervals may be based upon some varying criteria (e.g., flow of data in the network, number of nodes in the network, number of levels in the network, position of a given node in the network). Further still, partial propagation of data (e.g., ancestor data and/or descendent data) from one or more nodes may be permitted. Further still (as discussed above), one or more of the steps described herein may be omitted (and the various steps which are performed may not necessarily need to be carried out in the order described herein (which description was intended to represent a number of examples, and not be restrictive)). Further still, the root server and each of the user nodes may utilize essentially identical software for carrying out the network configuration, reconfiguration and data transfer operations described herein or the root server may have dedicated server software

DISH EXHIBIT 2002, Page 553
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

while the user nodes have different, dedicated user node software. Further still, the entire distribution network (e.g., the root server and all of the user nodes) may have the same branch factor (e.g., a branch factor of 2) or the user nodes may have a first branch factor (e.g., a branch factor of 2) and the root server may have a second branch factor (e.g., the root server may be capable of acting as a parent to more user nodes than 2). Further still, heuristics may be employed to drive network configuration, reconfiguration and/or data flow (e.g., based upon historic network configuration, reconfiguration and/or data flow).

DISH EXHIBIT 2002, Page 554
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

CLAIMS

1. A method for propagating a network topology model of a binary tree topology network through the network, the network including a plurality of nodes, including a root node and at least one leaf node, operatively networked together to provide a communications path for data, each of the plurality of nodes except the root node being docked downtree of a parent node, the parent node being one of the plurality of nodes, and each of the plurality of nodes adapted to be docked uptree of a first child node and a second child node, each of the at least one leaf nodes having none of the plurality of nodes docked downtree of and therewith, the method comprising the steps of:

each of the at least one leaf nodes providing a propagate network topology model message containing the address of the providing leaf node to the parent node docked uptree of and with the providing leaf node;

for each of the plurality of nodes receiving the propagate network topology model message from each child node docked downtree of and therewith:

forming a network topology model representing one or more paths from the receiving node to each one of the plurality of nodes downtree of the receiving node;

storing in a memory accessible to the receiving node, the network topology model so formed;

providing to the parent node docked uptree of and with the receiving node a propagate network topology model message containing the network topology model so formed,

thereby propagating a network topology model through the network.

2. The method of claim 1, wherein the communications path for data comprises a downtree communications path.

3. The method of claim 1, wherein the communications path for data comprises a downtree communications path for data and an uptree communications path for data.

DISH EXHIBIT 2002, Page 555
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

4. The method of claim 1, wherein the step of each of the at least one leaf nodes providing a propagate network topology model message is carried out a plurality of times.

5. The method of claim 1, wherein the step of each of the at least one leaf nodes providing a propagate network topology model message is carried out periodically.

6. The method of claim 1, wherein a first node being one of the plurality of nodes, but not a leaf node, receives a register message from a second node that is not part of the network, and wherein the first node is docked uptree of a first child node and a second child node, each of the first child node and the second child node being one of the plurality of nodes, the method further comprising the steps of:

searching the network topology model stored in the memory of the first node for a path to an open node, the open node being one of the plurality of nodes that the network topology model shows as not being docked uptree of and with two child nodes;

sending a path message to the second node containing at least an address of the open node.

7. The method of claim 6, wherein the path message comprises a path from the open node to the first node.

8. The method of claim 6, wherein the searching step comprising finding the open node such that a connection to the open node keeps the binary topology network balanced.

9. The method of claim 6, wherein step of searching further comprises the steps of:

searching consecutively further down hierarchical levels of the binary tree represented in the network topology model stored in the memory of the first node:

first to locate a path representing a node not being docked uptree of and with any child nodes, and if no such path is located,

DISH EXHIBIT 2002, Page 556
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

then to locate a path representing a node not being docked uptree of and with two child nodes, and

repeating the searching step until one such path is located; and

designating the located path as a path to the open node.

10. A method for propagating a network topology model of a binary tree topology network through the network, the network including a plurality of nodes, including a root node and at least one leaf node, operatively networked together to provide a communications path for data, each of the plurality of nodes except the root node being docked downtree of a parent node, the parent node being one of the plurality of nodes, and each of the plurality of nodes adapted to be docked uptree of a first child node and a second child node, each of the at least one leaf nodes having none of the plurality of nodes docked downtree of and therewith, the method comprising the steps of:

providing a propagate path message from the root node to each of the plurality of nodes that are docked downtree of and with the root node, the propagate path message indicating an address of the root node;

for each of the plurality of nodes receiving the propagate path message from the root node or from another one of the plurality of nodes:

storing in a memory accessible to the receiving node, the path to the root node stored in the propagate path message;

if the receiving node has at least one of the plurality of nodes docked downtree of and therewith, adding to the propagate path message an address of the receiving node; and

providing the propagate path message to each of the plurality of nodes docked downtree of and with the receiving node, the propagate path message a path to the root node;

thereby propagating a root path of a binary tree topology network through the network.

DISH EXHIBIT 2002, Page 557
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

11. The method of claim 10, wherein the communications path for data comprises a downtree communications path for data.

12. The method of claim 10, wherein the communications path for data comprises a downtree communications path for data and an uptree communications path for data.

13. The method of claim 10, wherein the step of providing a propagate path message is carried out a plurality of times.

14. The method of claim 10, wherein the step of providing a propagate path message is carried out periodically.

15. A method for propagating a network topology model of a binary tree topology network through the network, the network including a plurality of nodes, including a root node and at least one leaf node, operatively networked together to provide a communications path for data, each of the plurality of nodes except the root node being docked downtree of a parent node, the parent node being one of the plurality of nodes, and each of the plurality of nodes adapted to be docked uptree of a first child node and a second child node, each of the at least one leaf nodes having none of the plurality of nodes docked downtree of and therewith, the method comprising the steps of:

each of the at least one leaf nodes, providing a propagate network topology model message containing the address of the providing leaf node to the parent node docked uptree of and with the providing leaf node;

for each of the plurality of nodes receiving the propagate network topology model message from each child node docked downtree of and therewith:

forming a network topology model comprising a path from the receiving node to each one of the plurality of nodes downtree of the receiving node;

storing in a memory accessible to the receiving node, the network topology model so formed;

DISH EXHIBIT 2002, Page 558
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

providing to the parent node docked uptree of and with the receiving node a propagate network topology model message containing the network topology model so formed,

providing a propagate path message from the root node to each of the plurality of nodes that are docked downtree of and with the root node, the propagate path message indicating an address of the root node;

for each of the plurality of nodes receiving propagate path message from the root node or from another one of the plurality of nodes:

storing in a memory accessible to the receiving node, the path to the root node stored in the propagate path message;

if the receiving node has at least one of the plurality of nodes docked downtree of and therewith, adding to the propagate path message an address of the receiving node; and

providing the propagate path message to each of the plurality of nodes docked downtree of and with the root node.

16. The method of claim 15, wherein the communications path for data comprises a downtree communications path for data.

17. The method of claim 15, wherein the communications path for data comprises a downtree communications path for data and an uptree communications path for data.

18. The method of claim 15, wherein the step of providing a propagate network topology model message is carried out a plurality of times.

19. The method of claim 15, wherein the step of providing a propagate network topology model message is carried out periodically.

20. The method of claim 15, wherein the step of providing a propagate path message is carried out a plurality of times.

21. The method of claim 15, wherein the step of providing a propagate path message is carried out periodically.

DISH EXHIBIT 2002, Page 559
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

22. The method of claim 15, wherein a first node being one of the plurality of nodes, but not a leaf node, receives a register message from a second node that is not part of the network, and wherein the first node is docked uptree of a first child node and a second child node, each of the first child node and the second child node being one of the plurality of nodes, the method further comprising the steps of:

searching the network topology model stored in the memory of the first node for a path to an open node, the open node being one of the plurality of nodes that the network topology model shows as not being docked uptree of and with two child nodes;

sending a path message to the second node containing at least an address of the open node.

23. The method of claim 22, wherein the path message comprises a path from the open node to the first node.

24. The method of claim 22, wherein the path message comprises a path from the open node to the root node.

25. The method of claim 22, wherein the searching step comprising finding the open node such that a connection to the open node keeps the binary topology network balanced.

26. The method of claim 22, wherein step of searching further comprises the steps of:

searching consecutively further down hierarchical levels of the binary tree represented in the network topology model stored in the memory of the first node:

first to locate a path representing a node not being docked uptree of and with any child nodes, and if no such path is located,

then to locate a path representing a node not being docked uptree of and with two child nodes, and

DISH EXHIBIT 2002, Page 560
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

repeating the searching step until one such path is located; and

designating the located path as a path to the open node.

27. A method for propagating a network topology model of a binary tree topology network through the network, the network including a plurality of nodes, including a root node and at least one leaf node, operatively networked together to provide a communications path for data, each of the plurality of nodes except the root node being docked downtree of a parent node, the parent node being one of the plurality of nodes, and each of the plurality of nodes adapted to be docked uptree of a first child node and a second child node, each of the at least one leaf nodes having none of the plurality of nodes docked downtree of and therewith, the method comprising the steps of:

providing a banned list message from the root node to each of the plurality of nodes that are docked downtree of and with the root node, the banned list message comprising an identifier for each of a plurality of banned nodes;

for each of the plurality of nodes receiving the banned list message from the root node or from another one of the plurality of nodes:

storing in a memory accessible to the receiving node, the identifiers for each of the plurality of banned nodes; and

providing the banned list message to each of the plurality of nodes docked downtree of and with the receiving node;

thereby propagating the list of banned nodes through the network.

28. The method of claim 27, wherein the communications path for data comprises a downtree communications path for data.

29. The method of claim 27, wherein the communications path for data comprises a downtree communications path for data and an uptree communications path for data.

30. The method of claim27, further comprising the step of rejecting a register message from a new node that is not part of the network if the node is identified on the banned list.

DISH EXHIBIT 2002, Page 561
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

31. A method for propagating a network topology model of a binary tree topology network through the network, the network including a plurality of nodes, including a root node and at least one leaf node, operatively networked together to provide a communications path for data, each of the plurality of nodes except the root node being docked downtree of a parent node, the parent node being one of the plurality of nodes, and each of the plurality of nodes adapted to be docked uptree of a first child node and a second child node, each of the at least one leaf nodes having none of the plurality of nodes docked downtree of and therewith, the method comprising the steps of:

the first node sending a request firewall status message over a first channel to one of the plurality of nodes that is docked with the first node;

the one of the plurality of nodes receiving the request firewall status message sending at least one response message to the first node over a separate channel; and

the first node determining its firewall status based upon whether it receives the response message.

32. The method of claim 31, wherein the communications path for data comprises a downtree communications path for data.

33. The method of claim 31, wherein the communications path for data comprises a downtree communications path for data and an uptree communications path for data.

34. The method of claim 31, wherein the step of sending at least one response message comprises the steps of:

sending a first response message to the first node over a separate channel;

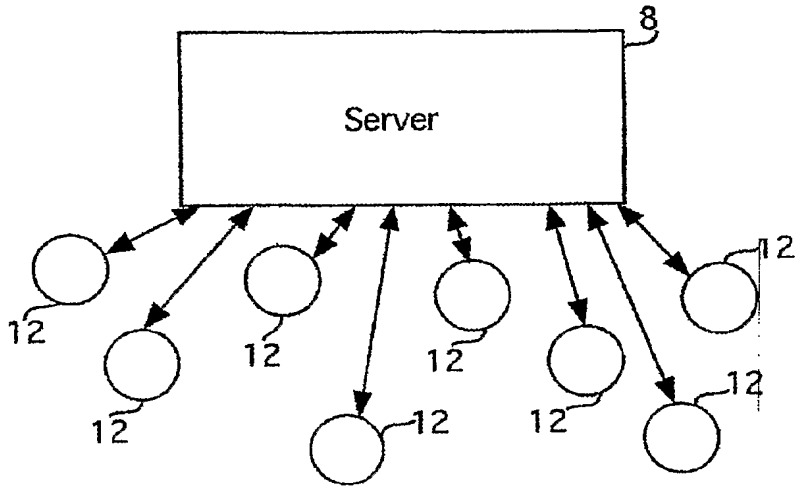
waiting a predefined period for an acknowledgement of the first response message, and if no acknowledgement is received, sending a second response message to the first node over the separate channel;

waiting a predefined period for an acknowledgement of the second response message, and if no acknowledgement is received, sending a third response message to the first node over the separate channel; and

DISH EXHIBIT 2002, Page 562
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

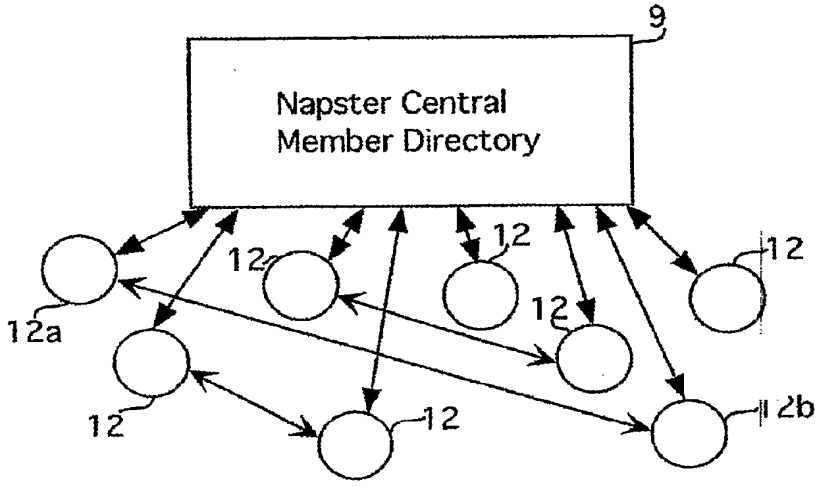
waiting a predefined period for an acknowledgement of the third response message, and if no acknowledgement is received, sending a firewall status on message to the first node over the first channel.

DISH EXHIBIT 2002, Page 563
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047



PRIOR ART

Fig. 1



PRIOR ART

Fig. 2

DISH EXHIBIT 2002, Page 564
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

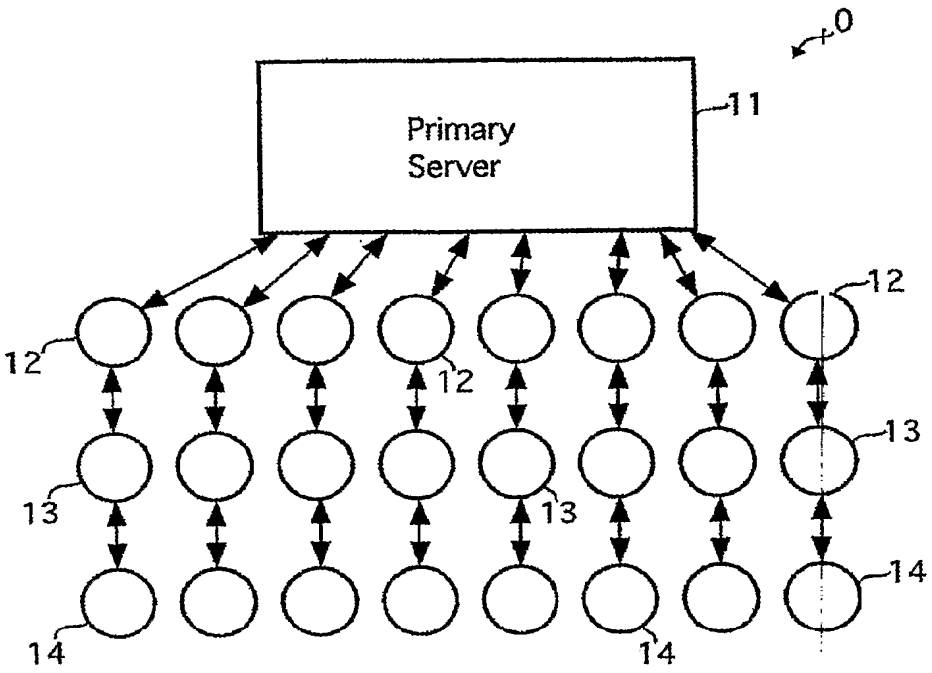


Fig. 3

"Start up

corresponds to ~~[illegible]~~
application of [illegible]
[illegible]

31

DISH EXHIBIT 2002, Page 565
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

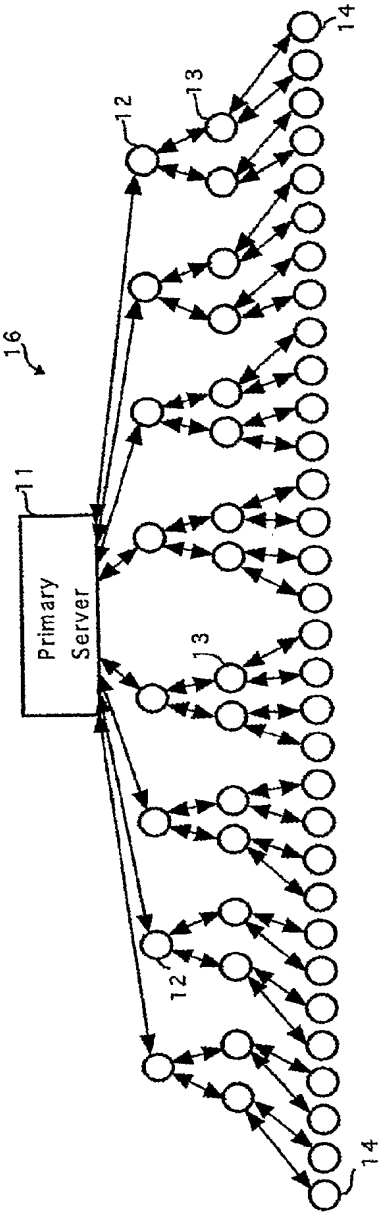


Fig. 4

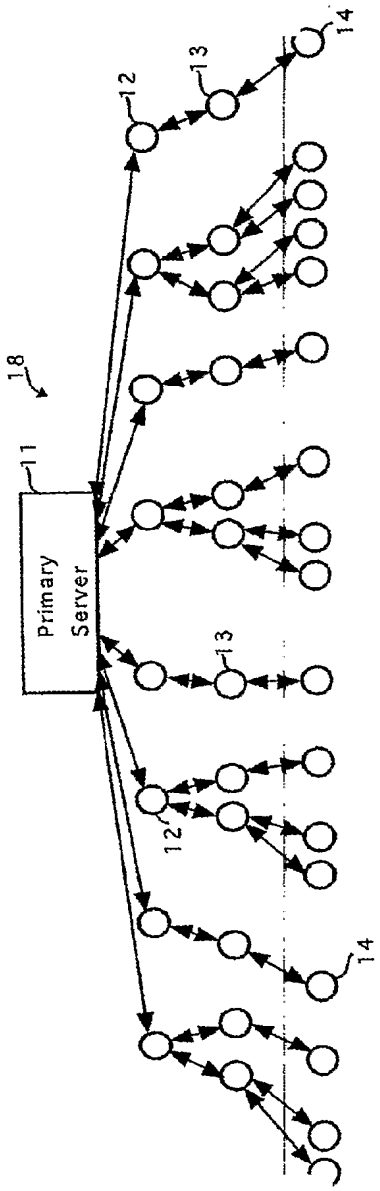


Fig. 5

DISH EXHIBIT 2002, Page 566
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

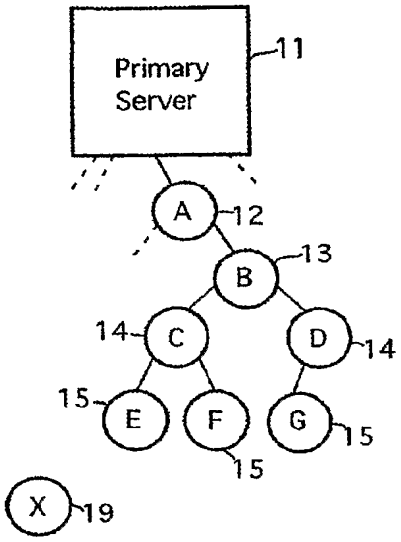


Fig. 6

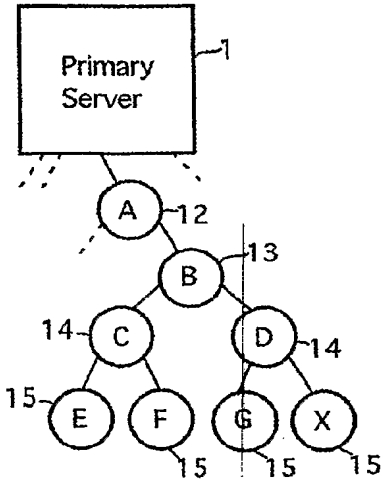


Fig. 7

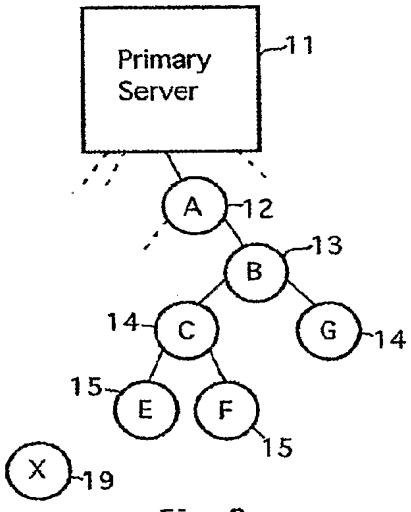


Fig. 8

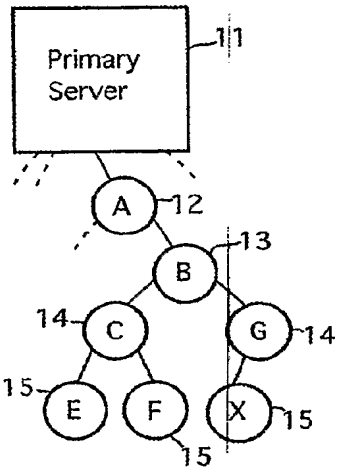


Fig. 9

DISH EXHIBIT 2002, Page 567
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

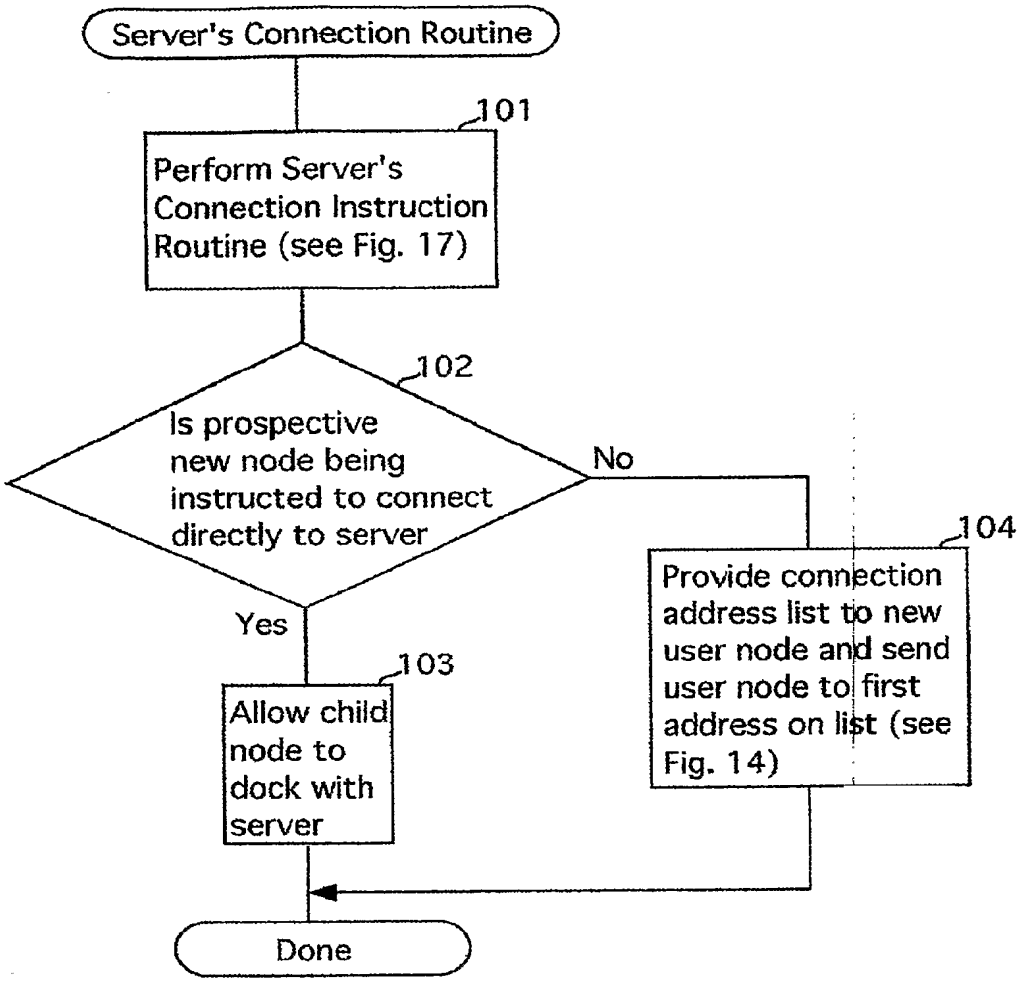


Fig. 10

DISH EXHIBIT 2002, Page 568
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

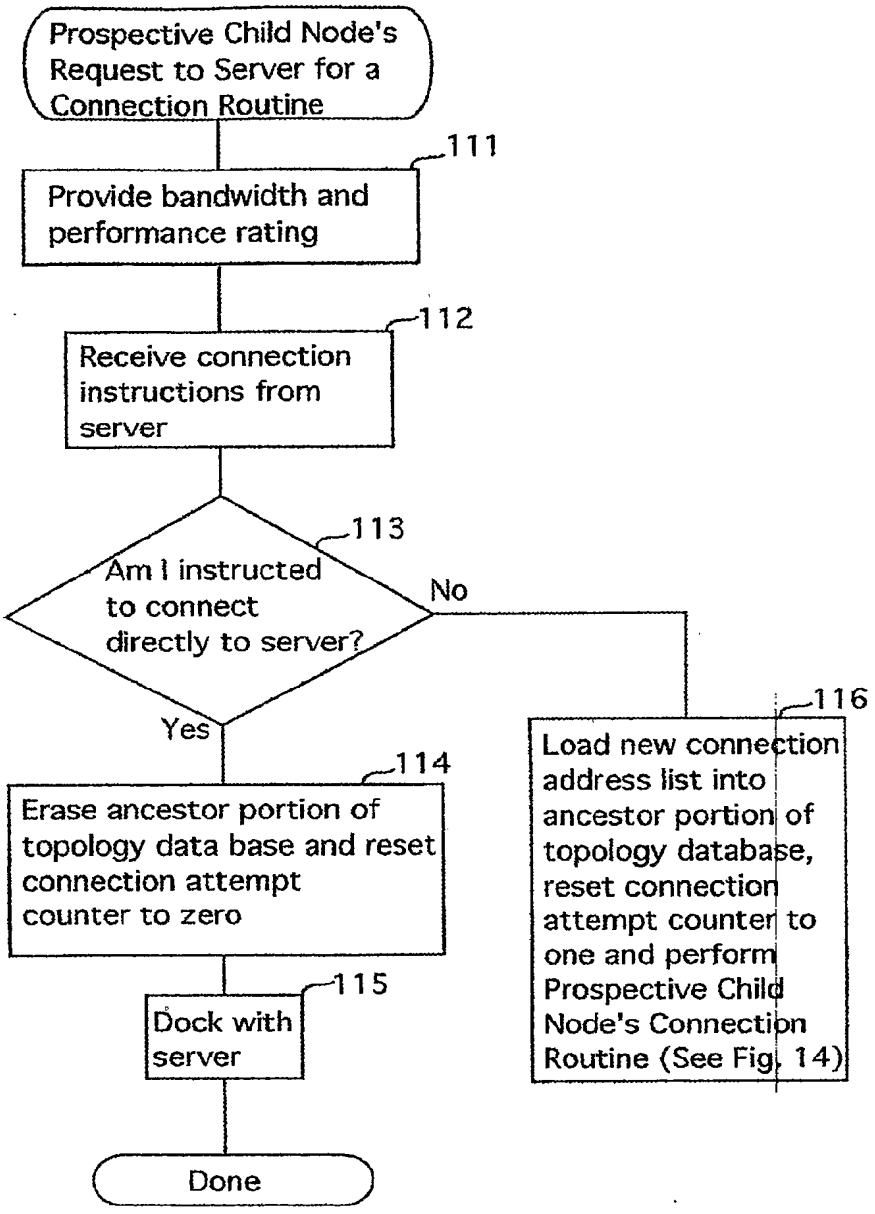


Fig. 11

DISH EXHIBIT 2002, Page 569
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

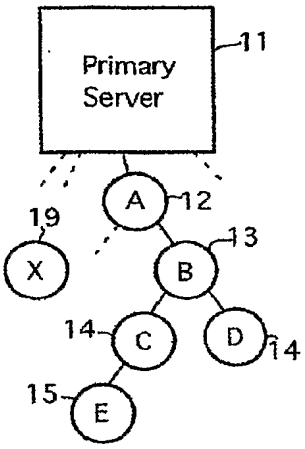


Fig. 12A

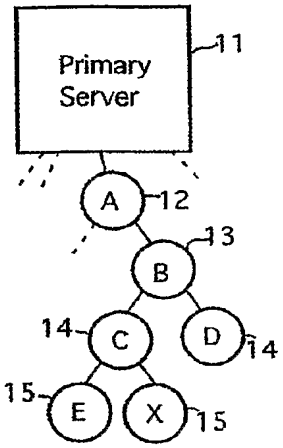


Fig. 12B

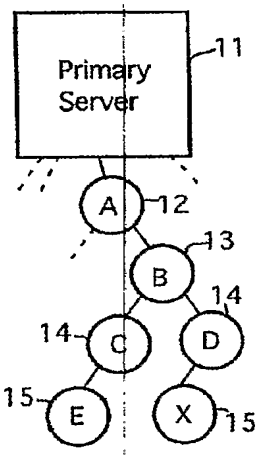


Fig. 12C

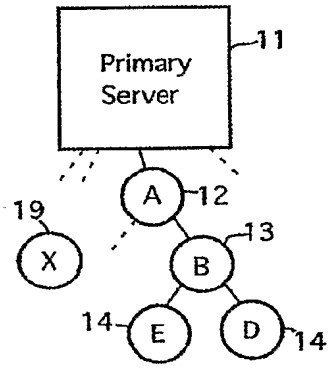


Fig. 12D

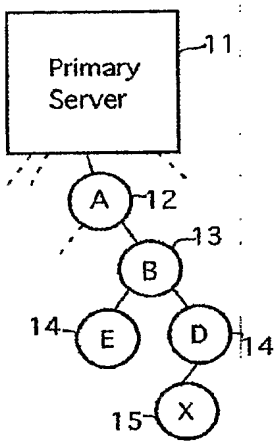


Fig. 12E

DISH EXHIBIT 2002, Page 570
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

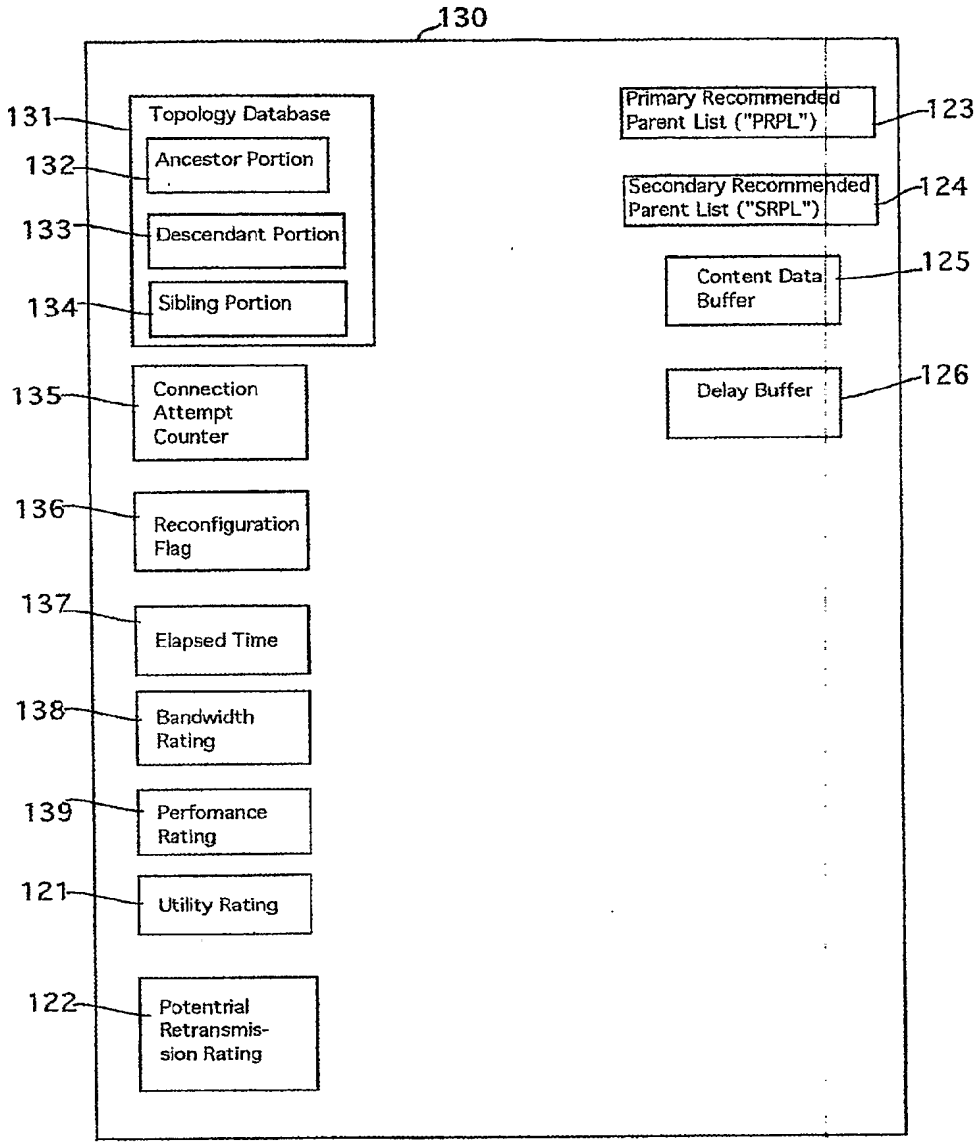


Fig. 13

DISH EXHIBIT 2002, Page 571
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

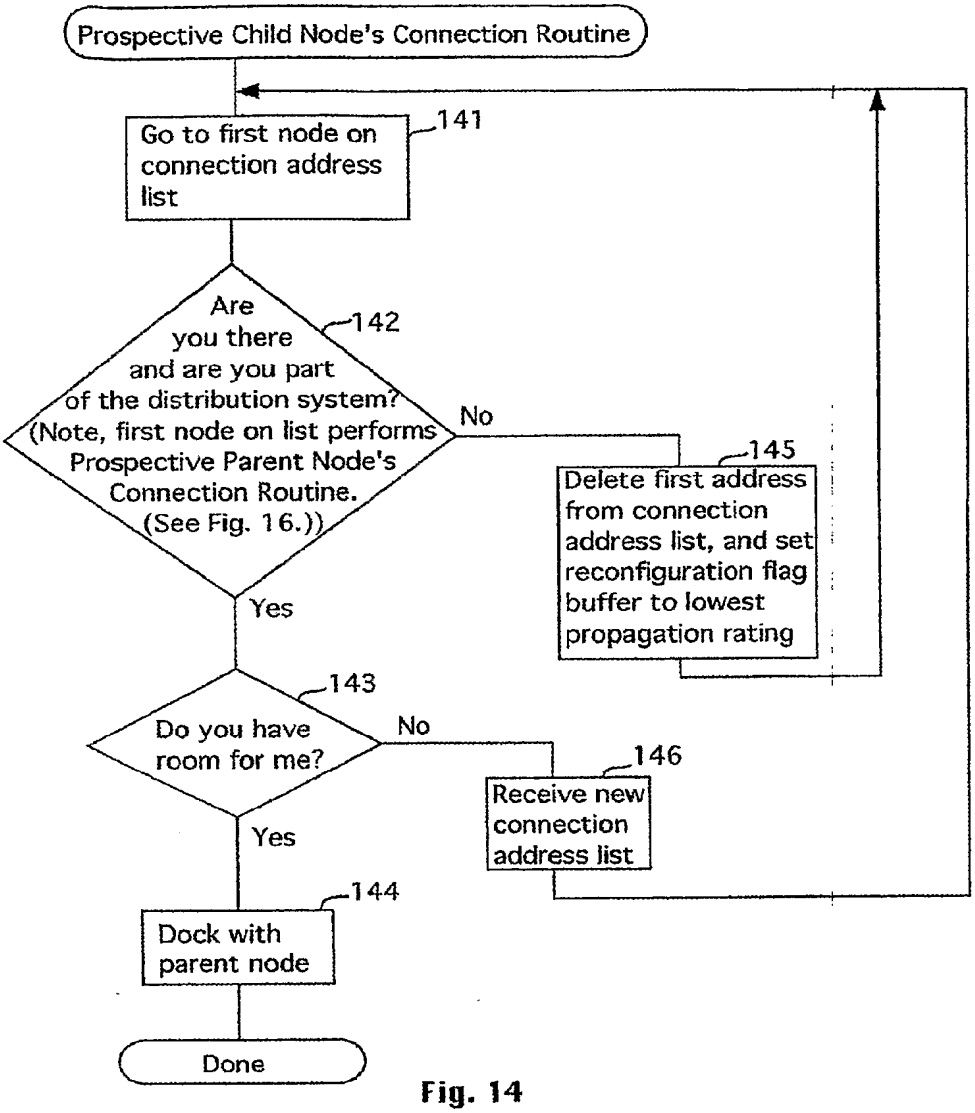

Prospective Child Node's Connection Routine
Go to first node on connection address list
141
Are you there and are you part of the distribution system? (Note, first node on list performs Prospective Parent Node's Connection Routine. (See Fig. 16.))
142
No
145
Delete first address from connection address list, and set reconfiguration flag buffer to lowest propagation rating
Yes
143
Do you have room for me?
No
146
Receive new connection address list
Yes
144
Dock with parent node
Done

Fig. 14

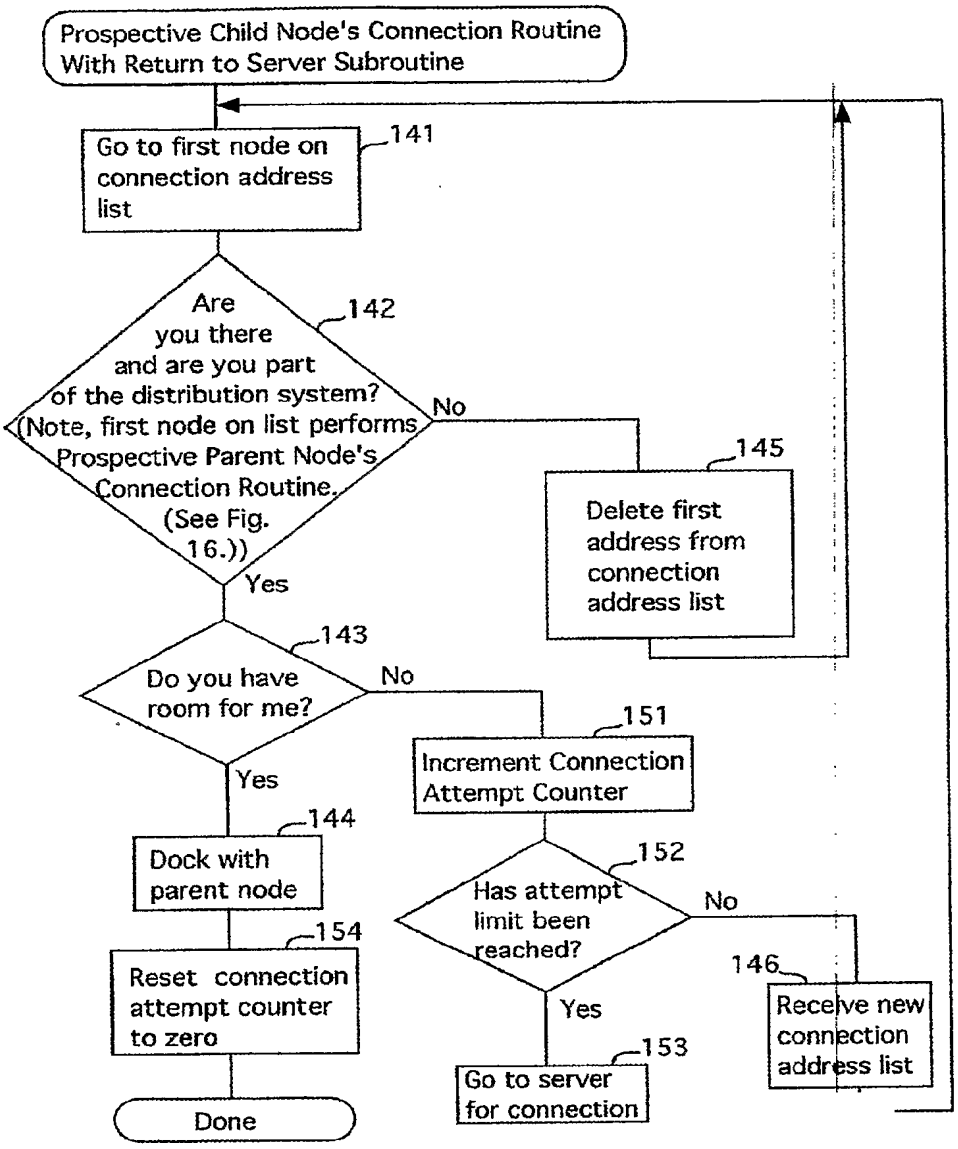


Fig. 15

DISH EXHIBIT 2002, Page 573
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

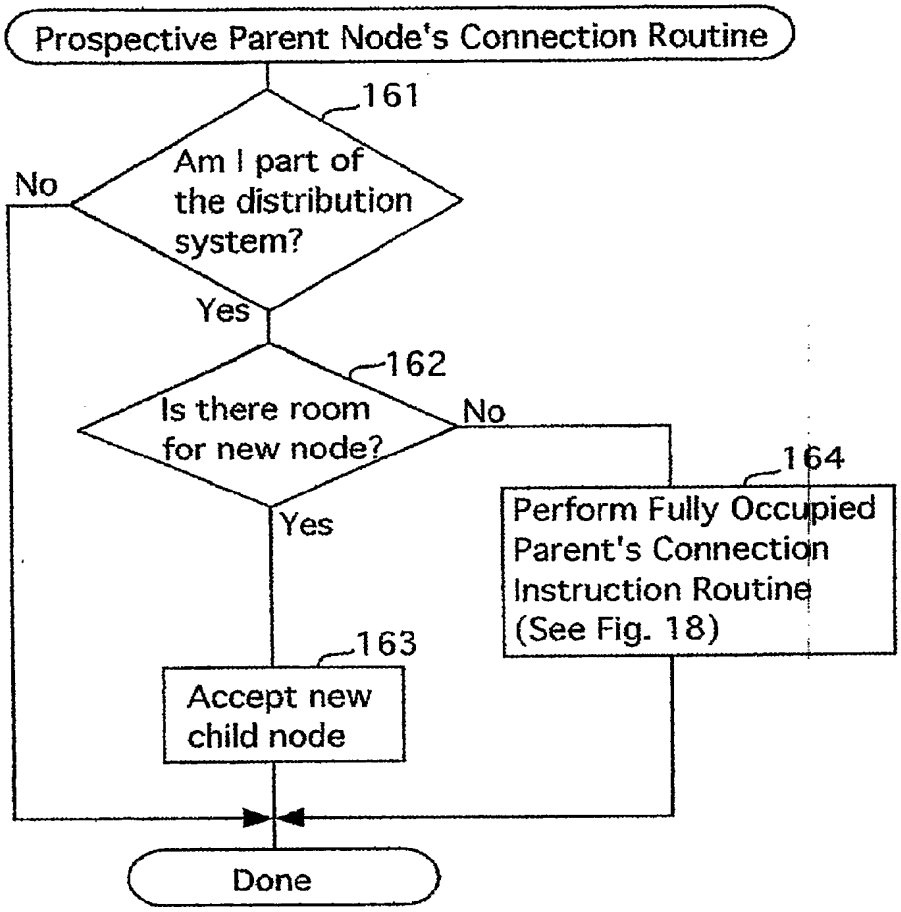


Fig. 16

DISH EXHIBIT 2002, Page 574
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

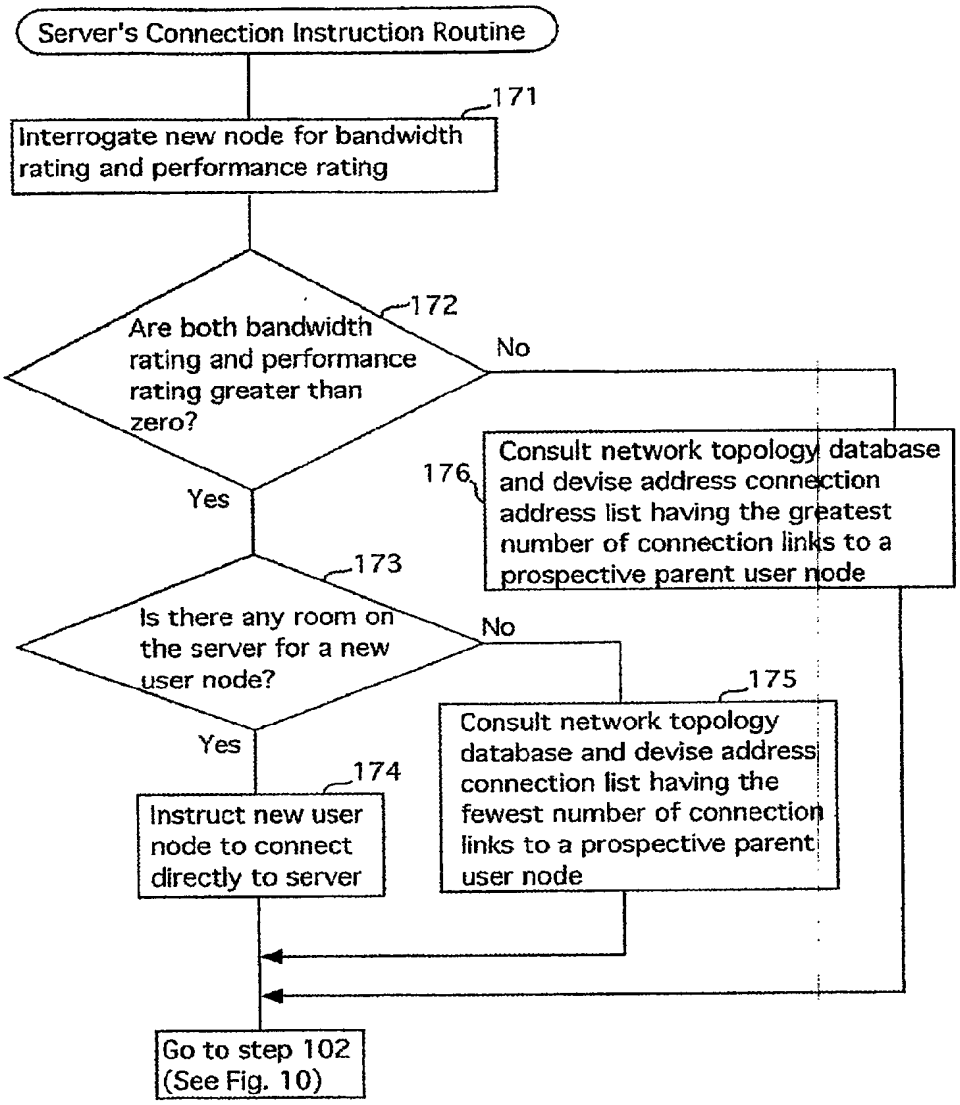


Fig. 17

DISH EXHIBIT 2002, Page 575
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

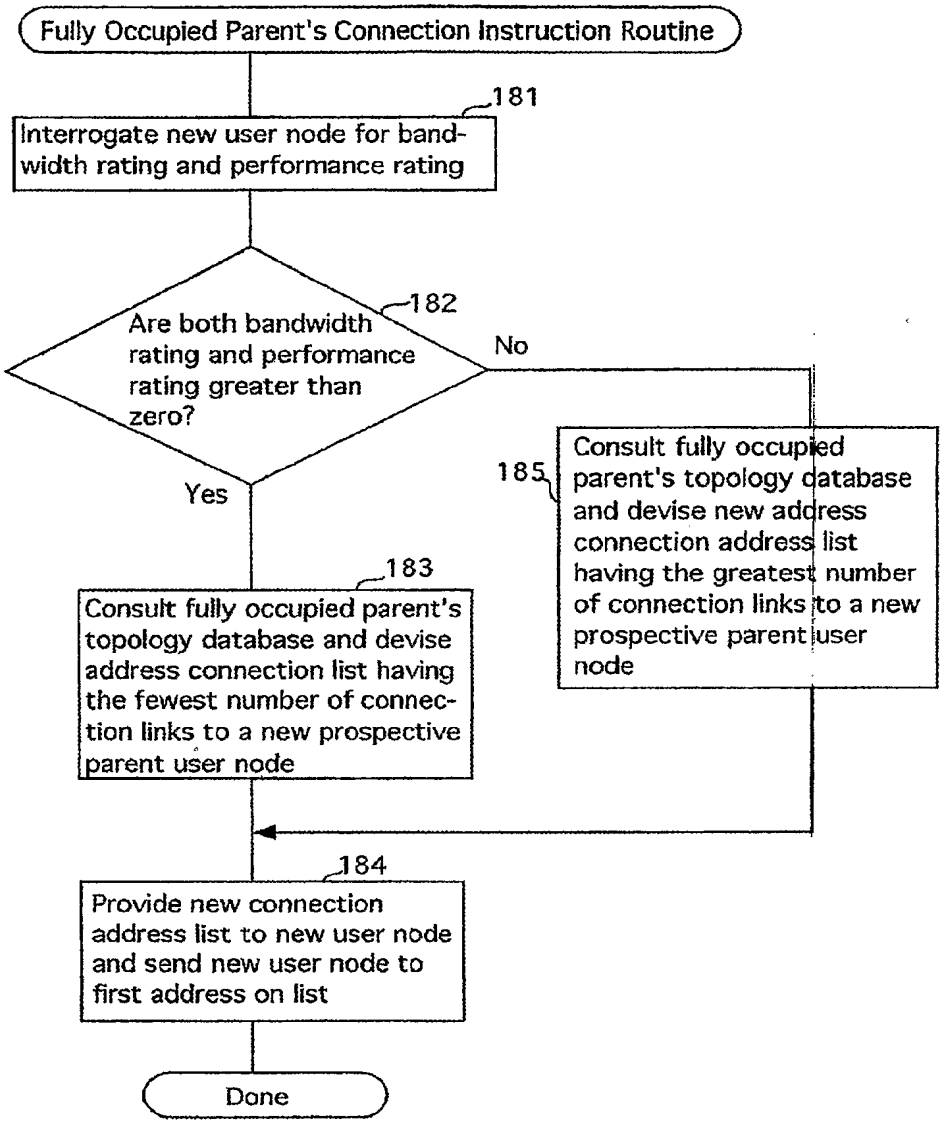


Fig. 18

DISH EXHIBIT 2002, Page 576
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

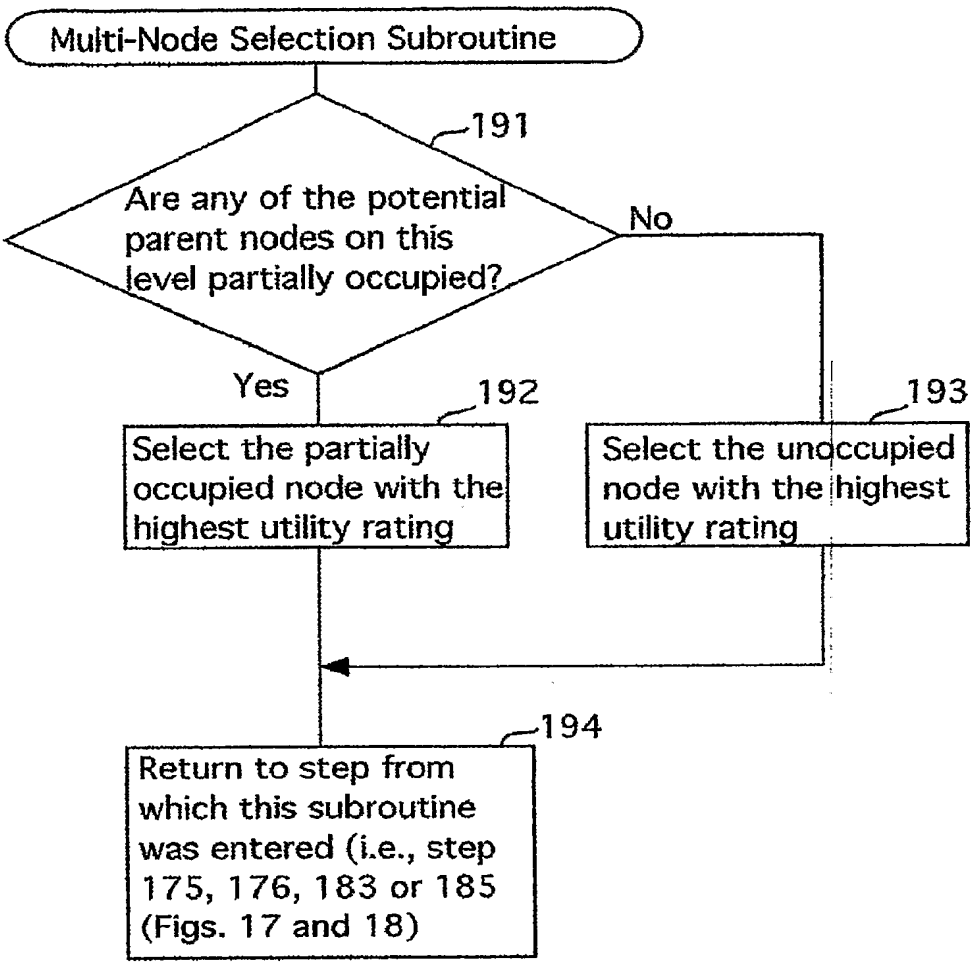


Fig. 19

DISH EXHIBIT 2002, Page 577
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

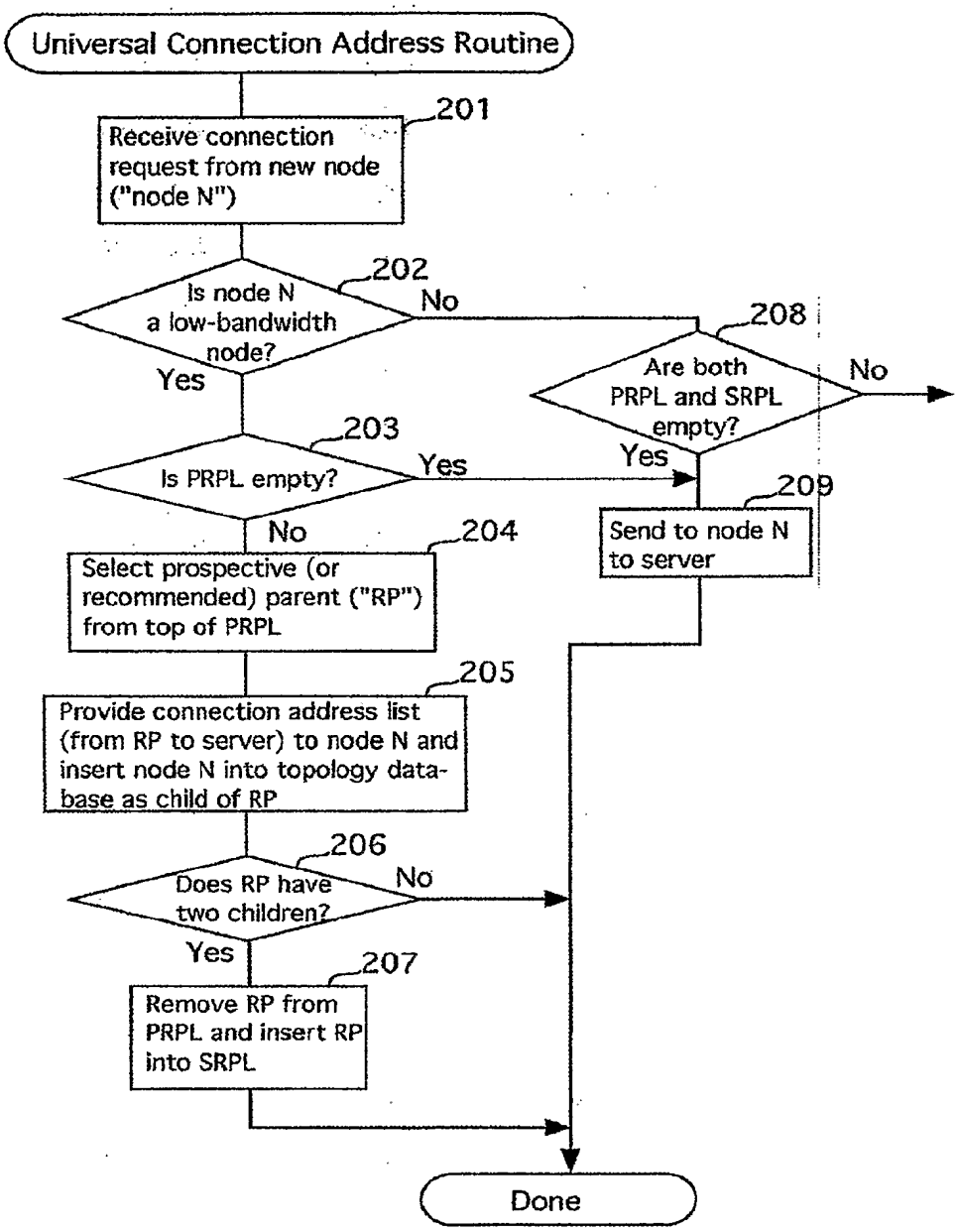


Fig. 20A

DISH EXHIBIT 2002, Page 578
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

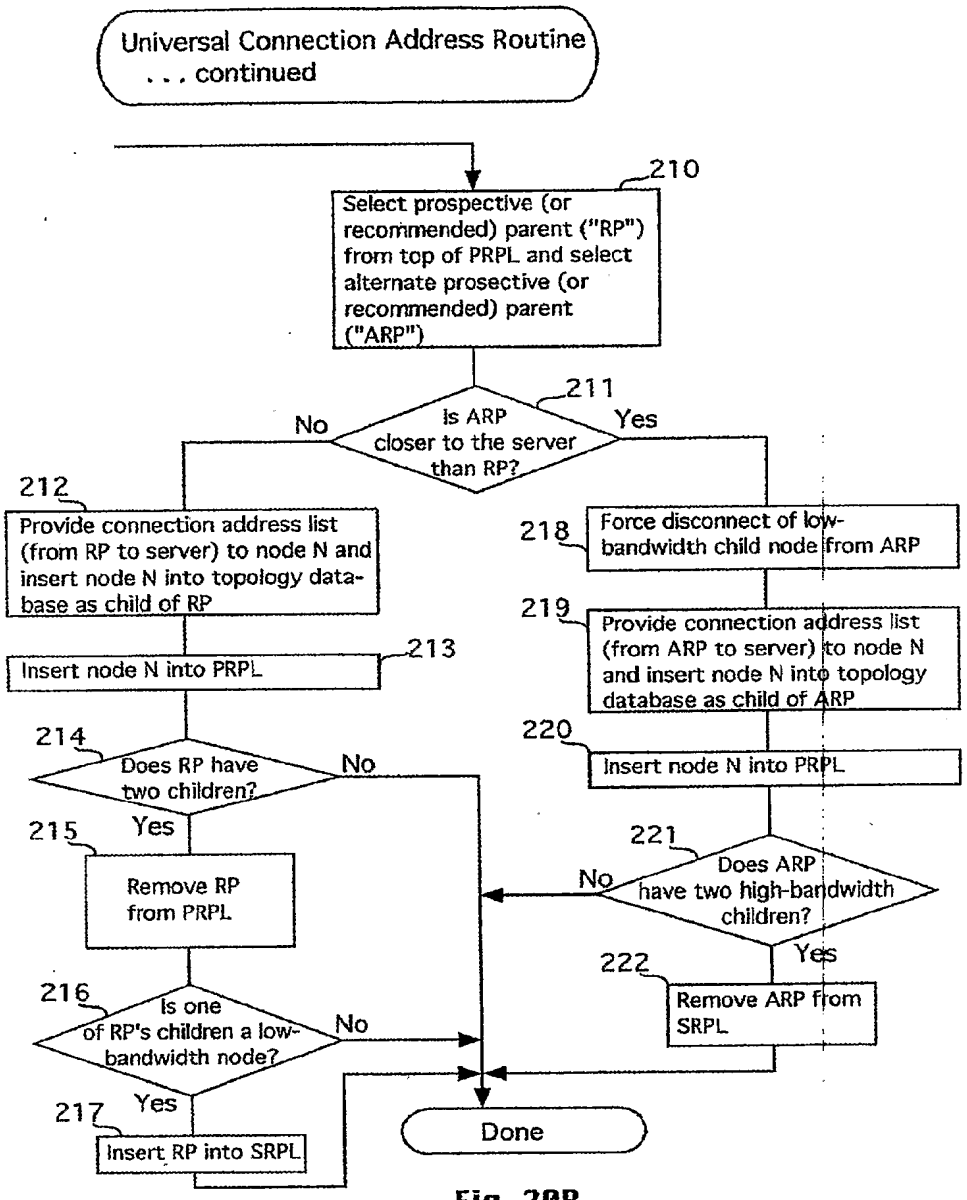


Fig. 20B

DISH EXHIBIT 2002, Page 579
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

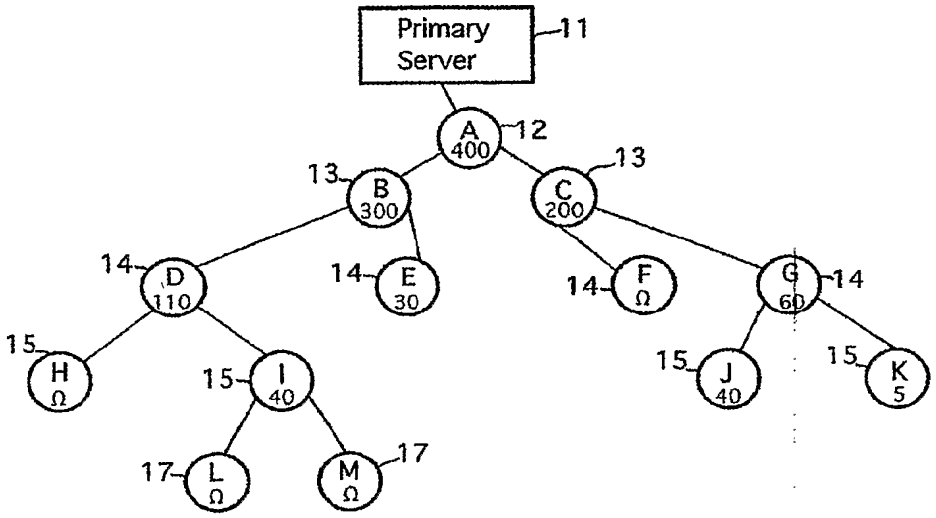


Fig. 21

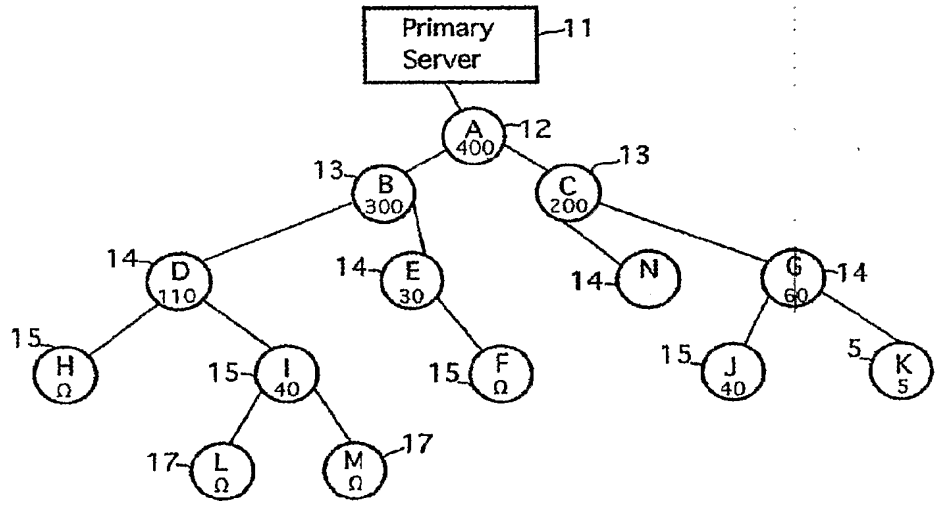


Fig. 22

DISH EXHIBIT 2002, Page 580
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

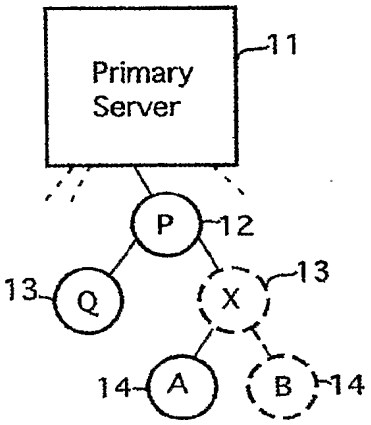


Fig. 23

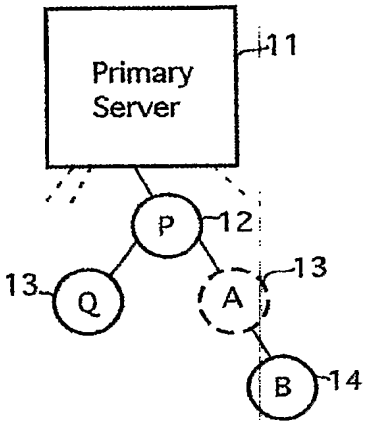


Fig. 24

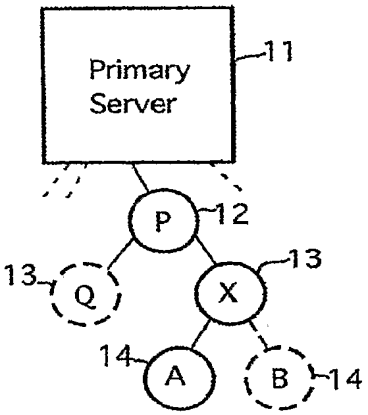


Fig. 25

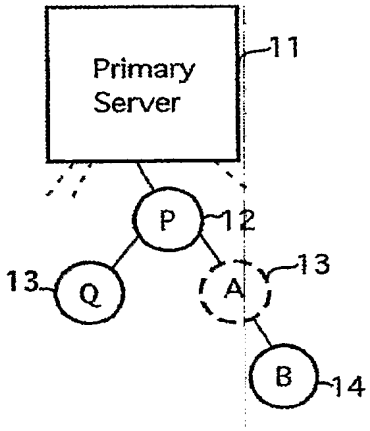


Fig. 26

DISH EXHIBIT 2002, Page 581
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

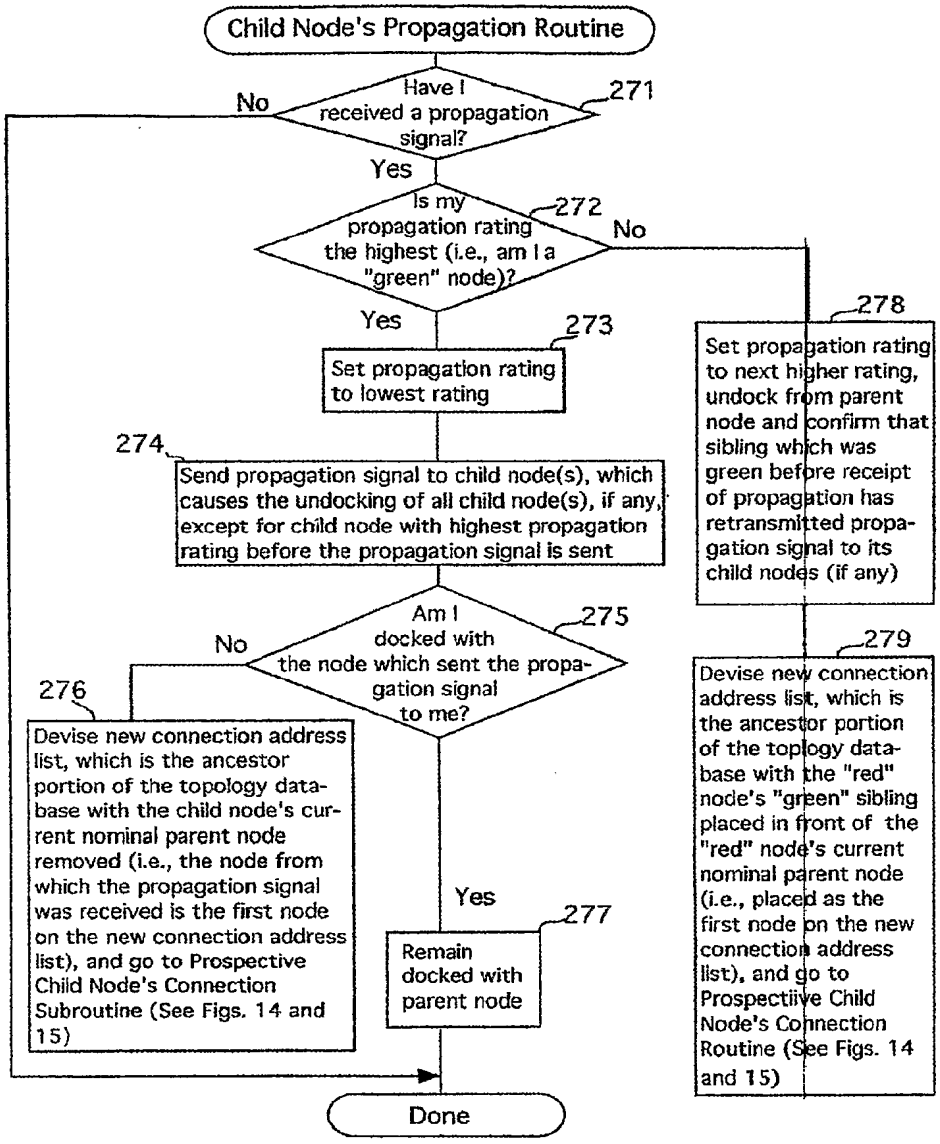


Fig. 27

DISH EXHIBIT 2002, Page 582
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

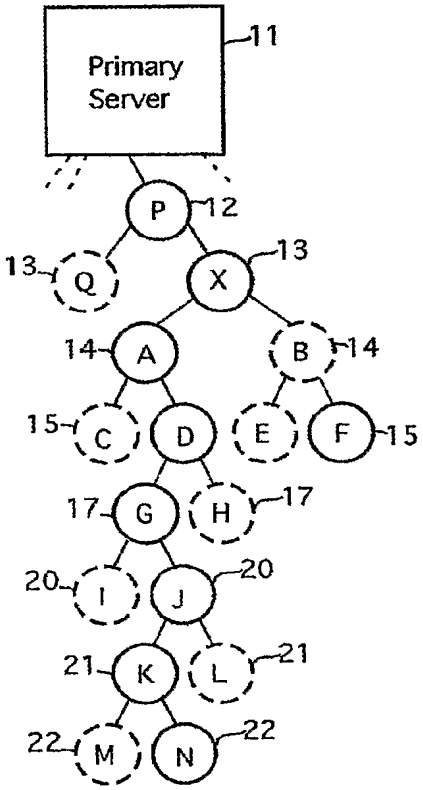


Fig. 28

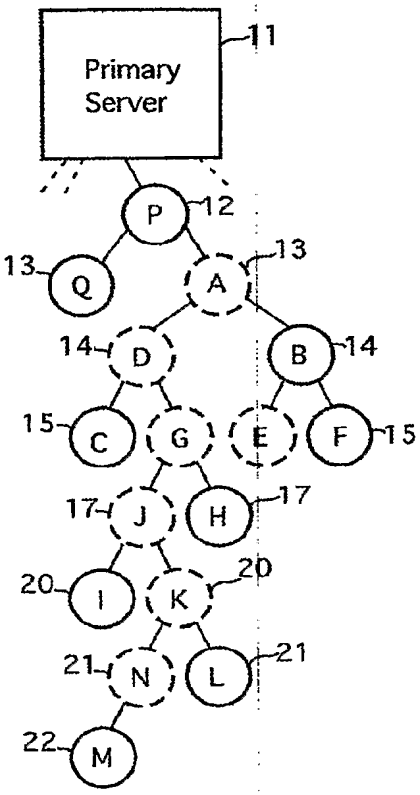


Fig. 29

DISH EXHIBIT 2002, Page 583
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

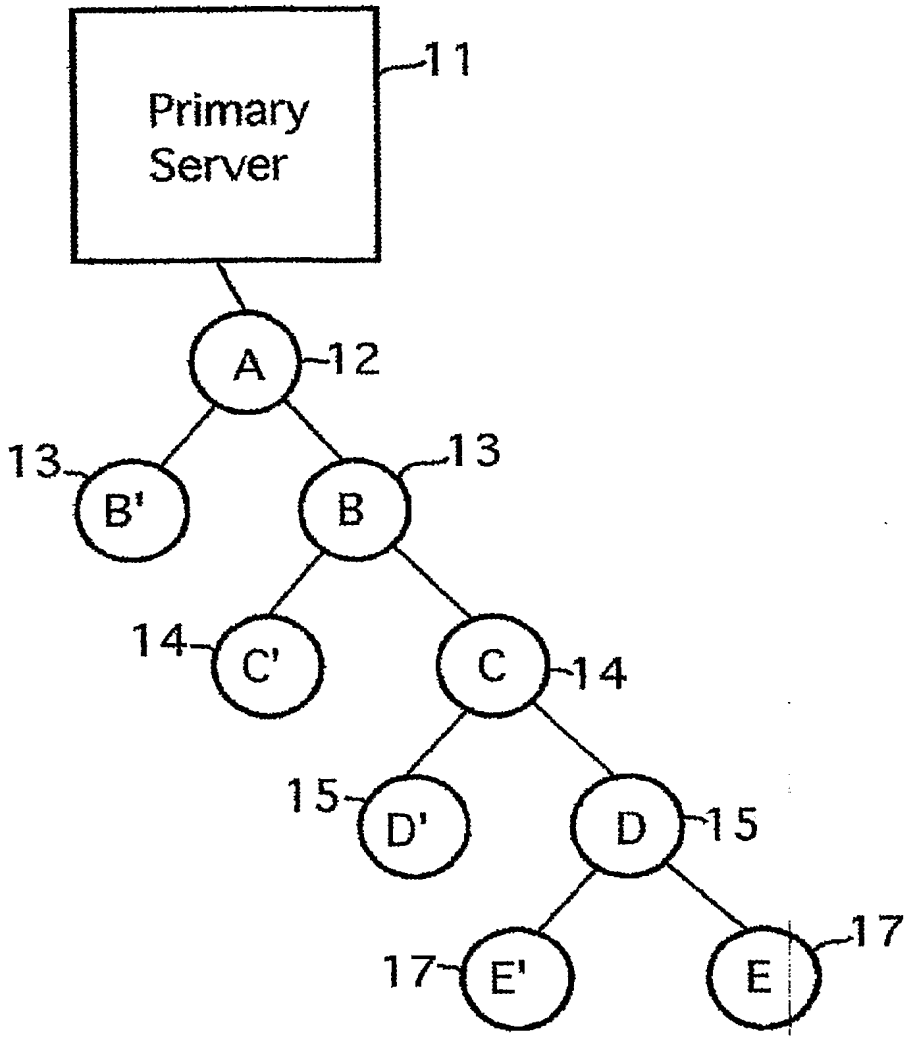


Fig. 30

DISH EXHIBIT 2002, Page 584
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

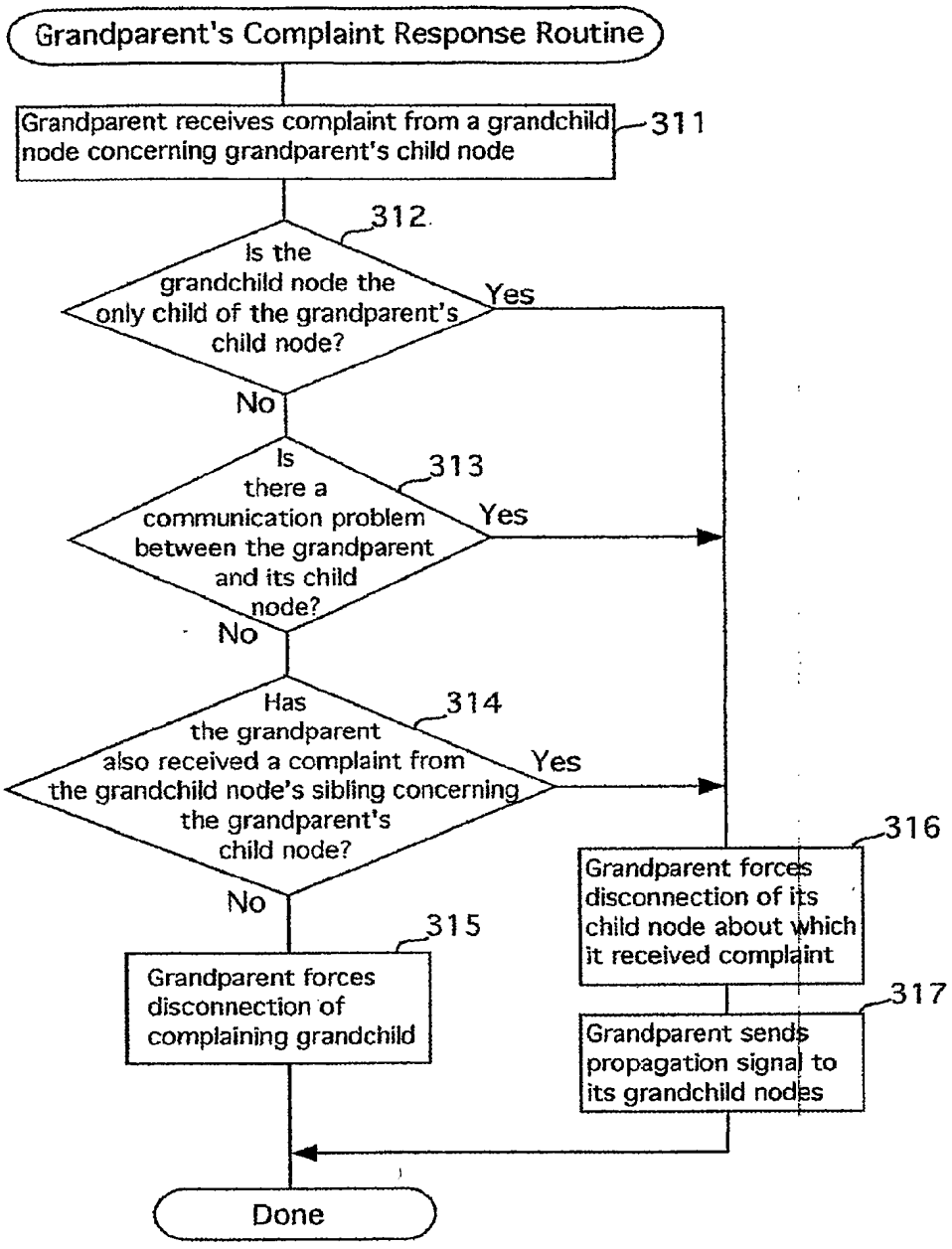


Fig. 31

DISH EXHIBIT 2002, Page 585
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

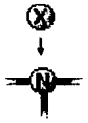


Fig. 32

Fig. 33A

Fig. 33B

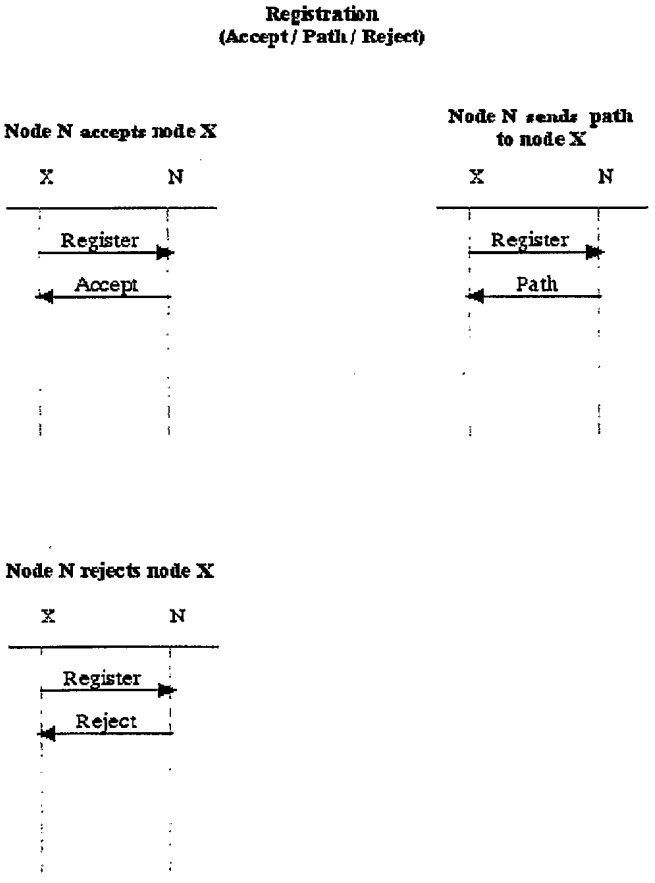


Fig. 33C

DISH EXHIBIT 2002, Page 586
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 34A

Fig. 34B

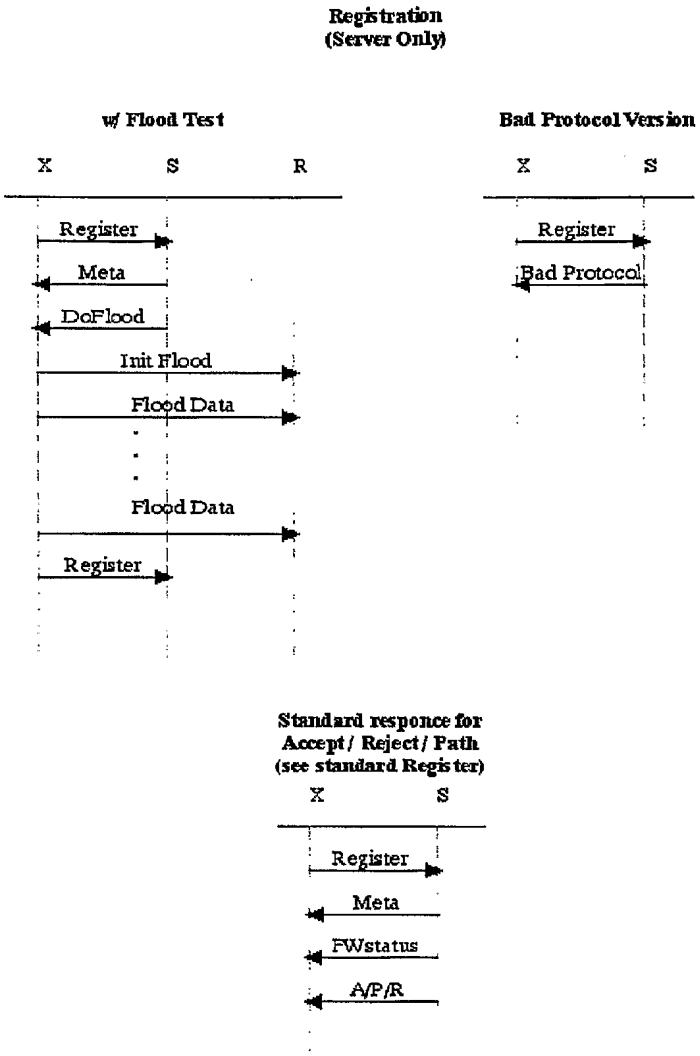


Fig. 34C

DISH EXHIBIT 2002, Page 587
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 35A

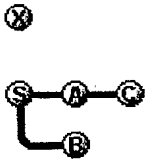
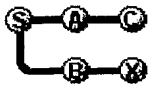


Fig. 35B



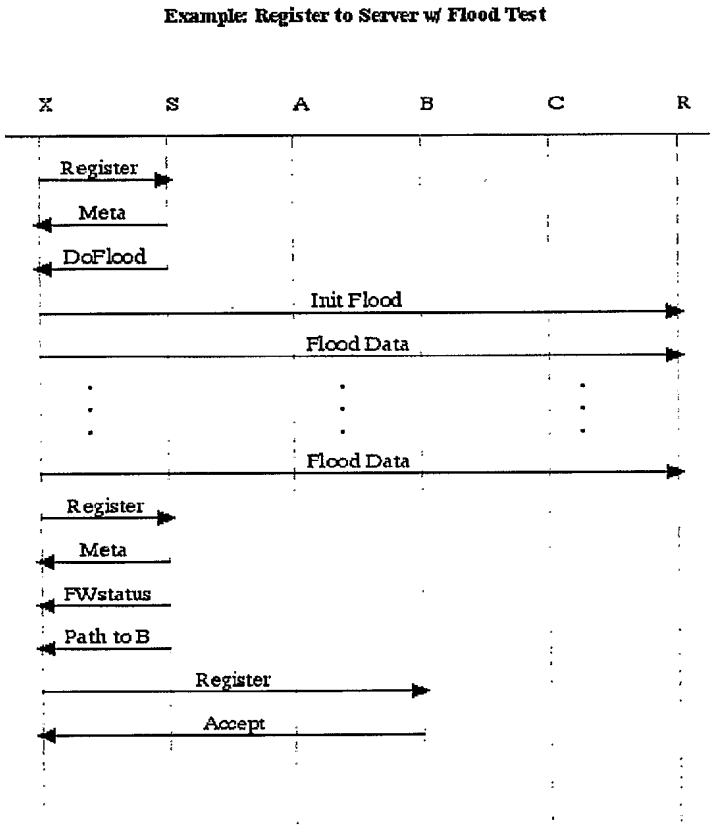
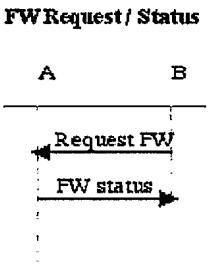


Fig. 36

DISH EXHIBIT 2002, Page 588
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 37

Fig. 38



DISH EXHIBIT 2002, Page 589
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 39A

Fig. 39B

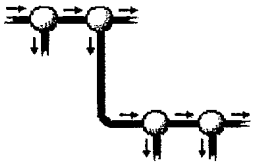
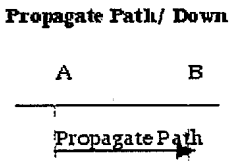


Fig. 40



DISH EXHIBIT 2002, Page 590
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 41A

Fig. 41B

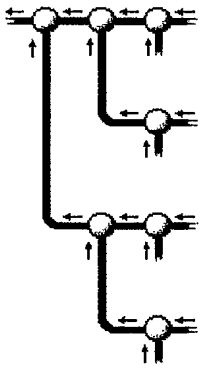
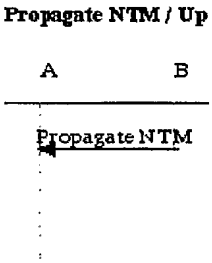


Fig. 42



DISH EXHIBIT 2002, Page 591
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 43

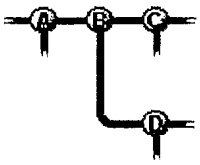
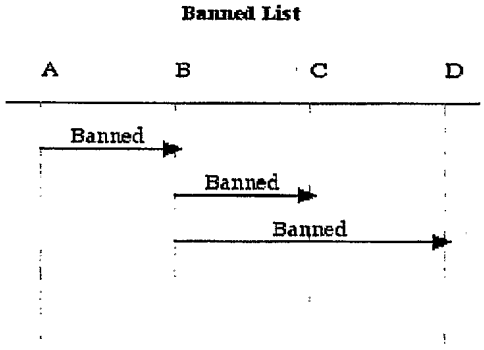
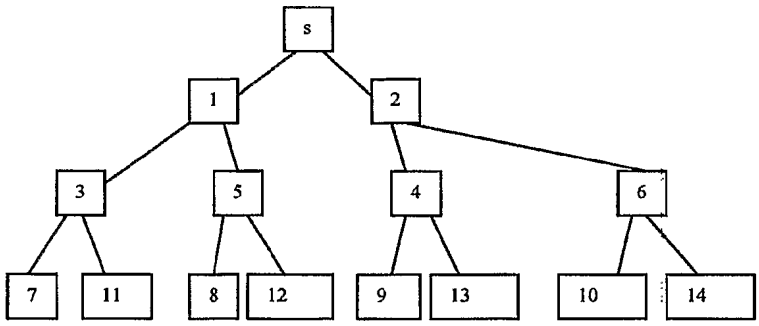


Fig. 44



DISH EXHIBIT 2002, Page 592
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 43



DISH EXHIBIT 2002, Page 593
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Fig. 46A

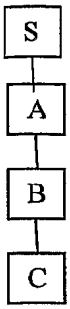


Fig. 46B

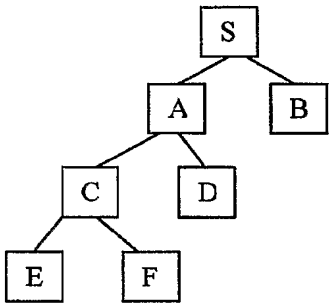
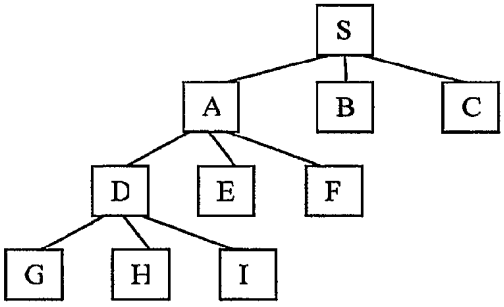


Fig. 46C



DISH EXHIBIT 2002, Page 594
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial. No.:	16/876,579	Confirmation No.:	3720
Examiner:	Chirag R. Patel	Art Unit:	2454
Filed:	05/18/2020	Customer No.:	70560

Title: **APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING**

Attorney Docket No.: 066.0141x1C9

RESPONSE AND AMENDMENT
FILED UNDER 37 C.F.R. § 1.111

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

FILED ELECTRONICALLY USING THE PTO-EFS SYSTEM

Commissioner:

In response to the Office Action mailed on June 18, 2020 (for which the period for response has been extended until November 18, 2020), please consider the remarks below under 37 C.F.R. § 1.111.

REMARKS begin on page 2.

DISH EXHIBIT 2002, Page 595
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Electronic Patent Application Fee Transmittal

Application Number:	16876579
Filing Date:	18-May-2020
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Filer:	Brett Carlson
Attorney Docket Number:	066.0141X1C9

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	1252	1	640	640
Miscellaneous:				
			Total in USD ($)	**640**

Electronic Acknowledgement Receipt

EFS ID:	41163337
Application Number:	16876579
International Application Number:	
Confirmation Number:	3720
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Customer Number:	70560
Filer:	Brett Carlson
Filer Authorized By:	
Attorney Docket Number:	066.0141X1C9
Receipt Date:	18-NOV-2020
Filing Date:	18-MAY-2020
Time Stamp:	19:22:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$640
RAM confirmation Number	E2020AHJ23070661
Deposit Account	
Authorized User	

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20201118_Response_06-0141X1C9.pdf	139680 66bad8e59fbd570342941e07ac613a6748aea593	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	2	3
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	30996 b1ee06c1c8a073a67ee1e5b25794e903dc65f646	no	2

Warnings:

Information:

Total Files Size (in bytes):	170676

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.

REMARKS

This is a response to the above-reference application, which has been granted Track One status. No amendments are made, so no new matter has been added.

Allowable Subject Matter

We appreciate the Examiner's acknowledgement that all claims are allowable but for the double patenting rejection addressed below.

Double Patenting Rejection

The only issue raised by the Office Action is a double patenting rejection citing the issued parent to this application, US Patent No. 10,469,554. The Office Action states that the rejection can be overcome with a terminal disclaimer, which is being filed under separate cover.

After entry of the terminal disclaimer, the rejection is believed to be moot. If there are any issues with the terminal disclaimer or associated fee payment, however, or if any additional disclaimers are needed, the Examiner is invited to contact the undersigned via telephone at 480.241.8219 (mobile) or 480.385.5069 (office).

Information Disclosure Statement

A large information disclosure statement has been submitted under separate cover. Almost all of the references cited are already of record from the parent applications to this matter, but Applicant desires that the art be printed on the front of the issued patent. If there are questions about the IDS or any of the cited art, the undersigned would welcome a telephone call.

Conclusion

Should any issues remain, we would welcome a telephone call to - (480) 385-5069 or an email to bcarlson@lkglobal.com. *Recognizing that Internet communications are not secure, we hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. We understand that a copy of*

DISH EXHIBIT 2002, Page 600
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

these communications will be made of record in the application file. (MPEP 502.03). Without limiting the foregoing, we further authorize the use of email for informal correspondence, including the exchange of proposed amendments or other draft documents.

Respectfully submitted,

LORENZ & KOPF, LLC

Dated: November 18, 2020

By: /Brett A. Carlson /
Brett A. Carlson
Reg. No. 39,928

bcarlson@lkglobal.com
480-385-5069 (direct)
480-241-8219 (mobile)
480-385-5060 (general)

LKGLOBAL is LORENZ & KOPF, LLC
Customer No. 70560

DISH EXHIBIT 2002, Page 601
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial. No.:	16/876,579	Confirmation No.:	3720
Examiner:	Chirag R. Patel	Art Unit:	2454
Filed:	05/18/2020	Customer No.:	70560

Title: **APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING**

Attorney Docket No.: 066.0141x1C9

SUPPLEMENTAL RESPONSE

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

FILED ELECTRONICALLY USING THE PTO-EFS SYSTEM

Commissioner:

In further response to the Office Action mailed on June 18, 2020 (for which the period for response has already been extended until November 18, 2020 in our response submitted earlier today), please consider the remarks below under 37 C.F.R. § 1.111, or any other appropriate rule.

REMARKS begin on page 2.

DISH EXHIBIT 2002, Page 602
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Electronic Acknowledgement Receipt

EFS ID:	41163515
Application Number:	16876579
International Application Number:	
Confirmation Number:	3720
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Customer Number:	70560
Filer:	Brett Carlson
Filer Authorized By:	
Attorney Docket Number:	066.0141X1C9
Receipt Date:	18-NOV-2020
Filing Date:	18-MAY-2020
Time Stamp:	19:46:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		20201118_SupplementalResponse_06-0141X1C9.pdf	136880 2c295b10580c97399fbd862f4473ed8031ba5c9f	yes	2

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Applicant Arguments/Remarks Made in an Amendment	2	2
	Supplemental Response or Supplemental Amendment	1	1
Warnings:			
Information:			
	Total Files Size (in bytes):	136880	

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.

REMARKS

Upon further review of our previously-filed response, it was discovered that we neglected to respond to the double patenting rejection alleging that our claims are verbatim identical to those of the issued parent, US Patent No. 10,469,554. We respectfully disagree: at the very least, the independent claims differ because the "video" referenced in present claim is not necessarily restricted to "live action" video, as in the cited parent. Even to the extent that dependent claims may overlap, this is remediable with a terminal disclaimer.

We are submitting terminal disclaimers citing both US Patent No. 10,489,554 and US Patent No. 10,489,555. Again, if the Examiner has any questions or suggestions to advance prosecution, the undersigned would welcome a telephone call.

Conclusion

Should any issues remain, we would welcome a telephone call to - (480) 385-5069 or an email to bcarlson@lkglobal.com. *Recognizing that Internet communications are not secure, we hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. We understand that a copy of these communications will be made of record in the application file. (MPEP 502.03). Without limiting the foregoing, we further authorize the use of email for informal correspondence, including the exchange of proposed amendments or other draft documents.*

Respectfully submitted,

LORENZ & KOPF, LLC

Dated: November 18, 2020

By: /Brett A. Carlson /
Brett A. Carlson
Reg. No. 39,928

bcarlson@lkglobal.com
480-385-5069 (direct)
480-241-8219 (mobile)
480-385-5060 (general)

LKGLOBAL is LORENZ & KOPF, LLC
Customer No. 70560

DISH EXHIBIT 2002, Page 605
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	16876579
Filing Date	18-May-2020
First Named Inventor	DAVID BRUECK
Attorney Docket Number	066.0141X1C9
Title of Invention	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING

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

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

Owner	Percent Interest
DISH TECHNOLOGIES LLC	100%

The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

10469555

10469554

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request. ○ I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.	
Applicant claims the following fee status: ○ Small Entity ○ Micro Entity ◉ Regular Undiscounted I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.	
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application Registration Number 39928 ○ A sole inventor ○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ○ A joint inventor; all of whom are signing this request	
Signature	/BRETT A. CARLSON/
Name	/BRETT A. CARLSON/

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

Electronic Patent Application Fee Transmittal

Application Number:	16876579
Filing Date:	18-May-2020
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Filer:	Brett Carlson/Julie Graf
Attorney Docket Number:	066.0141X1C9

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	1814	1	170	170
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**170**

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

Application No.: 16876579

Filing Date: 18-May-2020

Applicant/Patent under Reexamination: BRUECK

Electronic Terminal Disclaimer filed on November 19, 2020

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

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

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt

EFS ID:	41166947
Application Number:	16876579
International Application Number:	
Confirmation Number:	3720
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Customer Number:	70560
Filer:	Brett Carlson/Julie Graf
Filer Authorized By:	Brett Carlson
Attorney Docket Number:	066.0141X1C9
Receipt Date:	19-NOV-2020
Filing Date:	18-MAY-2020
Time Stamp:	11:10:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$170
RAM confirmation Number	E2020AIB10535159
Deposit Account	
Authorized User	

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

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	33611 2490b4dad50041890c6ab95030e5658250eaecf2	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30458 be55c8697533e89844cc242bcc44d4d00ebf6e08	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	64069		

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/876,579	05/18/2020	DAVID F. BRUECK	066.0141X1C9	3720

70560 7590 02/05/2021

LKGLOBAL (Dish Technologies L.L.C.)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

EXAMINER
PATEL, CHIRAG R

ART UNIT	PAPER NUMBER
2454	

NOTIFICATION DATE	DELIVERY MODE
02/05/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dish@lkglobal.com
ipdept@dish.com

Office Action Summary	Application No. 16/876,579	Applicant(s) BRUECK et al.	
	Examiner CHIRAG R PATEL	Art Unit 2454	AIA (FITF) Status No

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 18 November 2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-30 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-30 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date 11/17/20, 11/17/20, 11/17/20.

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

4) ☐ Other: _____.

DISH EXHIBIT 2002, Page 614
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Notice of Pre-AIA or AIA Status

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

Double Patenting

A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process... may obtain a patent therefor..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the claims that are directed to the same invention so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

Claims 1-2, 4-21, 23-26, 28 and 30 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-5, 7, 9-13, 16-19 and 23-28 of U.S. Patent No. 10,469,554. This is a statutory double patenting rejection.

Claims 1 and 2 of the instant application are a verbatim of claim 1 of the patent.

Claim 4 of the instant application is a verbatim of claim 2 of the patent.

Claim 5 of the instant application is a verbatim of claim 3 of the patent.

Claim 6 of the instant application is a verbatim of claim 4 of the patent.

Claim 7 of the instant application is a verbatim of claim 5 of the patent.

Claim 8 of the instant application is a verbatim of claim 7 of the patent.

Claim 11 of the instant application is a verbatim of claim 9 of the patent.

Claim 12 of the instant application is a verbatim of claim 10 of the patent.

Claim 13 of the instant application is a verbatim of claim 11 of the patent.

Claim 14 of the instant application is a verbatim of claim 12 of the patent.

Claim 15 of the instant application is a verbatim of claim 13 of the patent.

Claims 14 and 21 of the instant application are a verbatim of claim 16 of the patent.

Claim 15 of the instant application is a verbatim of claim 17 of the patent.

Claim 16 of the instant application is a verbatim of claim 18 of the patent.

Claim 17 of the instant application is a verbatim of claim 19 of the patent.

Claim 18 of the instant application is a verbatim of claim 23 of the patent.

Claim 19 of the instant application is a verbatim of claim 24 of the patent.

Claim 20 of the instant application is a verbatim of claim 25 of the patent.

Claims 23 and 26 of the instant application are a verbatim of claim 26 of the patent.

Claim 24 of the instant application is a verbatim of claim 27 of the patent.

Claim 25 of the instant application is a verbatim of claim 28 of the patent.

Claim 23 of the instant application is a verbatim of claim 26 of the patent.

Claims 28 and 30 of the instant application are a verbatim of claim 26 of the patent.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter: A thorough review of the prior art fails to disclose or render obvious, “wherein the first streamlet of each of the groups of streamlets has the same first duration and encodes the same first portion of the video in each of the low quality stream, the medium quality stream, and the high quality stream, and wherein the first streamlet of the low quality stream encodes the same first portion of the video at a different bitrate than the first streamlet of the high quality stream and the first streamlet of the medium quality stream.”

Response to Arguments

Applicant's arguments filed November 18, 2020 have been fully considered but they are not persuasive.

Applicants state, "The only issue raised by the Office Action is a double patenting rejection citing the issued parent to this application, US Patent No. 10,469,554. The Office Action states that the rejection can be overcome with a terminal disclaimer, which is being filed under separate cover"

Examiner removes the obvious double patent rejections in response to the terminal disclaimer filed for US Patent No. 10,469,555. However, a terminal disclaimer does not remove a statutory double patent rejection, which applied to U.S. Patent 10,469,554. The statutory double patent rejections were not addressed in applicant's response.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chirag R Patel whose telephone number is (571)272-7966. The examiner can normally be reached on Monday to Friday from 8:00AM to 4:30PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess, can be reached on 571-272-3949. 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://pairdirect.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).

/Chirag R Patel/
Primary Examiner, Art Unit 2454

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/876,579	BRUECK et al.
	Examiner	Art Unit
	CHIRAG R PATEL	2454

CPC - Searched*		
Symbol	Date	Examiner
(H04N21/2662, H04N21/8456, H04L65/607,H04L65/608, H04L67/02	06/12/2020	C.P.

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST	06/12/2020	C.P.
EAST	02/01/2021	C.P.

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

DISH EXHIBIT 2002, Page 619
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/876,579	BRUECK et al.
	Examiner	Art Unit
	CHIRAG R PATEL	2454

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

CLAIMS

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

CLAIM		DATE								
Final	Original	06/12/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								
	21	✓								
	22	✓								
	23	✓								
	24	✓								
	25	✓								
	26	✓								
	27	✓								
	28	✓								
	29	✓								
	30	✓								

DISH EXHIBIT 2002, Page 620
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	("10,469,554").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/01 16:44
L2	1	("10,469,555").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/01 16:47
L3	211	("20010013128" | "20010047423" | "20020029274" | "20020073167" | "20020091840" | "20020097750" | "20020131496" | "20020144276" | "20020152317" | "20020152318" | "20020156912" | "20020161898" | "20020161908" | "20020161911" | "20020169926" | "20020174434" | "20020176418" | "20020178330" | "20020188745" | "20030005455" | "20030014684" | "20030018966" | "20030021166" | "20030021282" | "20030055995" | "20030065803" | "20030067872" | "20030081582" | "20030093790" | "20030107994" | "20030135631" | "20030135863" | "20030140159" | "20030151753" | "20030152036" | "20030154239" | "20030195977" | "20030204519" | "20030204602" | "20030233464" | "20030236904" | "20040003101" | "20040010613" | "20040030547" | "20040030599" | "20040030797" | "20040031054" | "20040049780" | "20040054551" | "20040071209" | "20040083283" | "20040093420" | "20040103444" | "20040117427" | "20040143672" | "20040168052" | "20040170392" | "20040179032" | "20040199655" | "20040220926" | "20040221088" | "20040260701" | "20040267956" | "20050015509" | "20050033855" | "20050055425" | "20050066063" | "20050076136" | "20050084166" | "20050108414" | "20050120107" | "20050123058" | "20050185578" | "20050188051" |	US-PGPUB; USPAT	OR	ON	2021/02/01 16:51

"20050204046" | "20050251832" |
"20050262257" | "20060010003" |
"20060059223" | "20060075446" |
"20060080718" | "20060130118" |
"20060133809" | "20060165166" |
"20060168290" | "20060206246" |
"20060236219" | "20060277564" |
"20061068295" | "20070024705" |
"20070030833" | "20070067480" |
"20070079325" | "20070094405" |
"20070204310" | "20070280255" |
"20080028428" | "20080037527" |
"20080046939" | "20080056373" |
"20080104647" | "20080120330" |
"20080120342" | "20080133766" |
"20080162713" | "20080184688" |
"20080195744" | "20080205291" |
"20080219151" | "20080222235" |
"20080263180" | "20080281803" |
"20090043906" | "20090055471" |
"20090055547" | "20090210549" |
"20100098103" | "20100262711" |
"20110307545" | "20150058496" |
"4535355" | "5168356" | "5267334" |
"5404446" | "5687095" | "5732183" |
"57685627" | "5841432" | "5953506" |
"6091775" | "6091777" | "6122660" |
"6172672" | "6185736" | "6195680" |
"6366614" | "6374289" | "6389473" |
"6449719" | "6486803" | "6490627" |
"6510553" | "6574591" | "6604118" |
"6618752" | "6708213" | "6721723" |
"6731600" | "6757796" | "6760772" |
"6795863" | "6845107" | "6850965" |
"6859839" | "6874015" | "6968387" |
"6976090" | "7054365" | "7054774" |
"7054911" | "7075986" | "7093001" |
"7096271" | "7099954" | "7116894" |
"7174385" | "7194549" | "7240100" |
"7260640" | "7274740" | "7295520" |
"7310678" | "7325073" | "7328243" |
"7330908" | "7334044" | "7349358" |
"7349976" | "7369610" | "7376747" |
"7391717" | "7408984" | "7412531" |
"7477688" | "7523181" | "7536469" |
"7546355" | "7558869" | "7577750" |
"7593333" | "7599307" | "7609652" |
"7653735" | "7707303" | "7719985" |
"7760801" | "7779135" | "7788395" |
"7797439" | "7817985" | "7818444" |
"7925781" | "8036265" | "8370514" |
"8402156" | "8521836" | "8612624" |

		"8683066" | "8686066" | "8868772" | "8880721" | "9344496" | "9462074").PN.				
L4	211	("20010013128" | "20010047423" | "20020029274" | "20020073167" | "20020091840" | "20020097750" | "20020131496" | "20020144276" | "20020152317" | "20020152318" | "20020156912" | "20020161898" | "20020161908" | "20020161911" | "20020169926" | "20020174434" | "20020176418" | "20020178330" | "20020188745" | "20030005455" | "20030014684" | "20030018966" | "20030021166" | "20030021282" | "20030055995" | "20030065803" | "20030067872" | "20030081582" | "20030093790" | "20030107994" | "20030135631" | "20030135863" | "20030140159" | "20030151753" | "20030152036" | "20030154239" | "20030195977" | "20030204519" | "20030204602" | "20030233464" | "20030236904" | "20040003101" | "20040010613" | "20040030547" | "20040030599" | "20040030797" | "20040031054" | "20040049780" | "20040054551" | "20040071209" | "20040083283" | "20040093420" | "20040103444" | "20040117427" | "20040143672" | "20040168052" | "20040170392" | "20040179032" | "20040199655" | "20040220926" | "20040221088" | "20040260701" | "20040267956" | "20050015509" | "20050033855" | "20050055425" | "20050066063" | "20050076136" | "20050084166" | "20050108414" | "20050120107" | "20050123058" | "20050185578" | "20050188051" | "20050204046" | "20050251832" | "20050262257" | "20060010003" | "20060059223" | "20060075446" | "20060080718" | "20060130118" | "20060133809" | "20060165166" | "20060168290" | "20060206246" | "20060236219" | "20060277564" | "20061068295" | "20070024705" | "20070030833" | "20070067480" | "20070079325" | "20070094405" | "20070204310" | "20070280255" | "20080028428" | "20080037527" | "20080046939" | "20080056373" |	US-PGPUB; USPAT	OR	ON	2021/02/01 16:52

		"20080104647" | "20080120330" | "20080120342" | "20080133766" | "20080162713" | "20080184688" | "20080195744" | "20080205291" | "20080219151" | "20080222235" | "20080263180" | "20080281803" | "20090043906" | "20090055471" | "20090055547" | "20090210549" | "20100098103" | "20100262711" | "20110307545" | "20150058496" | "4535355" | "5168356" | "5267334" | "5404446" | "5687095" | "5732183" | "57685627" | "5841432" | "5953506" | "6091775" | "6091777" | "6122660" | "6172672" | "6185736" | "6195680" | "6366614" | "6374289" | "6389473" | "6449719" | "6486803" | "6490627" | "6510553" | "6574591" | "6604118" | "6618752" | "6708213" | "6721723" | "6731600" | "6757796" | "6760772" | "6795863" | "6845107" | "6850965" | "6859839" | "6874015" | "6968387" | "6976090" | "7054365" | "7054774" | "7054911" | "7075986" | "7093001" | "7096271" | "7099954" | "7116894" | "7174385" | "7194549" | "7240100" | "7260640" | "7274740" | "7295520" | "7310678" | "7325073" | "7328243" | "7330908" | "7334044" | "7349358" | "7349976" | "7369610" | "7376747" | "7391717" | "7408984" | "7412531" | "7477688" | "7523181" | "7536469" | "7546355" | "7558869" | "7577750" | "7593333" | "7599307" | "7609652" | "7653735" | "7707303" | "7719985" | "7760801" | "7779135" | "7788395" | "7797439" | "7817985" | "7818444" | "7925781" | "8036265" | "8370514" | "8402156" | "8521836" | "8612624" | "8683066" | "8686066" | "8868772" | "8880721" | "9344496" | "9462074").PN.				
L5	17	(("5267334") or ("5404446") or ("5841432") or ("5389473") or ("6172672") or ("20020156912") or ("20030055995") or ("20030233464") or ("20020131496") or ("20030135863")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2021/02/01 16:57
L6	211	("20010013128" | "20010047423" | "20020029274" | "20020073167" | "20020091840" | "20020097750" | "20020131496" | "20020144276" | "20020152317" | "20020152318" |	US-PGPUB; USPAT	OR	ON	2021/02/01 16:58

"20020156912"	"20020161898"
"20020161908"	"20020161911"
"20020169926"	"20020174434"
"20020176418"	"20020178330"
"20020188745"	"20030005455"
"20030014684"	"20030018966"
"20030021166"	"20030021282"
"20030055995"	"20030065803"
"20030067872"	"20030081582"
"20030093790"	"20030107994"
"20030135631"	"20030135863"
"20030140159"	"20030151753"
"20030152036"	"20030154239"
"20030195977"	"20030204519"
"20030204602"	"20030233464"
"20030236904"	"20040003101"
"20040010613"	"20040030547"
"20040030599"	"20040030797"
"20040031054"	"20040049780"
"20040054551"	"20040071209"
"20040083283"	"20040093420"
"20040103444"	"20040117427"
"20040143672"	"20040168052"
"20040170392"	"20040179032"
"20040199655"	"20040220926"
"20040221088"	"20040260701"
"20040267956"	"20050015509"
"20050033855"	"20050055425"
"20050066063"	"20050076136"
"20050084166"	"20050108414"
"20050120107"	"20050123058"
"20050185578"	"20050188051"
"20050204046"	"20050251832"
"20050262257"	"20060010003"
"20060059223"	"20060075446"
"20060080718"	"20060130118"
"20060133809"	"20060165166"
"20060168290"	"20060206246"
"20060236219"	"20060277564"
"20061068295"	"20070024705"
"20070030833"	"20070067480"
"20070079325"	"20070094405"
"20070204310"	"20070280255"
"20080028428"	"20080037527"
"20080046939"	"20080056373"
"20080104647"	"20080120330"
"20080120342"	"20080133766"
"20080162713"	"20080184688"
"20080195744"	"20080205291"
"20080219151"	"20080222235"
"20080263180"	"20080281803"
"20090043906"	"20090055471"
"20090055547"	"20090210549"

		"20100098103" | "20100262711" | "20110307545" | "20150058496" | "4535355" | "5168356" | "5267334" | "5404446" | "5687095" | "5732183" | "57685627" | "5841432" | "5953506" | "6091775" | "6091777" | "6122660" | "6172672" | "6185736" | "6195680" | "6366614" | "6374289" | "6389473" | "6449719" | "6486803" | "6490627" | "6510553" | "6574591" | "6604118" | "6618752" | "6708213" | "6721723" | "6731600" | "6757796" | "6760772" | "6795863" | "6845107" | "6850965" | "6859839" | "6874015" | "6968387" | "6976090" | "7054365" | "7054774" | "7054911" | "7075986" | "7093001" | "7096271" | "7099954" | "7116894" | "7174385" | "7194549" | "7240100" | "7260640" | "7274740" | "7295520" | "7310678" | "7325073" | "7328243" | "7330908" | "7334044" | "7349358" | "7349976" | "7369610" | "7376747" | "7391717" | "7408984" | "7412531" | "7477688" | "7523181" | "7536469" | "7546355" | "7558869" | "7577750" | "7593333" | "7599307" | "7609652" | "7653735" | "7707303" | "7719985" | "7760801" | "7779135" | "7788395" | "7797439" | "7817985" | "7818444" | "7925781" | "8036265" | "8370514" | "8402156" | "8521836" | "8612624" | "8683066" | "8686066" | "8868772" | "8880721" | "9344496" | "9462074").PN.				
L7	0	(L3 L4 L5 L6) and streamlet with "same" near2 duration	US-PGPUB; USPAT	OR	ON	2021/02/01 17:05
L8	7	(L3 L4 L5 L6) and streamlet with duration	US-PGPUB; USPAT	OR	ON	2021/02/01 17:06
L9	46	(("8521836") or ("7558869") or ("7707303") or ("7925781") or ("8880721") or ("9344496") or ("8683066") or ("8686066") or ("6708213") or ("6757796") or ("9462074") or ("20050033855") or ("20030093790") or ("20030195977") or ("20040199655") or ("20040267956") or ("20040220926") or ("20060010003") or ("20060277564") or ("20150058496") or ("20100262711") or ("20050251832") or ("20040221088") or ("20040179032") or	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2021/02/01 17:13

		("20020161908") or ("20030021282") or ("20080120330") or ("20080120342") or ("20110307545") or ("20050262257") or ("20030236904")).PN.				
L10	0	(l5 l6 l9) and streamlet with multiple near2 bitrates with duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:14
L11	0	streamlet with multiple near2 bitrates with duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:14
L12	27	streamlet with multiple near2 bitrates	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:15
L13	27	streamlet with multiple near2 bitrates and duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:15
S1	1	("10659513").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 07:55
S2	8	(("9571551") or ("9071668") or ("8612624") or ("8402156") or ("7818444") or ("8868772") or ("10469554") or ("10659513")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 07:58
S3	2	(("73369610") or ("20050055425") or ("20030103571")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:29
S4	3	(("7369610") or ("20050055425") or ("20030103571")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:30
S5	27	encod$3 near2 streamlets with bitrates	US-PGPUB; USPAT; USOCR;	OR	ON	2020/06/12 10:36

			FPRS; EPO			
S6	1	("9751551").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:45
S7	1	("9571551").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:46
S8	1	("8402156").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:53
S9	1	("7818444").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:55
S10	7	(("20080162713") or ("20040170392") or ("20040143672") or ("6486803") or ("20030204519") or ("6486803") or ("20030005455") or ("20040054551") or ("20040170392")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 11:02
S11	54	streamlets with bitrates	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 11:33
S12	74	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 12:37
S13	0	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3 and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:03
S14	5	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlets and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:03

S15	33,997	portions with stream and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:28
S16	1,761,238	portions with stream with bitrat$3and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:29
S17	24	portions with stream with bitrat$3 and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:29
S18	2	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and divid$3 with stream same bitrate and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:30
S19	3	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and (divid$3 split$3)with stream same bitrate and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:30
S20	1	("10469554").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 14:26
S21	1	("10469554").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 14:44
S22	1	("10469555").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 14:47

EAST Search History (Interference)

<This search history is empty>

2/1/2021 5:15:38 PM
C:\Users\cpatel\Documents\EAST\Workspaces\16876579.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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	8521836	B2	2013-08-27	Kewalramani et al.	
	2	7558869	B2	2009-07-07	Leon et al.	
	3	7707303	B2	2010-04-27	Albers et al.	
	4	7925781	B1	2011-04-12	Chan et al.	
	5	8880721	B2	2014-11-04	Hurst et al.	
	6	9344496	B2	2016-05-17	Hurst et al.	
	7	8683066	B2	2014-03-25	Hurst et al.	
	8	8686066	B2	2014-04-01	Kwampian et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	9	6708213	B1	2004-03-16	Bommaiah et al.	
	10	6757796	B1	2004-06-29	Hofmann	
	11	9462074	B2	2016-10-04	Guo 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	20050033855	A1	2005-02-10	Moradi et al.	
	2	20030093790	A1	2003-05-15	Logan et al.	
	3	20030195977	A1	2003-10-16	Liu et al.	
	4	20040199655	A1	2004-10-07	Davies et al.	
	5	20040267956	A1	2004-12-30	Leon et al.	
	6	20040220926	A1	2004-11-04	Lamkin et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

DISH EXHIBIT 2002, Page 632
Ayla Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	7	20060010003	A1	2006-01-12	Kruse	
	8	20060277564	A1	2006-12-07	Jarman	
	9	20150058496	A1	2015-02-26	Hurst et al.	
	10	20100262711	A1	2010-10-14	Bouazizi	
	11	20050251832	A1	2005-11-10	Chiueh	
	12	20040221088	A1	2004-11-04	Lisitsa et al.	
	13	20040179032	A1	2004-09-16	Huang	
	14	20020161908	A1	2002-10-31	Benitez et al.	
	15	20030021282	A1	2003-01-30	Hospodor	
	16	20080120330	A1	2008-05-22	Reed et al.	
	17	20080120342	A1	2008-05-22	Reed et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/
DISH EXHIBIT 2002, Page 633
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	18	20110307545	A1	2011-12-15	BOUAZIZI	
	19	20050262257	A1	2005-11-24	Major et al.	
	20	20030236904	A1	2003-12-25	Walpole 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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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	Krasic et al., QUALITY-ADAPTIVE MEDIA STREAMING BY PRIORITY DROP, Oregon Graduate Institute, 2001.	☓
	2	Krasic et al., QoS SCALABILITY FOR STREAMED MEDIA DELIVERY, Oregon Graduate Institute School of Science & Engineering Technical Report CSE 99-011, September 1999.	☒
	3	Huang et al., ADAPTIVE LIVE VIDEO STREAMING BY PRIORITY DROP, Portland State University PDXScholar, July 21, 2003.	☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	4	Walpole et al, A PLAYER FOR ADAPCTIVE MPEG VIDEO STREAMING OVER THE INTERNET, Oregon Graduate Institute of Science and Technology, October 25, 2012.	☒
	5	ALBANESE, ANDREW ET AL. "Priority Encoding Transmission", TR-94-039, August 1994, 36 pgs, International Computer Science Institute, Berkeley, CA.	☒
	6	BIRNEY, BILL "Intelligent Streaming", May 2003, Microsoft.	☒
	7	GOYAL, VIVEK K. "Multiple Description Coding: Compression Meets the Network," September 2001, pgs. 74-93, IEEE Signal Processing Magazine.	☒
	8	ON2 TECHNOLOGIES, INC. "TrueMotion VP7 Video Codec" White Paper, Document Version 1.0, January 10, 2005.	☒
	9	PATHAN, AL-MUKADDIM ET AL. "A Taxonomy and Survey of Content Delivery Networks" Australia, February 2007, available at http://www.gridbus.org/reports/CDN-Taxonomy.pdf.	☒
	10	PURI, ROHIT ET AL. "Multiple Description Source Coding Using Forward Error Correction Codes," October 1999, 5 pgs., Department of Electrical Engineering and Computer Science, University of California, Berkeley, CA.	☒
	11	WICKER, STEPHEN B. "Error Control Systems for Digital Communication and Storage," Prentice-Hall, Inc., New Jersey, USA, 1995, parts 1-6.	☒
	12	LIU, JIANGCHUAN ET AL. "Opportunities and Challenged of Peer-to-Peer Internet Video Broadcast," School of Computing Science, Simon Fraser University, British Columbia, Canada.	☒
	13	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.	☒
	14	MOVE NETWORKS, INC. "The Next Generation Video Publishing System," April 11, 2007; http://www.movenetworks.com/wp-content/uploads/move-networks-publishing-system.pdf.	☒

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	15	YOSHIMURA, TAKESHI ET AL. "Mobile Streaming Media CDN Enabled by Dynamic SMIL", NTT DoCoMo, Multimedia Laboratories and Hewlett-Packard Laboratories,dated May 7-11, 2002, ACM 1-58113-449-5/02/0005; http://www2002.org/CDROM/refereed/515/.	☒
	16	Nguyen, T. et al., Multiple Sender Distributed Video Streaming, IEEE TRANSACTINOS ON MULTIMEDIA, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 6, no. 2, April 1, 2004, pages 315-326, XP011109142, ISSN: 1520-9210, DOI: 10.1109/TMM.2003.822790.	☒

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

EXAMINER SIGNATURE

Examiner Signature	/CHIRAG R PATEL/	Date Considered	02/01/2021

*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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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)	2020-11-16
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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

DISH EXHIBIT 2002, Page 638
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Patel, Chirag R.
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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	7577750	B2	2009-08-18	Shen et al.	
	2	6195680	B1	2001-02-27	Goldszmidt et al.	
	3	6449719	B1	2002-09-10	Baker	
	4	7369610	B2	2008-05-06	Xu et al.	
	5	7408984	B2	2008-08-05	Lu et al.	
	6	7523181	B2	2009-04-21	Swildens et al.	
	7	6976090	B2	2005-12-13	Ben-Shaul et al.	
	8	7240100	B1	2007-07-03	Wein et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	9	6850965	B2	2005-02-01	Allen	
	10	7334044	B1	2008-02-19	Allen	
	11	7760801	B2	2010-07-20	Ghanbari et al.	
	12	7099954	B2	2006-08-29	Li et al.	
	13	6760772	B2	2004-07-06	Zou et al.	
	14	7054911	B1	2006-05-30	Lango et al.	
	15	7797439	B2	2010-09-14	Cherkasova et al.	
	16	7477688	B1	2009-01-13	Zhang et al.	
	17	7054774	B2	2006-05-30	Batterberry et al.	
	18	5168356		1992-12-01	Acampora et al.	
	19	7818444	B2	2010-10-19	Brueck et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

DISH EXHIBIT 2002, Page 640
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Patel, Chirag R.
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	20	7599307	B2	2009-10-06	Seckni et al.	
	21	7093001	B2	2006-08-15	Yang et al.	
	22	6874015	B2	2005-03-29	Kaminsky et al.	
	23	6845107	B1	2005-01-18	Kitazawa et al.	
	24	6185736	B1	2001-02-06	Ueno	
	25	57685627		1998-06-16	Zhu et al.	
	26	7274740	B2	2007-09-25	van Beek et al.	
	27	7546355	B2	2009-06-09	Kalnitsky	
	28	7174385	B2	2007-02-06	Li	
	29	7376747	B2	2008-05-20	Hartop	
	30	7719985	B2	2010-05-18	Lee et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	31	7349358	B2	2008-03-25	Hennessey et al.	
	32	7194549	B1	2007-03-20	Lee et al.	
	33	6374289	B2	2002-04-16	Delaney et al.	
	34	7325073	B2	2008-01-29	Shao et al.	
	35	7609652	B2	2009-10-27	Kellerer et al.	
	36	6795863	B1	2004-09-21	Doty, Jr.	
	37	7817985	B2	2010-10-19	Moon	
	38	7788395	B2	2010-08-31	Bowra et al.	
	39	7536469	B2	2009-05-19	Chou et al.	
	40	7412531	B2	2008-08-12	Lango et al.	
	41	7295520	B2	2007-11-13	Lee et al.	

DISH EXHIBIT 2002, Page 642
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	42	7054365	B2	2006-05-30	Kim et al.	
	43	6122660		2000-09-19	Baransky et al.	
	44	7391717	B2	2008-06-24	Kiemets et al.	
	45	7260640	B1	2007-08-21	Kramer et al.	
	46	7310678	B2	2007-12-18	Gunaseelan et al.	
	47	6618752	B1	2003-09-09	Moore et al.	
	48	6721723	B1	2004-04-13	Gibson et al.	
	49	6859839	B1	2005-02-22	Zahorjan et al.	
	50	7779135	B2	2010-08-17	Hudson et al.	
	51	7593333	B2	2009-09-22	Li et al.	
	52	5953506		1999-09-14	Kalra et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

DISH EXHIBIT 2002, Page 643
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	53	6091775		2000-07-18	Hibi et al.	
	54	6091777		2000-07-18	Guetz et al.	
	55	6195680		2001-02-27	Goldszmidt et al.	
	56	6366614		2002-04-02	Pian et al.	
	57	6389473		2002-05-14	Carmel et al.	
	58	6486803	B1	2002-11-26	Luby et al.	
	59	6490627		2002-12-03	Kalra et al.	
	60	6510553		2003-01-21	Hazra	
	61	6574591		2003-06-03	Kleiman et al.	
	62	6604118		2003-08-05	Kleiman et al.	
	63	6731600		2004-05-04	Patel et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	64	5732183		2004-05-04	Graham	
	65	6968387		2005-11-22	Lanphear	
	66	7075986		2006-07-11	Girod et al.	
	67	7096271		2006-08-22	Omoigui et al.	
	68	7349976		2008-03-25	Glaser et al.	
	69	7408984	B2	2008-08-05	Lu et al.	
	70	4535355		1985-08-13	Arn et al.	
	71	8036265	B1	2011-10-11	Reynolds et al.	
	72	5687095		1997-11-11	Haskell et al.	
	73	7116894	B1	2006-10-03	Chatterton	
	74	7328243	B2	2008-02-05	Yaeger et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

DISH EXHIBIT 2002, Page 645
Avlo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	75	7330908	B2	2008-02-12	Jungek	
	76	7653735	B2	2010-01-26	Mandato et al.	
	77	8612624	B2	2013-12-17	Brueck et al.	
	78	8868772	B2	2014-10-21	Major et al.	
	79	8402156	B2	2013-03-19	Brueck et al.	
	80	8370514	B2	2013-02-05	Hurst et al.	
	81	8880721	B2	2014-11-04	Hurst 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	20020161898	A1	2002-10-31	Hartop et al.	
	2	20050055425		2005-03-00	Lango et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	3	20050015509		2005-01-00	Sitaraman	
	4	20020131496		2002-09-00	Vasudevan et al.	
	5	20040083283	A1	2004-04-29	Sundaram et al.	
	6	20080219151	A1	2008-09-11	Ma et al.	
	7	20020152318	A1	2002-10-17	Menon et al.	
	8	20060080718	A1	2006-04-13	Gray et al.	
	9	20050120107	A1	2005-06-02	Kagan et al.	
	10	20040103444	A1	2004-05-27	Weinberg et al.	
	11	20050188051	A1	2005-08-25	Sneh	
	12	20030154239	A1	2003-08-14	Davis et al.	
	13	20040030547	A1	2004-02-12	Leaning et al.	

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

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Patel, Chirag R.
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	14	20040117427	A1	2004-06-17	Allen et al.	
	15	20030014684	A1	2003-01-16	Kashyap	
	16	20060206246	A1	2006-09-14	Walker	
	17	20050076136	A1	2005-04-07	Cho et al.	
	18	20030018966	A1	2003-01-23	Cook et al.	
	19	20040030599	A1	2004-02-12	Sie et al.	
	20	20050262257	A1	2005-11-24	Major et al.	
	21	20050033855	A1	2005-02-10	Moradi et al.	
	22	20010047423	A1	2001-11-29	Shao et al.	
	23	20030140159	A1	2003-07-24	Campbell et al.	
	24	20020176418	A1	2002-11-28	Hunt et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	25	20020169926	A1	2002-11-14	Pinckney, III, et al.	
	26	20020178330	A1	2002-11-28	Schlowsky-Fischer et al.	
	27	20050084166	A1	2005-04-21	Bonch et al.	
	28	20020091840	A1	2002-07-11	Pulier et al.	
	29	20080281803	A1	2008-11-13	Gentric	
	30	20061068295	A1	2006-07-27	Batterberry et al.	
	31	20060165166	A1	2006-07-27	Chou et al.	
	32	20020097750	A1	2002-07-25	Gunaseelan et al.	
	33	20020152317	A1	2002-10-17	Wang et al.	
	34	20030021166	A1	2003-01-30	Soloff	
	35	20040168052	A1	2004-08-26	Clisham et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Patel, Chirag R.
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	36	20050066063	A1	2005-03-24	Grigorovitch et al.	
	37	20050204046	A1	2005-09-15	Watanabe	
	38	20060059223	A1	2006-03-16	Klemets et al.	
	39	20060168290	A1	2006-07-27	Doron	
	40	20040260701	A1	2004-12-23	Lehikoinen et al.	
	41	20090055471	A1	2009-02-26	Kozat et al.	
	42	20080222235	A1	2008-09-11	Hurst et al.	
	43	20050185578	A1	2005-08-25	Padmanabham et al.	
	44	20070280255	A1	2007-12-06	Tsang et al.	
	45	20080037527	A1	2008-02-14	Chan et al.	
	46	20080205291	A1	2008-08-28	Li et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

DISH EXHIBIT 2002, Page 650
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	47	20070094405	A1	2007-04-26	Zhang	
	48	20080184688	A1	2006-08-17	Ganguly et al.	
	49	20080263180	A1	2008-10-23	Hurst et al.	
	50	20080133766	A1	2008-06-05	Luo	
	51	20070079325	A1	2007-04-05	de Heer	
	52	20070067480	A1	2007-03-22	Beek et al.	
	53	20070030833	A1	2007-02-08	Pirzada et al.	
	54	20090055547	A1	2009-02-26	Hudson et al.	
	55	20090210549	A1	2009-08-20	Hudson et al.	
	56	20100098103	A1	2010-04-22	Xiong et al.	
	57	20090043906	A1	2009-02-12	Hurst et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	58	20020161911	A1	2002-10-31	Pinckney, III et al.	
	59	20060236219	A1	2006-10-19	Grigorovitch et al.	
	60	20080046939	A1	2008-02-21	Lu et al.	
	61	20060130118	A1	2006-06-15	Damm	
	62	20070204310	A1	2007-08-30	Hua et al.	
	63	20030065803	A1	2003-04-03	Heuvelman	
	64	20040049780	A1	2004-03-11	Gee	
	65	20060133809	A1	2006-06-22	Chow et al.	
	66	20020144276	A1	2002-10-03	Radford et al.	
	67	20020073167	A1	2002-06-13	Powell et al.	
	68	20020174434	A1	2002-11-21	Lee et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	69	20020188745		2002-12-12	Hughes et al.	
	70	20030005455	A1	2003-01-02	Bowers	
	71	20030067872	A1	2003-04-10	Harrell et al.	
	72	20030081582		2003-05-01	Jain et al.	
	73	20030107994		2003-06-12	Jacobs et al.	
	74	20030135631		2003-07-17	Li et al.	
	75	20030151753		2003-08-14	Li et al.	
	76	20030152036		2003-08-14	Quigg Brown et al.	
	77	20030204519	A1	2003-10-30	Sirivara et al.	
	78	20040003101	A1	2004-01-01	Roth et al.	
	79	20040030797	A1	2004-02-12	Akinlar et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	80	20040031054	A1	2004-02-12	Dankworth et al.	
	81	20040054551	A1	2004-03-18	Ausubel et al.	
	82	20040071209		2004-04-15	Burg et al.	
	83	20040093420		2004-05-13	Gamble	
	84	20040143672	A1	2004-07-22	Padmanabham et al.	
	85	20040170392		2004-09-02	Lu et al.	
	86	20050108414		2005-05-19	Taylor et al.	
	87	20050123058		2005-06-09	Greenbaum et al.	
	88	20070024705		2007-02-01	Richter et al.	
	89	20080028428		2008-01-31	Jeong et al.	
	90	20080056373		2008-03-06	Newlin et al.	

DISH EXHIBIT 2002, Page 654
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	91	20080162713		2008-07-03	Bowra et al.	
	92	20080195744		2008-08-14	Bowra et al.	
	93	20020029274	A1	2002-03-07	Allen	
	94	20060075446	A1	2006-04-06	Klemets et al.	
	95	20080104647	A1	2008-05-01	Hannuksela	
	96	20040220926	A1	2004-11-04	Lamkin et al.	
	97	20010013128	A1	2001-08-09	Hagai et al.	
	98	20030204602	A1	2003-10-30	Hudson et al.	
	99	20040010613	A1	2004-01-15	Apostolopoulos 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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Patel, Chirag R.
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	1	2011004225	JP	A	2011-01-06	Hodoshima		
	2	2001067264	WO	A1	2001-09-13	Streamcenter, Inc.		
	3	200192752	JP		2001-04-06	Hitachi Information Systems Ltd.		
	4	2006010113	WO	A2	2006-01-26	Network Foundation Technologies, LLC		
	5	2004025405	WO	A2	2004-03-25	Thomson Licensing S.A.		
	6	2466482	CA	A1	2003-05-22	MusicMatch Inc.		
	7	2000-201343	JP		2000-07-18	Toshiba Corp.		
	8	0919952	EP	A1	1999-06-02	Mattavelli et al.		
	9	1670256	EP	A2	2006-06-14	Klements et al.		
	10	1777969	EP		2007-04-25	British Telcom		
	11	1298931	EP	A2	2003-04-02	Oplayo Oy		

DISH EXHIBIT 2002, Page 656
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	12	1202487	EP	A2	2002-05-02	Toshiba KK		
	13	1395014	EP	A1	2004-03-03	Matsushita Electric Ind. Co. Ltd.		
	14	2367219	GB	A	2002-03-27	Vintage Global		

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	FUJISAWA, HIROSHI ET AL. "Implementaton 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.	☒
	2	LIU, JIANGCHUAN ET AL. "Adaptive Video Multicast Over the Internet" IEEE Computer Society, 2003.	☒
	3	"The meaning of performance factor---English-Japanese Weblio Dictionary", [online], February 24, 2012, [searched on February 24, 2012], the Internet <URL:http://ejje.weblio.jp/content/performance+factor>.	☒
	4	TSURU, ET AL. "Recent evolution of the Internet measurement and inference techniques", IEICE Technical Report, Vol. 103, No. 123, pp. 37-42, June 12, 2003.	☒
	5	REJAIE, REZA ET AL. "Architectural Considerations for Playback of Quality Adaptive Video OVer the Internet" University of Southern California, Information Sciences Institute, 1998.	☒
	6	ROY, SUMIT ET AL. "A System Architecture for Managing Mobile Streaming Media Services" Streaming Media Systems Group, Hewlett-Packard Laboratories, 2003.	☒

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	7	XU, DONGYAN ET AL. "On Peer-to-Peer Media Streaming" Department of Computer Sciences, Purdue University, 2002.	☒
	8	KOZAMERINK, FRANC "Media Streaming Over the Internet - An Over of Delivery Technologies" EBU Technical Review, October 2002.	☒
	9	LIENHART, RAINER ET AL. "Challenges in Distributed Video Management and Delivery" Intel Corporation, EECS Dept., UC Berkeley, 2000-2002.	☒
	10	ZHANG, XINYAN ET AL. "CoolStreaming/DONet: A Data-Driven Overlay Network for Peer-to-Peer Live Media Streaming" IEEE 2005.	☒
	11	GUO, YANG "DirectStream: A Directory-Based Peer-to-Peer Video Streaming Service" LexisNexis, Elsevier B.V. 2007.	☒

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

EXAMINER SIGNATURE

Examiner Signature	/CHIRAG R PATEL/	Date Considered	02/01/2021

*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. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Patel, Chirag R.
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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)	2020-11-16
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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/
DISH EXHIBIT 2002, Page 660
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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	16876579
Filing Date	2020-05-18
First Named Inventor	David F. Brueck
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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	5267334	A	1993-11-30	Normille et al.	
	2	5404446	A	1995-04-04	Bowater et al.	
	3	5841432	A	1998-11-24	Carmel et al.	
	4	6389473	B1	2002-05-14	Carmel et al.	
	5	6172672	B1	2001-01-09	Ramasubramanian 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	20020156912	A1	2002-10-24	Hurst et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	2	20030055995	A1	2003-03-20	Ala Honkola	
	3	20030233464	A1	2003-12-18	Walpole et al.	
	4	20020131496	A1	2002-09-19	Vasudevan et al.	
	5	20030135863	A1	2003-07-17	VanDer Schaar	

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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	0365683	EP	A1	1990-05-02	OTSUKA PHARMA CO LTD		☒

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	ROY, S., et al., "Architecture of a Modular Streaming Media Server for Content Delivery Networks," 2002 IEEE. Published in the 2003 International Conference on Multimedia and Expo ICME 2003.	☒
	2	BOMMAIAH, E., et al., "Design and Implementation of a Caching System for Streaming Media over the Internet," 2000 IEEE. Published in RTAS '00 Proceedings of the Sixth IEEE Real Time Technology and Applications Symposium (RTAS 2000), page 111.	☒

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	3	DEFENDANT JADOO TV, INC.'S DISCLOSURE OF INVALIDITY CONTENTIONS, U.S. N. Dist. Ca. Case No. 5:18-cv-05214-EJD dated Sept. 22, 2020.	☒
	4	DEFENDANT JADOO TV, INC.'S DISCLOSURE OF INVALIDITY CONTENTIONS APPENDIX A, U.S. N. Dist. Ca. Case No. 5:18-cv-05214-EJD dated Sept. 22, 2020.	☒
	5	Balk et al., Adaptive Video Streaming: Pre-Encoded MPEG-4 with Bandwidth Scaling, 44 COMPUTER NETWORKS 415 (Mar. 2004)	☐

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

EXAMINER SIGNATURE

Examiner Signature	/CHIRAG R PATEL/	Date Considered	02/01/2021

*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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99**)	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	David F. Brueck
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

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)	2020-11-16
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. /C.R.P/

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. /C.R.P/

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

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	16876579	Filing Date	2020-05-18	Docket Number (if applicable)	066.0141x1c9	Art Unit	2454
First Named Inventor	David F. Brueck			Examiner Name	Chirag R. Patel		

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 order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

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

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

☒ Enclosed

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

MISCELLANEOUS

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

☐ Other _____

FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

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)	2020-08-05
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 to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

DISH EXHIBIT 2002, Page 668
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial. No.:	16/876,579	Confirmation No.:	3720
Examiner:	Chirag R. Patel	Art Unit:	2454
Filed:	05/18/2020	Customer No.:	70560

Title: **APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING**

Attorney Docket No.: 066.0141x1C9

REQUEST FOR CONTINUED EXAMINATION
FILED UNDER 37 C.F.R. § 1.114

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

****FILED ELECTRONICALLY USING THE PTO-EFS SYSTEM***

Commissioner:

In further response to the Office Action mailed on February 5, 2021 (for which the period for response has been extended until August 5, 2021), please consider the remarks below under 37 C.F.R. § 1.114, or any other appropriate rule.

Amendments to the Claims begin on the following page (page 2).

Remarks begin on page 10.

DISH EXHIBIT 2002, Page 669
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Amendments to the Claims

Please amend the claims without prejudice or disclaimer to read as follows:

1. (Currently Amended) A system for adaptive-rate content streaming of a video that is playable on one or more end user stations over the ~~Internet~~internet, the system comprising:

at least one storage device storing the video, wherein the video is digitally encoded at a plurality of different bitrates creating a plurality of streams including a low quality stream, a medium quality stream, and a high quality stream, the low quality stream, the medium quality stream, and the high quality stream each comprising a group of streamlets, wherein each streamlet corresponds to a portion of the video, and wherein each streamlet in each group of streamlets is encoded at a respective one of the plurality of different bitrates, and wherein each group of streamlets ~~comprising~~ comprises at least first and second streamlets, ~~each of the streamlets corresponding to a portion of the video~~;

wherein at least one of the low quality stream, the medium quality stream, and the high quality stream is encoded at a bitrate of no less than 600 kbps; and

wherein the first streamlet of each of the groups of streamlets has the same first duration and encodes the same first portion of the video in each of the low quality stream, the medium quality stream, and the high quality stream, and wherein the first streamlet of the low quality stream encodes the same first portion of the video at a ~~different~~ lower bitrate than the first streamlet of the high quality stream and the first streamlet of the medium quality stream.

2. (Original) The system of claim 1, wherein the video is a live event video.

3. (Original) The system of claim 1, wherein the video includes archived content.

4. (Original) The system of claim 1, wherein the second streamlet of each of the groups of streamlets each has the same second duration and corresponds to the

DISH EXHIBIT 2002, Page 670
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

same second portion of the video in the low quality stream, the medium quality stream, and the high quality stream, the second streamlet of the low quality stream having the same bitrate as the first streamlet of the low quality stream.

5. (Original) The system of claim 4, wherein the first and second durations are different.

6. (Currently Amended) The system of claim 1, further comprising: a plurality of web servers located at different locations across the internet, each web server configured to: receive at least one streamlet request over one or more internet connections from a respective one of the one or more end user stations to retrieve the first streamlet ~~storing a portion of the video~~, wherein the at least one streamlet request from the respective one of the one or more end user stations includes a request for a currently selected first streamlet from one of the low quality stream, the medium quality stream, and the high quality stream based upon a determination by the respective one of the one or more end user stations to select a higher or lower bitrate version of a respective one of the plurality of streams; retrieve from the at least one storage device the requested first streamlet from the currently selected one of the low quality stream, the medium quality stream, and the high quality stream; and send the retrieved first streamlet ~~from the currently selected one of the different copies~~ to the ~~requesting~~ respective one of the one or more end user stations over the one or more ~~network~~ internet connections.

7. (Original) The system of claim 1, wherein each of the first streamlets has a first duration that is the range of 0.1 to 5 seconds.

8. (Original) The system of claim 1, further comprising:

a first web server configured to: receive at least one streamlet request over one or more internet connections from the one or more end user stations to retrieve the first streamlet storing the first portion of the video,

wherein the at least one streamlet request from the one or more end user stations includes a request for a currently selected first streamlet from one of the low quality

DISH EXHIBIT 2002, Page 671
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

stream, the medium quality stream, and the high quality stream based upon a determination by the end user station to select a higher or lower bitrate version of the video; retrieve from the storage device the requested first streamlet from the currently selected one of the low quality stream, the medium quality stream, and the high quality stream; and send the retrieved first streamlet from the currently selected one of the low quality stream, the medium quality stream, and the high quality stream to the requesting one of the end user stations over the one or more network connections.

9. (Original) The system of claim 8, wherein the first web server is further configured to: receive at least one virtual timeline request over the one or more internet connections from the one or more end user stations to retrieve a virtual timeline; and send the virtual timeline to the requesting one of the end user stations over the one or more network connections.

10. (Original) The system of claim 9, wherein the virtual timeline corresponds to the currently selected one of the low quality stream, the medium quality stream, and the high quality stream.

11. (Original) The system of claim 10, wherein the virtual timeline defines a playlist for a user to view.

12. (Original) The system of claim 11, wherein the virtual timeline comprises a file that is configured to define a playlist for a user to view.

13. (Original) The system of claim 12, wherein the virtual timeline comprises at least one quantum media extension (QMX).

14. (Currently Amended) An end user station to stream a video over a network from a server for playback of the video, the ~~content player device~~end user station comprising:

a processor;

DISH EXHIBIT 2002, Page 672
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

a digital processing apparatus memory device comprising non-transitory machine-readable instructions that, when executed, cause the processor to:

establish ~~one or more network connections~~an internet connection between the end user station and the server, wherein the server is configured to access at least one of a plurality of groups of streamlets;

wherein the video is encoded at a plurality of different bitrates to create a plurality of streams including at least a low quality stream, a medium quality stream, and a high quality stream, each of the low quality stream, the medium quality stream, and the high quality stream comprising a group of streamlets encoded at the same respective one of the different bitrates, each group comprising at least first and second streamlets, each of the streamlets corresponding to a portion of the video;

wherein at least one of the low quality stream, the medium quality stream, and the high quality stream is encoded at a ~~bit rate~~bitrate of no less than 600 kbps; and wherein the first streamlets of each of the low quality stream, the medium quality stream and the high quality stream each has an equal playback duration and each of the first streamlets encodes the same portion of the video at a different one of the different bitrates;

select a specific one of the low quality stream, the medium quality stream, and the high quality stream based upon a determination by the end user station to select a higher or lower bitrate version of the streams;

place a streamlet request to the server over the ~~one or more network connections~~internet connection for the first streamlet of the selected stream;

receive the requested first streamlet from the server via the ~~one or more network connections~~internet connection; and

provide the received first streamlet for playback of the video.

15. (Original) The end user station of claim 14, wherein the second streamlet of each of the groups of streamlets each has the same second duration and corresponds to the same second portion of the video in the low quality stream, the

DISH EXHIBIT 2002, Page 673
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

medium quality stream, and the high quality stream, the second streamlet of the low quality stream having the same bitrate as the first streamlet of the low quality stream.

16. (Original) The end user station of claim 15, wherein the first and second durations are different.

17. (Currently Amended) The end user station of claim 14, wherein each of the first streamlets has a first duration that is in the range of 0.1 to 5 seconds.

18. (Currently Amended) The end user station of claim 14, wherein the end user station is further configured to: request and receive a virtual timeline; and wherein one or more streamlet requests are based on the ~~at least one~~ received virtual timeline.

19. (Original) The end user station of claim 18, wherein the virtual timeline corresponds to the currently selected one of the low quality stream, the medium quality stream, and the high quality stream.

20. (Original) The end user station of claim 18, wherein the virtual timeline defines a playlist for a user to view.

21. (Original) The end user station of claim 14, wherein the video is a live event video.

22. (Original) The end user station of claim 14, wherein the video includes archived content.

23. (Currently Amended) A process executable by one or more servers to stream a video for playback by one or more end user stations, the process comprising:

storing, by the one or more servers, a plurality of streams including a low quality stream, a medium quality stream, and a high quality stream, wherein the low quality stream, the medium quality stream, and the high quality stream each comprise a group

DISH EXHIBIT 2002, Page 674
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

of streamlets encoded at a respective one of a plurality of different bitrates, each group comprising at least first and second streamlets, each of the streamlets corresponding to a portion of the video;

wherein at least one of the low quality stream, the medium quality stream, and the high quality stream is encoded at a bitrate of no less than 600 kbps; and wherein the first streamlet of each of the groups of streamlets has the same first duration and encodes the same first portion of the video in the low quality stream, the medium quality stream, and the high quality stream, the first streamlet of the low quality stream having a different one of the different bitrates than the first streamlet of the high quality stream and the first streamlet of the medium quality stream;

receiving at least one streamlet request over ~~one or more internet connections~~an internet connection from a respective one of the one or more end user stations to retrieve the first streamlet storing the first portion of the video,

wherein the at least one streamlet request from the respective one of the one or more end user stations includes a request for a currently selected first streamlet from one of the low quality stream, the medium quality stream, and the high quality stream based upon a determination by the respective one of the one or more end user station~~s~~ to select a higher or lower bitrate version of the video;

retrieving from the ~~storage device~~one or more servers the requested first streamlet from the currently selected one of the low quality stream, the medium quality stream, and the high quality stream; and

sending the retrieved first streamlet from the currently selected one of the low quality stream, the medium quality stream, and the high quality stream to the ~~requesting~~ respective one of the one of the end user stations over the ~~one or more network connections~~internet connection.

24. (Original) The process of claim 23, wherein the second streamlet of each of the groups of streamlets each has the same second duration and corresponds to the same second portion of the video in the low quality stream, the medium quality

DISH EXHIBIT 2002, Page 675
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

stream, and the high quality stream, the second streamlet of the low quality stream having the same bitrate as the first streamlet of the low quality stream.

25. (Original) The process of claim 23, wherein the first and second durations are different.

26. (Original) The process of claim 23, wherein the video is a live event video.

27. (Original) The process of claim 23, wherein the video includes archived content.

28. (Currently Amended) A process executable by a content player device to stream a video over a network from a server for playback of the video by the content player device, the process comprising:

establishing ~~one or more network connections~~an internet connection between the content player device and the server,

wherein the server accesses a plurality of streams including a low quality stream, a medium quality stream, and a high quality stream, wherein the low quality stream, the medium quality stream, and the high quality stream each comprise a group of streamlets encoded at a respective one of a plurality of different bitrates, each group comprising at least first and second streamlets, each of the streamlets corresponding to a portion of the video; wherein at least one of the low quality stream, the medium quality stream, and the high quality stream is encoded at a bitrate of no less than 600 kbps; and

wherein the first streamlet of each of the groups of streamlets has the same first duration and encodes the same first portion of the video in the low quality stream, the medium quality stream, and the high quality stream, the first streamlet of the low quality stream having a

DISH EXHIBIT 2002, Page 676
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

different bitrate than the first streamlet of the high quality stream and the first streamlet of the medium quality stream;

selecting, by the content player device, a currently selected one of the low quality stream, the medium quality stream, and the high quality stream based upon a determination by the ~~end user station~~content player device to select a higher or lower bitrate version of the video;

placing a streamlet request over one or more internet connections from the ~~one or more end user stations~~content player device to retrieve the first streamlet storing the first portion of the video; and

receiving the requested streamlet from the server via the ~~one or more network connections~~internet connection; and rendering, by the content player device, the received streamlet for playback of the video.

29. (Original) The process of claim 28, wherein the video includes archived content.

30. (Original) The process of claim 28, wherein the video is a live event video.

DISH EXHIBIT 2002, Page 677
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

REMARKS

We hereby respond under Rule 114 to request continued examination of the above-referenced application. Support for the above amendments can be found in the originally-filed application, and no new matter has been added.

If there are any remaining issues with this application, the undersigned requests a telephone call to 480.385.5069 (office) or 480.241.8219 (mobile).

Allowable Subject Matter

We appreciate that all claims have been indicated as allowable except for the double patenting issues addressed below.

Double Patenting

The Office Action objects to certain claims, which are alleged to be duplicates of certain claims pending in US Patent No. 10,469,554. We previously submitted a terminal disclaimer citing the '554 Patent, and our previous response pointed out that the claims are different at least in that the claims recited "video" that is not necessarily "live action" video.

Without consenting to the rejection, we are amending each of our independent claims for better clarity and to advance prosecution. We expressly reserve the right to revisit the prior claims at a later date (e.g., in a continuing application). At present, however, the rejections are believed to be no longer relevant. We respectfully request reconsideration.

Conclusion

Should any issues remain, we would welcome a telephone call to - (480) 385-5069 or an email to bcarlson@lkglobal.com. *Recognizing that Internet communications are not secure, we hereby authorize the USPTO to communicate with the undersigned and practitioners in accordance with 37 CFR 1.33 and 37 CFR 1.34 concerning any subject matter of this application via video conferencing, instant messaging, or electronic mail. We understand that a copy of these communications will be made of record in the application file. (MPEP 502.03).*

DISH EXHIBIT 2002, Page 678
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Without limiting the foregoing, we further authorize the use of email for informal correspondence, including the exchange of proposed amendments or other draft documents.

No official fee is believed to be due in connection with this Response, other than any fees that may be addressed elsewhere in this submittal. If, however, any additional time extension or other fee is required to consider this response or to otherwise prevent abandonment of this application, please consider this as a request for an extension of time and as authorization to charge Deposit Account No. 50-2091 for any fees that may be due.

Respectfully submitted,

LORENZ & KOPF, LLC

Dated: August 5, 2021

By: /Brett A. Carlson /
Brett A. Carlson
Reg. No. 39,928

bcarlson@lkglobal.com
480-385-5069 (direct)
480-241-8219 (mobile)
480-385-5060 (general)

LKGLOBAL is LORENZ & KOPF, LLC
Customer No. 70560

DISH EXHIBIT 2002, Page 679
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Electronic Patent Application Fee Transmittal

Application Number:	16876579
Filing Date:	18-May-2020
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Filer:	Brett Carlson
Attorney Docket Number:	066.0141X1C9

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

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

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 3 months with $0 paid	1253	1	1480	1480
Miscellaneous:				
RCE- 1ST REQUEST	1801	1	1360	1360
		Total in USD ($)		**2840**

Electronic Acknowledgement Receipt

EFS ID:	43439438
Application Number:	16876579
International Application Number:	
Confirmation Number:	3720
Title of Invention:	APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING
First Named Inventor/Applicant Name:	DAVID F. BRUECK
Customer Number:	70560
Filer:	Brett Carlson
Filer Authorized By:	
Attorney Docket Number:	066.0141X1C9
Receipt Date:	05-AUG-2021
Filing Date:	18-MAY-2020
Time Stamp:	16:44:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2840
RAM confirmation Number	E202185G45163113
Deposit Account	
Authorized User	

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

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)	20210805_RCE_06-0141X1C9.pdf	697604 11cb4aed396aad7af7e1c6b1849d312ecf66868c	no	3
Warnings:					
Information:					
2		20210805_RCEResponse_06-0141X1C9.pdf	130912 fe9132c7c31f3f0f19a9e4bb093c8302a27abb59	yes	11

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment Submitted/Entered with Filing of CPA/RCE	1	1
Claims	2	9
Applicant Arguments/Remarks Made in an Amendment	10	11

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	40976 4b16fe0c660e14bc964bade1ad0cfa1040ba90e3	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	869492		

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/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/876,579	Filing Date 05/18/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	08/05/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 30	Minus	** 30	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

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

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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	5424455		1995-06-13	Yamamoto et al.	
	2	5544318		1996-08-06	Schmitz et al.	
	3	5867230		1999-02-02	Wang et al.	
	4	5933603		1999-08-03	Vahalia et al.	
	5	5941951		1999-08-24	Day et al.	
	6	5966015		1999-10-12	Horii	
	7	5966025		1999-10-12	Beffa	
	8	6003030		1999-12-14	Kenner et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	9	6112239		2000-08-29	Kenner et al.	
	10	6154744		2000-11-28	Kenner et al.	
	11	6181867	B1	2001-01-30	Kenner et al.	
	12	6292383	B1	2001-09-18	Worley	
	13	6498897	B1	2002-12-24	Nelson et al.	
	14	6625643	B1	2003-09-23	Colby et al.	
	15	6637031	B1	2003-10-21	Chou	
	16	6665726	B1	2003-12-16	Leighton et al.	
	17	6766407	B1	2004-07-20	Lisitsa et al.	
	18	6795863	B1	2004-09-21	Doty, Jr.	
	19	7047307	B2	2006-05-16	Li	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	20	7386627	B1	2008-06-10	Lango et al.	
	21	7974200	B2	2011-07-05	Walker 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	20030072376	A1	2003-04-17	Krishnamachari et al.	
	2	20030061305	A1	2003-03-27	Copley et al.	
	3	20020170062	A1	2002-11-14	Chen et al.	
	4	20020044528	A1	2002-04-18	Pogrebinsky et al.	
	5	20020002708	A1	2002-01-03	Arye	
	6	20030009578	A1	2003-01-09	Apostolopoulos et al.	
	7	20030236906	A1	2003-12-25	Klemets et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	8	20040136327	A1	2004-07-15	Sitaraman et al.	
	9	20040260827	A1	2004-12-23	Wang	
	10	20040202109	A1	2004-10-14	Akiyama et al.	
	11	20050177618	A1	2005-08-11	Zimler et al.	
	12	20050207569	A1	2005-09-22	Zhang et al.	
	13	20080022343	A1	2008-01-24	Hodzic et al.	
	14	20080086570	A1	2008-04-10	Dey 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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2002045372	WO	A1	2002-06-06	BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		
	2	2003009581	WO	A1	2003-01-30	BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	3	2003041413	WO	A1	2003-05-15	PA CONSULTING SERVICES LIMITED		
	4	2003042856	WO	A1	2003-05-22	AEROCAST.COM, INC.		
	5	2004021668	WO	A1	2004-03-11	KONINKLIJKE PHILIPS ELECTRONICS N.V.		
	6	2004057832	WO	A1	2004-07-08	KONINKLIJKE PHILIPS ELECTRONICS N.V.		
	7	2006086717	WO	A1	2006-08-17	VIDIATOR ENTERPRISES INC.		
	8	2004295569	JP	A	2004-10-21	SONY CORP		
	9	139497	EP	A2	2004-03-03	MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.		

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	RealPlayer Plus™ G2 Manual", RealNetworks Inc., Seattle, WA (1998-1999), pp. 1-77	
	2	Kontothanassis, L. et al., "A Transport Layer for Live Streaming in a Content Delivery Network," Proceedings of the IEEE, 2004. pp.1408 - 1419. (Retrieved August 18, 2021 from https://www.akamai.com/it/it/multimedia/documents/technical-publication/a-transport-layer-forlive-streaming-in-a-content-delivery-network-technical-publication.pdf).	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	3	Dawson, F. "Improving Quality May Help to Boost Streaming Media," Multichannel News, December 19, 1999. pp. 1-17 (retrieved August 18, 2021 from https://www.nexttv.com/news/improving-quality-may-help-boost-streaming-media-143325).
	4	'InterVu Granted Key Internet Patent," Bloomberg Business, December 16, 1999 pp. 1-3 (retrieved August 18, 2021 from https://www.bloomberg.com/press-releases/1999-12-16/intervu-granted-key-internet-patent).
	5	'InterVu Streams Ahead Behind the Scenes", Paul Festa, cnet, January 2, 2002 (retrieved August 18, 2021 from https://www.cnet.com/news/intervu-streams-ahead-behind-the-scenes/).
	6	'Microsoft Announces Beta Release of Windows Media Technologies 4.0," April 13, 1999, pp. 1-5 (retrieved August 18, 2021 from https://news.microsoft.com/1999/04/13/microsoft-announcesbeta-release-of-windows-media-technologies-4-0/).
	7	'Sandpiper Adds RealSystem G2 to its Content Delivery Network," CBR Staff, August 4, 1999, pp. 1-4 (retrieved August 18, 2021 from https://techmonitor.ai/techonology/sandpiper_adds_realsystem_g2_to_its_content_delivery_nnetwork.
	8	'Speedera Posts Another Record Fiscal Year, Revenue Jumps 60 Percent," BusinessWire Digital Commerce 360, July 14, 2004, pp. 1-5 (retrieved August 18, 2021 from https://www.digitalcommerce360.com/2004/07/14/speedera-posts-another-record-fiscal-yearrevenue-jumps-60-perc/)
	9	'Developer Documentation QuickTime 6", Apple Computer Inc., Cupertino, CA (2002), pp. 1-240.
	10	'IBM Digital Library Version 2 Expands Its Comprehensive Solution Framework", Software Announcement, August 12, 1997, pp. 1-26 (retrieved August 18, 2021 from https://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_ca/2/897/ENUS297-312/index.html&request_locale=en).
	11	'Fresh Approach: Axient founder finds another way to make networking pay off", Y. Tara Teichgraeber, Phoenix Business Journal, January 13, 2002, pp. 1-6 (retrieved August 18, 2021 from https://www.bizjournals.com/phoenix/stories/2002/01/14/story6.html).
	12	Mac OS X Server QuickTime Streaming Server 5.0 Administration, Apple Computer Inc., Cupertino, CA (2003), pp. 1-65.
	13	RESPONDENTS LULULEMON ATHLETICA INC. AND CURIOUSER PRODUCTS INC. RESPONSE TO COMPLAINT US Int'l Trade Commission Investigation. No. 337-TA-1265.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	14	RESPONDENT PELOTON INTERACTIVE, INC.'S RESPONSE TO COMPLAINT US Int'l Trade Commission Investigation. No. 337-TA-1265.
	15	VERIFIED RESPONSE OF ICON HEALTH & FITNESS, INC., FREE MOTION FITNESS, INC., AND NORDICTRACK, INC. TO COMPLAINT US Int'l Trade Commission Investigation. No. 337-TA-1265.

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	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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)	2021-08-19
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 1 394 973 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.03.2004 Bulletin 2004/10

(51) Int Cl.[7]: **H04H 1/00**

(21) Application number: **03255270.5**

(22) Date of filing: **26.08.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **27.08.2002 JP 2002247695**

(71) Applicant: **MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.**
Kadoma-shi, Osaka 571-8501 (JP)

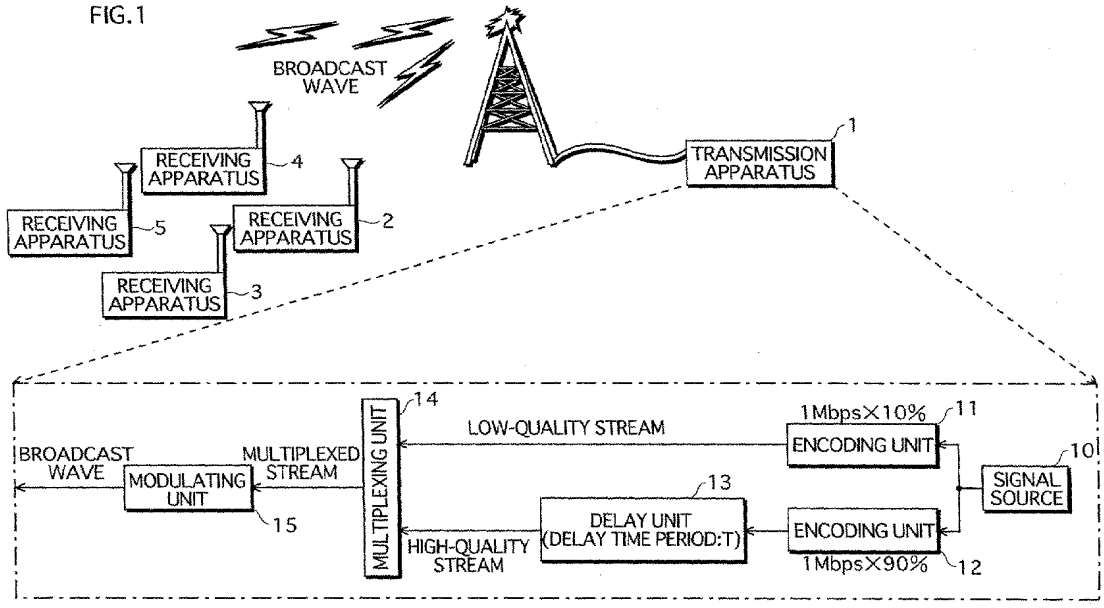
(72) Inventor: **Kitamura, Tomohiko**
Hirakata-shi Osaka 573-0034 (JP)

(74) Representative: **Crawford, Andrew Birkby**
A.A. Thornton & Co.
235 High Holborn
London WC1V 7LE (GB)

(54) Broadcast system having a transmitter and a receiver for low quality and high quality streams based on the same content, the receiver and program

(57) A broadcast system has digital receiving apparatuses that imitate deteriorated reproduction that is observed in analog receiving apparatuses when a transmission path failure occurs, thus preventing the audiences, who are accustomed to the analog broadcasting, from sensing discomfort at the digital broadcasting. A transmission apparatus causes encoding units 11 and 12 to generate low- and high-quality streams based on the same contents, and transmits these streams onto a transmission path while delaying the high-quality stream. In the receiving apparatuses, a reproduction unit 25 reproduces the high-quality stream in a normal state, while packets of the low-quality stream received during a time period T until the current time are accumulated in an accumulation unit 22. If a transmission path failure occurs, a reproduction control unit 26 causes the reproduction unit 25 to reproduce, instead of the high-quality stream, the accumulated packets of the low-quality stream.

FIG.1



EP 1 394 973 A2

DISH EXHIBIT 2002, Page 695
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Description

BACKGROUND OF THE INVENTION

(1) Field of the Invention

[0001] The present invention relates to a broadcast system having a transmission apparatus and receiving apparatuses, specifically to improvements in digital broadcast services.

(2) Description of the Related Art

[0002] In recent years, the infrastructure for the shift from analog broadcasting to digital broadcasting has been improved steadily. In this improvement of the infrastructure, it is important to fully recognize the differences between the analog broadcasting and the digital broadcasting. One of such differences is observed when a transmission path failure occurs.

[0003] In the analog broadcasting, when a transmission path failure occurs, the failure is recognized by the audiences as deteriorated reproduction quality. Experiencing more than 50 years of operation of analog broadcasting, the audiences are familiar with such deteriorated reproduction quality that is caused by a thunderstorm or the like.

[0004] On the other hand, in digital broadcasting, a transmission path failure causes receiving apparatuses to detect a bit error. When they detect a bit error in a received broadcast wave, the receiving apparatuses correct the bit error using Reed-Solomon parity codes or the like before supplying reproduction output. With these operations, the audiences are supplied with reproduction outputs not deteriorated by the bit error. However, the receiving apparatuses stop supplying the reproduction outputs if a thunderstorm or the like causes a large amount of bit error that cannot be corrected by a bit error correction. It should be noted here that in the present document, a "digital broadcast failure" indicates a large failure that cannot be overcome by a bit error correction.

[0005] Meanwhile, the common knowledge: "when a transmission path failure occurs, the failure is recognized by the audiences as deteriorated reproduction quality" may become an unexpected obstacle in digital broadcasting. That is to say, for example, if a sudden thunderstorm occurs while a user is supplied with a reproduction output, the user will probably expect deterioration in the reproduction quality due to the above-mentioned common knowledge that has taken root. However, if supply of reproduction output from a receiving apparatus suddenly stops against this expectation due to a transmission path failure, the user may mistake the transmission path failure for a receiving apparatus failure. In such circumstances, there is a possibility that a flood of complaints about a receiving apparatus failure are sent to the maker of the receiving apparatus each time a thunderstorm or the like causes a lot of transmission path failures. In such a case, the maker will be tied up with dealing with the complaints.

SUMMARY OF THE INVENTION

[0006] The object of the present invention is therefore to provide a broadcast system having digital receiving apparatuses that imitate deterioration of reproduction output that is observed in the analog receiving apparatuses when a transmission path failure occurs, thus preventing the audiences from mistaking a transmission path failure for a receiving apparatus failure.

[0007] The above object is fulfilled by a broadcast system including a transmission apparatus and a receiving apparatus, the transmission apparatus including: a generating unit operable to generate a first digital stream and a second digital stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first digital stream is lower than An encoding bit rate for the second digital stream; and a transmission unit operable to transmit the first and second digital streams onto a transmission path while delaying the second digital stream relative to the first digital stream, the receiving apparatus including: a reproduction unit operable to reproduce the second digital stream in a normal state; and a reproduction control unit operable to, if a transmission path failure occurs, cause the reproduction unit to reproduce, instead of the second digital stream, a portion of the first digital stream that has been received before the occurrence of the transmission path failure.

[0008] With the above-stated construction, the transmission apparatus transmits the low-quality stream preceding the high-quality stream. The receiving apparatus reproduces the high-quality stream in a normal state, but if a transmission path failure occurs, reproduces a portion of the low-quality stream that has been received prior to and has the same contents as a portion of the high-quality stream that should have been reproduced if the transmission path failure had not occurred. With this arrangement, the audience would fail to recognize that the reproduction has been suspended.

[0009] Also, by reproducing the low-quality stream in place of the high-quality stream during the reception-interruptedperiod, the receiving apparatus imitates deteriorated reproduction that has been observed long in analog receiving apparatuses when a transmission path failure occurs, thus preventing the audiences, who are accustomed to the analog broadcasting, from sensing discomfort at the digital broadcasting.

[0010] In the above broadcast system, the receiving apparatus may superpose a signal resembling a noise on the one or more packets accumulated in the accumulating unit when the one or more packets are reproduced due to occurrence of a transmission path failure.

[0011] With the above-stated construction, the digital receiving apparatus can reproduce a digital stream with

DISH EXHIBIT 2002, Page 696
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

which a white noise is mixed in imitation of a degraded reproduction of analog receiving apparatuses. This realistic imitation prevents the audiences, who are accustomed to the analog broadcasting, from sensing discomfort at the digital broadcasting.

[0012] In the above broadcast system, the receiving apparatus may be provided with a pilot lamp that emits light in a manner in which a normal state is distinguished from an abnormal state, wherein in the normal state, the second digital stream is reproduced, and in the abnormal state, the first digital stream is reproduced.

[0013] With the above-stated construction, the digital receiving apparatus can reproduce a digital stream with blinking of the pilot lamp, which is familiar to the audiences of analog receiving apparatuses. This realistic imitation prevents the audiences, who are accustomed to the analog broadcasting, from sensing discomfort at the digital broadcasting.

[0014] In the above broadcast system, the receiving apparatus may further include: an operation receiving unit operable to receive input of an operation by a user to request real time reproduction; and a switch unit operable to switch from reproduction of the second digital stream to reproduction of the first digital stream if the operation receiving unit receives the input of the operation by the user.

[0015] The above-stated construction provides a practical advantage. For example, suppose a user is watching a real sports game while listening to the live broadcasting of the sports game with a portable-type receiving apparatus. The user can select either the high-quality stream which is provided with delay or the low-quality stream which is provided without delay. This function facilitates the user since he/she can select the reproduction of the low-quality stream and enjoy watching the game without being confused by the time lag between the real game and the broadcast of the game.

[0016] In the above broadcast system, the generating unit of the transmission apparatus may include two encoders that respectively generate the first digital stream and the second digital stream by performing a variable-length encoding onto an analog signal.

[0017] With the above-stated construction in which the generating unit performs a variable-length encoding onto an analog signal, as much amount of bit rate as omitted from the audio frames that contain less amounts of audible component can be appropriated to the audio frames that contain more amounts of audible component. This enables the quality of the audio reproduction to be improved in total.

[0018] The above objects are also fulfilled by a broadcast system including a transmission apparatus and a receiving apparatus, the transmission apparatus including: a generating unit operable to generate a first digital stream, a second digital stream, and a third digital stream by encoding a same signal respectively at different encoding bit rates, where an encoding bit rate for the first digital stream is the lowest among the encoding bits rates, an encoding bit rate for the second digital stream is the middle between encoding bit rates for the first and third digital streams, and an encoding bit rate for the third digital stream is the highest among the encoding bits rates; and a transmission unit operable to transmit the first, second, and third digital streams onto a transmission path while delaying the second digital stream by time period T1 and delaying the third digital stream by time period T2, wherein T2 > T1, the receiving apparatus including: an accumulating unit operable to accumulate part of the first and second digital streams received from the transmission apparatus; a reproduction unit operable to reproduce the third digital stream in a normal state; and a reproduction control unit operable to cause the reproduction unit to reproduce, instead of the third digital stream, the part of the second digital stream accumulated in the accumulating unit if a transmission path failure continues for the time period T2 or more, and to reproduce the part of the first digital stream accumulated in the accumulating unit following the reproduction of the part of the second digital stream accumulated in the accumulating unit.

[0019] With the above-stated construction, in the normal reception period, data is reproduced with a quality level that is proportionate to 85 % of the bit rate, and in the reception-interrupted period, first, data is reproduced with a quality level that is proportionate to 10 %, and then with a quality level that is proportionate to 5 % of the bit rate. This would give an impression to the audiences that the reproduction quality is gradually deteriorated, making them feel as if they were listening to an analog receiver.

[0020] The above objects are also fulfilled by a broadcast system including a transmission apparatus and a receiving apparatus, the transmission apparatus including: a first generating unit operable to generate a first audio stream and a second audio stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first audio stream is lower than an encoding bit rate for the second audio stream; a second generating unit operable to generate a first video stream and a second video stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first video stream is lower than an encoding bit rate for the second video stream; and a transmission unit operable to transmit the first and second audio streams and the first and second video streams onto a transmission path while delaying the second video stream by a time period T1 and delaying the second audio stream by a time period T2, wherein T2 > T1, the receiving apparatus including: a first accumulating unit operable to accumulate part of the first video stream received during the time period T1 until a current time; a second accumulating unit operable to accumulate part of the first audio stream received during the time period T2 until the current time; a reproduction unit operable to reproduce the second video stream and the second audio stream in a normal state; and a reproduction control

DISH EXHIBIT 2002, Page 697
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

unit operable to cause the reproduction unit to reproduce (i) the part of the first video stream accumulated in the first accumulating unit and (ii) the part of the first audio stream accumulated in the second accumulating unit for the time period T1 if a transmission path failure continues for the time period T2 or more, and to reproduce, after the time period T1, the part of the first audio stream accumulated in the second accumulating unit.

[0021] With the above-stated construction, the "high-quality audio + high-quality video" output that is supplied during the normal reception period changes to the "low-quality audio + low-quality video" output if a failure occurs to the transmission path. Furthermore, if the time reception interruption continues for a certain time period, the reproduction changes from "audio + video" to "only audio". That is to say, the reproduced data changes step by step from the high-quality audio and video in the normal reception period to the low-quality audio and video, and to the only audio without video. In this way, the digital receiving apparatuses imitate the gradual deterioration of reproduction output that is observed in the analog receiving apparatuses when a transmission path failure occurs, giving an impression to the audiences that the reproduction quality is gradually degraded in the same manner as when they are listening to analog receivers.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] These and the other objects, advantages and features of the inventionwillbecomeapparent from the followingdescription thereof taken in conjunction with the accompanying drawings which illustrate a specific embodiment of the invention. In the drawings:

Fig. 1 shows the construction of a broadcast system in Embodiment 1 of the present invention;
Fig. 2 shows encoding procedures performed by the encoding units 11 and 12;
Fig. 3 shows the structure of the digital stream generated by the encoding unit 11;
Fig. 4 shows how the high-quality stream is delayed by the delay unit 13 with reference to the low-quality stream;
Fig. 5 shows the construction of the receiving apparatuses;
Fig. 6 shows the portion of the low-quality stream that is accumulated in the accumulating unit 22;
Figs. 7A to 7D shows how packets are written (accumulated) into the accumulating unit 22;
Fig. 8 shows reproduction control performed by the reproduction control unit 26;
Fig. 9 is a flowchart showing the reproduction control procedures of the reproduction control unit 26;
Fig. 10 shows the construction of the receiving apparatuses in Embodiment 2;
Fig. 11 shows the construction of the receiving apparatuses in Embodiment 3;
Fig. 12 shows the construction of a transmission apparatus in Embodiment 4;
Fig. 13 shows the construction of the receiving apparatuses;
Fig. 14 shows the construction of the broadcast system in Embodiment 5;
Fig. 15 shows the construction of the receiving apparatuses in Embodiment 5; and
Fig. 16 shows the construction of a transmission apparatus in a broadcast system in Embodiment 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] The following describes a broadcast system according to preferred embodiments of the present invention.

Embodiment 1

[0024] Fig. 1 shows the construction of a broadcast system in Embodiment 1 of the present invention. In Fig. 1, the broadcast system includes a digital transmission apparatus 1 and digital receiving apparatuses 2-5, and provides a digital broadcast service. It should be noted here that the present embodiment deals with a terrestrial digital radio broadcasting.

[0025] The transmission apparatus 1 transmits a digital stream using a band for digital broadcasting. The band for digital broadcasting can be identified by a time slot in a radio frequency band. It is supposed here that a bit rate of 1 Mbps is assigned to the band.

[0026] The receiving apparatuses 2-5 are digital receiving apparatuses that have been developed to replace existent analog radio receiving apparatuses. There are portable and stationary types of digital receiving apparatuses, and both types receive the digital streams from the transmission apparatus and reproduce them.

[0027] Now, the construction of the transmission apparatus for use in the broadcast system outlined above will be described with reference to Fig. 1. As shown in Fig. 1, the transmission apparatus 1 includes a signal source 10, an encoding unit 11, an encoding unit 12, a delay unit 13, a multiplexing unit 14, and a modulating unit 15.

[0028] The signal source 10 receives audio signals from a sound recording apparatus in a broadcast station and/or a reproduction apparatus for reproducing analog audio signals recorded on tape, and outputs analog signals.

[0029] The encoding unit 11 encodes the analog signals output from the signal source 10 into a first type of digital stream. Fig. 2 shows encoding procedures performed by the encoding units 11 and 12. The upper portion of Fig. 2 is a graph showing change with time in the analog signals output from the signal source 10.

[0030] First, the encoding unit 11 samples the amplitude of the analog signals output from the signal source

DISH EXHIBIT 2002, Page 698
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

10, with a predetermined sampling frequency "cy". The amplitude obtained by the sampling is represented by the number of quantization bits "rx". This encoding process outputs audio frames. The audio frame is the smallest unit of digital audio data, and has a time period (for example, an order of 20 milliseconds) that corresponds to the inverse of the sampling frequency. By repeating this encoding process while analog signals are output from the signal source 10, a digital stream composed of a sequence of audio frames is obtained. Fig. 3 shows the structure of the digital stream generated by the encoding unit 11. The digital stream includes a header and at least one audio frame. The header includes a packet identifier for identifying a packet that is currently received among those included in a digital stream. The encoding unit 11 encodes the received analog signal by obtaining the number of quantization bits at 10 % of 1 Mbps of bit rate assigned to one band. A bit rate is assigned to each type of digital stream by taking the transmission on a transmission path into account. It should be noted here that 1 Mbps of bit rate is only an example, and the bit rate may be different from this.

[0031] The encoding unit 12 encodes the analog signals output from the signal source 10 into a second type of digital stream. In this encoding, the encoding unit 12 assigns 90 % of the bit rate for one band to the second type of digital stream. The second type of digital stream has higher quality than the first type of digital streams due to a great difference between the bit rates. The arrows "ib1" and "ib2" in Fig. 2 indicate the encoding processes performed by the encoding units 1 and 2, respectively. The indicators "ib1" and "ib2" indicate "density" of the first and second types of digital streams, which results from the bit rates assigned by the encoding units 1 and 2, respectively. As the indicators indicate, the encoding unit 12 encodes analog signals with a lot of quantization bits, thus providing a high quality. For this reason, the second type of digital stream obtained by the encoding unit 12 is referred to as a high-quality stream, and the first type of digital stream obtained by the encoding unit 11 is referred to as a low-quality stream.

[0032] The delay unit 13 delays the high-quality stream generated by the encoding unit 12, by a time period T. Fig. 4 shows how the high-quality stream is delayed relative to the low-quality stream by the delay unit 13. Both low-quality and high-quality streams are a sequence of packets to which identifiers P1, P2, ... are assigned. As indicated by Fig. 4, the first packet P1 of the high-quality stream is provided together with packet P6 of the low-quality stream after the delay unit 13 delays the high-quality stream by time period T.

[0033] The multiplexing unit 14 multiplexes the low-quality stream generated by the encoding unit 11 and the high-quality stream generated by the encoding unit 12 and delayed by the delay unit 13, into a multiplexed stream.

[0034] The modulating unit 15 modulates the multiplexed stream, and transmits a broadcast wave obtained as a result of the modulation onto a transmission path using one band for digital broadcasting.

[0035] Now, the receiving apparatuses will be described. Fig. 5 shows the construction of the receiving apparatuses. As shown in Fig. 5, each receiving apparatus includes a demodulating unit 20, a demultiplexing unit 21, an accumulating unit 22, a complement data storage unit 23, a selection/output unit 24, a reproduction unit 25, and a reproduction control unit 26.

[0036] The demodulating unit 20 demodulates a broadcast wave received via the transmission path, performs an error correction onto the demodulated broadcast wave to obtain a multiplexed stream, and outputs the obtained multiplexed stream to the demultiplexing unit 21.

[0037] The demultiplexing unit 21 performs an error correction onto the multiplexed stream output from the demodulating unit 20, and demultiplexes the multiplexed stream into a high-quality stream and a low-quality stream. The demultiplexing unit 21 performs the error correction by calculating a bit error rate in the multiplexed stream, and judges whether the bit error rate exceeds a predetermined standard value, and if the judgment is positive, notifying the reproduction control unit 26 of the fact. The standard value used in the judgment is an acceptable limit within which the bit error can be corrected through an error correction. The notification that the bit error rate has exceeded the predetermined standard value indicates that the bit error found in the multiplexed stream cannot be corrected, and that the demultiplexing unit 21 has stopped execution of the demultiplexing process. The reproduction control unit 26 monitors how long the demultiplexing unit 21 stops execution of the demultiplexing process, and recognizes the time period detected by the monitoring as a reception-interrupted period. Conversely, a time period during which the digital streams are received normally is referred to as a normal reception period.

[0038] The accumulating unit 22 is a buffer memory in which part of the low-quality stream obtained by the demultiplexing is accumulated. The accumulating unit 22 accumulates a portion of the low-quality stream that corresponds to a time period T in the past up to the current time. In the present embodiment, the time period T is equal to the delay time T.

[0039] Fig. 6 shows the portion of the low-quality stream that is accumulated in the accumulating unit 22 . It is supposed here that among the packets in the low-quality stream, packet P10 was received most recently, and packets P6 to P10 received during the time period T are accumulated in the accumulating unit 22. It should be noted here that each receiving apparatus keeps receiving a new packet, and packets received during the time period T until the current time are always accumulated in the accumulating unit 22.

[0040] Figs. 7A to 7D shows how packets are written (accumulated) into the accumulating unit 22. Fig. 7A indicates that packet P11 is received newly when packets

DISH EXHIBIT 2002, Page 699
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

P6 to P10 have been accumulated in the accumulating unit 22. Fig. 7B indicates that the oldest packet P6 is deleted and the newly received packet P11 is written into the accumulating unit 22. This applies to the case where packet P12 is received. Fig. 7C, indicates that packet P12 is received newly when packets P7 to P11 have been accumulated in the accumulating unit 22. Fig. 7D indicates that the oldest packet P7 is deleted and the newly received packet P12 is written into the accumulating unit 22.

[0041] The above-described procedures are repeated and most recently received packets during the time period T are always accumulated in the accumulating unit 22. The capacity of the accumulating unit 22 is set to "time period T $\times$ 1 Mbps $\times$ 10 %". The accumulating unit 22 keeps on accumulating part of the low-quality stream as long as the low-quality stream is received normally. The accumulating unit 22 does not accumulate the low-quality stream when the low-quality stream is not received, namely in the reception-interrupted period.

[0042] It should be noted here that in the present embodiment, the time period T is equal to the delay time T for the sake of convenience, but in realty, the two time periods may differ from each other.

[0043] The complement data storage unit 23 stores complement data realized by supplementary audio data that is used to complement the stopped reproduction during the reception-interrupted period. The supplementary audio data is an announcement of the fact that the reproduction output has been stopped due to deteriorated condition of the transmission path.

[0044] The selection/output unit 24 selects one from: (a) a high-quality stream; (b) part of the low-quality stream accumulated in the accumulating unit 22; and (c) audio data stored in the complement data storage unit 23, and outputs the selected one to the reproduction unit 25. The selection and output is performed by the selection/output unit 24 in accordance with instructions sent from the reproduction control unit 26.

[0045] The reproduction unit 25 reproduces the digital stream selectively output from the selection/output unit 24. Since the digital stream dealt with in the present embodiment is audio data, the reproduction unit 25 supplies audio outputs. When the part of the low-quality stream accumulated in the accumulating unit 22 is reproduced by the reproduction unit 25, the quality of the reproduced audio is low since only 10 % of the bit rate is assigned to the low-quality stream.

[0046] The reproduction control unit 26 instructs the selection/output unit 24 to select and output the high-quality stream while the multiplexed stream is received normally. The reproduction control unit 26 instructs the selection/output unit 24 to select and output the part of the low-quality stream accumulated in the accumulating unit 22 when it is notified from the demultiplexing unit 21 of occurrence of.a reception interruption. That is to say, the part of the low-quality stream accumulated in the accumulating unit 22 is output during the reception-interrupted period.

[0047] Fig. 8 shows reproduction control performed by the reproduction control unit 26. During the reception-interrupted period shown in Fig. 8, packets P11 to P16 of the low-quality stream and packets P6 to P11 of the high-quality stream are expected to be received. It is supposed here that it is inevitable that some packets drop out from both the high-quality and low-quality streams due to the reception interruption.

[0048] On the other hand, the accumulating unit 22 has accumulated packets of the low-quality stream during the time period T immediately before the start of the reception-interrupted period. In this example shown in Fig. 8, the accumulating unit 22 has accumulated packets P6 to P10 of the low-quality stream during the period. This is because as explained earlier, the reception of the high-quality stream is delayed from the reception of the low-quality stream. With this arrangement, it is possible for the reproduction control unit 26 to instruct the selection/output unit to select and output the packets of the low-quality stream accumulated in the accumulating unit 22 so that packets P6 to P10 of the low-quality stream are reproduced instead of packets P6 to P10 of the high-quality stream during the reception-interrupted period.

[0049] As apparent from above, both packets P6 to P10 of the low-quality stream and P6 to P10 of the high-quality stream have been generated from the same source and have the same broadcast contents, but are different in that while 90 % of the bit rate for one band for digital broadcasting are assigned to the high-quality stream, 10 % of the same bit rate for the band are assigned to the low-quality stream. When reproduced by the reproduction unit 25, the quality of the low-quality stream is lower than that of the high-quality stream, though the broadcast contents are the same. This gives an impression to the audiences that the reproduction quality has been degraded.

[0050] Fig. 9 is a flowchart showing the reproduction control procedures of the reproduction control unit 26.

[0051] The process performed by the reproduction control unit 26 is broadly divided into the process for the normal reception period (steps S1-S2) and the process for the reception-interrupted period (steps S3-S7).

[0052] In the normal reception period, the reproduction control unit 26 instructs the selection/output unit 24 to select and output the high-quality stream unless it is notified from the demultiplexing unit 21 that the bit error rate exceeded the standard value (steps S1-S2).

[0053] If it is notified from the demultiplexing unit 21 that the bit error rate exceeded the standard value, the reproduction control unit 26 performs the process for the reception-interrupted period, starting with obtaining a packet identifier of a packet of the high-quality stream that has been demultiplexed most recently by the demultiplexing unit 21 (step S3). The reproduction control unit 26 then judges whether a packet having a packet identifier that follows the packet identifier obtained in step S3 has been accumulated in the accumulating unit

DISH EXHIBIT 2002, Page 700
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

22 (step S4). If the judgment result is positive, the reproduction control unit 26 reads the packet from the accumulating unit 22 and instructs the selection/output unit 24 to output the read packet (step S5). The above steps S4-S6 are executed repeatedly during the reception-interrupted period, and the packets accumulated in the accumulating unit 22 are output and reproduced in succession. If the reception-interrupted period is longer than a time required to reproduce the packets accumulated in the accumulating unit 22, it may happen that there is no packet accumulated in the accumulating unit 22 that can be reproduced before the reception-interrupted period ends. In this case, the reproduction control unit 26 instructs the selection/output unit 24 to output the audio data stored in the complement data storage unit 23 (step S7). This enables the audiences to be informed that the reproduction output has been stopped due to deteriorated condition of the transmission path.

[0054] As described above, according to the broadcast system in the present embodiment, the low-quality stream is transmitted preceding the high-quality stream by apredetermined time period, and most recently received packets of the low-quality stream during the predetermined time period are always accumulated in the accumulating unit 22. And if a reception interruption occurs, the packets accumulated in the accumulating unit 22 are reproduced. This prevents the audiences from recognizing a suspended reproduction.

[0055] With the above-described arrangement in which the digital receiving apparatuses imitate deterioration of reproduction output that is observed in the analog receiving apparatuses when a transmission path failure occurs, it is possible to prevent the audiences, who are familiar with deterioration in reproduction quality in such a case, from being confused by a sudden stop of reproduction supply.

[0056] It is preferable that the time period T is determined based on statistics of the reception-interrupted period for the transmission path. This is because with such an arrangement, if a reception interruption occurs, the high-quality stream is delayed by the time period T, packets of the low-quality stream are always accumulated during the time period T until the current time, and the reception-interrupted period lasts for the time period T, thus making it highly possible that the audiences can enjoy seamless reproduction of the broadcasting even during the reception-interrupted period.

[0057] In the present embodiment, the high-quality stream and the low-quality stream are multiplexed into one multiplexed stream, which is then transmitted onto a transmission path. However, the high-quality stream and the low-quality stream may be transmitted onto different transmission paths, respectively. For example, the high-quality stream and the low-quality stream may be transmitted onto transmission paths for the radio broadcasting and the cable broadcasting, respectively. In this case, even if a thunderstorm or the like causes a failure on a transmission path for the high-quality stream, the failure does not affect a transmission path for the low-quality stream, and the broadcast is provided without interruption.

[0058] Also, in the present embodiment, an audio announcement is provided as the complement data. However, music or an electronic sound may be provided instead of announcement. It is preferred that the music or electronic sound has such a tone as makes the audiences feel alarmed that the transmission path failure might have occurred.

Embodiment 2

[0059] Embodiment 2 relates to an improvement of the receiving apparatuses in live broadcasting of a sports game or the like. In Embodiment 1, the receiving apparatuses reproduce delayed high-quality stream during the normal reception period. This means that the audiences listen to the broadcast contents always after a delay of time period T. The audiences do not recognize such a delay when they listen to a pre-recordedbroadcast program. However, when the audiences listen to a live broadcast program of a sports game or the like, some problems may occur. For example, suppose a user is watching a real sports game listening to the live broadcasting of the sports game with a portable-type receiving apparatus. The user might be confused by the time lag between the real game and the broadcast of the game, which is caused by the receiving apparatus reproducing the delayed high-quality stream.

[0060] The present embodiment provides a method to solve the problem. Fig. 10 shows the construction of the receiving apparatuses in Embodiment 2. The construction resembles the construction shown in Fig. 1, but differs from it in that the multiplexing unit 21 outputs both the low-quality and high-quality streams directly to the selection/output unit 24, as well as outputting the low-quality stream to the accumulating unit 22. The receiving apparatuses in the present embodiment also include a switch 27 that receives an instruction by the user (audience) to switch between the low- and high-quality streams, and sends the instruction to the selection/output unit 24.

[0061] Now, the operation of the receiving apparatuses in the present embodiment will be described.

[0062] As described in Embodiment 1, the selection/output unit 24 receives the high-quality stream output from the multiplexing unit 21 and outputs it to the reproduction unit 25. However, if the user operates the switch 27 to switch from the high-quality stream to low-quality stream, the selection/output unit 24 receives the low-quality stream from the multiplexing unit 21 and outputs it to the reproduction unit 25.

[0063] As described above, audiences can select either the high-quality stream which is provided with delay or the low-quality stream which is provided without delay. This function facilitates the audiences, especially when they are watching a sports game while listening

DISH EXHIBIT 2002, Page 701
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

to the broadcast of the game since they can select the reproduction of the low-quality stream and enjoy watching the game without being confused by the time lag between the real game and the broadcast of the game.

Embodiment 3

[0064] In Embodiment 3, the imitation of analog receiving apparatuses by the digital receiving apparatuses in Embodiment 1 is performed in a more realistic manner. Fig. 11 shows the construction of the receiving apparatuses in Embodiment 3. Fig. 11 differs from Fig. 5 in that it additionally includes a superposing unit 28 and a pilot lamp 29.

[0065] The superposing unit 28 superposes a noise signal on the reproduced low-quality stream output from the reproduction unit 25 during the reception-interrupted period. The noise signal has a signal waveform that resembles the white noise. When the noise signal is superposed on the reproduced low-quality stream, the audiences can hear, together with voices/sounds output from the reproduction unit 25, a burst of noise that is familiar to them through analog broadcasting output from analog receiving apparatuses. This may give an impression to the audiences that they are listening to an analog receiving apparatus.

[0066] The pilot lamp 29 is a light-emitting element such as a light-emitting diode, where the light emitted from the pilot lamp indicates a state of stream reception. The reproduction control unit 26 controls the pilot lamp 29 for the audiences to visually distinguish the reception-interrupted period from the normal reception period. More specifically, the reproduction control unit 26 causes the pilot lamp 29 to blink stably during the normal reception period, and in contrast, to emit light intermittently on an unstable basis during the reception-interrupted period. This operation is an imitation of the blinking of a pilot lamp that is provided in many analog receiving apparatuses.

[0067] As described above, according to the present embodiment, the digital receiving apparatuses imitate the noise andblinking of a pilot lamp which have been familiar to the audiences of analog receiving apparatuses, thus preventing the audiences from sensing discomfort at the digital broadcasting.

Embodiment 4

[0068] In Embodiment 1, the low-quality stream and the high-quality stream are transmitted onto a transmission path. In Embodiment 4, n digital streams are transmitted onto a transmission path. Fig. 12 shows the construction of a transmission apparatus in Embodiment 4. In Fig. 12, it is presumed that the number of digital streams "n" is 3. The encoding units 11 and 12 shown in Fig. 1 are replaced with a low-rate encoding unit 31, a middle-rate encoding unit 32, and a high-rate encoding unit 33 in Fig. 12. The encoding units 31-33 encodes analog signals output from the signal source 10. Embodiment 4 differs from Embodiment 1 in the bit rate assigned to each digital stream by each encoding unit. More specifically, in Embodiment 1, the encoding units 11 and 12 assign 10 % and 90 % of the bit rate for one band to the two types of digital streams, respectively, while in Embodiment 4, the encoding units assign 5 %, 10 %, and 85 % of the bit rate for one band to three types of digital streams, respectively.

[0069] The delay unit 13 shown in Fig. 1 is replaced with delay units 34 and 35 in Fig. 12. The delay units 34 and 35 delays digital streams generated by the encoding units 32 and 33, respectively. The delay unit 34 delays digital streams generated by the middle-rate encoding unit 32 by a time period T/2, and outputs the delayed digital streams to the multiplexing unit 14. The delay unit 35 delays digital streams generated by the high-rate encoding unit 33 by a time period T, and outputs the delayed digital streams to the multiplexing unit 14.

[0070] With the above-described replacement of components, the multiplexing unit 14 shown in Fig. 12 multiplexes the following three types of digital streams into one multiplexed stream: (1) a digital stream generated by the low-rate encoding unit 31; (2) a digital stream generated by the middle-rate encoding unit 32 and delayed by the delay unit 34 by time period T/2; and (3) a digital stream generated by the high-rate encoding unit 33 and delayed by the delay unit 35 by time period T.

[0071] Now, the construction of the receiving apparatuses will be described. Fig. 13 shows the construction of the receiving apparatuses. In Fig. 13, the accumulating unit 22 shown in Fig. 5 has been replaced with accumulating units 36 and 37. The accumulating unit 37 accumulates in itself a low-quality digital stream to which 5 % of the bit rate for one band is assigned. The accumulating unit 36 accumulates in itself a middle-quality digital stream to which 10 % of the bit rate for one band is assigned and delayed by time period T/2.

[0072] In Embodiment 4, the reproduction control unit 26 instructs the selection/output unit 24 to select and output a high-quality digital stream to which 85 % of the bit rate for one band is assigned and delayed by time period T in the normal reception period. With this arrangement, the high-quality digital stream is reproduced by the reproduction unit 25 during the normal reception period.

[0073] The reproduction control during the reception-interrupted period will be described next. It is presumed here for the sake of convenience that the reception-interrupted period lasts for time period T. During the first half (T/2) of the reception-interrupted period, the reproduction control unit 26 instructs the selection/output unit 24 to output the middle-quality digital stream accumulated in the accumulating unit 36. With this change of outputs, the quality of data reproducedby the reproduction unit 25 is degraded in proportionate to the change from 85 % to 10 % of the bit rate. Duringthesecondhalf (T/2) ofthereception-interruptedperiod, the reproduction

DISH EXHIBIT 2002, Page 702
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

control unit 26 instructs the selection/output unit 24 to output the low-quality digital stream accumulated in the accumulating unit 37. With this change of outputs, the quality of data reproducedby the reproduction unit 25 is degraded in proportionate to the change from 10 % to 5 % of the bit rate.

[0074] As described above, in the present embodiment, in the normal reception period, data is reproduced with a quality level that is proportionate to 85 % of the bit rate, and in the reception-interrupted period, first, data is reproduced with a quality level that is proportionate to 10 %, and then with a quality level that is proportionate to 5 % of the bit rate. This would give an impression to the audiences that the reproduction quality is gradual-lydeteriorated, making them feel as if they were listening to an analog receiver.

[0075] It should be noted here that the distribution rate of 85 %, 10 %, and 5 % is only an example, and it may be varied in so far as it gives an impression to the audiences that the reproduction quality is gradually deteriorated.

Embodiment 5

[0076] In Embodiment 1, only one signal source is provided. In Embodiment 5, different signal sources are provided for video and audio, respectively. Fig. 14 shows the construction of the broadcast system in Embodiment 5. Signal sources 10a and 10b generate audio and video analog signals, respectively. Encoding units 11a and 12a and delay unit 13a are provided in correspondence with the signal source 10a, and encoding units 11b and 12b and delay unit 13b are provided in correspondence with the signal source 10b. With this construction, a low-quality stream and a high-quality stream are generated and the high-quality stream is delayed, for each of the audio and video signals.

[0077] Video data requires a higher bit rate in transmission than does audio data. As a result, the encoding unit 11a, 12a, 11b, and 12b assign different bit rates to digital streams, respectively.

[0078] As is the case with Embodiment 1, the encoding units 11a and 12a assign 10 % and 90 % of the bit rate (1 Mbps) for one band to the low- and high-quality streams for audio, respectively. It is supposed here that the bit rate for video data transmission in digital broadcasting is 5 Mbps. The encoding units 11b and 12b assign 10 % and 90 % of the bit rate (5 Mbps) for one band to the low- and high-quality streams for video, respectively.

[0079] That is to say, the encoding by the encoding units 11a, 12a, 11b, and 12b provides: (1) an audio digital stream to which 10 % of 1 Mbps is assigned; (2) an audio digital stream to which 90 % of 1 Mbps is assigned; (3) a video digital stream to which 10 % of 5 Mbps is assigned; and (4) a video digital stream to which 90 % of 5 Mbps is assigned. It should be noted here that 5 Mbps for video digital stream is given only as an example, and the bit rate may differ from this.

[0080] The delay units 13a and 13b delay the audio and video digital streams, respectively. As is the case with Embodiment 1, the delay unit 13a delays the audio high-quality stream generated by the encoding unit 12a by time period T. The delay unit 13b delays the video high-quality stream generated by the encoding unit 12b by time period T/2. The reason why the delay given by the encoding unit 12b is half the delay given by the encoding unit 12a is that the capacity of the accumulating unit 22 increases as the time period T increases, where the capacity of the accumulating unit 22 is calculated by: time period T $\times$ 1 Mbps $\times$ 10 %.

[0081] The video low-quality stream receives higher assignment of the bit rate, which is 5 Mbps $\times$ 10 % in the present embodiment, than the audio low-quality stream, which is 1 Mbps $\times$ 10 %. If the data is accumulated with this rate for the time period T, the video accumulating unit would require a storage capacity five times that of the audio accumulating unit. As a result, the video high-quality stream is delayed by T/2, so that the amount of the low-quality stream to be accumulated in the receiving apparatuses is reduced as much.

[0082] The low- and high-quality streams for audio and video, with the high-quality streams being delayed, are output to the multiplexing unit 14 to be multiplexed into streams.

[0083] The multiplexing unit 14 multiplexes all the types of digital streams into one multiplexed stream, and outputs the generated multiplexed stream to the modulating unit 15.

[0084] Up to now, the construction and operation of the transmission apparatus in Embodiment 5 has been described. Now, the construction of the receiving apparatuses in Embodiment 5 will be described.

[0085] Fig. 15 shows the construction of the receiving apparatuses in Embodiment 5. In the receiving apparatuses in Embodiment 5, the accumulating unit 22, the selection/output unit 24, and the reproduction unit 25 are provided for each audio and video. More specifically, an accumulating unit 22a, aselection/output unit 24a, and a reproduction unit 25a deal with the low- and high-quality streams for audio, and an accumulating unit 22b, a selection/output unit 24b, and a reproduction unit 25b deal with the low- and high-quality streams for video.

[0086] The demultiplexing unit 21 demultiplexes a multiplexed stream to obtain four types of digital streams: an audio low-quality stream; a video low-quality stream; an audio high-quality stream; and a video high-quality stream.

[0087] The accumulating unit 22a accumulates part of the audio low-quality stream that has been obtained during a time period T until the current time.

[0088] The accumulating unit 22b accumulates part of the video low-quality stream that has been obtained during a time period T/2 until the current time.

[0089] The selection/output unit 24a selects one among (i) the audio high-quality stream output from the

DISH EXHIBIT 2002, Page 703
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

demultiplexing unit 21 and (ii) part of the audio low-quality stream accumulated in the accumulating unit 22a, and outputs the selected audio digital stream to the reproduction unit 25a.

[0090] The selection/output unit 24b selects one among (i) the video high-quality stream output from the demultiplexing unit 21 and (ii) part of the video low-quality stream accumulated in the accumulating unit 22b, and outputs the selected video digital stream to the reproduction unit 25b.

[0091] The reproduction unit 25a reproduces the audio digital stream output from the selection/output unit 24a.

[0092] The reproduction unit 25b reproduces the video digital stream output from the selection/output unit 24b.

[0093] The reproduction control unit 26 controls the output of the selection/output units 24a and 24b. The reproduction control unit 26 instructs the selection/output unit 24a to output the audio high-quality stream and the selection/output unit 24b to output the video high-quality stream while the multiplexed stream is normally received. The reproduction control unit 26 performs the reproduction control during the reception-interrupted period as follows, where it is supposed that the reception-interrupted period lasts for time period T.

[0094] During the first half (T/2) of the reception-interrupted period, the reproduction control unit 26 instructs the selection/output unit 24a to output the packets accumulated in the accumulating unit 22a, and instructs the selection/output unit 24b to output the packets accumulated in the accumulating unit 22b. Since the accumulating unit 22a accumulates part of the audio low-quality stream and the accumulating unit 22b accumulates part of the video low-quality stream, the audio low-quality stream and the video low-quality stream are reproduced during the first half (T/2) of the reception-interrupted period.

[0095] During the second half (T/2) of the reception-interrupted period, the reproduction control unit 26 instructs the selection/output unit 24a to output the packets accumulated in the accumulating unit 22a. However, since all the packets accumulated in the accumulating unit 22b, that is, part of the video low-quality stream has been reproduced during the first half (T/2) of the reception-interrupted period, only the audio low-quality stream is reproduced during the second half (T/2) of the reception-interrupted period.

[0096] As described above, according to the present embodiment, the "high-quality audio + high-quality video" output that is supplied during the normal reception period changes to the "low-quality audio + low-quality video" output if a failure occurs to the transmission path. Furthermore, if the time reception interruption continues for a certain time period, the reproduction changes from "audio + video" to "only audio" . That is to say, the reproduced data changes step by step from the high-quality audio and video in the normal reception period to the low-quality audio and video, and to the only audio without video. In this way, the digital receiving apparatuses imitate the gradual deterioration of reproduction output that is observed in the analog receiving apparatuses when a transmission path failure occurs, giving an impression to the audiences that the reproduction quality is gradually degraded in the same manner as when they are listening to analog receivers.

Embodiment 6

[0097] The encoding units 11 and 12 in Embodiment 1 perform a fixed-bit-rate encoding. In Embodiment 6, the transmission apparatus performs a variable-length encoding.

[0098] Fig. 16 shows the construction of a transmission apparatus in a broadcast system in Embodiment 6. In comparison with Fig. 1, Fig. 16 includes encoding units 60 and 62 respectively in place of the encoding units 11 and 12, and includes buffers 61 and 63 that respectively correspond to the encoding units 11 and 12.

[0099] The encoding unit 60 generates a low-quality stream by performing a variable-length encoding in which it assigns a variable-length bit rate to each audio frame.

[0100] The buffer 61 stores 30 seconds of audio frames among those constituting the low-quality stream generated by the encoding unit 60.

[0101] The encoding unit 62 generates a high-quality stream by performing a variable-length encoding in which it assigns a variable-length bit rate to each audio frame.

[0102] The buffer 63 stores 30 seconds of audio frames among those constituting the high-quality stream generated by the encoding unit 62.

[0103] The multiplexing unit 14 multiplexes the 30 seconds of audio frames stored in the buffer 61 with the 30 seconds of audio frames stored in the buffer 63 into one multiplexed stream, and outputs the multiplexed stream to the modulating unit 15. The modulating unit 15 outputs the multiplexed stream at 1 Mbps of the bit rate for one band.

[0104] Here, the variable-length encoding performed by the encoding units 60 and 62 will be described.

[0105] In the variable-length encoding, the encoding unit 60 (62) checks each section of an analog signal that corresponds to each audio frame and detects an amount of audible component the section contains, assigns a bit rate to each section in proportionate to the detected amount of audible component, and generates audio frames by encoding each section in accordance with the assigned bit rate. With this arrangement, as much amount of bit rate as omitted from the audio frames that contain less amounts of audible component can be appropriated to the audio frames that contain more amounts of audible component. This enables the quality of the audio reproduction to be improved in total.

[0106] The bit rate assigned to each audio frame by

DISH EXHIBIT 2002, Page 704
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

the encoding unit 60 is a part of the number of bits obtained by "1 Mbps × 10 % × 30 seconds" . That is to say, although the encoding unit 60 assigns a variable-length bit rate to each audio frame, the total bit rate for 30 seconds does not exceed "1 Mbps × 10 %".

[0107] Similarly, the bit rate assigned to each audio frame by the encoding unit 62 is a part of the number of bits obtained by "1 Mbps × 90 % × 30 seconds". That is to say, although the encoding unit 62 assigns a variable-length bit rate to each audio frame, the total bit rate for 30 seconds does not exceed "1 Mbps × 90 %".

[0108] This is because the 30 seconds of audio frames stored in the buffer 61 and the 30 seconds of audio frames stored in the buffer 63, which are multiplexed together and output onto a transmission path, should not exceed 1 Mbps of the bit rate for one band.

[0109] As described above, the present embodiment enables the quality of the audio reproduction to be improved in total by assigning higher bit rates to the audio frames that contain more amounts of audible component, and assigning lower bit rates to the audio frames that contain less amounts of audible component.

[0110] It should be noted here that the time period of 30 seconds is only an example given for the sake of convenience, and it may be either increased or decreased.

Embodiment 7

[0111] In Embodiments 1 to 6, the signal source 10 generates an analog signal, and the encoding units 11 and 12 perform a quantization process with different numbers of quantization bits, so that two digital streams are transmitted at different bit rates on transmission paths. In Embodiment 7, the signal source 10 generates a digital signal. That is say, the signal source 10 generates a quantized digital signal and the encoding units 11 and 12 encode the quantized digital signal. In this encoding, the encoding amount in the encoding unit 11 is set to a larger value, and the encoding amount in the encoding unit 12 is set to a smaller value. It is possible to assign different bit rates to two digital streams for transmission only by adjusting the encoding amount as explained above. It is accordingly possible to use a digital signal source that has been encoded by MPEG and accumulated, as it is. This facilitates the broadcasting stations.

[0112] In the transmission apparatus in Embodiments 1-7, the delay unit 13 operates after the encoding unit 12 . However, the delay unit 13 may operate before the encoding unit 12. That is to say, the delay unit 13 may delay the signal from the signal source 10 before the signal is input to the encoding unit 12.

[0113] The features of the transmission apparatus and the receiving apparatuses described in Embodiments 1-7 can be realized by a computer-readable program. Such a computer-readable program can be executed separately from the transmission apparatus and the receiving apparatuses. Also, such a programmay be recorded into a computer-readable recording medium, may be transferred or lent to other parties via the recording medium, and may be executed by the parties. Also, such a program may be distributed on a network and executed by the receivers.

[0114] Although the present invention has been fully described by way of examples with reference to the accompanying drawings, it is to be noted that various changes and modifications will be apparent to those skilled in the art. Therefore, unless such changes and modifications depart from the scope of the present invention, they should be construed as being included therein.

Claims

1. A broadcast system including a transmission apparatus and a receiving apparatus, the transmission apparatus including:

   a generating unit operable to generate a first digital stream and a second digital stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first digital stream is lower than an encoding bit rate for the second digital stream; and
   a transmission unit operable to transmit the first and second digital streams onto a transmission path while delaying the second digital stream relative to the first digital stream,
   the receiving apparatus including:

   a reproduction unit operable to reproduce the second digital stream in a normal state; and
   a reproduction control unit operable to, if a transmission path failure occurs, cause the reproduction unit to reproduce, instead of the second digital stream, a portion of the first digital stream that has been received before the occurrence of the transmission path failure.

2. The broadcast system of Claim 1, wherein
   the receiving apparatus further includes:

   a receiving unit operable to receive packets constituting the first and second digital streams for each digital stream; and
   an accumulating unit operable to accumulate one or more packets of the first digital stream received by the receiving unit during a predetermined time period until a current time, wherein
   the reproduction control unit causes the reproduction unit to reproduce the one or more packets of the first digital stream accumulated in the

DISH EXHIBIT 2002, Page 705
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

accumulating unit, if a transmission path failure occurs.

3. The broadcast system of Claim 2, wherein
the predetermined time period is equal to a time period by which the second digital stream is delayed by the transmission unit.

4. The broadcast system of Claim 2, wherein
the receiving apparatus further includes
a write control unit operable to, each time the receiving unit newly receives a packet, write the newly received packet into the accumulating unit after deleting an oldest packet among the one or more packets accumulated in the accumulating unit.

5. The broadcast system of Claim 4, wherein
the predetermined time period is determined based on statistics of a time period for which a transmission path failure continues.

6. The broadcast system of Claim 1, wherein
the receiving apparatus superposes a signal resembling a noise on the one or more packets accumulated in the accumulating unit when the one or more packets are reproduced due to occurrence of a transmission path failure.

7. The broadcast system of Claim 1, wherein
the receiving apparatus is provided with a pilot lamp that emits light in a manner in which a normal state is distinguished from an abnormal state, wherein in the normal state, the second digital stream is reproduced, and in the abnormal state, the first digital stream is reproduced.

8. The broadcast system of Claim 2, wherein
if a transmission path failure continues exceeding the predetermined time period during which the one or more packets are accumulated in the accumulating unit, the receiving apparatus reproduces supplementary data so as to complement the reproduction of the accumulated packets.

9. The broadcast system of Claim 1, wherein
the receiving apparatus further includes:

an operation receiving unit operable to receive input of an operation by a user to request real time reproduction; and
a switch unit operable to switch from reproduction of the second digital stream to reproduction of the first digital stream if the operation receiving unit receives the input of the operation by the user.

10. The broadcast system of Claim 1, wherein
the generating unit of the transmission apparatusincludes two encoders that respectively generate the first digital stream and the second digital stream by performing a variable-length encoding onto an analog signal.

11. A broadcast system including a transmission apparatus and a receiving apparatus, the transmission apparatus including:

a generating unit operable to generate a first digital stream, a second digital stream, and a third digital stream by encoding a same signal respectively at different encoding bit rates, where an encoding bit rate for the first digital stream is the lowest among the encoding bits rates, an encoding bit rate for the second digital stream is the middle between encoding bit rates for the first and third digital streams, and an encoding bit rate for the third digital stream is the highest among the encoding bits rates; and
a transmission unit operable to transmit the first, second, and third digital streams onto a transmission path while delaying the second digital stream by time period T1 and delaying the third digital stream by time period T2, wherein T2 > T1,
the receiving apparatus including:

an accumulating unit operable to accumulate part of the first and second digital streams received from the transmission apparatus;
a reproduction unit operable to reproduce the thirddigital stream in a normal state; and
a reproduction control unit operable to cause the reproduction unit to reproduce, instead of the third digital stream, the part of the second digital stream accumulated in the accumulating unit if a transmission path failure continues for the time period T2 or more, and to reproduce the part of the first digital stream accumulated in the accumulating unit following the reproduction of the part of the second digital stream accumulated in the accumulating unit.

12. A broadcast system including a transmission apparatus and a receiving apparatus, the transmission apparatus including:

a first generating unit operable to generate a first audio stream and a second audio stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first audio stream is lower than an encoding bit rate for the second audio stream;
a second generating unit operable to generate

DISH EXHIBIT 2002, Page 706
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

a first video stream and a second video stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first video stream is lower than an encoding bit rate for the second video stream; and
a transmission unit operable to transmit the first and second audio streams and the first and second video streams onto a transmission path while delaying the second video stream by a time period T1 and delaying the second audio stream by a time period T2, wherein T2 > T1,
the receiving apparatus including:

a first accumulating unit operable to accumulate part of the first video stream received during the time period T1 until a current time;
a second accumulating unit operable to accumulate part of the first audio stream received during the time period T2 until the current time;
a reproduction unit operable to reproduce the second video stream and the second audio stream in a normal state; and
a reproduction control unit operable to cause the reproduction unit to reproduce (i) the part of the first video stream accumulated in the first accumulating unit and (ii) the part of the first audio stream accumulated in the second accumulating unit for the time period T1 if a transmission path failure continues for the time period T2 or more, and to reproduce, after the time period T1, the part of the first audio stream accumulated in the second accumulating unit.

13. A receiving apparatus for use in a broadcast system including a transmission apparatus that generates a first digital stream and a second digital stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first digital stream is lower than an encoding bit rate for the second digital stream, and transmits the first and second digital streams onto a transmission path while delaying the second digital stream relative to the first digital stream, the receiving apparatus comprising:

a reproduction unit operable to reproduce the second digital stream in a normal state; and
a reproduction control unit operable to, if a transmission path failure occurs, cause the reproduction unit to reproduce, instead of the second digital stream, a portion of the first digital stream that has been received before the occurrence of the transmission path failure.

14. The receiving apparatus of Claim 13 further comprising :

a receiving unit operable to receive packets constituting the first and second digital streams for each digital stream; and
an accumulating unit operable to accumulate one or more packets of the first digital stream received by the receiving unit during a predetermined time period until a current time, wherein
the reproduction control unit causes the reproduction unit to reproduce the one or more packets of the first digital stream accumulated in the accumulating unit, if a transmission path failure occurs.

15. The receiving apparatus of Claim 14, wherein
the predetermined time period is equal to a time period by which the second digital stream is delayed by the transmission apparatus.

16. The receiving apparatus of Claim 14 further comprising
a write control unit operable to, each time the receiving unit newly receives a packet, write the newly received packet into the accumulating unit after deleting an oldest packet among the one or more packets accumulated in the accumulating unit.

17. The receiving apparatus of Claim 16, wherein
the predetermined time period is determined based on statistics of a time period for which a transmission path failure continues.

18. The receiving apparatus of Claim 13, wherein
the receiving apparatus superposes a signal resembling a noise on the one or more packets accumulated in the accumulating unit when the one or more packets are reproduced due to occurrence of a transmission path failure.

19. The receiving apparatus of Claim 13, wherein
the receiving apparatus is provided with a pilot lamp that emits light in a manner in which a normal state is distinguished from an abnormal state, wherein in the normal state, the second digital stream is reproduced with delay, and in the abnormal state, the first digital stream is reproduced without delay.

20. The receiving apparatus of Claim 13, wherein
if a transmission path failure continues exceeding the predetermined time period during which the one or more packets are accumulated in the accumulating unit, the receiving apparatus reproduces supplementary data so as to complement the reproduction of the accumulated packets.

DISH EXHIBIT 2002, Page 707
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

21. The receiving apparatus of Claim 13 further comprising:

an operation receiving unit operable to receive input of an operation by a user to request real time reproduction; and
a switch unit operable to switch from reproduction of the second digital stream to reproduction of the first digital stream if the operation receiving unit receives the input of the operation by the user.

22. A receiving apparatus for use in a broadcast system including a transmission apparatus that generates a first digital stream, a second digital stream, and a third digital stream by encoding a same signal respectively at different encoding bit rates, where an encoding bit rate for the first digital stream is the lowest among the encoding bits rates, an encoding bit rate for the second digital stream is the middle between encoding bit rates for the first and third digital streams, and an encoding bit rate for the third digital stream is the highest among the encoding bits rates, and transmits the first, second, and third digital streams onto a transmission path while delaying the second digital stream by time period T1 and delaying the third digital stream by time period T2, wherein T2 > T1, the receiving apparatus comprising:

an accumulating unit operable to accumulate part of the first and second digital streams received from the transmission apparatus;
a reproduction unit operable to reproduce the third digital stream in a normal state; and
a reproduction control unit operable to cause the reproduction unit to reproduce, instead of the third digital stream, the part of the second digital stream accumulated in the accumulating unit if a transmission path failure continues for the time period T2 or more, and to reproduce the part of the first digital stream accumulated in the accumulating unit following the reproduction of the part of the second digital stream accumulated in the accumulating unit.

23. A receiving apparatus for use in a broadcast system including a transmission apparatus that generates a first audio stream and a second audio stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first audio stream is lower than an encoding bit rate for the second audio stream, generates a first video stream and a second video stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first video stream is lower than an encoding bit rate for the second video stream, and transmits the first and second audio streams and the first and second video streams onto a transmission path while delaying the second video stream by a time period T1 and delaying the second audio stream by a time period T2, wherein T2 > T1, the receiving apparatus comprising:

a first accumulating unit operable to accumulate part of the first video stream received during the time period T1 until a current time;
a second accumulating unit operable to accumulate part of the first audio stream received during the time period T2 until the current time;
a reproduction unit operable to reproduce the second video stream and the second audio stream in a normal state; and
a reproduction control unit operable to cause the reproduction unit to reproduce (i) the part of the first video stream accumulated in the first accumulating unit and (ii) the part of the first audio stream accumulated in the second accumulating unit for the time period T1 if a transmission path failure continues for the time period T2 ormore, and to reproduce, after the time period T1, the part of the first audio stream accumulated in the second accumulating unit.

24. A program that causes a computer to execute a reception process in a broadcast system including a transmission apparatus that generates a first digital stream and a second digital stream from a same signal source by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first digital stream is lower than an encoding bit rate for the second digital stream, and transmits the first and second digital streams onto a transmission path while delaying the second digital stream relative to the first digital stream, the reception process including:

a reproduction step for reproducing the second digital stream in a normal state; and
a reproduction control step for causing, if a transmission path failure occurs, the reproduction step to reproduce, instead of the second digital stream, a portion of the first digital stream that has been.received before the occurrence of the. transmission path failure.

25. The program of Claim 24, wherein
the computer includes:

a receiving unit operable to receive packets constituting the first and second digital streams for each digital stream; and
an accumulating unit operable to accumulate one or more packets of the first digital stream received by the receiving unit during a predetermined time period until a current time,

DISH EXHIBIT 2002, Page 708
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

wherein
the reproduction control step causes the reproduction step to reproduce the one or more packets of the first digital stream accumulated in the accumulating unit, if a transmission path failure occurs.

26. The program of Claim 25, wherein
the predetermined time period is equal to a time period by which the second digital stream is delayed by the transmission apparatus.

27. The program of Claim 25, wherein
the reception process further includes
a write control step for, each time the receiving unit newly receives a packet, writing the newly received packet into the accumulating unit after deleting an oldest packet among the one or more packets accumulated in the accumulating unit.

28. The program of Claim 27, wherein
the predetermined time period is determined based on statistics of a time period for which a transmission path failure continues.

29. The program of Claim 24, wherein
the computer further includes
an operation receiving unit operable to receive input of an operation by a user to request real time reproduction, and
the reception process further includes
a switch step for switching from reproduction of the second digital stream to reproduction of the first digital stream if the operation receiving unit receives the input of the operation by the user.

30. A program that causes a computer to execute a reception process in a broadcast system including a transmission apparatus that generates a first digital stream, a second digital stream, and a third digital stream by encoding a same signal respectively at different encoding bit rates, where an encoding bit rate for the first digital stream is the lowest among the encoding bits rates, an encoding bit rate for the second digital stream is the middle between encoding bit rates for the first and third digital streams, and an encoding bit rate for the third digital stream is the highest among the encoding bits rates, and transmits the first, second, and third digital streams onto a transmission path while delaying the second digital stream by time period T1 and delaying the third digital streamby time period T2, wherein T2 > T1, the computer including
an accumulating unit operable to accumulate part of the first and second digital streams received from the transmission apparatus,
the reception process including:
a reproduction step for reproducing the third digital stream in a normal state; and
a reproduction control step for causing the reproduction step to reproduce, instead of the third digital stream, the part of the second digital stream accumulated in the accumulating unit if a transmission path failure continues for the time period T2 or more, and to reproduce the part of the first digital stream accumulated in the accumulating unit following the reproduction of the part of the second digital stream accumulated in the accumulating unit.

31. A program that causes a computer to execute a reception process in a broadcast system including a transmission apparatus that generates a first audio stream and a second audio stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first audio stream is lower than an encoding bit rate for the second audio stream, generates a first video stream and a second video stream by encoding a same signal at different encoding bit rates, where an encoding bit rate for the first video stream is lower than an encoding bit rate for the second video stream, and transmits the first and second audio streams and the first and second video streams onto a transmission path while delaying the second video stream by a time period T1 and delaying the second audio stream by a time period T2, wherein T2 > T1, the computer including:

a first accumulating unit operable to accumulate part of the first video stream received during the time period T1 until a current time; and
a second accumulating unit operable to accumulate part of the first audio stream received during the time period T2 until the current time,
the reception process comprising:

a reproduction step for reproducing the secondvideo stream and the second audio stream in a normal state; and
a reproduction control step for causing the reproduction step to reproduce (i) the part of the first video stream accumulated in the first accumulating unit and (ii) the part of the first audio stream accumulated in the second accumulating unit for the time period T1 if a transmission path failure continues for the time period T2 or more, and to reproduce, after the time period T1, the part of the first audio stream accumulated in the second accumulating unit.

DISH EXHIBIT 2002, Page 709
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

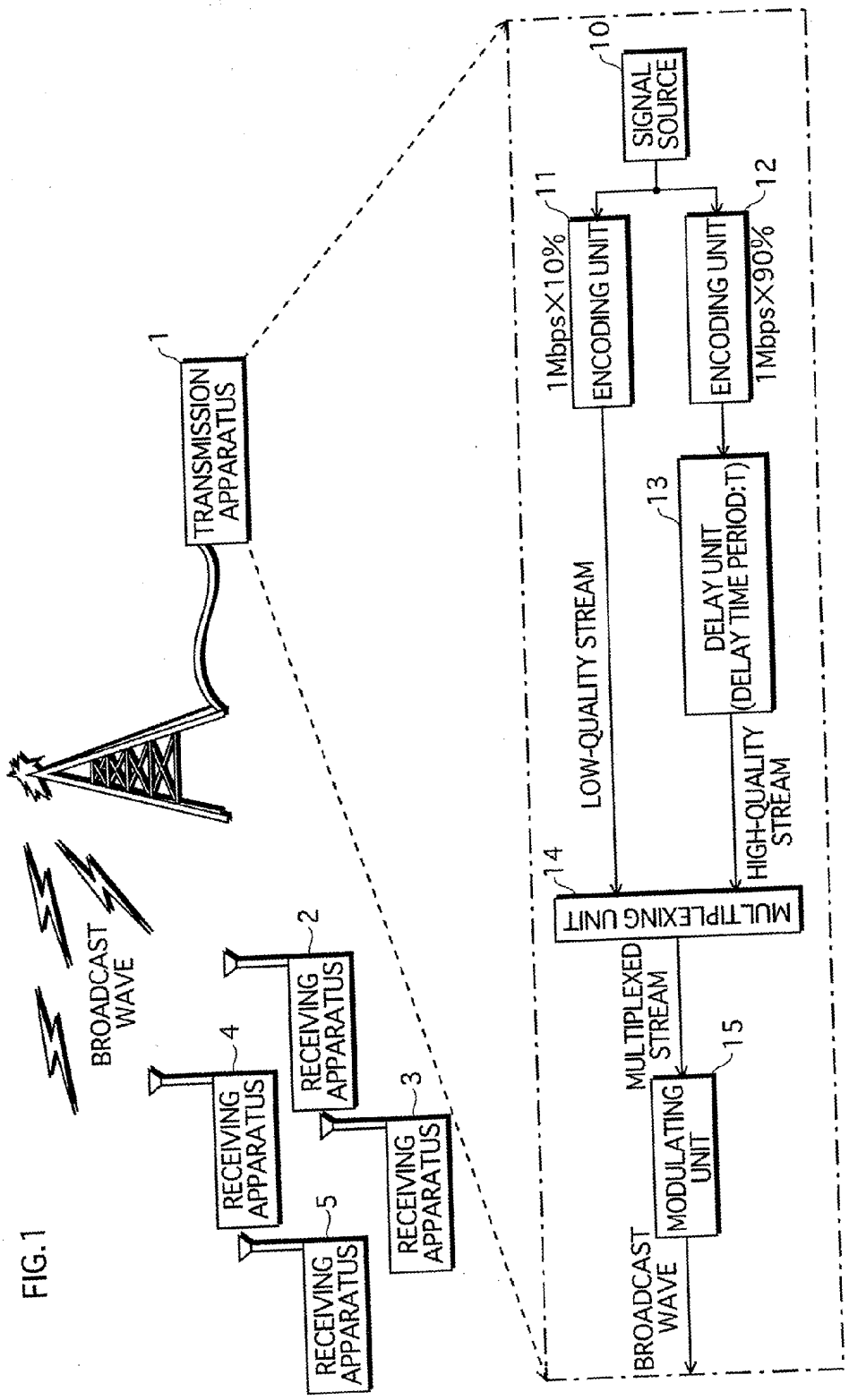


FIG.1

DISH EXHIBIT 2002, Page 710
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.2

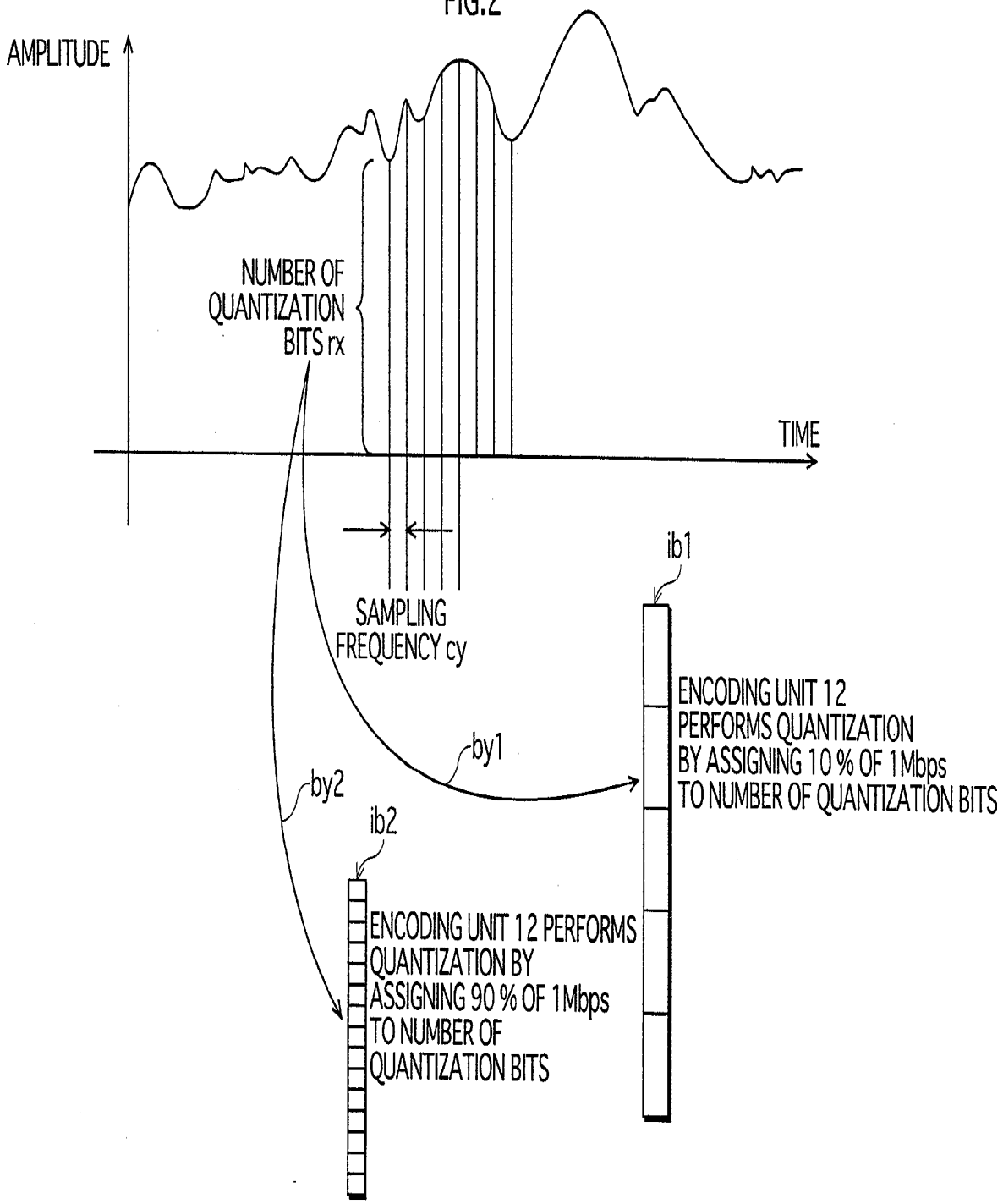
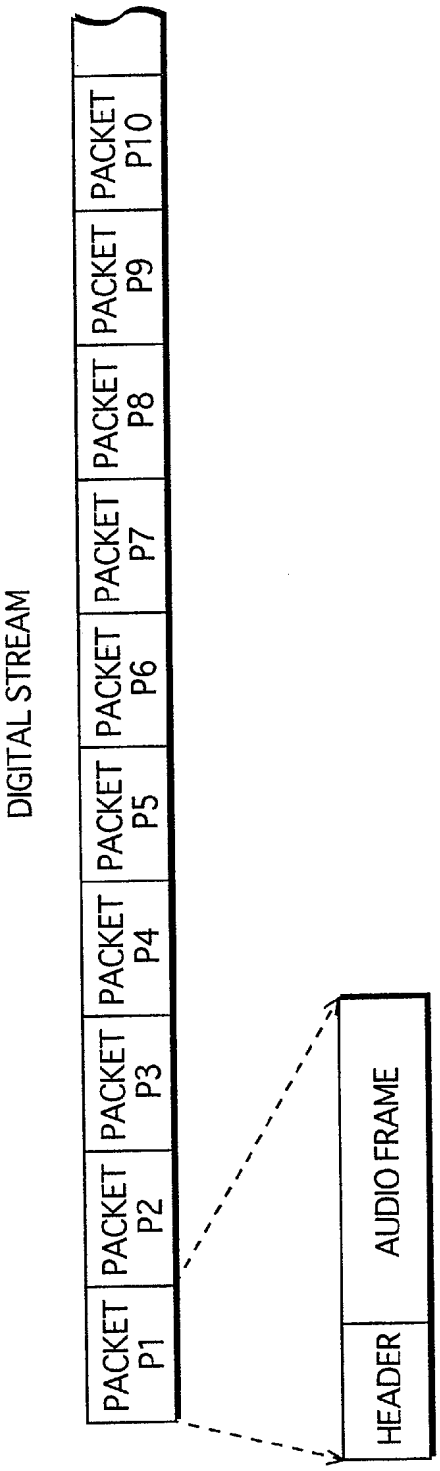
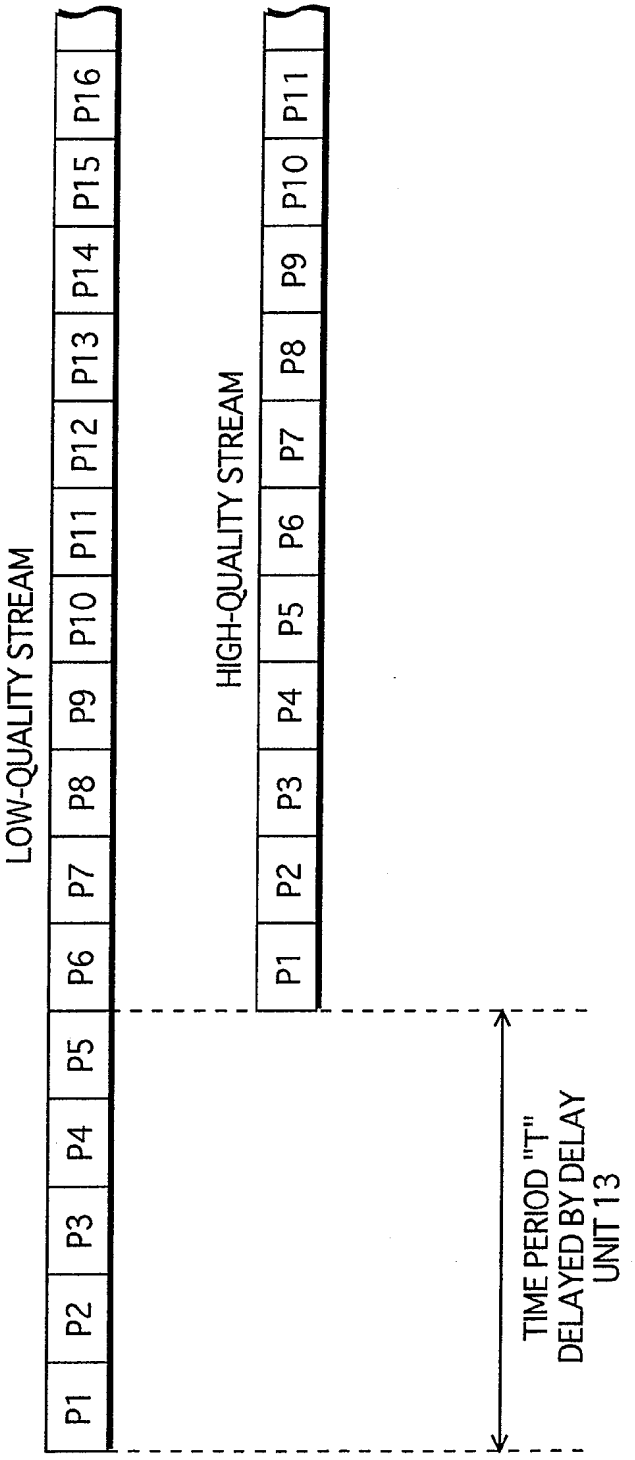

AMPLITUDE
NUMBER OF QUANTIZATION BITS rx
TIME
SAMPLING FREQUENCY cy
ib1
ENCODING UNIT 12 PERFORMS QUANTIZATION BY ASSIGNING 10 % OF 1Mbps TO NUMBER OF QUANTIZATION BITS
by1
by2
ib2
ENCODING UNIT 12 PERFORMS QUANTIZATION BY ASSIGNING 90 % OF 1Mbps TO NUMBER OF QUANTIZATION BITS

FIG.3



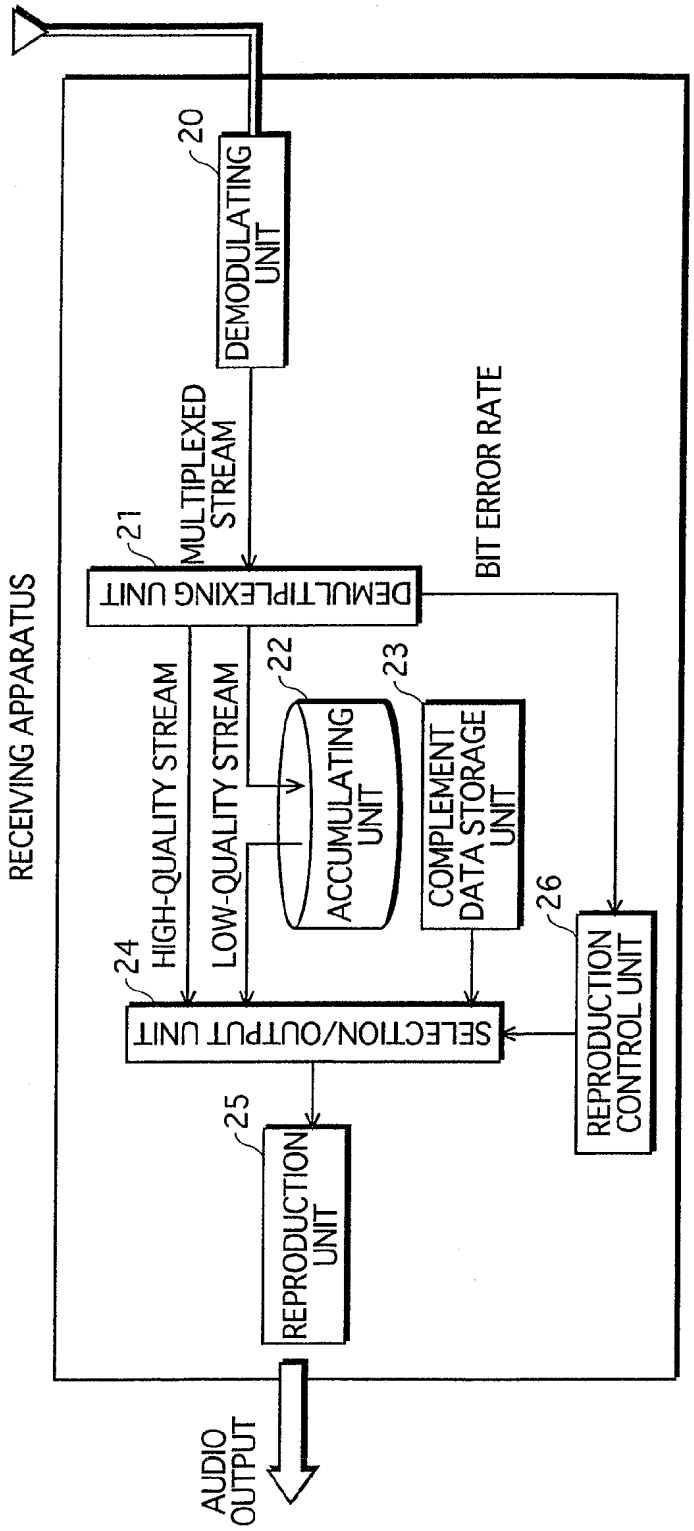
DISH EXHIBIT 2002, Page 712
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.4



DISH EXHIBIT 2002, Page 713
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.5



DISH EXHIBIT 2002, Page 714
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.6

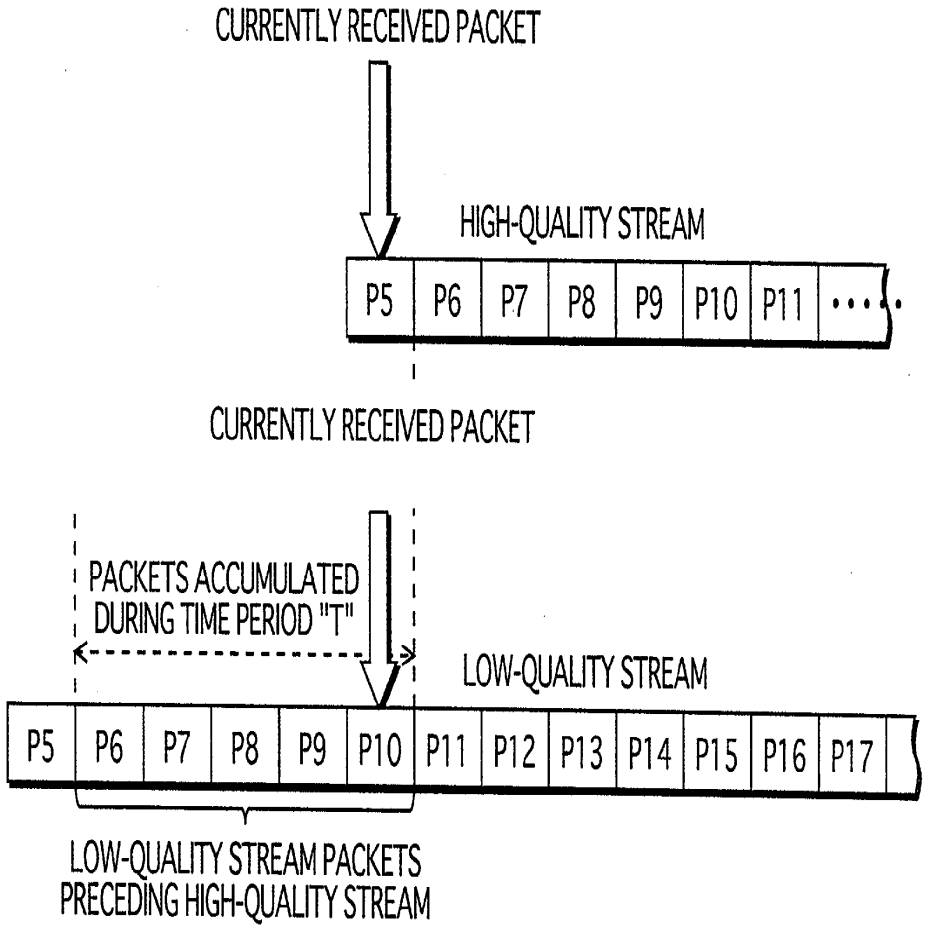

CURRENTLY RECEIVED PACKET
HIGH-QUALITY STREAM
P5
P6
P7
P8
P9
P10
P11
CURRENTLY RECEIVED PACKET
PACKETS ACCUMULATED DURING TIME PERIOD "T"
LOW-QUALITY STREAM
P5
P6
P7
P8
P9
P10
P11
P12
P13
P14
P15
P16
P17
LOW-QUALITY STREAM PACKETS PRECEDING HIGH-QUALITY STREAM

FIG.7A

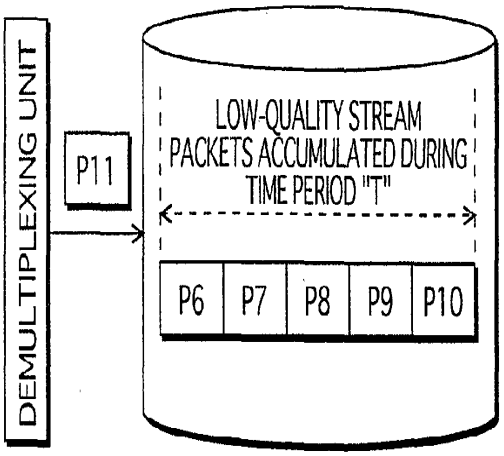


FIG.7B

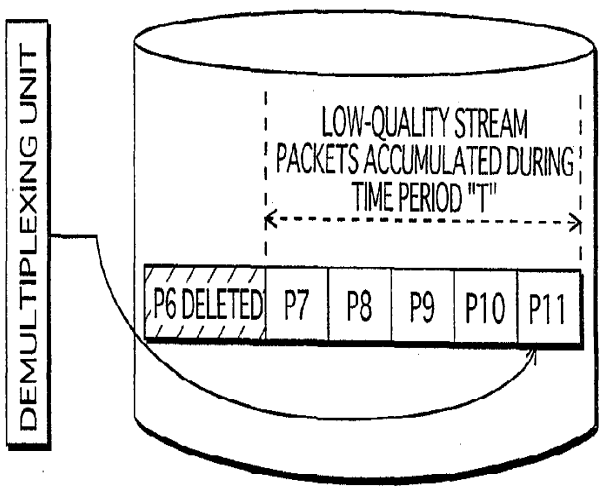


FIG.7C

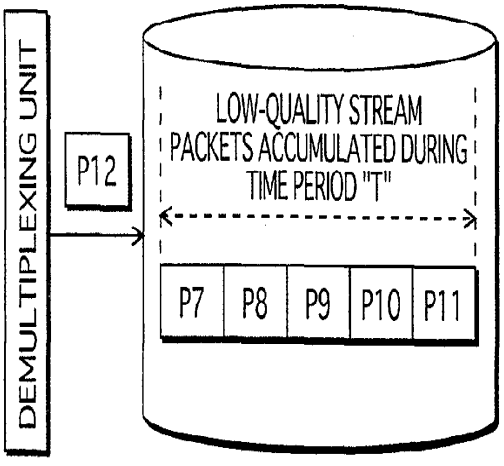
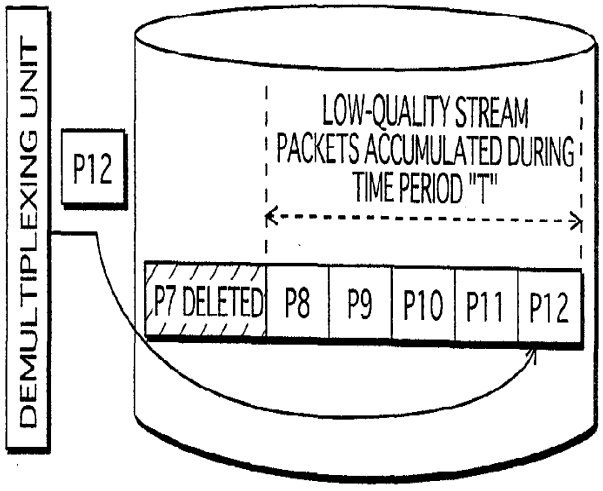


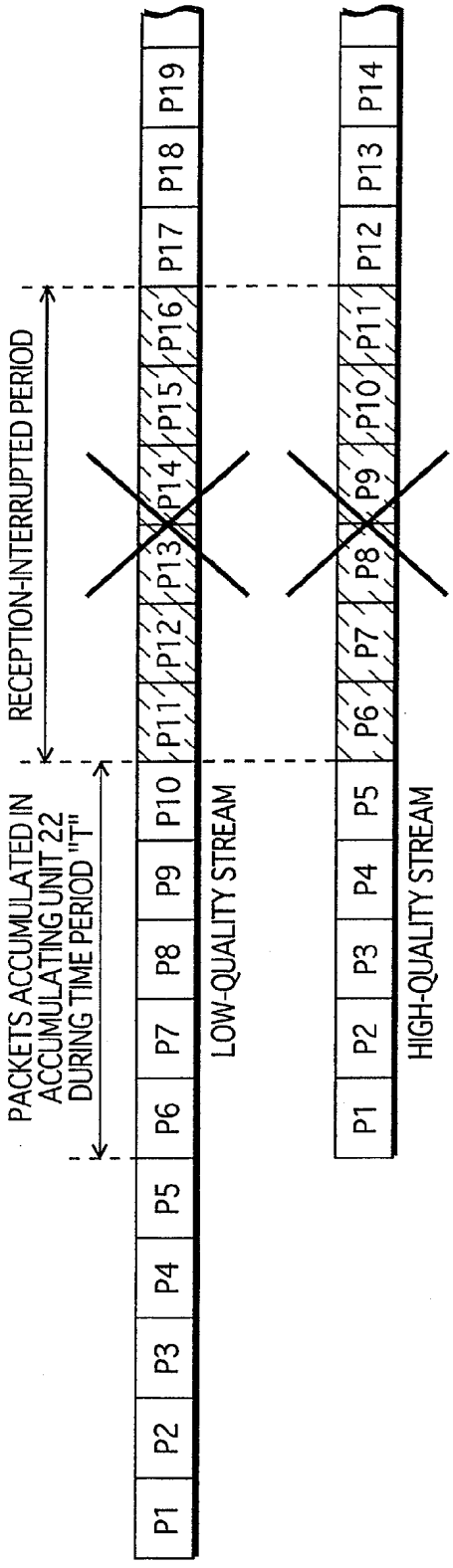
FIG.7D



EP 1 394 973 A2

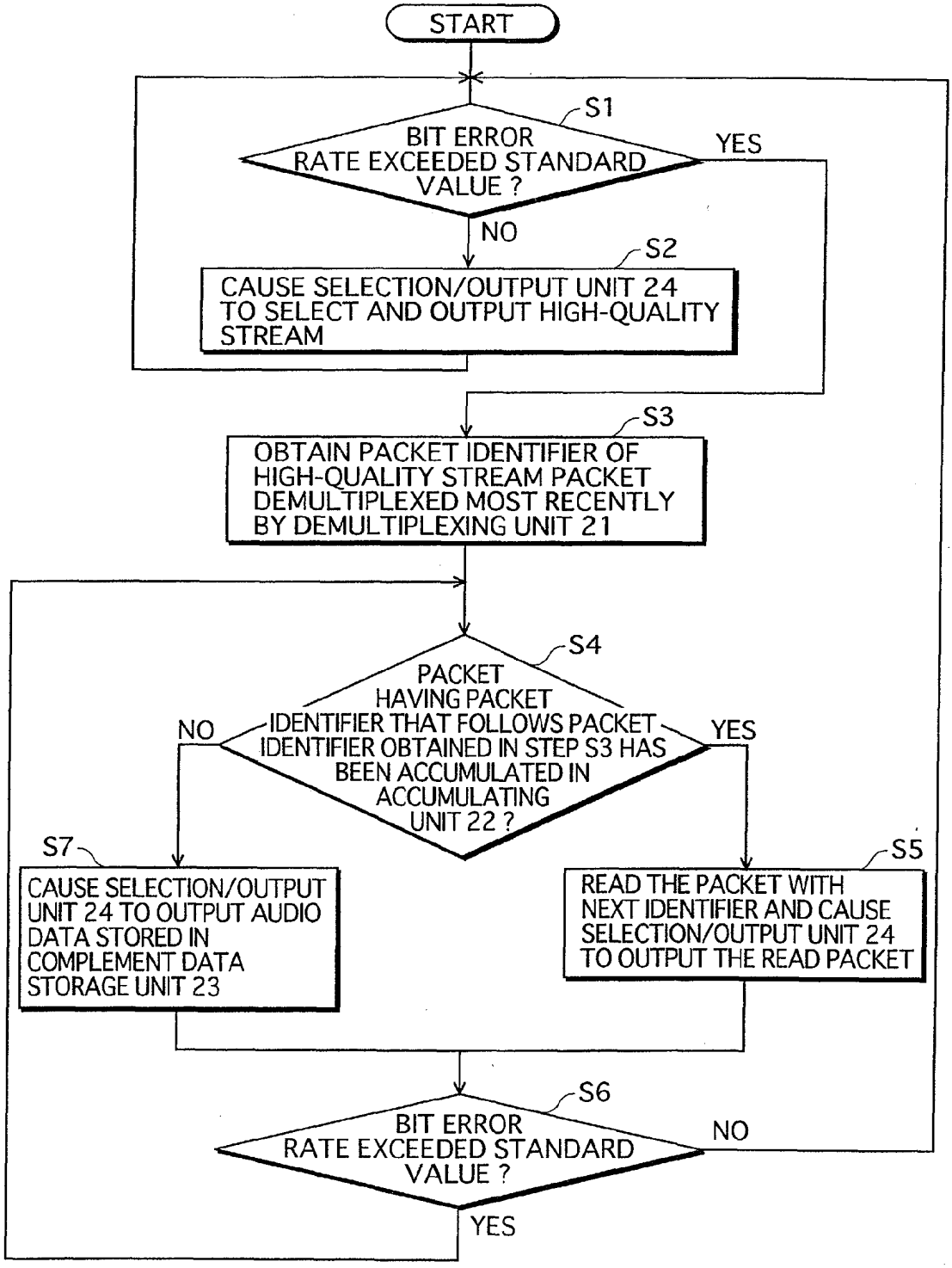
DISH EXHIBIT 2002, Page 716
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.8



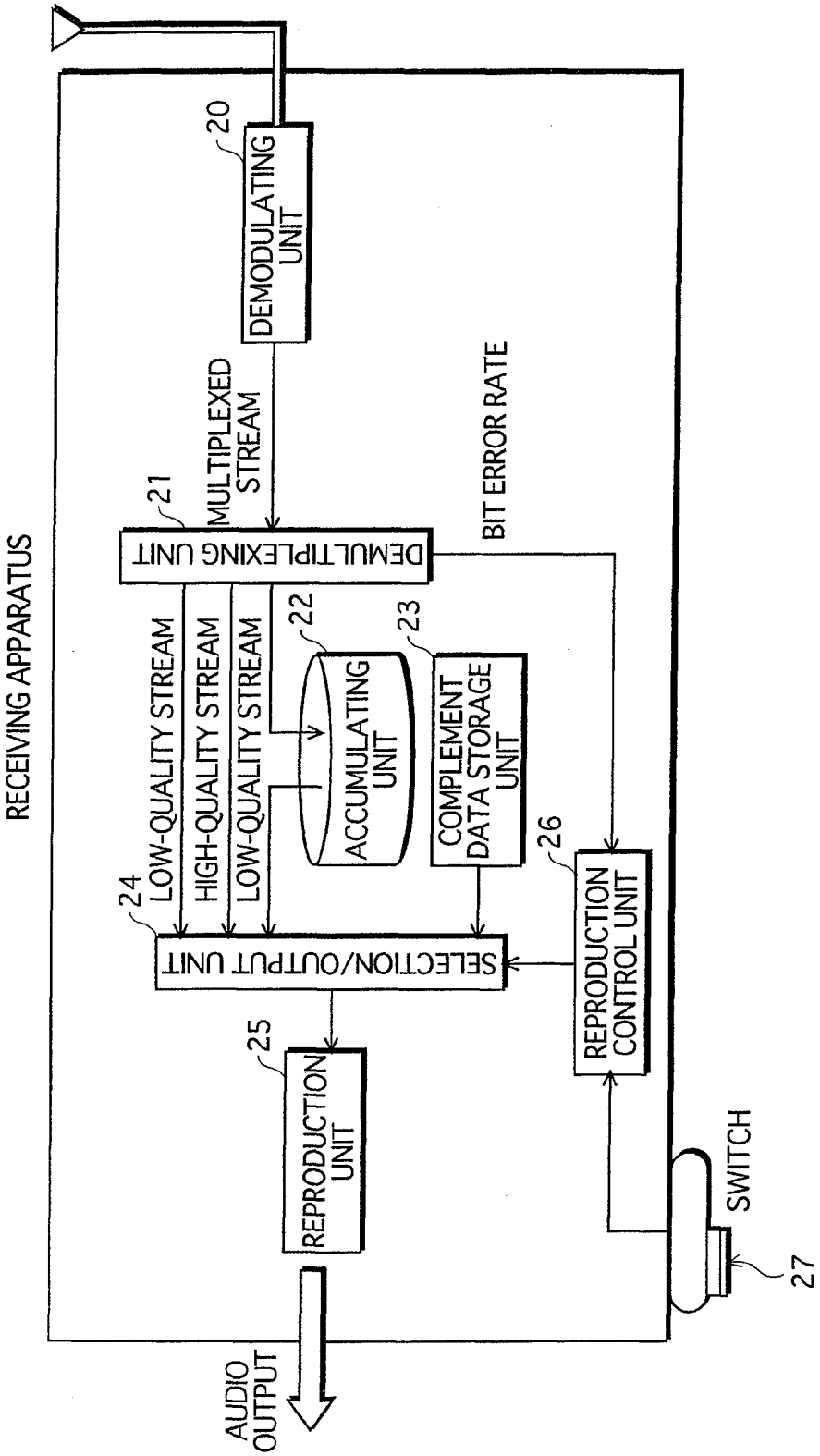
DISH EXHIBIT 2002, Page 717
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.9



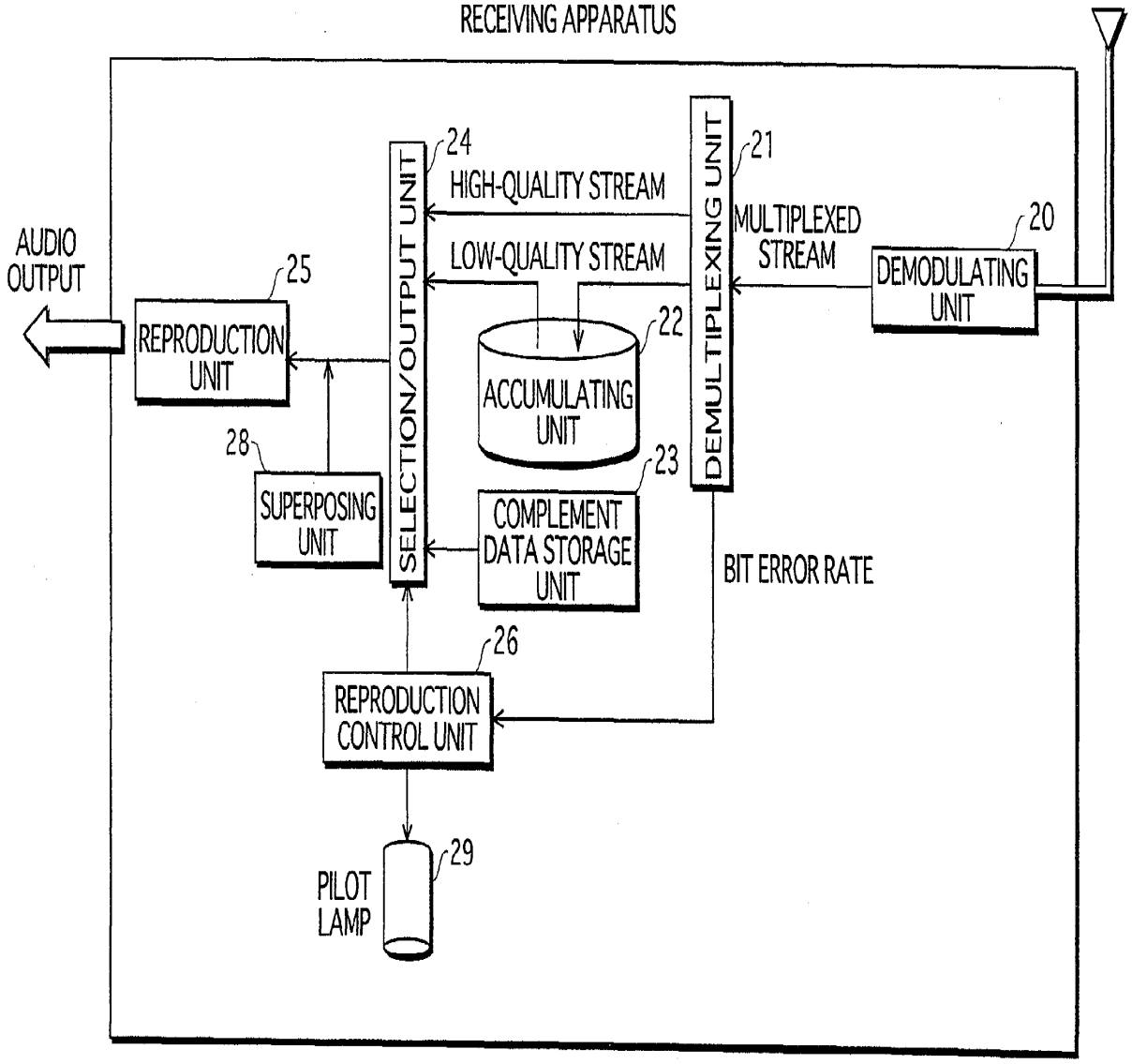
DISH EXHIBIT 2002, Page 718
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.10



DISH EXHIBIT 2002, Page 719
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

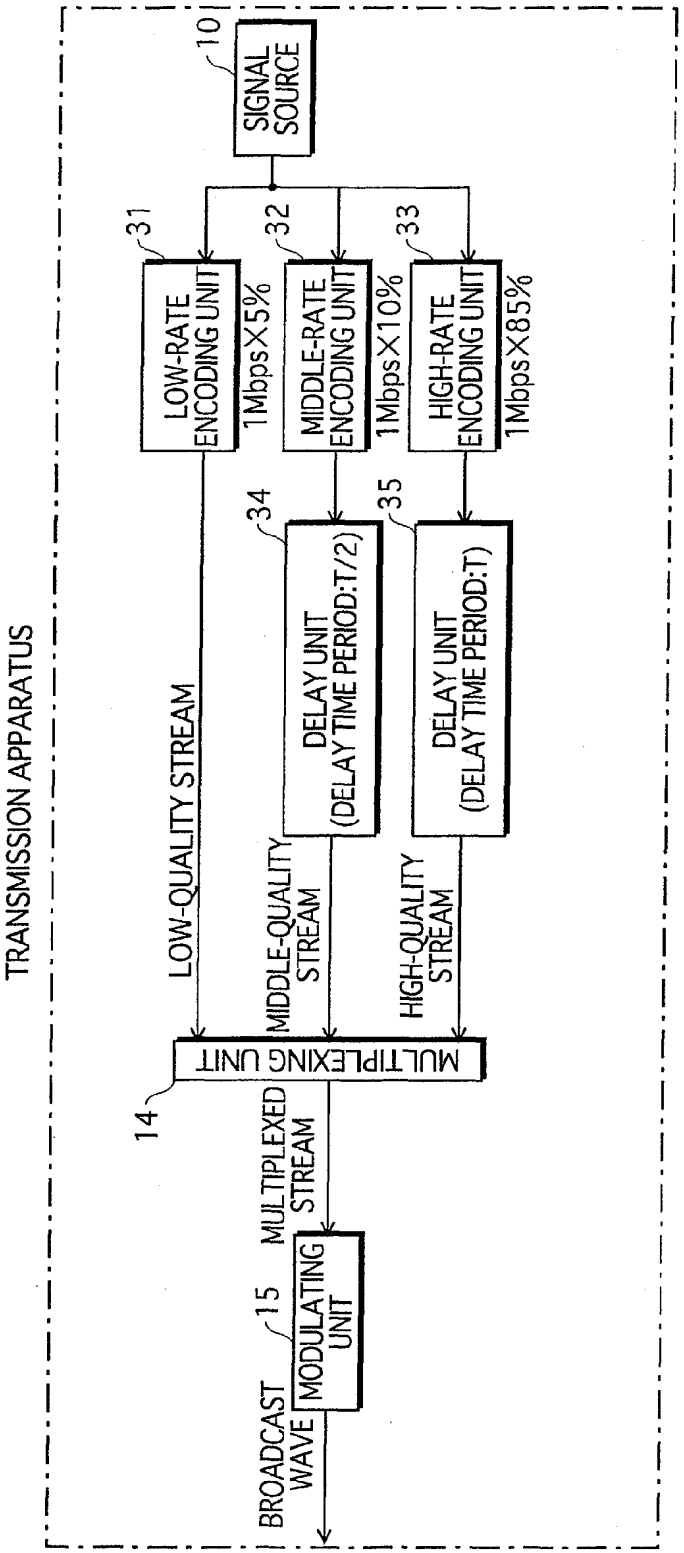
FIG.11



EP 1 394 973 A2

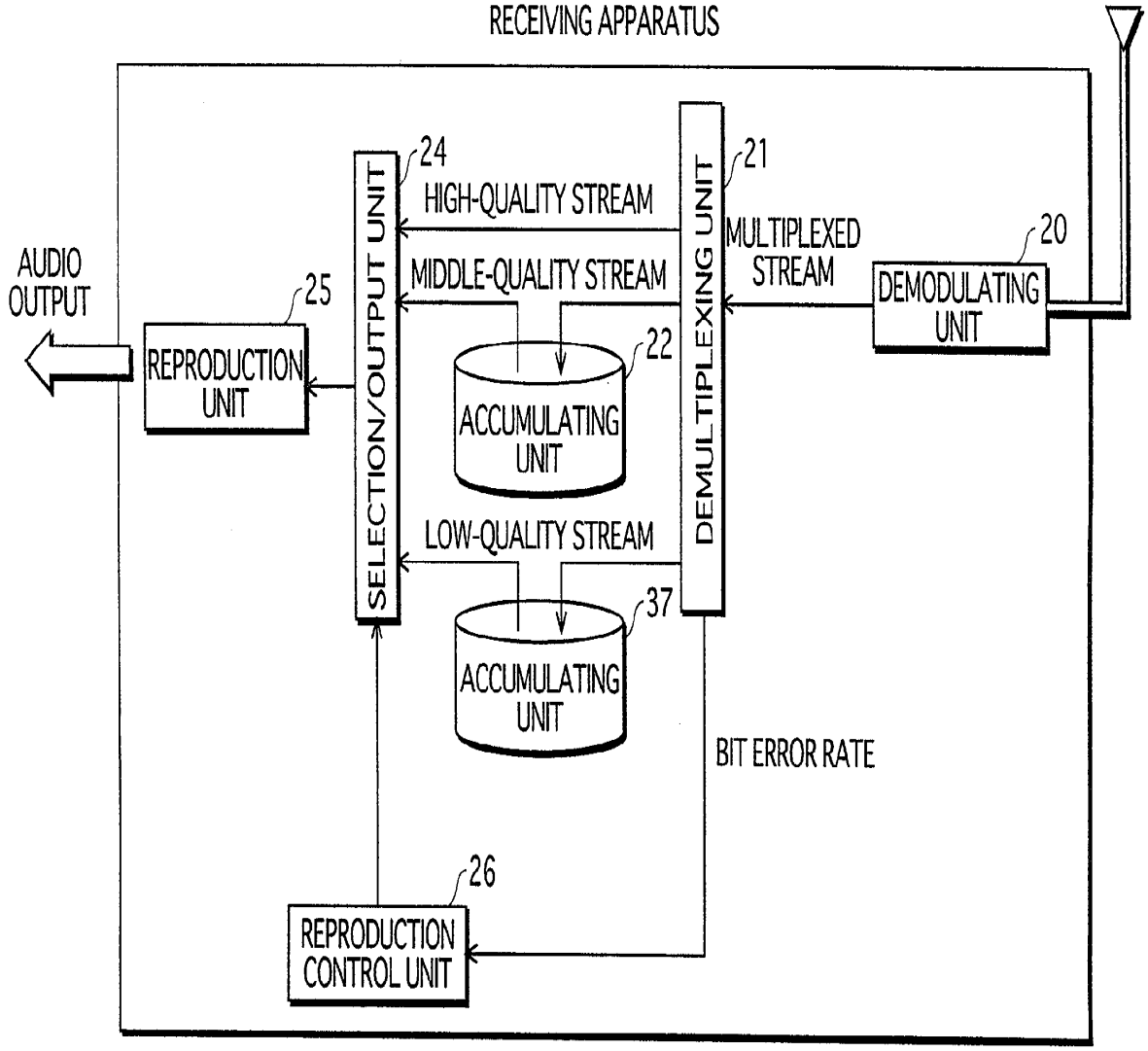
DISH EXHIBIT 2002, Page 720
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.12



DISH EXHIBIT 2002, Page 721
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

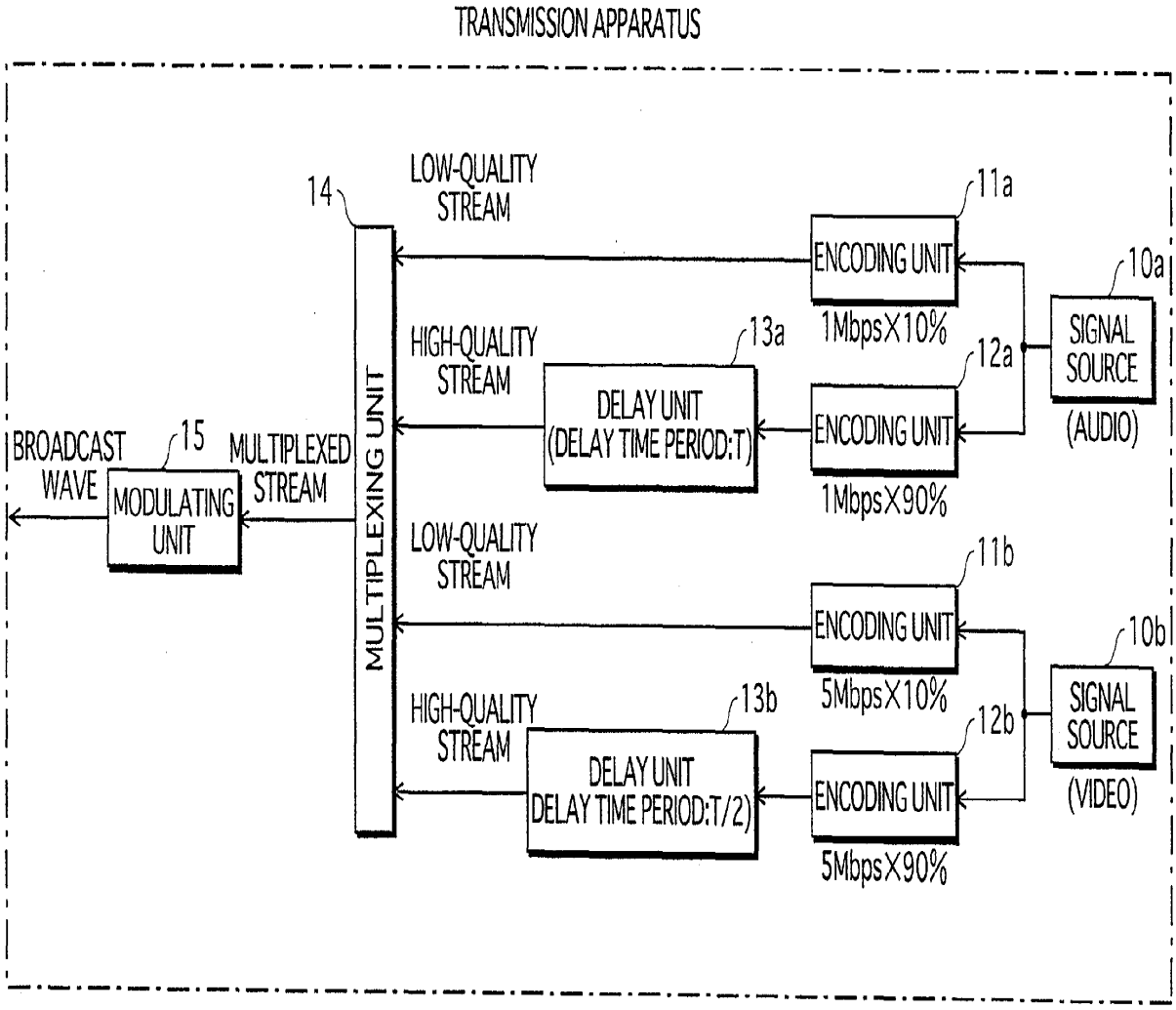
FIG.13



EP 1 394 973 A2

DISH EXHIBIT 2002, Page 722
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

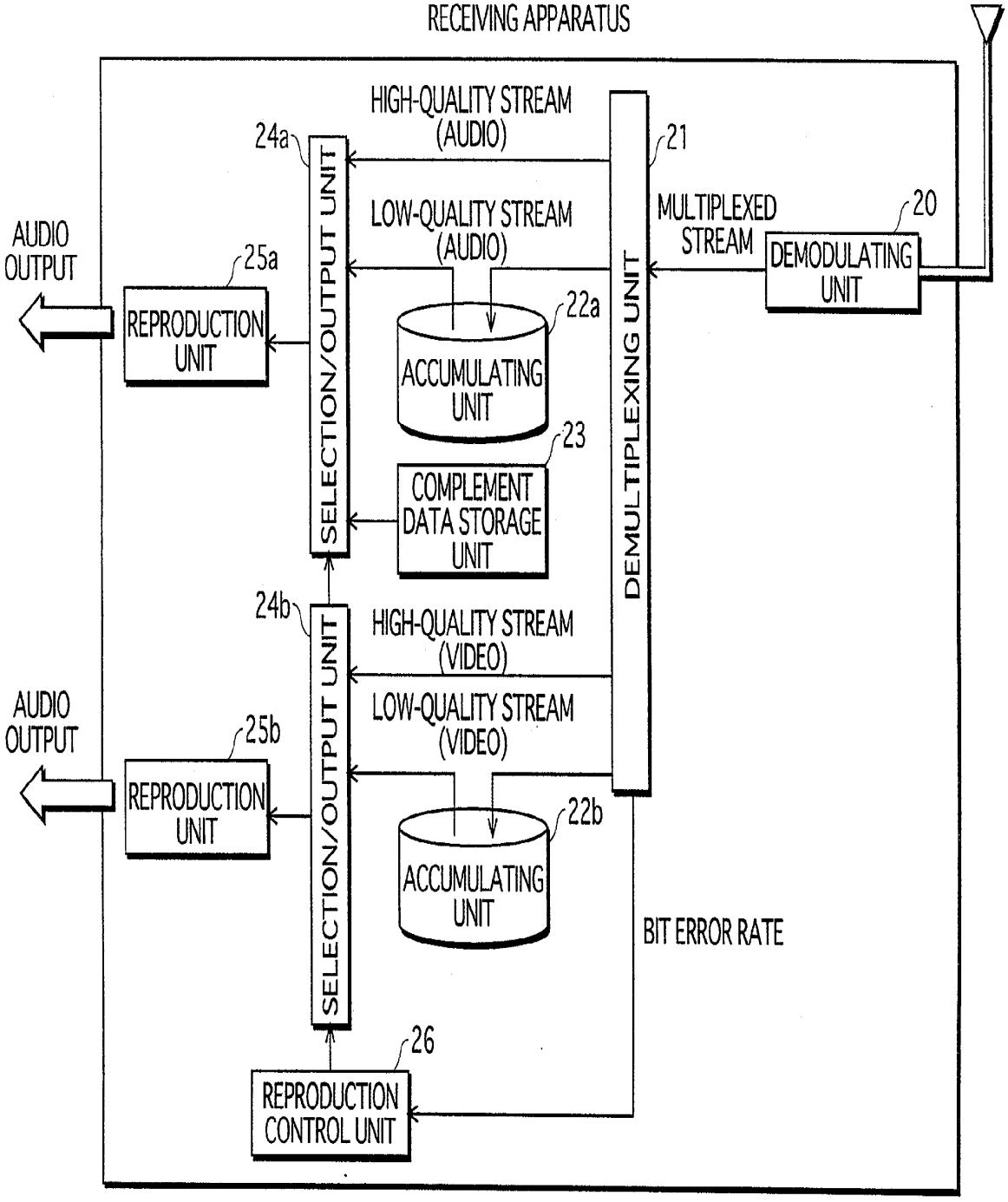
FIG.14



EP 1 394 973 A2

DISH EXHIBIT 2002, Page 723
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

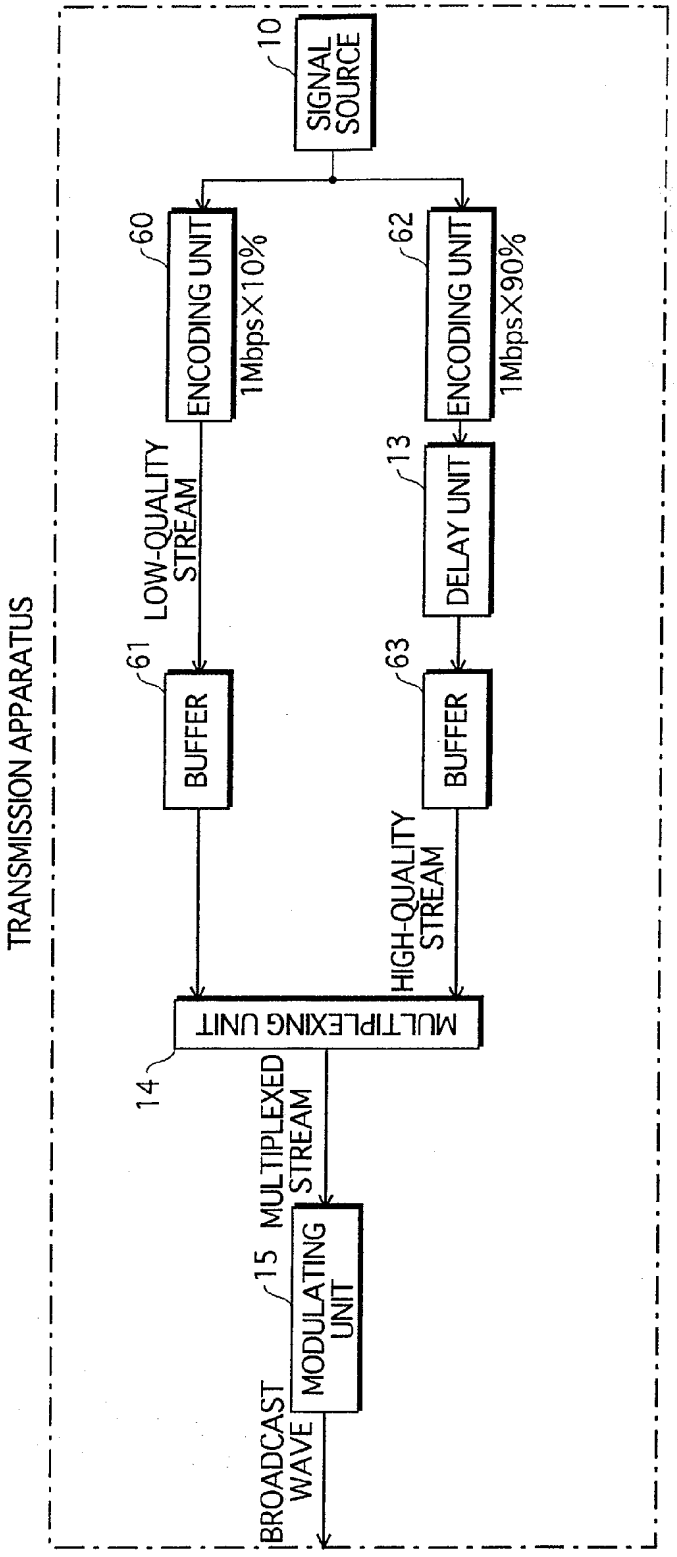
FIG.15



EP 1 394 973 A2

DISH EXHIBIT 2002, Page 724
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG.16



DISH EXHIBIT 2002, Page 725
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
30 January 2003 (30.01.2003)

PCT

(10) International Publication Number
WO 03/009581 A1

(51) International Patent Classification[7]: H04N 5/00, 7/24

(21) International Application Number: PCT/GB02/03307

(22) International Filing Date: 19 July 2002 (19.07.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
01306206.2 19 July 2001 (19.07.2001) EP

(71) Applicant *(for all designated States except US)*: **BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY** [GB/GB]; 81 Newgate Street, London EC1A 7AJ (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **JACOBS, Richard, James** [GB/GB]; 15 Through Duncans, Woodbridge, Suffolk IP12 4EA (GB). **WALKER, Matthew, David** [GB/GB]; 9 Thirlmere Court, Felixstowe, Suffolk IP11 9SN (GB). **MIRAS, Dimitrios** [GR/GR]; 12 Proti Parodos Avras, 24100 Kalamata (GR).

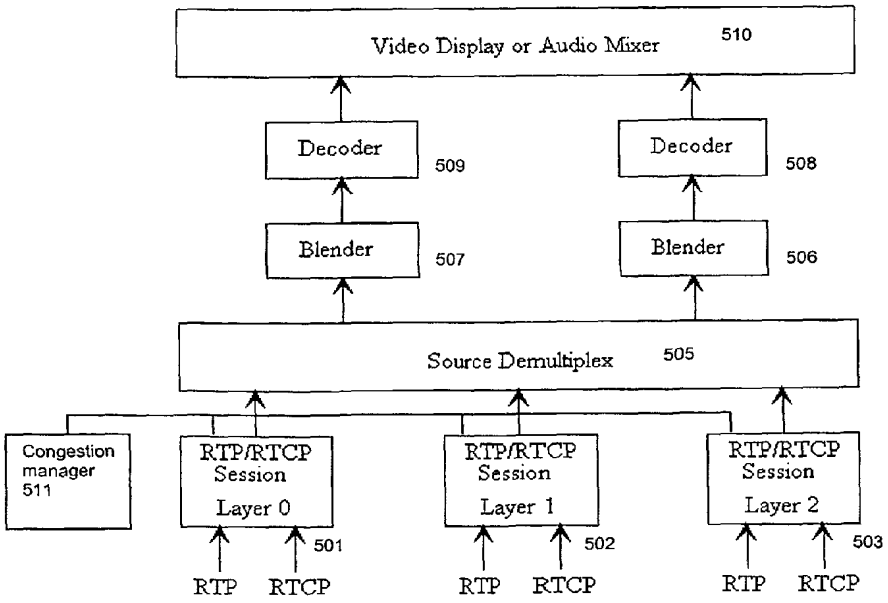
(74) Agent: **WILLIAMSON, Simeon, Paul**; 0T Group Legal, Intellectual Property Department, Holborn Centre 8th Floor, 120 Holborn, London EC1N 2TE (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

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

[Continued on next page]

(54) Title: VIDEO STREAM SWITCHING



(57) Abstract: A technique is described for providing a client on a packet based network with a stream of encoded video data. The system is able to maximise the bit-rate of the video stream by adapting to fluctuations in network capacity. The technique is characterised in that adaptation of the bit-rate of the transmitted encoded video data is timed to occur upon a scene change in the video sequence. In this way the interruption to the viewer when the perceived quality of the video sequence increases or decreases is minimised as it is 'hidden' in the scene change. The technique is described as applied to hierarchically encoded video data but equally may be applied to other encoding techniques which adapt to network conditions.

WO 03/009581 A1

Published:
— *with international search report*

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.

Video Stream Switching

The invention is in the field of video streaming over packet networks and in particular concerns the adaptive transmission of data in response to network congestion.

In recent years, the Internet has experienced a proliferation in transmission of real-time multimedia, mainly in the form of streamed audio-visual content, either delivered live or from pre-recorded sources. Furthermore, traditional forms of multimedia such as streaming and conferencing are being followed by applications with richer content such as Internet multi-channel TV and complex immersive environments. This increase in traffic will put strains on the network and it is therefore desirable that application programs are designed to respond to congestion if stability of the network is to be maintained. It is desirable that network conditions are monitored and output bit-rates adjusted to the available bandwidth.

There is a more immediate advantage to the user in having an adaptive output bit-rate which is that the highest possible transmission bit-rate that the network will allow is used and therefore the user will always receive the best possible image quality. There are a number of known approaches to adaptive quality video streaming, one of which is hierarchical coding. In this technique the original video data is encoded into a number of discreet streams called layers, where the first layer consists of basic data of a relatively poor quality and where successive layers represent more detailed information so that layers can be added to increase the image quality or layers can be taken away, depending on the available bandwidth.

As the bit-rate available to a session is subject to significant variations in the number of layers that are transmitted, quality fluctuations occur in the decoded image as layers are added or dropped. When layers are added or dropped frequently the fluctuations in quality may become disturbing to a viewer.

In a first embodiment of the present invention there is provided a method of operating a multimedia server, said method comprising:

providing a stream of video data representing a video sequence to an output of the multimedia server, wherein the output of the media server is connected to a packet based network,

measuring a property of the video data in order to determine the occurrence of a scene change in the video sequence,

detecting the available bandwidth on the network,

varying the bit-rate of the stream of video data,

wherein the method is characterised in that

variation in the bit-rate of the video data is controlled to occur in response to variations in the capacity of the network (203) and preferentially with a scene change in the video sequence.

The term preferentially used herein is meant to indicate that in certain circumstances (discussed in greater detail below) it may not be practical to wait for a change of scene to occur in the video sequence before varying the bit-rate of the video stream, and in such circumstances the bit-rate will be changed at points in the video stream which do not correspond to a change of scene.

The term scene change (or change of scene) is intended to refer to a sudden change in a video sequence within the space of a one or a very few frames such as typically occurs at a change of scene, whether or not there has been an actual change of scene.

Embodiments of the present invention will now be described, by way of example only, with reference to the following figures, where;

Figure 1 is a schematic diagram of the content-based inter-stream session bandwidth sharing architecture.

Figure 2 shows the order of packets in a layered coding system.

Figure 3 is a diagram of a media server.

Figure 4 is a diagram of the network interface of the media server shown in Figure 3.

Figure 5 is a diagram of a client.

Figure 6 is a diagram of a client according to a first embodiment of the present invention.

The client/ server arrangement for a known hierarchical streaming technology is shown in Figure 1. A media server 202 is provided which has access to compressed audiovisual data 201, which may be fed 'live' from an outside broadcast or may be pre-compressed and stored in a database. The data source 201 may be on the same premises as the media server 202 and linked via an intranet. The media server 202 runs on a suitable server computer and which has access to the Internet 203.

A video viewer, hitherto referred to as the client 204, running on a PC suitably configured to have access to the Internet 203, may connect to the media server 202 via the Internet 203 and thus the client 204 is able to access content. A suitable PC terminal is used.

Layered video compression is achieved with the 1998 version of H.263 but equally may be any other codec, such as MPEG4. Each layer in the hierarchy is coded in such a way as to allow the quality of individual pictures to be enhanced and their resolution to be increased, and additional pictures to be included to increase the overall picture rate, as explained with reference to Figure 2. Figure 2 illustrates a typical dependency between pictures in an H.263 scalable layered coder, with the boxes representing the frames for each layer and arrows showing the dependency between frames. The lowest row shows original, un-coded frames. The next row shows the lowest layer (Layer 0) of the hierarchy which is coded at half the frame rate of Layer 1. Frames in Layer 0 are predicted from the previously encoded frame, as in conventional video compression. Frames in Layer 1 may be predicted from the previously encoded frame in Layer 1 and, if present, the temporally simultaneous Layer 0 encoded frame. Frames in Layer 2 may be predicted from the previously encoded frame in Layer 2 and, if present, the temporally simultaneous Layer 1 or Layer 0 encoded frame. The H.263 specification allows for 15 layers; in the present embodiment server and client software is not limited in the number of layers that can be used, but in this case a database has been generated with video streams containing four layers.

Figure 3 shows the architecture of media server 201. In the present embodiment the audiovisual source is a database 301 of compressed video data and the media server 201 is responsible for reading the compressed data from a database, packetising and distributing it. The data is distributed according to the

Real-time Transport Protocol (RTP) which provides end-to-end network transport functions suitable for applications transmitting real-time data such as audio, video or simulation data. RTP does not address resource reservation and does not guarantee quality-of-service for real-time services. The data transport is augmented by a control protocol (RTCP) to allow monitoring of the data delivery and to provide minimal control and identification functionality. RTP and RTCP are designed to be independent of the underlying transport and network layers. The media server 201 has four major components: database reader 302, video RTP packetiser 303, audio RTP packetiser 305 and a network interface 304. Video and audio data are stored as files of compressed bits in the database 301. The database reader 302 retrieves and synchronises the compressed audio and video from the database 301.

The audio and video data is then sent to a RTP packetiser 303,305. Audio and video information is transmitted over the IP network using the User Datagram Protocol (UDP) and Real-time Transport Protocol (RTP) packetisation. UDP provides a checksum to detect transmission errors, but does not guarantee data delivery: packets may be lost, duplicated or re-ordered. RTP provides end-to-end delivery services, such as payload type identification, sequence numbering, time-stamping and delivery monitoring. RTP packetisers 303,305 attach the RTP Header and, in the case of video packets, the H.263 Payload Header which provides some protection from packet loss. The Payload Header contains information specific to the video stream, such as motion vector predictors, which is obtained by decoding the compressed bit stream.

The rate at which data is read from the database 301 is controlled from the network interface 304, which is illustrated in greater detail in Figure 4. With reference to Figure 4 the arrangement of the network interface 304 for the video data will now be described. A packet numbering module 401 assigns a number to each packet of data. These packet numbers are used by the client to assemble packets into the sequence required for decoding. The number of bits produced by compressing a picture is in general not constant, even when the transmission rate is constant. The first picture of a new scene will usually produce a larger number of bits than a picture where there is little movement or detail. The encoding process will use a control strategy together with an output data buffer to smooth these variations in preparation for transmission at a

constant bit rate. In the case of layered coding, each layer has its own control strategy and buffer as it has its own constant bit rate constraint to meet. The delay across each of these buffers will not be constant and will not be the same for each layer. Delay variation between the layers is therefore introduced at the source of the data. Transmission across a network may cause this delay variation to increase. A packet numbering scheme is therefore needed to ensure that a client can arrange the packets it receives into the order required for decoding. This scheme is required to handle the cases of the client not receiving all of the layers and of packet loss in the layers that it does receive.

Each layer is transmitted as an independent RTP Session on a separate IP address by a session handler 403, 405, 407, 409. The rate at which data is transmitted is controlled by the Transfer Rate Control module 402, which counts Layer 0 bytes to ensure that the correct number are transmitted in a given period of time. The transmission rate of the other layers is smoothed and locked to the rate of Layer 0 using First-In First-Out (FIFO) buffer elements 404, 406, 408.

The client 204 of the known hierarchical streaming technology will now be described with reference to Figure 5. Each RTP/RTCP Session associated with each layer of encoded data has a session handler 501, 502, 503, 504 at the client which is responsible for receiving RTP packets from the network.

The packets are then passed to a source demultiplex module 505. This receives packets from all layers and all sources, demultiplexes them by source, and routes them to a blender module 506, 507 for that source.

The blender module 506, 507 receives packets from all layers from one source in the order that they were received from the network. This may not be the order required for decoding because of packet inter-arrival jitter or packet loss. The blender module 506, 507 uses the packet numbers in the RTP headers to arrange the packets from each layer in order and then combines the packets from all layers together. The output of the blender module 506, 507 is a single stream of packets which are in the correct order for decoding. This is the same order as they come out of the packet numbering module 401 of the media server 202.

Packets are then sent to the decoder 508, 509 where the packets are decoded into 20ms blocks of audio samples or to video pictures. In the case of pictures, these are rendered to a window on the display 508.

Also provided is a congestion manager 511 to which the session handlers 501-504 report packet loss. If packets are being consistently lost, indicating network congestion, the congestion manager 511 will instruct the session handler responsible for the highest layer of compressed data to terminate the RTP/RTCP Session. Periodically the congestion manager 511 will instruct an experimental joining of a layer via the appropriate session handler to test whether there is available bandwidth in the network. If this experiment is successful, i.e. that substantially all of the packets of each layer are getting reaching the client, then the new layer will be adopted. In this way the maximum available bandwidth is employed.

It possible for the congestion manager 509 to instruct layers to be dropped and restored rapidly as the network bandwidth fluctuates. This could be annoying for a viewer and so a way of 'hiding' the shift is employed. The layered encoding method described above is adapted so that if a layer is to be dropped or added, the changeover preferentially occurs during a scene-change in the video data. A video scene is typically perceived as the number of consecutive frames within a video sequence that do not show significant changes in the video content. Within a video scene or shot, the camera action may be fixed or may exhibit a number of relatively uniform changes like panning, zooming, tracking etc. Scene changes may be recognised as abrupt transitions of the camera action or gradual transitions. In order to identify the scenes within a video sequence the assumption is that the levels of motion energy as well as those of luminance and colour do not change much between successive frames within a single scene. Techniques of scene boundary identification include pixel differencing, motion vector and block matching techniques. A very sudden change in the content of temporally adjacent frames will thus appear as a change of scene; clearly it is conceivable that such a change might not actually relate to a scene change at all, but, for example, may instead be the consequence of a large foreground object coming rapidly into view. However, such an abrupt change will nonetheless be a good place to add or remove a

session layer and thus the term scene change is meant to cover such large changes in frame content from one frame to another.

Figure 6 illustrates a system which detects congestion in the network and also imposes the extra condition of adding or dropping a layer upon a scene change. The server 601 comprises the components of the media server 202 of Figure 1 and the unit 603 comprises the components of the client 204 also shown in Figure 1. Video data from the audiovisual source is also passed to a content analyser 604 which segments the video sequence into scenes. The segmented video is then passed to an objective quality assessment module (OQAM) 605 which assesses the contribution to the perceived quality of a scene that each component layer provides.

These results are then passed to an inter layer adaptation module (ILAM) 607. The function of the ILAM 607 is to continuously calculate the number of layers that maximise the perceived quality for the session. The ILAM 607 also receives input from a sender congestion manager 608 which reports on the bandwidth available to the session on the network 203. The sender congestion manager 608 receives feedback from a client congestion manager 609 on the number of packets that have been received. If this matches the number of packets that were sent then the bandwidth is known to be the current transmission rate. If packets are being lost then the bandwidth available to the session is less than the transmission rate, in which case the sender congestion manager 608 informs the ILAM 607 that a layer should be dropped.

In order to select which layer should be dropped the ILAM 607 couples the bandwidth required by a layer with its contribution to the quality of the complete image, as calculated by the OQAM 605. The ILAM 607 performs an exhaustive search on all of the bandwidth/quality values. When the ILAM 607 has selected which layer is to be dropped from a particular scene, the timing of the drop is preferentially set to coincide with the transmission of that particular scene. In this way the drop in quality occurs with the scene change and is thus much less noticeable to a viewer than if the quality change had occurred during a scene. In the case that no packets have been lost for a preset period of time the sender congestion manager 608 will request the ILAM 607 to add in a layer to test

whether all of the available bandwidth is being employed. If no packets are lost during this experiment then the newly added layer is maintained. This process of experimentation with adding layers is continued until a significant proportion of packets are lost, in which instance the system can be confident that all of the available bandwidth is being employed. Again, the timing of the introduction of a layer is set to occur preferentially as the scene changes.

Under a given bit-rate allocation the levels of perceived quality do not change considerably within a scene, but scene cuts cause considerable changes in perceived quality, especially when the content features (spatial and motion energy) change a lot between subsequent scenes. As a consequence there will also be a significant difference in the corresponding quality scores for those successive scenes which may justify a rescheduling of the number of layers in the stream.

The invention is not limited in use to hierarchical encoding schemes. The invention is suitable for use in any encoding technique where the adaptation of transmission bit-rate to accommodate fluctuations in network capacity occurs. For instance the invention may be applied to a transcoding system where encoded data streams are transcoded from a high bit-rate to a low bit-rate or from a low bit-rate to a high bit-rate. The present invention would be suitable to reduce the impact for the viewer as the output bit-rate shifts in response to network conditions by timing the transition to occur upon a scene change in the encoded video sequence. Another example of an adaptive video streaming technique to which the invention may be applied is where multiple independent video streams of different bit-rates are transmitted. In this case the client chooses which stream to accept based on session bandwidth. The client may switch from one stream to another as bandwidth fluctuates; the present invention ensures that the switch is timed to coincide with a scene change in the encoded video stream.

Naturally, there may be times when a change of scene is such a long way away that it is advantageous to switch from one bit-rate to another other than during a change of scene. For example, consider the case where multiple independent video streams at different bit-rates are available for transmission by a media server to a client as, for example, described in co-pending European patent

application No. 00310594.7 the contents of which are hereby incorporated herein by way of reference. In such a case, the server may be capable of transmitting a first stream at a bit-rate of 500kbit/s and a second, higher quality stream at a bit-rate of 1500kbit/s. The client may initially request that the server transmit the first stream at a transmission rate of 1000kbit/s. If the network is not congested and all of the packets transmitted are successfully received by the client, the receive buffer at the client will start to fill with data at a rate of 500kbit/s, since the client will only be removing data from the buffer at a rate of 500kbit/s. After say 10 seconds of filling up the buffer at this rate, the client will have a buffer of ten seconds worth of data at which point it may decide it can attempt to receive the higher bit-rate second stream of video data from the server and thus sends an appropriate request to the server to this effect. If, however, the server is aware that the client has a receive buffer of 5 Mbytes size, it knows that it may continue sending data from the first stream at the rate of 1000kbit/s for at least another 150 seconds before the receive buffer overflows, causing problems for the client. Therefore, the server may attempt to wait for a specified period to see if a scene change occurs during this interval. If so, a switch to the second higher bit-rate signal is not made until the change of scene occurs. Of course, if there is no change of scene within the determined period, the server switches to the higher rate anyway. In this example, a period of only ten seconds is deemed appropriate as the waiting time.

Note that instead of simply waiting to see if a change of scene occurs in the specified period and switching at the end of the period if no such change of scene is detected, an alternative method would be to pre-analyse the video to be sent (clearly this only applies to pre-stored video data and not live video) and to note when changes of scene occur. In such a case, the server, upon receipt of a request from the client to switch streams, could search to see if a suitable change of scene will occur within the predetermined period and if not to switch immediately to the new bit stream.

In the present example, upon switching to the higher rate bit stream, the client may have requested a transmission rate of 1500kbit/s corresponding to the rate at which the data will be drawn from the receive buffer by the client. In such a case, the buffer size of 10 seconds should remain constant so long as all of the

transmitted packets are successfully received by the client. However, in the event of congestion on the network, a proportion of packets may fail to arrive at the client. In such a case, the server will be warned of this via the RTCP. If the congestion is sufficiently severe, the server may deduce that the buffer is in danger of emptying which would cause a break in the video displayed by the client to occur. To prevent this, the server may switch back to the lower bit rate stream. Via the notification of how many packets are being lost, the server can deduce how long it will be before the buffer is emptied. For this time, the server can wait to see if a change of scene occurs, and if so, the new stream will be switched to at that point. Note that it would also be possible for the client to simply request that the new stream be switched to upon detecting that its receive buffer is emptying at an unsustainable rate.

Note that the amount of data in the buffer is actually of less significance than the rate of change of the amount of data in the buffer. Thus it is preferably this quantity which either the server or the client measures in order to determine whether to change from one bit stream to another (or whether to add or drop a layer in the first example).

CLAIMS

1. A method of operating a multimedia server (202), said method comprising;

providing a stream of video data representing a video sequence to an output of the multimedia server (202), wherein the output of the media server (202) is connected to a packet based network (203),

measuring a property of the video data in order to determine the occurrence of a scene change in the video sequence,

detecting the available bandwidth on the network (203),

varying the bit-rate of the stream of video data,

wherein the method is characterised in that

variation in the bit-rate of the video data is controlled to occur in response to variations in the capacity of the network (203) and preferentially with a scene change in the video sequence.

2. A method of operating a multimedia server (202) in accordance with claim 1 wherein upon detecting a decrease in the available bandwidth the bit-rate of the video data is decreased.

3. A method of operating a multimedia server (202) in accordance with claim 1 wherein the bit-rate of the video data is periodically increased in order to ensure that all of the available bandwidth is being used.

4. A method of operating a multimedia server 202 in accordance with claims 1 to 3 wherein said stream of video data is comprised of a plurality of hierarchically encoded layers.

5. A method of operating a multimedia server (202) in accordance with claim 4 wherein the bit-rate of the video data is varied by adding or dropping layers from the stream of data transferred to the output port.

6. A method of operating a multimedia server (202) in accordance with claims 4 or 5 wherein the objective quality contribution of each layer to the

overall quality of the video sequence is measured in order to determine which of the layers is to be added or dropped from the stream of data transferred to the output port.

7. A method of operating a multimedia server 202 in accordance with claims 1 to 3 wherein said stream of video data is comprised of a plurality of independently encoded flows each of which encoded at different bit-rates.

8. A method of operating a multimedia server (202) in accordance with claim 7 wherein the bit-rate of the video data is varied by switching between independently encoded flows.

9. A method of operating a multimedia server 202 in accordance with any of the preceding claims in which the source 201 of video data is stored in encoded form in a database.

10. A method of operating a multimedia server 202 in accordance with any of claims 1 to 8 in which the source 201 of video data is encoded in real-time.

11. A method of operating a multimedia server 202 in accordance with any of the preceding claims wherein, upon detecting a variation in the capacity of the network such as to render it appropriate for a change in bit rate to occur, the server waits for a predetermined time to attempt to detect a change of scene, and if such a change of scene is detected within the predetermined time, the change of bit rate is caused to occur at the time of the change of scene, but if a change of scene is not detected within the predetermined time, then the change of bit rate is caused to occur at the expiry of the predetermined time.

12. A method of operating a multimedia server 202 in accordance with any of the preceding claims wherein, upon detecting a variation in the capacity of the network such as to render it appropriate for a change in bit rate to occur, the server determines if there is going to be a change of scene within a predetermined time, and if it is determined that there will be such a change of scene within the predetermined time, the change of bit rate is caused to occur at the time of the change of scene, but if it is determined that there is not going to

be a change of scene within the predetermined time, then the change of bit rate is caused to occur substantially immediately after having made such a determination.

13. The method of claim 12 further including the step of, prior to providing a stream of video data to the output of the media server, processing the video data to determine the positions within the video data in which changes of scenes occur and making this information available for permitting whether a scene change will occur within a predetermined period at any point along the stream of video data.

14. A multimedia server (202) comprising;

a reader (302) for reading video data representing a video sequence from a source (301),

a scene change detector (604) for detecting changes of scene in the video sequence,

a bit-rate controller (607) for controlling the rate at which the video data is transferred from the reader to an output port, wherein the output port is capable of communicating with a client (204) on a packet network (203);

the media server further comprising means (608) for detecting available bandwidth between the multimedia server (202) and client (204) on the packet network,

characterised in that

the bit-rate controller (607) is arranged to vary the bit-rate of the video data transferred to the output port in dependence on the detected bandwidth preferentially in correlation with a scene change detected by the scene change detector (604).

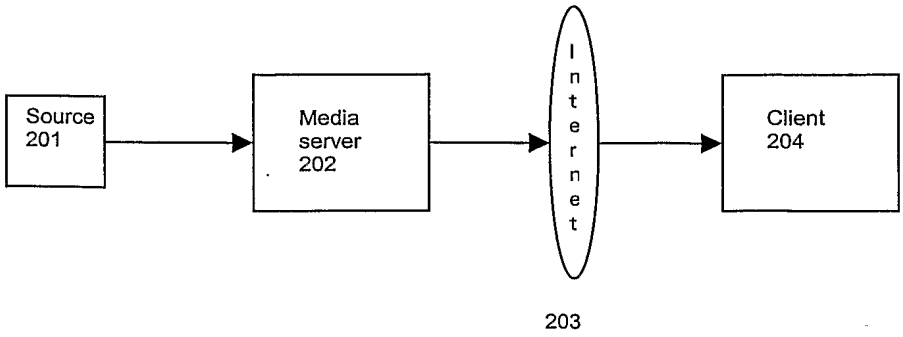


Figure 1

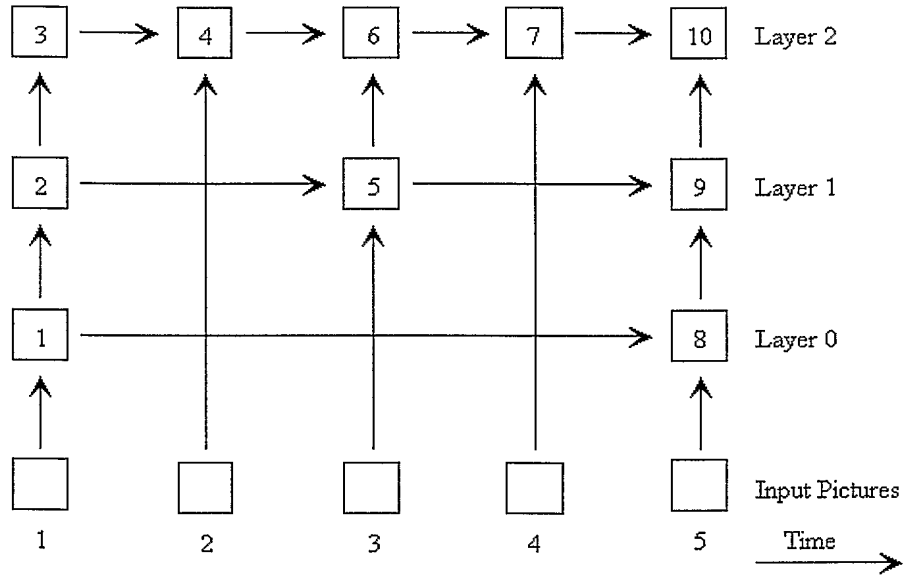


Figure 2

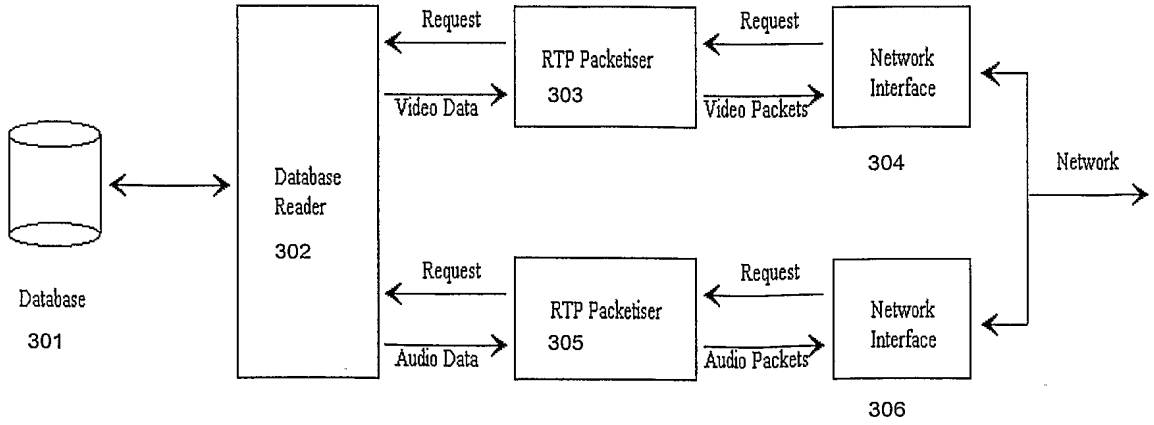


Figure 3

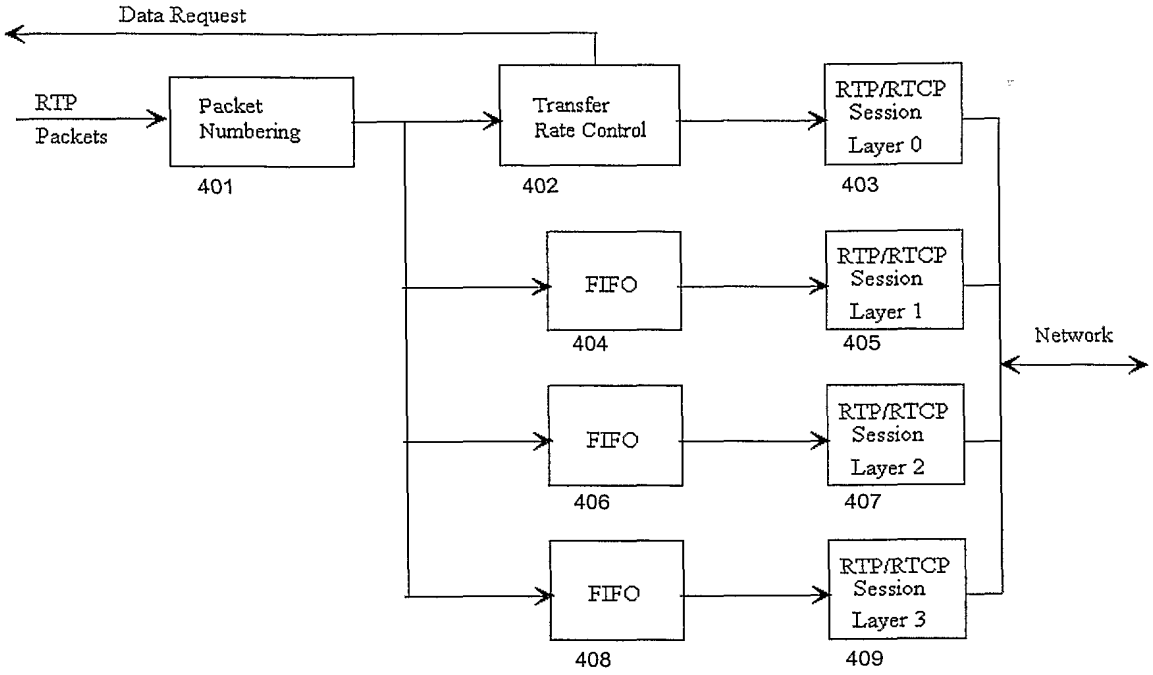


Figure 4

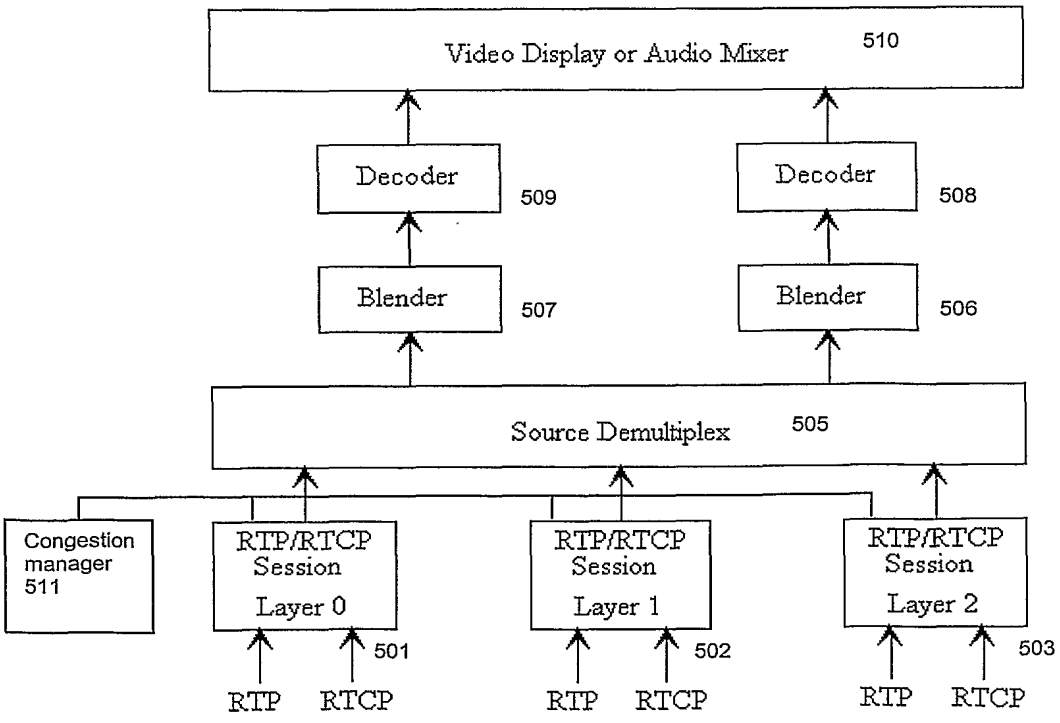


Figure 5

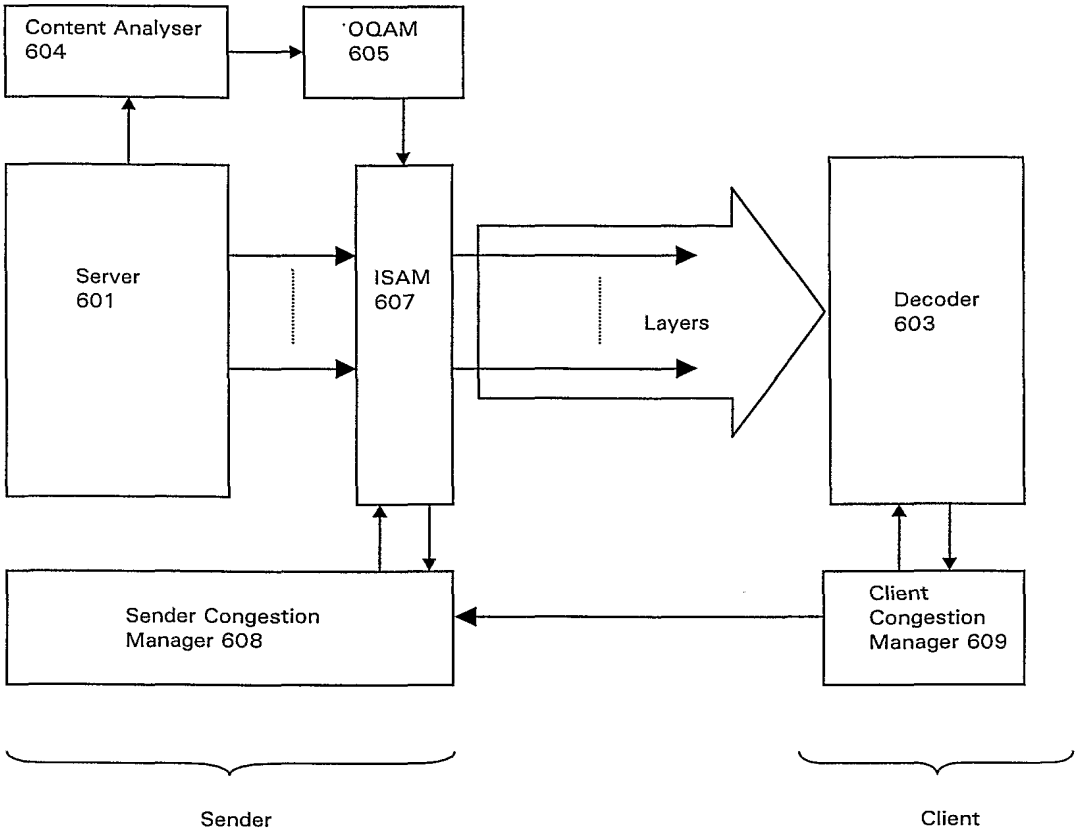

Content Analyser
604
OQAM
605
Server
601
ISAM
607
Layers
Decoder
603
Sender Congestion
Manager 608
Client
Congestion
Manager 609
Sender
Client

Figure 6

INTERNATIONAL SEARCH REPORT

ıtional Application No
PCT/GB 02/03307

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/00 H04N7/24

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N H04L G06F

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 practical, search terms used)
EPO-Internal, PAJ, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 014 694 A (AHARONI AMIR ET AL) 11 January 2000 (2000-01-11)	1-10,14
Y	abstract column 2, line 29 - line 65 column 3, line 62 -column 4, line 34 column 8, line 54 -column 9, line 35 column 10, line 34 - line 49 column 14, line 34 -column 15, line 6	11-13
X	ANONYMOUS: "Method to Deliver Scalable Video across a Distributed Computer System" IBM TECHNICAL DISCLOSURE BULLETIN, IBM CORP. NEW YORK, US, vol. 5, no. 37, 1 May 1994 (1994-05-01), pages 251-256, XP002079392 ISSN: 0018-8689	1-10,14
A	the whole document	11-13

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in 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 document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 September 2002	23/09/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Fantini, F

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

nal Application No
PCT/GB 02/03307

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6 038 000 A (HURST JR ROBERT NORMAN) 14 March 2000 (2000-03-14)	11-13
A	column 2, line 52 -column 3, line 22 column 4, line 20 - line 49 column 6, line 9 - line 45 column 7, line 1 - line 24 column 13, line 46 -column 14, line 18 column 20, line 13 - line 30	1,14
A	EP 1 079 631 A (SONY UK LTD) 28 February 2001 (2001-02-28) page 3, line 1 - line 4	1-14
A	US 5 990 945 A (DENTENEER THEODORUS J J ET AL) 23 November 1999 (1999-11-23) abstract column 3, line 13 - line 35 column 4, line 42 - line 44 column 5, line 37 - line 39	11-13

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

ıtional Application No
PCT/GB 02/03307

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 6014694	A	11-01-2000	AU	7928998 A	19-01-1999
			EP	0992160 A1	12-04-2000
			WO	9900984 A1	07-01-1999
			JP	2002511216 T	09-04-2002
US 6038000	A	14-03-2000	US	6137834 A	24-10-2000
			EP	0954924 A1	10-11-1999
			JP	2001509354 T	10-07-2001
			WO	9832281 A1	23-07-1998
			EP	0901718 A1	17-03-1999
			JP	2002503402 T	29-01-2002
			KR	2000016034 A	25-03-2000
			WO	9745965 A1	04-12-1997
EP 1079631	A	28-02-2001	GB	2353653 A	28-02-2001
			EP	1079631 A1	28-02-2001
			JP	2001119305 A	27-04-2001
US 5990945	A	23-11-1999	CN	1199532 A	18-11-1998
			EP	0860087 A1	26-08-1998
			WO	9809442 A1	05-03-1998
			JP	11514825 T	14-12-1999

IDS CERTIFICATION STATEMENTS

I. THIS IDS IS BEING FILED UNDER 37 C.F.R. 1.97(b): (check one box)

☐ Within three months of the filing date of a national application other than a continued prosecution application under 1.53(d).

☐ Within three months of the date of entry of the national stage as set forth in 1.491 in an international application.

☐ Before the mailing date of a first Office Action on the merits. In the event that a first Office Action on the merits has been mailed, please consider this IDS under 37 C.F.R. 1.97(c) and see the statement under 1.97(e) or charge deposit account 50-2091 the fee specified by 37 C.F.R. 1.17(p) if such statement is not selected in Section IV.

☑ Before the mailing of a first Office Action after the filing of a request for continued examination under 1.114.

II. THIS IDS IS BEING FILED UNDER 37 C.F.R. 1.97(c):

☐ After the period specified in 37 C.F.R. 1.97(b) and before the mailing date of any of a final action under 1.113, a notice of allowance under 1.311 or an action that otherwise closes prosecution in the application, and accompanied by:

- ☐ a statement specified in 1.97(e) as subsequently provided in this IDS; or
- ☐ the fee set forth in 1.17(p).

III. THIS IDS IS BEING FILED UNDER 37 C.F.R. 1.97(d):

☐ After the period specified in 37 C.F.R. 1.97(c) and on or after the mailing date of any of a final action under 1.113, a notice of allowance under 1.311 or an action that otherwise closes prosecution in the application, but before or simultaneous with payment of the issue fee, and accompanied by a statement specified in 1.97(e) as subsequently provided in this IDS **and** the fee set forth in 1.17(p).

IV. Statement under 37 C.F.R. 1.97(e) (check only one box)

The undersigned hereby states that:

☐ Each item of information contained in the IDS 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 this IDS.

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

V. Statement under 37 C.F.R. §1.704(d):

☐ The undersigned hereby states that each item of information contained in the information disclosure statement: (i) was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the information disclosure statement; or (ii) is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office, and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the information disclosure statement..

VI. CONCLUSION

It is respectfully submitted that the claims presently on file patently distinguish the present invention from each of the references cited in this IDS. The references cited in this IDS are being cited only in the interest of candor and without any admission that they constitute statutory prior art or contain matter which anticipates the invention or which would render the same obvious, either singly or in a combination, to a person of ordinary skill in the art. Furthermore the filing of this IDS should not be construed to be an admission that the information cited in this IDS is, or is considered to be, material to patentability as defined in 1.56(b). In addition, the filing of this IDS should not be construed as a representation that a search has been made.

If the Examiner has any questions concerning this IDS, the Examiner is requested to contact the undersigned at the telephone number associated with Customer No. 70560 . If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule, with a petition if necessary, and charge the appropriate fee to Deposit Account No. 50-2091.

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
6 June 2002 (06.06.2002)

PCT

(10) International Publication Number
WO 02/45372 A2

(51) International Patent Classification[7]: H04L 29/00

(21) International Application Number: PCT/GB01/05246

(22) International Filing Date:
28 November 2001 (28.11.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
00310594.7 29 November 2000 (29.11.2000) EP

(71) Applicant *(for all designated States except US)*: **BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY** [GB/GB]; 81 Newgate Street, London EC1A 7AJ (GB).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **WALKER, Matthew, David** [GB/GB]; 9 Thirlmere Court, Felixstowe, Suffolk IP11 9SN (GB). **JACOBS, Richard, James** [GB/GB]; 15 Through Duncans, Woodbridge, Suffolk IP12 4EA (GB). **NILSSON, Michael, Erling** [GB/GB]; 5 Laburnum Gardens, Rushmere St. Andrew, Ipswich IP5 1BY (GB).

(74) Agent: **ROBINSON, Simon, Benjamin**; BT Group Legal Services, Intellectual Property Dept., Holborn Centre, 8th Floor, 120 Holborn, London EC1N 2TE (GB).

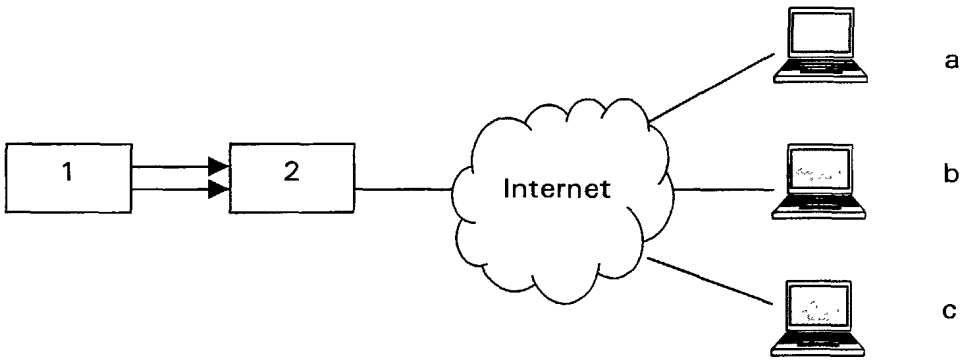
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT,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

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, 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, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

[Continued on next page]

(54) Title: TRANSMITTING AND RECEIVING REAL-TIME DATA



(57) Abstract: The invention concerns streaming real-time data (e.g. video) over packet networks (e.g. the Internet). Conventionally, in packet networks, in order to view streamed video data a reservoir of data is built up to reduce the effect of jitter, caused by variations in the inter-arrival times of packets of data. Consequently, a delay is experienced before the video material can be viewed as the reservoir is filled. The invention is concerned with providing streamed video without the start-up delay by transmitting data from a video streamer to the video viewer more rapidly than the video viewer consumes the data and using the excess data to build a buffer at the video viewer. When a suitable sized buffer is built the transmission rate of data to the buffer may be reduced. In order to deliver the best quality material for the available bandwidth, the supply of video data may be switched to a higher bit-rate source when the reservoir is filled. Fluctuations in network throughput may be accommodated during the transmission of data on a fine scale by adjusting the transmission rate of the data and on a coarse scale by switching between data streams encoded at different bit-rates. Fluctuations in network throughput are determined by counting the number of missing packets at the video viewer which information may then be fed back to the video streamer to adjust the flow of data accordingly.

WO 02/45372 A2

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.

Transmitting and Receiving Real-Time Data

The invention is in the field of handling of time-sensitive data over packet switched networks, and more particularly transmitting and receiving video data over the Internet.

The invention relates to a method of providing a streaming video service to a client across a packet network whilst reducing the start-up delay usually associated with preparing a buffer of data while maintaining the use of a buffer. The invention also relates to a method of controlling the transmission rate of the streaming video to adapt to congestion in the network.

Traditionally the Internet has supported traffic such as FTP, e-mail and web-surfing, where the overall delay does not intrinsically detract from the final presentation of the media. The advent of faster processing multimedia PC's has driven the delivery of multimedia, including video, over the Internet. Time-sensitive applications however require continuous, quality of service guaranteed, high bandwidth data channels, which is seemingly at odds with the packet-based nature of the Internet and has the potential to disrupt transmissions with unacceptable packet jitter, i.e. the variation in the inter-arrival times of packets caused by variable routing and changeability of delivery rates owing to congestion. Currently, commercial streaming technologies overcome jitter by constructing a large buffer (5-30 seconds) before starting to playback video material. This start-up delay is non-optimal for a user, who may have to wait for this period, before realising that the content requested is incorrect; and generally detracts from the users experience of the multimedia presentation.

According to a first aspect of the present invention there is provided a method of operating a real-time communication apparatus comprising a real-time data sender, a real-time data display device having a store and a network connecting said sender and said display device, said method comprising the steps of:

operating said sender to transmit a plurality first-encoding-rate data packets representing a first part of a real-time presentation to said display device, said transmission rate being higher than said encoding rate;

operating said display device to:

receive said first-encoding-rate data packets into said store;

remove first-encoding-rate data packets from said store at said first encoding rate for decoding to present said real-time presentation to said user at a first level of quality;

on said store being filled with said first-encoding-rate data to a predetermined level, sending an indication that said level has been reached to said sender;

operating said sender, on receipt of said indication, to send second-encoding-rate data packets representing subsequent parts of said real-time presentation to said display device, said second encoding rate being higher than said first encoding rate;

operating said display device to:

receive second-encoding-rate data packets representing a subsequent part of real-time presentation into said store;

remove second-encoding-rate data packets from said store at said second encoding rate for decoding to present said real-time presentation to said user at a second level of quality higher than said first level of quality.

According to another aspect of the present invention there is provided a method of presenting time-sensitive data at a client while constructing a buffer of time-sensitive data, said method comprising receiving time-sensitive data which has been transmitted to said client, passing said time-sensitive data to a data buffer; and, monitoring the quantity of time-sensitive data in the data buffer; reading said time dependent data out of the data buffer to be processed for viewing; wherein the method is characterised in that the rate at which the time-sensitive data is read out of the data buffer is lower than the rate at which the time-sensitive data is passed to the data buffer; and the time-sensitive data is read out of the data buffer when it

arrives in the data buffer, such that there is substantially no delay between the client receiving the time-sensitive data and making the time-sensitive data available; and, presenting the time-sensitive data.

There will come a point when the data buffer becomes sufficiently full. The rate of transmission can then be reduced to equal the rate of consumption by the viewing means which will bring the quantity of data in the buffer to an equilibrium. However, in this situation the bandwidth of the connection may not be employed to full capacity.

In a further aspect of the present invention there is provided a method of presenting time-sensitive data at a client, wherein, time-sensitive data encoded at a first bit-rate is received until a pre-determined quantity of data fills the data buffer, whereupon time-sensitive data encoded at a second bit-rate is received, wherein said second bit-rate is higher than the first bit-rate.

A still further aspect of the present invention provides a method of providing time-sensitive data to a client is taught, wherein time-sensitive data encoded at a first bit-rate is read from a first data buffer at a first transmission rate to be transmitted to the client; and, upon request, time-sensitive data encoded at a second bit-rate is read from a second data buffer at a second rate.

It is desirable to use as much of the available bandwidth of a link as possible to transmit data because with a higher bit-rate of video data comes better quality reproduction. However, loss of data in the network causes severe degradation of service – far outstripping the benefits of increased bit-rate. For example, with predictive coding schemes such as H.263 and MPEG, receiving half of a 500 $kbits^{-1}$ video stream is likely to give a much worse quality than all of a 250 $kbits^{-1}$ stream. It is therefore important to reduce transmission rate in a controlled way, rather than letting data be lost to the network. The Internet protocol TCP has a built-in control mechanism whereby the data transmission rate is steadily increased until packet loss is detected, whereupon the data rate is reduced. The data rate is then increased again until packet loss reoccurs. A variable transmission rate is said to be elastic and applications which are able to control the transmission rate of data in response to network conditions are said to be TCP-friendly. It is desirable to provide video data in

a TCP-friendly way so that the as much of the bandwidth available at any particular time is utilised. A further benefit of TCP-friendly data delivery is that congestion in the network is managed as individual applications themselves reduce data rates until each has a fair share of the bandwidth.

Standard compression technologies, such as MPEG4 or H.263 can be managed to exhibit TCP-friendly behaviour, see for example the applicant's co-pending patent application number GB 9928023.2. This solution, however, requires a high-speed, dedicated PC per video stream. Transcoding an encoded data stream from a high bit-rate to a low bit-rate when network congestion is detected also suffers from the problem of being computationally demanding. Another approach is to use layering of video streams, whereby quality adaption is achieved by adding or dropping layers of the video stream. The disadvantage of this method is that it is inefficient, as a certain proportion of the available bandwidth must be allocated to instructions for integrating the layers.

The present invention further provides a method wherein the rate at which time-sensitive data is read out from first and second buffers may be dynamically varied in dependence upon the condition of a link to the client, and further, time-sensitive data encoded at a first bit-rate is read from a first data buffer at a first transmission rate to be transmitted to the client; or, time-sensitive data encoded at a second bit-rate is read from a second data buffer at a second rate, in dependence upon the condition of a link to the client, wherein said first bit-rate is lower than the second bit-rate.

Embodiments of the invention will now be described, by way of example only, with reference to the figures, where:

Figure 1 is a schematic overview of the relationship between encoder, video streamer and clients;

Figure 2 shows the arrangement of the video streamer;

Figure 3 shows the arrangement of a client; and

Figure 4 shows the stepwise operation of one embodiment of the present invention.

As shown in Figure 1, a first embodiment of the present invention consists of a source of compressed video data, encoder 1, which encodes data both at a low bit-rate R_L, which may have a value of for example 500 $kbits^{-1}$, and a high bit-rate R_H, of

for example 1500 $kbits^{-1}$. The compression codec used is H.263 but equally may be any other codec, such as MPEG4. Encoder 1 takes 'live' video data as its input, for instance a broadcast of a sporting event.

The two encoded data streams are transmitted via separate logical connections to the video streamer 2 at a transmission rate T_E. The video streamer 2 may be on the same premises as the encoder 1 and linked via an intranet. The video streamer 2 runs on a server computer, for instance one comprising a Pentium III 700 MHz, 256MB RAM which has access to the Internet.

A video viewer, hitherto referred to as the client, running on a PC (a,b,c etc in Figure 1) suitably configured to have access to the Internet, may connect to the video streamer 2 via the Internet and thus the client is able to access content. A suitable PC terminal is a 266 MHz Pentium II laptop PC. The video streamer 2 can support a large number of clients (typically up to 1000) viewing the same stream.

For a live broadcast, the encoder 1 will transmit at a transmission rate T_E which is real-time. The two streams of data R_L and R_H coded at different bit-rates offer different quality video reproduction, but each data stream has the same transmission rate, T_E. The data must be decoded at this rate for the program to play back in real-time.

Figure 2 shows the arrangement of the video streamer 2. Low quality encoded video data encoded at a low bit-rate R_L and high quality encoded video data encoded at a high bit-rate R_H from the encoder 2 is received at the input connections 21 and 22 respectively and fed to buffers 23 and 24 respectively. It should be noted that there is provided one buffer per channel of encoded video data that is received by the video streamer 2. Encoded video data is read out from each buffer 23, 24 via a switch 26 which selects which encoded video data stream is to be sent to the output connection 27. There is provided a buffer manager 25 which is capable of controlling the rate at which data is read out from each of the buffers 23, 24 and thus defines the transmission rate T_S of the video streamer 2. The buffer manager is also in connection with the switch 26 and is further capable of receiving signals from connection 28. T_S is selected by varying the time delay between the transmission of each packet, such that T_S may be less than, equal to or greater than the encoder transmission rate T_E. Those skilled in the art will realise that the limiting factor on the sustainability of transmission where $T_S > T_E$ is the size of the buffer 23, 24 such that

a buffer of size S kbits will be able to sustain a transmission rate of $T_S = 2T_E$ for twice as long as a buffer of size S/2 kbits. Through the control of both switch 26 and the transmission rate T_S the buffer manager is able to control the bit-rate which is output from the video streamer 2 on two scales; by adjusting the transmission rate T_S fine control of the bit-rate is achieved, and by switching between the two encoded data streams encoded at bit-rates R_L and R_H control of the bit-rate on a coarse scale may be achieved. The buffer manager 25 makes adjustments to T_S or switches the output between buffers in response to signals received from connection 28.

Figure 3 shows the arrangement of the client running on a PC 3a, b, c etc. The encoded video data that is sent from the video streamer 2 is received at the client via a connection 27 and checked for completeness by a packet loss detector 31. The data is then sent into a client buffer 32 which is of a size suitable to absorb fluctuations in network throughput. The client buffer 32 is connected directly to a decoder 33 and from there decoded data is sent to be displayed at the client screen (not shown). A client status monitor 34 is connected to the packet loss detector 31 and client buffer 32. The client status monitor 34 is able to send signals via connection 28.

The packet loss detector 31 monitors incoming packets. If packet loss is detected then a signal is sent to the client status monitor 34, which is informs the buffer manager at the video streamer 2 via connection 28. Missing packets can be retransmitted. The buffer manager 25 steadily increases the transmission rate T_S until a consistent pattern of packet loss occurs, indicating that the maximum bandwidth is being utilised. In the interest of maintaining a congestion free network, the transmission rate T_S may then be exponentially reduced. The client status monitor 34 monitors the volume of data in the client buffer 32 such that a signal is sent via connection 28 to the buffer manager 25 at the video streamer 2 when the client buffer 32 becomes sufficiently full of data.

The system of video streamer 2 and client 3 as described above allows user-friendly video streaming, i.e. the client buffer 32 enables the quality of the video to be despite variations in network conditions, which might otherwise have a detrimental effect on the overall perceived quality of the media.

The operation of the present embodiment of the invention will now be described with reference to Figure 4.

The video streamer 2 is initialised, which involves filling the buffers 23, 24 with a quantity of data from the encoder 1. For a live broadcast, data is constantly fed into the buffers 23, 24 and is subsequently discarded after an amount of time defined by the size of the buffer and the quality of data being received.

A PC running browser software to browse web pages on the Internet may be used to select a link to, for example, a live broadcast on a site hosted by the entity providing streamed video. Being interested in viewing the particular clip or broadcast, the user clicks (selects) the link. The browsing software detects that streamed video data has been requested and launches the video viewing client software which embodies the client 3. The client 3 issues a "send data" command via connection 28 to the buffer manager 25, which sets switch 26 to read encoded video data from the low bit-rate data buffer 23 and requests a transmission rate of $T_S = 2T_E$. The data is transmitted to the data connection 27 and thence to the client 3. Using the example encoding bit-rate cited above of 500 $kbits^{-1}$ for R_L , data flows into the network to the client at a rate of 1000 $kbits^{-1}$.

The client 3 receives the encoded video data and sends it via the packet loss detector 31 to the client buffer 32 which is supplied at the rate $2T_E$. When data is detected in the buffer 32 the encoded video data is promptly read out to the decoder 33 at a rate of T_E. Therefore the buffer 32 fills at a rate T_E while the decoded data from the decoder 33 is displayed. Thus the user is provided with video pictures without having to wait for the client buffer 32 to fill.

The client monitor 34 waits for the quantity of R_L data in the client buffer 32 to reach a specified level, upon which a "switch buffer" command is sent to the buffer manager 25 at the video streamer 2 via the connection 28. The buffer manager 25 then switches the flow of data from the low bit-rate data buffer 23 to the high bit-rate data buffer 24 and instructs transmission at a rate $T_S = T_E$. Using the example encoding rate cited above, data is transmitted on the network at 1500 $kbits^{-1}$.

The client buffer 32 will then begin filling with high quality data which will be placed behind the low quality data. After a length of time the R_H data will begin to be read into the decoder 33, whereupon the user will perceive an increase in the picture quality. At this point, the client 3 has a full buffer and the user is watching images of a quality which is consistent with the capacity of the network link.

The video streamer 2 can support a number of clients (typically 1000). Each client is initially given a unique read-out point for the start-up phase, whereupon, after equilibrium of the client buffer 32 has been reached and the video streamer 2 is supplying high bit-rate data from the buffer 24, the read-out point can be amalgamated with other client read-out points. Read-out points may have to be devolved as discrepancies in network capacity demand increasing or decreasing the transmission rate for a particular client.

The skilled person will appreciate that the low bit-rate data buffer 23 should be of a size which will allow data to be read from it at a rate $2T_E$ for a period of time which is long enough to provide the client buffer 32 with a suitable quantity of data. For example, in order to buffer 5 seconds worth of 500 $kbits^{-1}$ data at the client 3, the video streamer 2 must supply 1000 kbits of data for 5 seconds, 500 kbits of which will be consumed by the decoder 33 per second and 500 kbits will build up in the buffer per second until 5 seconds has elapsed. Therefore the low bit-rate data buffer must be able to hold at least 5Mbits of data (5x1000kbits), or just over 0.5Mb.

The skilled person will appreciate that there are problems associated with 'tapping into' a stream of encoded data when data is initially read out of a buffer. The compression technology typically employed by the encoder 1 involved coding a frame of video data, termed an anchor frame or an I-frame and from this frame an estimate is made as to what the next frame will look like, this estimated frame being termed a B-frame. In this way the quantity of data representing a series of frames may be greatly reduced. However, if the first frame to be read from either of the data buffers 23, 24 is a B-frame then the first few frames of decoded data may be unintelligible as the decoder tries to reconstruct frames based on an estimate. In a further embodiment of the invention, an extra buffer of data is supplied in parallel with the data buffers 23, 24 consisting solely of I-frames. The first frame to be transmitted is read from the I-frame buffer and thus gives the decoder a reliable point from which to start decoding. Data is then switched to be read from either of the data buffers 23, 24.

The system allows user-friendly video streaming, i.e. the quality of the video does not fluctuate rapidly as network conditions vary, which can have a detrimental affect on the overall perceived quality of the media. In the event of packet loss being reported by the client, the system can exponentially reduce its transmission rate. This need

not result in an immediate switching of the video source, as there may be data buffered at the client. Immediately after the packet loss it is possible that the transmission rate is lower than the encoding rate, and the client is supplementing received data with buffered data in order to meet the demands of the video decoder, with the result that the client's buffer is emptying. In the event of isolated packet loss, the system can again ramp up the transmission rate, initially slowing the rate at which the client's buffer is emptying before eventually returning to a state of filling it.

The skilled person will appreciate that the ability to transmit data at variable rates for a period of time enables the streamed data to be elastic and allows TCP-friendly transmission. Detection of sustained packet loss by the packet loss detector 31 is indicative of network congestion. The buffer manager 25 at the video streamer 2 reacts to notification of packet loss by instructing a reduction in the transmission rate of data from the high bit-rate data buffer 24. The high bit-rate data buffer 24 should be appropriately sized to cope with such an event. If packet loss persists at the reduced transmission rate for longer than the high bit-rate data buffer can sustain, then the buffer manager 25 will switch to supply data from the low bit-rate data buffer 23. Effective management protocols are necessary to prevent rapid switching between data buffers 23 and 24 as the data capacity of the network fluctuates, because this will cause changes in the perceived quality of the played back video. While a user will tolerate low quality playback, rapid changes in quality can be irritating to a user.

There is no limit to the number of encoded data streams that may be provided to the video streamer. Maximum bandwidth utilisation may be achieved thus: starting by reading data from a low bit-rate data buffer, the transmission rate is increased. Finding that no packets are lost at this transmission rate, the output is switched to a higher bit-rate data buffer, whereupon the transmission rate is increased. If this transmission rate encounters no obstacle then a higher still bit-rate data buffer can be switched in, and so on until the maximum bandwidth is employed.

The buffer manager 25 located at the video streamer 2 is enabled to decide how to adjust the transmission rate T_S and when to switch buffers. Equally, instructions may be sent from the client 3 to the video streamer 2 about transmission rate T_S and which buffer to feed data from. The location of the buffer manager 25 in the

embodiments described has been chosen because it is practical to situate the control centre close to the centre which is responsible for charging for the service, which in this case is the ISP.

The example of video data is chosen as an example of multimedia data to illustrate the above embodiments. The invention is equally suited to any other form of time-sensitive data, such as audio data or a multimedia presentation.

In the embodiment described above, data is supplied by the encoder 1. Equally, compressed video data may be held in a library of program data files, for example a library of feature films, which may be accessed when required.

The video streamer 2 may be remote from the encoder 1, such that the video streamer 2 and the encoder 1 are connected via the Internet. It is likely that the video streamer 2 would be operated by an Internet Service Provider (ISP) and remote connection of the video streamer 2 and encoder 1, would allow the ISP to make content available to the client from many encoders.

CLAIMS

1. A method of operating a real-time communication apparatus comprising a real-time data sender, a real-time data display device having a store and a network connecting said sender and said display device, said method comprising the steps of:

operating said sender to transmit a plurality first-encoding-rate data packets representing a first part of a real-time presentation to said display device, said transmission rate being higher than said encoding rate;

operating said display device to:

receive said first-encoding-rate data packets into said store;

remove first-encoding-rate data packets from said store at said first encoding rate for decoding to present said real-time presentation to said user at a first level of quality;

on said store being filled with said first-encoding-rate data to a predetermined level, sending an indication that said level has been reached to said sender;

operating said sender, on receipt of said indication, to send second-encoding-rate data packets representing subsequent parts of said real-time presentation to said display device, said second encoding rate being higher than said first encoding rate;

operating said display device to:

receive second-encoding-rate data packets representing a subsequent part of real-time presentation into said store;

remove second-encoding-rate data packets from said store at said second encoding rate for decoding to present said real-time presentation to said user at a second level of quality higher than said first level of quality.

2. A method of presenting time-sensitive data and constructing a buffer of time-sensitive data, said method comprising

receiving time-sensitive data;

reading said time-sensitive data into a data buffer; and,

reading said time-sensitive data out of the data buffer for presentation; and,

presenting the time-sensitive data;

wherein the method is characterised in that

the rate at which the time-sensitive data is read out of the data buffer is lower than the rate at which the time-sensitive data is read into the data buffer; and,

reading the time-sensitive data out of the data buffer is initiated when the time-sensitive data first arrives at the data buffer, such that there is substantially no delay between the client first receiving the time-sensitive data and making the time-sensitive data available for presentation.

3. A method of presenting time-sensitive data at a client according to claim 2, including the step of,

monitoring the quantity of time-sensitive data in the data buffer;

wherein the bit-rate of the received time-sensitive data is dependent on the quantity of data in the data buffer.

4. A method of presenting time-sensitive data at a client according to claim 3, wherein,

time-sensitive data encoded at a first bit-rate is received until the quantity of data in the data buffer reaches an upper threshold, whereupon time-sensitive data encoded at a second bit-rate is received, wherein said first bit-rate is lower than the second bit-rate.

5. A method of presenting time-sensitive data at a client according to claim 4, wherein,

time-sensitive data encoded at the second bit-rate is received until the quantity of data in the data buffer reaches a lower threshold, whereupon time-sensitive data encoded at the first bit-rate is received.

6. A method of presenting time-sensitive data at a client according to any one of the preceding claims, wherein,

the rate at which the time-sensitive data is read into the data buffer is dependent on the quantity of data in the data buffer.

7. A method of providing time-sensitive data to a client, wherein

time-sensitive data is encoded at a plurality of bit-rates;

wherein data encoded at one of the plurality of bit-rates is selected for transmission to the client;

transmitting the data to the client.

8. A method of providing time-sensitive data to a client according to claim 7, wherein,

the rate at which time-sensitive data selected for transmission to the client is transmitted to the client may be dynamically varied.

9. A method of providing time-sensitive data to a client, according to claim 7, wherein,

the time-sensitive data encoded at one of the plurality of bit-rates is selected in dependence upon a received signal.

10. A method of providing time-sensitive data to a client according to claim 8, wherein,

the rate at which the time-sensitive data selected for transmission is transmitted is dependent upon a received signal.

11. A method of providing time-sensitive data to a client according to claims 9 or 10, wherein,

the received signal is representative of the condition of the link to the client.

12. A method of providing time-sensitive data to a client according to claims 9 or 10, wherein,

the received signal is representative of the quantity of data in a data buffer at the client.

13. A method of providing time-sensitive data to a client according to claim 11, wherein,

the condition of the link to the client is determined by the quantity of data in a data buffer at the client.

14. A method of providing time-sensitive data to a client in accordance with any one of the preceding claims, wherein the time-sensitive data represents video data or may represent audio data.

15. Apparatus for receiving time-sensitive data, said apparatus comprising,

buffer means for storing received time-sensitive data for a period of time,

means for reading said time-sensitive data into the buffer means,

means for reading said time dependent data out of said buffer means,

monitoring means for monitoring the quantity of data held in the buffer means; and

means for transmitting data relating to the quantity of time dependent data held in said buffer means,

said apparatus being characterised in that means for initiating reading the time-sensitive data out of the data buffer when the monitoring means detects the arrival of time-sensitive data at the data buffer, such that there is substantially no delay between the client first receiving the time-sensitive data and the time-sensitive data being read out of the buffer.

16. Apparatus for supplying encoded video data to at least one client, said apparatus comprising,

receiving means to receive a plurality of data streams, wherein each of the plurality of data streams comprises video data encoded from the same source with differing quantisation parameters,

a plurality of buffer means for storing each stream of encoded video data for a period of time,

at least one reading means for reading encoded video data from one of the plurality of buffer means,

buffer management means arranged to control the at least one reading means,

characterised in that,

said reading means is arranged to read, under control of the buffer management means, encoded video data from any of the buffer means at a frame rate which may be less than, equal to or greater than the frame rate at which the video data is encoded.

17. Apparatus for supplying encoded video data to a client as claimed in claim 16, including,

means for receiving data relating to the quantity of encoded video data in the buffer of the client, and

means for determining the current capacity of the link to the client,

wherein the buffer management means is arranged to control the reading means in dependence on the quantity of encoded video data in the buffer of the client and on the capacity of the link to the client.

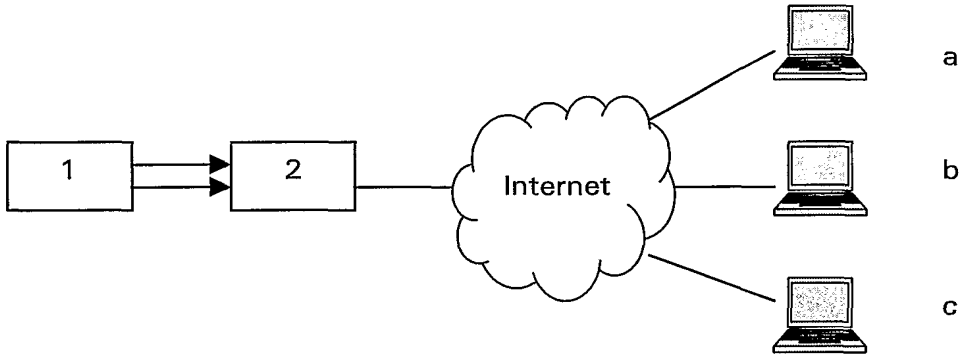


Figure 1

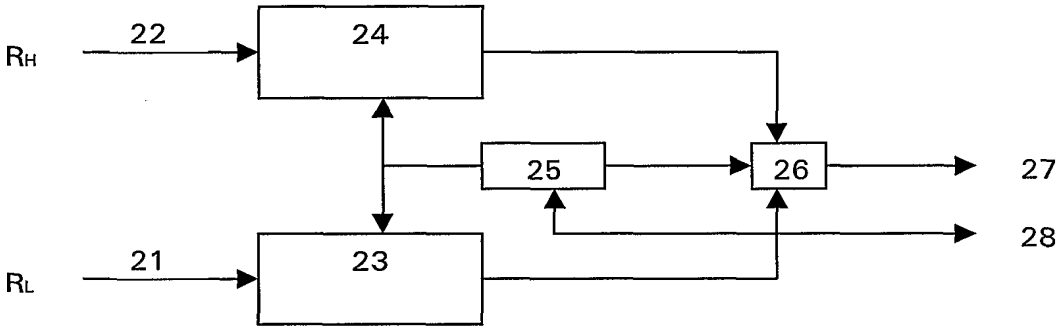


Figure 2

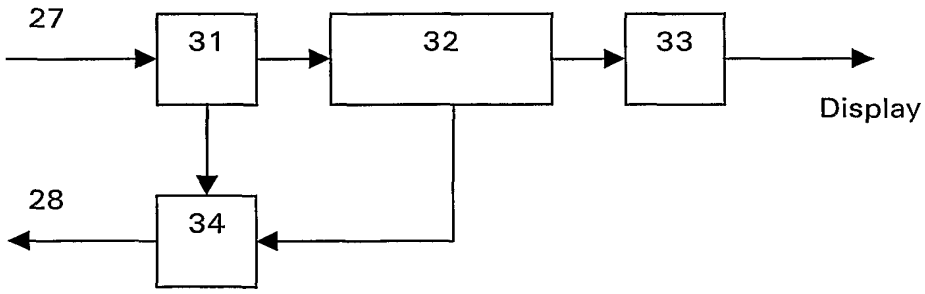


Figure 3

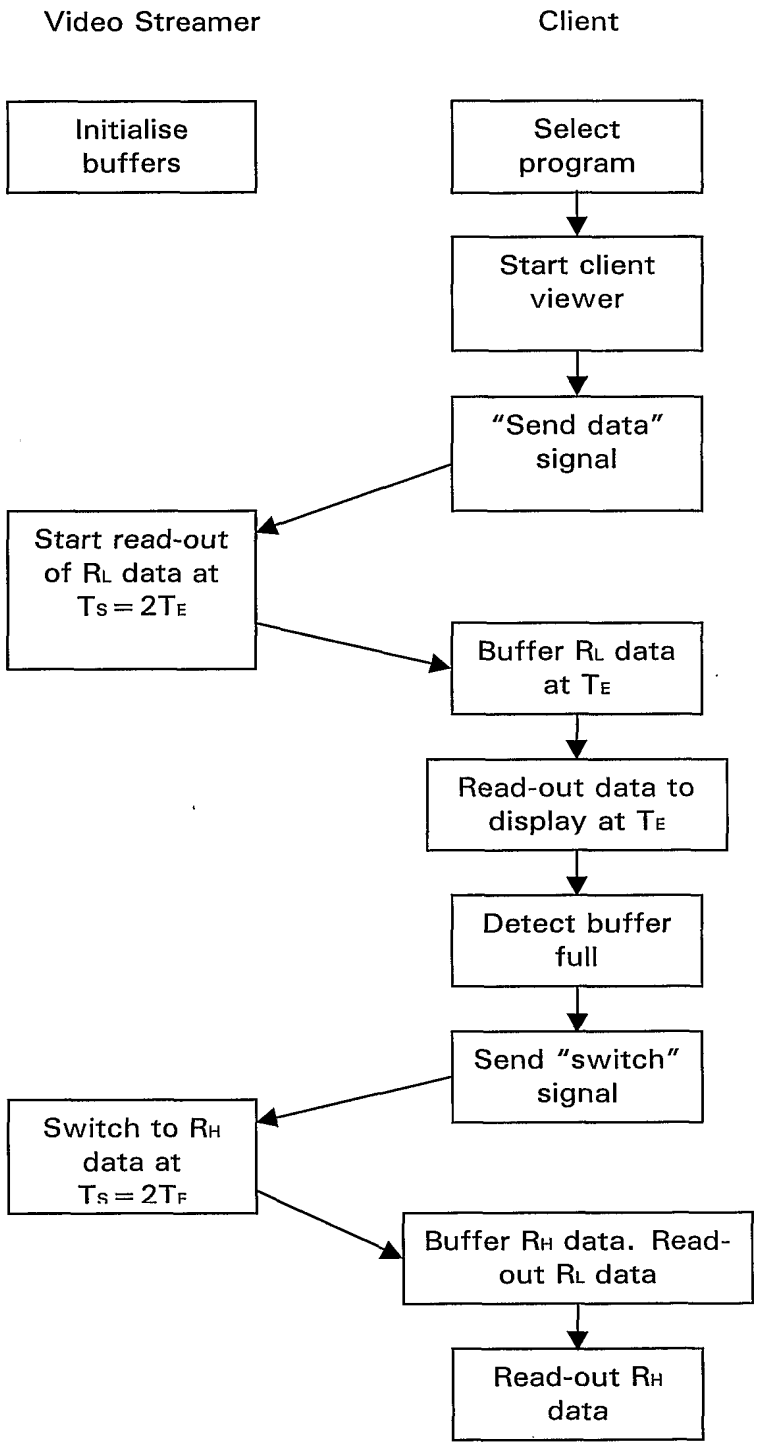

Video Streamer
Client
Initialise buffers
Select program
Start client viewer
"Send data" signal
Start read-out of R_L data at $T_S = 2T_E$
Buffer R_L data at T_E
Read-out data to display at T_E
Detect buffer full
Send "switch" signal
Switch to R_H data at $T_S = 2T_F$
Buffer R_H data. Read-out R_L data
Read-out R_H data

Figure 4

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/876,579	**08/19/2021 03:37:32 PM ET**	**066.0141X1C9**

Title of Invention

APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3720	FILED BY	Francene Stewart
PATENT CENTER #	60286065	FILING DATE	05/18/2020
CUSTOMER #	70560	FIRST NAMED INVENTOR	DAVID F. BRUECK
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Brett Carlson

Documents

TOTAL DOCUMENTS: 23

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
20210819_IDS_066-0141X1C9.pdf	9	Information Disclosure Statement (IDS) Form (SB08)	1013 KB
20210819_IDSCert_066-0141X1C9.pdf	1	Transmittal Letter	228 KB
EP1394973A2.pdf	31	Foreign Reference	1571 KB
JP2004295569A.pdf	62	Foreign Reference	2969 KB
WO2003009581.pdf	21	Foreign Reference	803 KB
WO2003041413.pdf	47	Foreign Reference	1912 KB

WO2003042856.pdf	38	Foreign Reference	1615 KB
WO2002045372.pdf	19	Foreign Reference	726 KB
NPL3_Dawson-ImprovingQuality.pdf	17	Non Patent Literature	2586 KB
NPL4_IntervuGranted.pdf	3	Non Patent Literature	61 KB
NPL5_InterVuStreams.pdf	4	Non Patent Literature	64 KB
NPL6_MicrosoftAnnounces.pdf	5	Non Patent Literature	88 KB
NPL7_SandpiperAddsRealSystem.pdf	4	Non Patent Literature	1401 KB
NPL8_Speedera.pdf	5	Non Patent Literature	147 KB
NPL9_DeveloperDocumentation2002.pdf	240	Non Patent Literature	1676 KB
NPL10_IBM-DigitalLibrary.pdf	26	Non Patent Literature	117 KB
NPL11_FreshApproach.pdf	6	Non Patent Literature	104 KB
NPL13_20210618-MIRRORResponseToComplaint.pdf	87	Non Patent Literature	1139 KB
NPL14_20210618-PelotonResponseToComplaint.pdf	59	Non Patent Literature	611 KB
NPL15_20210618-VerifiedResponseICONToComplaint.pdf	78	Non Patent Literature	668 KB
NPL1_AppendixREAL06_RPG2Manual.pdf	77	Non Patent Literature	1082 KB

NPL12_MacOSX.pdf	65	Non Patent Literature	1344 KB
NPL2_Kontothanassis-TransportLayer2.pdf	11	Non Patent Literature	332 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
20210819_IDS_066-0141X1C9.pdf	822464FC50F0ED4703E2B055512A75A640D1DD0AA35B383EFC79829EE765D500B16FD06BDD6D443F38619A930BDFC8E3CD43E4F049233C1F9C6E38C99630B03C
20210819_IDSCert_066-0141X1C9.pdf	BBE4C565406C80996B54477939204EF54771A20072F28FC8717B9EFB91F36BD7AF0D774D8EB76055793888F34CB8987A076C563CEE9BE02EB4079922F0B76CDF
EP1394973A2.pdf	9C3D7FE9643DB0B481734ADB401027C2E42F250ACE40C64A3A799B40CAC803E88B9D5E43B8BFEE76BC14FB1ED25FBCBF1524877C0B66222A61EF863D39FEA32A
JP2004295569A.pdf	889E0615E42948E711259B2F31DA82F418D45E3D6AE71B7E0B7D33B3614199E002EBA656516099061BD486B93025A0C73FB5BAA4BBC82C42E90A25DCCCA38CAD
WO2003009581.pdf	8F3AE00A3550AB43AB429D27046EC3FA8C94CA1100CA1956924263A0A33CB21F56F65462A304A7FFC1B277A9F82141BB8CB37F08738B1797A28F1A6B08792594
WO2003041413.pdf	530F6A35ABF61260B00933091014F6E4060D18445A90C048A304A3315123D755ADDB8734D6B4880D8B909F4DDC255D0487E0C20925DDCE5A8A0F14303F18C9C9
WO2003042856.pdf	E189E94C7DE6ECB6307C40F76595925DE5F6B38DB006ECE2A17E1BFEB7A9AD5EF750936D9320575F50D2038F2A22199D661D10D25B6E72B782958A1C1D749FB7
WO2002045372.pdf	888D99D1E8056EC07D65DCBA29BC9E7FD9B0864B1EFC6D02

	0C119D6FC1ECF3A644D4A73534A507E96ADDE1A8C470144C684D1EEA0BD1869B464029B9F68D70F1
NPL3_Dawson-ImprovingQuality.pdf	EC0D576F4AC031A4E59409049280505 9E0106659C16BE3E43C7D41FC7FFDD5C6D2A56FBF38E3989A1ABCF97852A7A018C6BF4E1171E934BDB542C34BEFC5B59E
NPL4_IntervuGranted.pdf	669F93A664AA1EEE5FD7B981C4380484BFC03296F4E111A0BB38C1CE4A30A47197B12677B5DF332574F417A660C7E2EB6D19807FC438D3C8199EA4CA900CA37E
NPL5_InterVuStreams.pdf	A7A13973DA3A49E5C46EEC5FC302B1BAE789C507CF41A2C8E285A409102A93ABEBC70CABFBCF3E9A6F3AB9DCF8F16D53107EAEFAC4B24A8DA3F05E1FA3F5AAB2
NPL6_MicrosoftAnnounces.pdf	1A67755DADD74D3030F87C9D168A8CDE881E4FBCE37521E2EA61C5E45E715C21DDD78FCE3BEB7CAD01883AF388026619681FA6E34CD276928AC3A47ACDFF526B
NPL7_SandpiperAddsRealSystem.pdf	BBD4E1AB430F7E76C5245870CE35A779A6DEEB2A7689F325B5FF4416F471983AF604EDFF1A51B964D9EDA8DC39000F537A0D08298E2F06B17A8C7211E6A2FD5E
NPL8_Speedera.pdf	26DF6944979AB7002DA8D329BE10FDCE3F80E7B5140B3E6038CA26E6B6789D3D2CE47ACD24A2BB85084639CCA3859B647C8FE532EC674758D24CF94D946FF6E2
NPL9_DeveloperDocumentation2002.pdf	4A6AC1C75C53C03572BD83BE5457C23D747B937BD56EA96A6FF26900FC3FB6AC4F98A224319474B42F18A85A7787EFB914062626095264D129207111C9F30914
NPL10_IBM-DigitalLibrary.pdf	773733278B55631CF951FA881ED92CD1419A091DB43E5D2EC331B1268E59974DDA877EDA72BE496D8F3F4BEA9A63C2966A6FFE35D663505B1CA601DB9852F6CC
NPL11_FreshApproach.pdf	591F9899DE6351D47CB286EE67D1732697C27263F28C8B515D66DBB697165F24516DDCA2E4F88D1327ACCD57E14A416B522579F987BC5B0BB931F7C15F209AC9
NPL13_20210618-	0F79DA808E267107A2507BBCC578FB390B45C831FFB08E9EA

MIRRORResponseToComplaint.pdf	E180B04133B746AA151D2A43439CAD5C2FC83A73F38BF81A762EA62AC689E427B75411868B78FFE
NPL14_20210618-PelotonResponseToComplaint.pdf	C89E3FB3534809F9F43901DF18E5DC468EA1D9D3933A4AC109837BBB8F1354435CA4A5AEC252D6C7C98B974A8B0EED2C7B82C57BCF145714C711B9F737872F57
NPL15_20210618-VerifiedResponseICONToComplaint.pdf	87C872E01C6A5651FF0B23137118AAFC4B53194FFDB2EF6A421D1A00946142B1AAF903D9B2B740AB1631BB4BA221C00D34A2CF5D4B4BF7E23CC3643FE9E5A234
NPL1_AppendixREAL06_RPG2Manual.pdf	0207AB31AE8E6CBC295450EE18EEAA69A0832CCC2E090D894A837C002627CF30591CC41B624167C088FEDA90CAE52FFACA8BCC4521E0A9D668BBFCFED135D0DD
NPL12_MacOSX.pdf	073371622083A79EA0D7D7DD41D1CDB6B81CC4368A1D9C1D16E484D9C63C0119E2D100C52FDAB8294621A88D30D155B94008CA28F9DF93029A5195286AF5FB77
NPL2_Kontothanassis-TransportLayer2.pdf	566D232CA48476569FBC429D093A2FE289D37116B11970D008DD9B845600545C9E38E7414E4FA37CD2D4288F4DC6270CBB792D738A88290EA5A61452AE768428

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

New Applications Under 35 U.S.C. 111

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

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

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

New International Application Filed with the USPTO as a Receiving Office

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

Espacenet

Bibliographic data: JP2004295569 (A) — 2004-10-21

INFORMATION PROCESSOR, INFORMATION PROCESSING METHOD, AND COMPUTER PROGRAM

Inventor(s): YOSHIKAWA NORIFUMI; HONDA YASUAKI; MORITA TOSHIHIRO; KUSAKABE TOSHIAKI ± (YOSHIKAWA NORIFUMI, ; HONDA YASUAKI, ; MORITA TOSHIHIRO, ; KUSAKABE TOSHIAKI)

Applicant(s): SONY CORP ± (SONY CORP)

Classification: **- international:** ***G06F13/00; G10K15/02; H04N21/262; H04N21/2668; H04N7/173;*** (IPC1-7): G06F13/00; G10K15/02; H04N7/173

- cooperative:

Application number: JP20030088010 20030327

Priority number(s): JP20030088010 20030327

Abstract of JP2004295569 (A)

PROBLEM TO BE SOLVED: To provide a device and method efficiently carrying out a content reproduction process in random order while reducing a load of a client. ;SOLUTION: A list randomly setting a reproduction order of contents is created in a server side on the basis of a request from the client, and it is sent to the client. Random order information corresponding to list order setting information of the content reproduction list is stored in property information corresponding to contents stored in a server, and in response to a browse request or the like from the client, a shuffle shifting process of the random order information of contents in a specific folder is carried out, a contents reproduction list set with a list order corresponding to shifted random order information is created, and it is sent to the client. By this composition, necessity to carry out a shuffle process by the user and a client side is eliminated. ;COPYRIGHT: (C)2005,JPO&NCIPI

Patent Translate
Powered by EPO and Google

Notice

This translation is machine-generated. It cannot be guaranteed that it is intelligible, accurate, complete, reliable or fit for specific purposes. Critical decisions, such as commercially relevant or financial decisions, should not be based on machine-translation output.

DESCRIPTION JP2004295569A

10 Information processing equipment, information processing methods, and computer programs

[]

14 The present invention relates to an information processing apparatus, an information processing method, and a computer program. Further, in detail, when the content provided by the content providing server is reproduced on the client side, the content reproduction sequence can be appropriately changed and reproduced without causing a burden on the client side. Information processing equipment, information processing methods, and computer programs. Conventional Technology With the spread of data communication networks in recent years, home appliances, computers, and other peripheral devices are connected to the network to enable communication between each device, that is, a so-called home network. Is permeating. The home network provides convenience and comfort to users, such as sharing the data processing function of each device by communicating between network-connected devices and sending and receiving content between devices. It is expected that it will become more and more popular. Universal Plug and Play (UPnP: Universal Plug and Play) is known as a protocol suitable for such a home network configuration. Universal Plug and Play (UPnP) makes it possible to easily build a network without complicated operations, and provides services for each connected device in network-connected devices without difficult operations or settings. It is intended to be receivable. In addition, UPnP has the advantage that devices can be easily added without depending on the OS (operating system) on the device. UPnP exchanges definition files conforming to XML (eXtensible Markup Language) between connected devices, and performs mutual recognition between the devices. The outline of UPnP processing is as follows. (1) Addressing process for acquiring own device ID such as IP address. (2) A discovery process that searches for each device on the network, receives a response from each device, and acquires information such as the device type and function included in the response. (3) Service request processing that requests a service from each device based on the information acquired in the discovery processing. By performing the

DISH EXHIBIT 2002, Page 773
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

above processing procedure, it is possible to provide and receive a service to which a device connected to the network is applied.

40 The device newly connected to the network acquires the device ID by the above addressing process, acquires the information of the other device connected to the network by the discovery process, and requests the service from the other device based on the acquired information. Is possible. For example, when trying to play content such as music data and image data stored in a server on a client-side device, the client acquires information about the content held by the server. The server stores the content in the storage unit and also stores the attribute information for the stored content. The attribute information includes, for example, various information such as the title of a song or movie, the artist name, the recording date and time, the data compression mode, and the like as contents. These attribute information is called metadata or meta information. For example, when trying to play content such as music data and image data stored in a server on a client-side device, the content information stored in the server from the client side to the server, for example, a song or a movie. Sends a request to acquire attribute information of various contents such as title, artist name, data compression mode information (ATRAC: moving picture experts group, MPEG: moving picture experts group, etc.), and copyright information as necessary. .. The server transmits metadata (attribute information) related to the contents held by the server to the client in response to a request from the client. The client displays the content information on the display of the client device according to a predetermined display program based on the metadata acquired from the server. For example, a list of songs consisting of artist names, titles, etc. is displayed on the display. The user confirms or selects the content to be played back based on the display information, and transmits the content transmission request to the server. The server receives the content request from the client, the server sends the content to the client in response to the reception request, and the received content is played back on the client side. The content stored in the server in this way can be searched from another device (client) connected to the network, and a specific content can be specified and played back.

65 For example, when the client selects only one music content as a playback target, a content transmission request including an identifier of the one music content is transmitted to the server, and the server acquires the designated content from the storage unit. Is sent to the client and played on the client, and the process ends. When a plurality of music contents are selected by the client as a playback target, a transmission request is transmitted from the client to the server for each content, and each music content is sequentially provided from the server to the client and played on the client side. Become. The content folder stored in the server includes a content folder containing a plurality of music contents, for example, a folder created by collecting only favorite songs by the user, or a plurality of music contents such as a specific artist and genre. The stored folders and the like can be set, and the user on the client side can specify these specific folders and sequentially play back a plurality of contents (songs) stored in the folders. For example, Patent Document 1 describes a configuration in which content and its management data are transmitted together when an aggregate composed of a plurality of songs is transferred from a recording / playback device to a terminal such as a portable device. .. When a client executes a plurality of contents in a folder

DISH EXHIBIT 2002, Page 774
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

in which a plurality of contents are stored as a playback target, if the playback order of the songs is always in a fixed order, the user who listens to the contents enjoys the content. Decline. Therefore, a process of changing the order of playing a plurality of contents, that is, shuffling the order of playing a plurality of contents to change the playing order is performed. Conventionally, in such a content reproduction sequence change process, the user performs a reproduction order determination process based on a data list such as a song related to a plurality of contents transmitted from the server to the client, or the client. Processing such as determining the playback order was performed by the playback sequence determination program stored in the device on the side. That is, the client side takes the initiative in determining the content reproduction order, and the client sends the content request to the server according to the determined content reproduction order. In general, the server simply sends the contents in sequence based on the request information from the client.

92 In such a configuration, it is necessary to execute a process of changing the playback order of a plurality of contents on the client side, such as setting the playback order of the contents or shuffling, which causes a burden on the user or the client side. was there. Japanese Patent Application Laid-Open No. 2001-216766 [0017] The present invention has been made in view of the above-mentioned problems, and is borne by the user or the client. It is an object of the present invention to provide an information processing device, an information processing method, and a computer program capable of appropriately changing and reproducing a reproduction sequence of contents without generating an information processing device. A first aspect of the present invention is an information processing device that executes a content information transmission process, an object including at least one of a content or a data folder, and attributes of the object. A storage unit that stores property information as information, a data transmission / reception unit that executes data transmission / reception processing between the client as a content information requesting device, and content information that generates content information to be transmitted to the client based on the property information. The property information has a rewritable random order information corresponding to the list order setting information of the content playback list, and the content information generation unit responds to a content playback list request from a client. It is characterized by having a configuration in which an update process is executed as a process of replacing and resetting the random order information, and a process of generating content playback list information having list order information according to the update information and transmitting it to a client is executed. It is in the information processing device. Further, in one embodiment of the information processing apparatus of the present invention, the random order information is set for each property information corresponding to each content included in the content folder set as a set of a plurality of contents. It is numbering data as a number, and is information set so that n random order numbers are not duplicated with respect to the number n of contents included in the content folder, and the content information generation unit corresponds to the number of contents n. It is characterized in that the random order information of 1 to n is shuffled and the random order information exchange processing set for each property information is executed.

121 Further, in one embodiment of the information processing apparatus of the present invention,

DISH EXHIBIT 2002, Page 775
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

the random order information is numbering data as a number set for the property information corresponding to the content reproduction list folder storing the content reproduction list. The content information generation unit shuffles the random order information of 1 to n corresponding to the number of folders n to be shuffled, and executes the replacement process of the random order information set for each property information. It is characterized by executing the list order setting process for each folder. Further, in one embodiment of the information processing apparatus of the present invention, the information processing apparatus determines whether or not there is a content reproduction list generation request by a random order in the content reproduction list request data from the client. It is characterized in that the configuration is such that the update process of the random order information is executed on condition that there is a content reproduction list generation request by the random order. Further, in one embodiment of the information processing apparatus of the present invention, the information processing apparatus executes the update process of the random order information, and then the random order information is being reproduced while the content is being reproduced according to the content reproduction list in the client. It is characterized in that it is configured to maintain and retain the memory. Further, in one embodiment of the information processing apparatus of the present invention, the information processing apparatus executes the update processing of the random order information, and then the random order information is being reproduced while the content is being reproduced according to the content reproduction list in the client. Is maintained and stored, and during the storage retention period, content playback list information based on the stored random order information is generated and transmitted to the client in response to a re-request of the content playback list request from the client. It is characterized in that it has a configuration for executing processing. Further, in one embodiment of the information processing apparatus of the present invention, the content information generation unit is characterized in that it executes a process of generating the content playlist information as XML (eXtended Markup Language) data. And. Further, the second aspect of the present invention is an information processing apparatus that performs content information acquisition processing, with respect to a data transmission / reception unit that executes data transmission / reception processing with a server that holds the content information, and the server. Based on the content information request processing unit that executes the request processing of the content playback list set in the random order and the content information received from the server via the data transmission / reception unit, the content playback list composed of a plurality of content information is created. A content information analysis unit to be generated, a display unit to display the content playback list generated by the content information analysis unit, and a content acquisition request to be transmitted to the server according to the list order of the content playback list, and the content received from the server. The information processing apparatus is characterized by having a content reproduction control unit for executing the reproduction control process of the above.

162 Further, in one embodiment of the information processing apparatus of the present invention, the content information request processing unit sets a random order as the setting order sort

DISH EXHIBIT 2002, Page 776
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

information of the content playback list together with the designation information of the content folder storing a plurality of contents. It is characterized in that it has a configuration for executing a process of generating content information request data in which information is stored. Further, in one embodiment of the information processing apparatus of the present invention, the content information request processing unit provides random order setting information as setting order sort information of the content playback list together with the designation information of a plurality of content playback list folders. It is characterized in that it has a configuration for executing a process of generating stored content information request data. Further, in one embodiment of the information processing apparatus of the present invention, the content reproduction control unit requests a content in which a content corresponding URL included in the content information received from the server is set according to the list order of the content reproduction list. It is characterized in that it is configured to execute a process of sequentially transmitting information to the server. Further, in one embodiment of the information processing apparatus of the present invention, the content information received from the server is XML (eXtended Markup Language) data that describes the property information corresponding to the content, and the content information analysis unit is The XML data is analyzed to generate a content reproduction list composed of a plurality of content information. Further, the third aspect of the present invention is an information processing method for executing the content information transmission process, the content information acquisition request receiving step for receiving the content information acquisition request from the client, and the property corresponding to the content. The random order information update step that executes the update processing of the random order information as the list order setting information of the content playback list stored in the information, and the content playback list information having the list order information according to the updated random order information. The information processing method is characterized by having a list generation step for generating the information and a step for transmitting the generation list to the client. Further, in one embodiment of the information processing method of the present invention, the random order information is set for each property information corresponding to each content included in the content folder set as a set of a plurality of contents. The numbering data as the number is set so that n random order numbers are not duplicated with respect to the number n of contents included in the content folder, and the random order information update step is set to the number of contents n. It is characterized in that the shuffle of the corresponding 1 to n random order information is executed and the random order information exchange processing set for each property information is executed.

199 Further, in one embodiment of the information processing method of the present invention, the random order information is numbering data as a number set for the property information corresponding to the content playback list folder storing the content playback list. Yes, in the random order information update step, the random order information of 1 to n corresponding to the number of folders n to be shuffled is shuffled, and the random order information set for each property information is replaced. It is characterized by executing the list order setting process for each folder. Further, in one embodiment of the information

DISH EXHIBIT 2002, Page 777
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

processing method of the present invention, the information processing method further determines whether or not the request data of the content playlist from the client includes a content playlist generation request by a random order. It is characterized in that the update process of the random order information is executed on condition that the content playback list generation request by the random order is made. Further, in one embodiment of the information processing method of the present invention, the information processing method further executes the update processing of the random order information, and then the random is being played while the content is being played according to the content playback list on the client. It is characterized by having a step of maintaining and storing order information. Further, in one embodiment of the information processing method of the present invention, the information processing method further executes the update processing of the random order information, and then the random is being played while the content is being played according to the content playback list on the client. The order information is maintained and stored, and during the storage retention period, the content playback list information based on the stored random order information is generated to the client in response to the re-request of the content playback list request from the client. It is characterized by executing a process of transmitting. Further, in one embodiment of the information processing method of the present invention, the content information generation step is characterized in that a process of generating the content playlist information as XML (eXtended Markup Language) data is executed. Further, the fourth aspect of the present invention is an information processing method for performing content acquisition processing, and content information for executing request processing of a content playback list set in a random order for a server holding content information. A request processing step, a content information analysis step that generates a content playback list composed of a plurality of content information based on the content information received from the server, and a display step that displays the content playback list generated in the content information analysis step. The information processing method is characterized by having a content reproduction control step of transmitting a content acquisition request to the server according to the list order of the content reproduction list and executing a reproduction control process of the content received from the server. be.

236 Further, in one embodiment of the information processing method of the present invention, the content information request processing step sets a random order as setting order sort information of the content playback list together with the designation information of the content folder storing a plurality of contents. It is characterized by executing a process of generating content information request data in which information is stored. Further, in one embodiment of the information processing method of the present invention, the content information request processing step provides random order setting information as setting order sort information of the content playback list together with the designation information of a plurality of content playback list folders. It is characterized by executing a process of generating stored content information request data. Further, in one embodiment of the information processing method of the present invention, the content reproduction control step requests a content in which a content corresponding URL included in the content

DISH EXHIBIT 2002, Page 778
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

information received from the server is set according to the list order of the content reproduction list. It is characterized in that a process of sequentially transmitting to the server is executed. Further, in one embodiment of the information processing method of the present invention, the content information received from the server is XML (eXtended Markup Language) data that describes the property information corresponding to the content, and the content information analysis step is It is characterized in that a process of generating a content reproduction list composed of a plurality of content information is executed by analyzing the XML data. Further, the fifth aspect of the present invention is a computer program that executes the content information transmission process, the content information acquisition request receiving step for receiving the content information acquisition request from the client, and the property corresponding to the content. Random order information update step that executes update processing of random order information as list order setting information of the content playback list stored in the information, and content playback list information that has list order information according to the updated random order information A computer program characterized by having a list generation step for generating information and a step for sending the generation list to a client. Further, the sixth aspect of the present invention is a computer program that performs content acquisition processing, and content information that executes request processing of a content playback list set in a random order for a server that holds content information. A request processing step, a content information analysis step that generates a content playback list composed of a plurality of content information based on the content information received from the server, and a display step that displays the content playback list generated in the content information analysis step. A computer program characterized by having a content reproduction control step of transmitting a content acquisition request to the server according to the list order of the content reproduction list and executing a reproduction control process of the content received from the server. be.

274 [Action] According to the configuration of the present invention, the client generates a list in which the playback order of the contents is randomly set on the server side based on the request from the client, and transmits the list to the client. Only by performing the playback process according to the list received from the server, it is possible to enjoy the content playback according to the random playback sequence, and the need for the shuffle process on the user and client sides is eliminated. Further, according to the configuration of the present invention, rewritable random order information corresponding to the list order setting information of the content playback list is stored in the property information corresponding to the content held in the server, and browsed from the client. Acquiring content information such as requests Content that acquires property information corresponding to the content in the specified folder, executes shuffle replacement processing of random order information, and sets the list order corresponding to the replaced random order information. Since the playback list is generated and sent to the client, the client can set the content playback sequence depending on the processing on the server side without increasing the processing load on the server side. Further, according to the configuration of the present invention, the server has a reset random order No. Random order No. based on

DISH EXHIBIT 2002, Page 779
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

After generating sequential content playback list information and sending it to the client, the random order information is maintained and stored during content playback according to the content playback list on the client, and the content playback list from the client is stored during the storage retention period. When the request is re-requested, the content playback list information based on the stored random order information is generated and sent to the client, so the client executes the process of sending the content in the specific folder to the random sequence. It becomes possible to reproduce without duplication according to. The computer program of the present invention provides, for example, a storage medium, a communication medium, for example, a CD or an FD, which is provided in a computer-readable format to a general-purpose computer system capable of executing various program codes. , MO, or a computer program that can be provided by a communication medium such as a network. By providing such a program in a computer-readable format, processing according to the program is realized on the computer system.

303 Still other objectives, features and advantages of the present invention will be clarified by more detailed description based on the examples of the present invention described later and the accompanying drawings. In the present specification, the system is a logical set configuration of a plurality of devices, and the devices having each configuration are not limited to those in the same housing. Hereinafter, details of the information processing apparatus, the information processing method, and the computer program of the present invention will be described with reference to the drawings. [System Overview] First, an example of an applicable network configuration of the present invention will be described with reference to FIG. FIG. 1 shows a server 101 that executes processing in response to processing requests from various client devices, and a PC 121, a monitor 122, a mobile phone 123, a player 124, and a PDA 125 as client devices that make processing requests to the server 101. Indicates a configuration connected via the network 100, for example, a home network configuration. In addition to this, various electronic devices and home appliances can be connected as the client device. The process executed by the server 101 in response to a request from the client is, for example, data processing by providing contents stored in a storage means such as a hard disk owned by the server 101 or by executing an application program that can be executed by the server. Services etc. Although the server 101 and the client device are shown separately in FIG. 1, the device that provides the service for the request from the client is shown as the server, and each client device is its own. When the data processing service is provided to other clients, the function as a server can be provided. Therefore, the network-connected client device shown in FIG. 1 can also be a server. The network 100 is a wired or wireless network, and each connected device transmits / receives communication packets such as Ethernet (registered trademark) frames via the network 100. That is, the client executes the data processing request to the server 101 by transmitting the frame in which the processing request information is stored in the data unit of the Ethernet frame to the server 101. The server 101 executes data processing in response to the reception of the processing request frame, stores the result data as the data processing result in the data unit of the communication packet as necessary, and transmits the result data to each client.

DISH EXHIBIT 2002, Page 780
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

332 The network connection device is composed of, for example, a universal plug and play (UPnP: Universal Plug and Play) compatible device. Therefore, it is easy to add or delete connected devices to the network. Devices newly connected to the network are (1) an addressing process that acquires their own device ID such as an IP address. (2) A discovery process that searches for each device on the network, receives a response from each device, and acquires information such as the device type and function included in the response. (3) Service request processing that requests a service from each device based on the information acquired in the discovery processing. By performing the above processing procedure, it is possible to receive the service to which the device connected to the network is applied. As an example of the information processing device constituting the server and the client device shown in FIG. 1, a hardware configuration example of a PC will be described with reference to FIG. The CPU (Central Processing Unit) 201 executes various processes according to a program stored in the ROM (Read Only Memory) 202, the HDD 204, or the like, and functions as a data processing means or a communication control processing means. .. The program and data executed by the CPU 201 are appropriately stored in the RAM 203. The CPU 201, ROM 202, RAM 203, and HDD 204 are connected to each other via the bus 205. An input / output interface 206 is connected to the bus 205, and the input / output interface 206 is connected to, for example, an input unit 207 composed of a keyboard, a switch, a button, a mouse, or the like operated by a user. An output unit 208 composed of an LCD, a CRT, a speaker, or the like that presents various information to the user is connected. Further, a communication unit 209 that functions as a data transmission / reception means, and a removable recording medium 211 such as a magnetic disk, an optical disk, a magneto-optical disk, or a semiconductor memory can be mounted, and data reading or writing processing from these removable recording media 211 can be attached. Drive 210 is connected to execute. The configuration shown in FIG. 2 is an example of a server and a personal computer (PC) as an example of the network-connected device shown in FIG. 1, but the network-connected device is not limited to the PC and is portable as shown in FIG. It can be configured by a mobile communication terminal such as a telephone or a PDA, other various electronic devices such as a playback device and a display, and an information processing device.

362 Therefore, it is possible to have a hardware configuration unique to each device, and the processing according to the hardware is executed. [Metadata] Next, the metadata held by the server that stores the content to be provided to the client will be described. The server has attribute information as metadata corresponding to each content such as still images, image data such as moving images, and audio data such as music stored in its own storage unit. The components of the metadata are called property information. Contents such as still images, image data such as moving images, and audio data such as music owned by the server are collectively referred to as AV contents. In the server, the AV content is managed by a content directory having a hierarchical structure. The content directory has a hierarchical structure composed of individual AV contents or folders storing a plurality of AV contents. Each element of the content directory, that is, each of the individual AV contents or the folder containing the plurality of AV contents, is called an object. The object is a general term for a

DISH EXHIBIT 2002, Page 781
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

data unit processed by a server, and there are various objects other than individual AV contents or folders storing a plurality of AV contents. Further, a set of objects is called a container, and the unit of the set is, for example, a set based on the physical storage position of each object, a set based on the logical relationship of each object, a set based on a category, or the like. It can be set in various ways. The smallest unit of AV content, that is, one piece of music data, one piece of video data, one piece of still image data, or the like is called an item. Objects are classified into classes according to their type, such as music (Audio), video (Video), photograph (Photo), and the like, and class labeling is performed. The client can, for example, specify a specific class to request and execute a "search" targeting only objects belonging to a specific classification. It is also possible to specify an object such as a specific folder, request "browsing" to request only information about the folder, and perform an acquisition process of information about the specific folder. In the server, the classes are also managed in a hierarchical structure, and subclasses can be set under one class.

388 The metadata is various management information including attribute information corresponding to the content of the server, class definition information, information on the hierarchical structure constituting the content directory, and the like. The metadata as the attribute information of the content defined in association with each object includes various information such as the content identifier (ID), data size, resource information, title, artist name, copyright information, and the like. .. The individual information contained in the metadata is called a property. It should be noted that it is predetermined in advance what kind of property metadata is possessed for each of the above-mentioned classes such as music (Audio), video (Video), and photo (Photo). [Content Reproduction Process by Client] For example, a client who intends to reproduce a content can make a content request to a server, receive the requested content from the server, and reproduce the content. A general content reproduction procedure will be described with reference to FIG. First, in step S11, the client requests the acquisition of the content information held by the server. In step S12, the server generates content information such as a title and an artist name as XML (eXteded Markup Language) data based on the content-corresponding metadata according to the client's request and transmits the content information to the client. In step S13, the client displays the content information on the display according to the received XML information. For example, in the case of music content, it is displayed as a list consisting of song names, artist names, playback times, etc. corresponding to a plurality of music held by the server. Next, in step S14, the client selects a song to be received and played from the server in the client device, and transmits the content designation information (for example, the content ID) to the server. The server acquires the content from the storage means based on the received content specification information and transmits the content. In step S16, the client reproduces the content received from the server. If the content is compressed by ATRAC, MPEG, etc., the content is decrypted on the client side and then played back. The normal content reproduction procedure is as described above. The client acquires various content attribute information, that is, property information included in the metadata corresponding to the content held by the server, displays a UI such as a content list on the client based on

DISH EXHIBIT 2002, Page 782
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

the property information, selects the content, and the server. Can be requested.

417 The process in step S11 shown in FIG. 3, that is, when the client acquires the content information held by the server, the client requests the content information containing "Christmas" as a word in the title, for example. It is possible to select and acquire specific content information by so-called search processing. Alternatively, the content of a plurality of contents stored in a specific folder, for example, a folder created by collecting only favorite songs by the user, or a folder containing a plurality of music contents such as a specific artist or genre, is specified and stored in the folder. It is possible to obtain information. As described above, in the server, the object as the management content is classified into various categories (types) such as music (Audio), video (Video), photo (Photo), artist, album, and the like.) Is used to classify and manage the classes, and the classes are managed in a hierarchical structure. FIG. 4 shows an example of the management class in the server. The example of FIG. 4 is an example of a class related to music contents. As shown in FIG. 4, various classes such as songs, albums, genres, and album cabinets in which a plurality of albums are integrated are set, and the server sets the content in each class, metadata as content attribute information, and property information. I am managing it. FIG. 5 shows an example of a hierarchical configuration of classes managed by the server. The hierarchical structure can be shown as a branched tree-like diagram as shown in FIG. Each of the circles shown in FIG. 5 corresponds to an individual class. This hierarchical structure shows a logical management structure corresponding to the contents stored and managed by the server in the storage unit. Metadata as attribute information is set corresponding to each class. In FIG. 5, the top level is called the root container 301. For example, music (music) class 302, moving image class 303, still image class 304, and the like are set under the root container. A class such as genre 305 is set at the lower level of the music class 302, and an artist 306 or the like is set at the lower level of the genre. [0073] A client who intends to execute a content search can specify a class and request and execute a search targeting only objects belonging to a specific classification.

443 In addition, it is possible to specify a specific object, for example, a folder in which a plurality of contents are stored, and acquire information on the contents stored in the folder. The client displays the content information on the display based on the XML data that describes the content information received from the server. FIG. 6 shows an example of display processing of the content information list. In the example shown in FIG. 6, a content information list 357 having a data structure listing the content numbers, titles, artist names, and the like is displayed on the display 350. These content information is generated based on the property information as a component of the content-corresponding metadata managed by the server. The server acquires property information in the metadata of the content that matches the conditions based on the search or browse request received from the client, generates XML data based on the acquired property information, and sends it to the client. The client receives the XML data based on the property information corresponding to the content extracted by the server, generates the display data as shown in FIG. 6 based on the received XML data, and displays it on the display of the client. The user on the client side selects the content to be played from these lists and transmits the selected content

DISH EXHIBIT 2002, Page 783
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

information to the server, so that the content, that is, various contents such as music, movies, and photographs are transmitted from the server to the client. Playback and output are executed on the side. [Content playback sequence setting process] As described above, the client selects the content stored in the server by browsing or searching, and then specifies the playback request content to the server, that is, the actual content, that is, music or an image. It is possible to acquire data, etc., and play and output it on the client. For example, when the client selects only one music content as a playback target, a content transmission request including an identifier of the one music content is transmitted to the server, and the server acquires the designated content from the storage unit. Is sent to the client and played on the client, and the process ends. When a plurality of music contents are selected by the client as a playback target, a transmission request is transmitted from the client to the server for each content, and each music content is sequentially provided from the server to the client and played on the client side. Become.

471 The content folder stored in the server includes a content folder containing a plurality of music contents, for example, a folder generated by collecting only favorite songs by the user, or a plurality of music contents such as a specific artist and genre. The stored folders and the like can be set, and the user on the client side can obtain a list of contents stored in these specific folders from the server by the above-mentioned browse or search. By displaying the content list on the display and setting the client to sequentially send content requests to the server in the order according to the list, continuous playback of a plurality of contents is possible. However, as described in the section of the prior art, when playing back a plurality of contents in a folder, if the playing order of the songs is always in a fixed order, the enjoyment of the user who listens to the contents is reduced. do. Therefore, a process of changing the order of playing a plurality of contents, that is, shuffling the order of playing a plurality of contents to change the playing order is performed. Conventionally, the content playback sequence change process is executed by shuffling the content list sent from the server to the client on the user side, changing the order of the list, and sending the content request to the server according to the changed list. Was there. However, this process creates a burden on the user or client side. In the configuration of the present invention, for example, when a client requests a content list in which a specific folder is specified, content information including content playback list information set in a random sequence is generated on the server side and transmitted to the client. do. The client displays a content playlist (content playlist) on the client-side display based on the content information (XML data) received from the server. The content playback list in random order order set on the server side is displayed on the client side display. Therefore, on the client side, the content can be shuffled, that is, the content can be reproduced in a random sequence only by making the content reproduction requests in the order according to the content playlist received from the server. [0083] With reference to FIG. 7, a processing procedure in the case of executing the random sequence reproduction processing of the content will be described. First, in step S31, the client executes the content information acquisition process from the server.

499 The client identifies a folder in which a plurality of contents are stored by searching or

DISH EXHIBIT 2002, Page 784
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

browsing, and requests an acquisition process of the content information in which the folder is specified. In this content information request, the client requests that the setting of the content playlist in the folder is set in a random sequence and transmitted together with the specified information of the folder in which the plurality of contents are stored. FIG. 8 shows an example of request data for transmitting by setting the setting of the content playlist to be transmitted from the client to the server in a random sequence. The example shown in FIG. 8 shows an example of data transmitted by the client in response to a browse request specifying a specific folder. In the transmission data, the request identifier 401 indicating that the request is a browse request, the folder identification information 402, and the sort designation information 403 indicating that sorting in a random order is desired as the sorting process of the content playback list. In addition, list information 404 indicating the range of list data to be included in the content playback list is included. As the sorting method, it is possible to specify the order of artists, the order of song titles, etc. in addition to the random order. The range of the list data to be included in the content playback list specified in the list information 404 can be arbitrarily set. For example, in the case of a folder in which 100 songs of music content are stored, 10 songs are specified as the list data and the sort process is performed. When a random order is specified, the first 10 songs are selected from the 100 songs of the random sequence content set on the server side, a list is generated, and the list is sent to the client. Returning to the sequence of FIG. 7, and continuing the description, in step S31, as shown in FIG. 8, a sort designation indicating that the client desires sorting in a random order as the sorting process of the content playback list. When a content information acquisition request including information is transmitted and the server receives the request, in step S32, the server acquires the property information corresponding to the content stored in the folder specified by the client and sets it in the property information. Random order No. Set. [089] With reference to FIG. 9, the property information corresponding to the content held by the server and the random order No. Will be described. The server stores the attribute information (property information) corresponding to the content stored in the storage means in the storage unit corresponding to the content.

529 For example, when the server holds a content folder 420 storing a plurality of contents of the contents A421, the contents B422, ... The contents N423 in a storage unit such as a hard disk in the server, the server causes the contents A to N. The property information 425, 426, 427 corresponding to the content is stored in the storage unit in association with the content. The property information is information corresponding to the content, and is attribute information of the content including various information such as a creator, an artist, and a playback time of the content. In the configuration of the present invention, as shown in the figure as property information corresponding to the content, the random order No. Is set. 【００９２】ランダムオーダＮｏ． Is numbering data (number) as random order information set for each content. This is rewritable random order information corresponding to the list order setting information of the content playlist. When the server receives from the client a content information acquisition request including sort specification information indicating that the content playback list is to be sorted in a random order as shown in FIG. 8 described

DISH EXHIBIT 2002, Page 785
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

above, the server receives the content information acquisition request. Random order No. in the property information of the content included in the specified folder. Is replaced and reset.

【００９３】ランダムオーダＮｏ．　Is numbering data as a number set for each property information corresponding to the content included in the content folder set as a set of a plurality of contents, and n pieces for the number n of the contents included in the content folder. Random order numbers of are the information set without duplication. For example, in a content folder containing 100 music contents, numbers 1 to 100 are random order numbers in the property information of each content. Is set as. This is executed for each sort request in random order from the client, and random order Nos. 1 to 100 are executed for each process. Is reset as the property information of each content. [0995] The set random order No. Is the sequence of the content playlist and is set as the playback sequence. Returning to FIG. 7, the description of the content reproduction sequence setting will be continued. In step S32, the server uses the random order No. 1 in the property information corresponding to the content included in the folder specified by the client as described above.

557 Shuffle the random order No. And set the random order No. The XML information as the configuration information for generating the content playlist is generated based on the above, and the content information including the list information is transmitted to the client in step S33. The content information transmitted to the client includes content information such as the title and artist name of the content, as well as URL (Uniform Resource Location) information of the content as address information indicating the location of the content. These are generated by XML (eXted Markup Language) data and transmitted to the client. In step S34, the client displays the content playlist on the display based on the content information received from the server. The client receives XML data based on the property information corresponding to the content extracted by the server, generates a content playback list as shown in FIG. 10 based on the received XML data, and displays it on the client's display. As shown in FIG. 10, the content playlist is displayed as a list showing content information in the order of reproduction. In the example shown in the figure, an example is shown in which a content information list 481 having a data structure in which the playback sequence number, content name, title, artist name, and playback time are listed in the playback order as display information is displayed on the display 480. There is. [0100] These content information is generated based on the property information as a component of the content-corresponding metadata managed by the server. The playback sequence number is a random order No. set by the server. Will be set as a value corresponding to. [0101] The client can reproduce the content according to the content playlist as shown in FIG. For example, by clicking the playback button 482 shown in FIG. 10, playback is started, and by clicking the continuous playback setting button 483 to set it to the enabled state, the list is controlled in consideration of the playback time of each playback content. Content requests are sequentially sent to the server in order, and the client side can receive and play the contents in the order of the list from the server. [0102] A series of sequences such as a content transmission request, content reception, content decoding, and output processing executed in the content reproduction process are executed according to the content

DISH EXHIBIT 2002, Page 786
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

reproduction program on the client side.

585 The content playback program sends a HTTP (Hyper Text Transfer Protocol) GET method, which is a content request for which a content identifier is set as content information received from the server together with the list, for example, a content acquisition request for which a content URL is set, to the server according to the list. The contents are sequentially transmitted, the contents are sequentially received from the server according to the order of the list, and the reproduction process is executed. The user can also specify only specific content from the list and play only the specified content. [0103] When the continuous playback process is enabled, the content playback program on the client side sequentially requests the content according to the list order in consideration of the playback time of the content, that is, HTTP (Hyper Text Transfer Protocol) in which the content URL is switched. Executes the process of generating the GET method and sending it to the server. The server transmits the content to the client based on the specified URL according to the content request (HTTP (HyperText Transfer Protocol) GET method) sent in the order of the list. In the sequence diagram shown in FIG. 7, the processes of step S35 on the client side and step S36 on the server side correspond to the above-mentioned series of processes. [0105] When the playback of the contents in the list is completed, the client can request the list corresponding to the remaining contents in the same folder and receive it from the server. In the server, the random order No. of each content is set while the content reproduction process is being executed on the client side, that is, within the time considering the content transmission to the client and the reproduction time on the client. The setting of is kept unchanged. [0106] In a new content playlist request from a client, for example, in the data shown in FIG. 8, the playlist No. = When there is a list request with a designation such as 11 to 20, the random order No. set in the property information (see FIG. 9) of each content. Based on No. Random order Nos. 11 to 20 Set the content playlist information based on the property information of the content with and send it to the client. [0107] The client can display the newly transmitted content playlist on the display and play the content according to the displayed content playlist.

612 [0108] As described above, in the configuration of the present invention, a list in which the playback order of the contents is randomly set is generated on the server side based on the request from the client, and the list is transmitted to the client. It is possible to enjoy the content reproduction according to a random reproduction sequence only by performing the reproduction processing according to the list received from, and the need for the shuffle processing on the user and the client side is eliminated. The processing sequences in each of the client and the server will be described with reference to the flowcharts of FIGS. 11 and 12. First, the processing procedure of the client will be described with reference to FIG. In step S101, the client requests a playlist from the server. This is done in response to a browse request that specifies a folder for the server, and as described earlier with reference to FIG. 8, it is possible to request that the request data for the server be sorted by a random order. .. In response to the client request, the server sets the random order No. 1 in the property information corresponding to the content included in the designated folder as described above. Shuffle the random order No. Was reset, and the set random order No. Generates a

DISH EXHIBIT 2002, Page 787
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

content playlist based on and sends it to the client. In step S102, the client receives the content information including the playlist, and displays the received content playlist on the display. [0112] In step S103, the user on the client side starts playing the content. At this time, when continuous playback is specified as described above, the playback processing program on the client side sequentially transmits the content request in which the content URL is set to the server in the order of the content playlist. [0113] In step S104, the content is received from the server, and the received content is reproduced in step S105. If the received content is compressed by ATRAC, MPEG, etc., it is reproduced after the decryption processing is performed on the client side. [0114] In step S106, it is determined whether or not the reproduction of all the listed contents is completed, and if there is unreproduced content, the processing of step S103 or less, that is, the content request, reception, and reproduction are repeatedly executed.

638 Before the end of the playback time of the currently played content, the next content request in the content playlist is output to the server. When the playback of the contents in the list is completed, the process ends. After the playback of the content at the end of the list is completed, it is possible to return to the top of the list and perform repeated playback. These processes are executed based on the settings of the content reproduction processing program on the client side. Next, a processing procedure on the server side will be described based on the flowchart of FIG. When the server receives the content information request from the client in step S201, the server determines in step S202 whether or not the request is made to set the content playlist as a random sequence. [0116] If it is a request to set the content playlist setting to a random sequence and transmit it (see FIG. 8), the process proceeds to step S203, and if there is no such specification, the process proceeds to step S211. In step S211, the sequence No. preset in the content stored in the designated folder is set. The default playlist information according to the above is generated, and the process proceeds to step S205 to transmit the content information including the generated list information to the client. If it is a request to set the content playback list setting to a random sequence and transmit it (see FIG. 8), the process proceeds to step S203, and the server corresponds to the content stored in the folder specified by the client. Random order No. set in the property information after acquiring each property information. Set. That is, the random order No. in the property information of the contents included in the specified folder. Shuffle and reset. [0118] In step S204, the reset random order No. Random order No. based on Sequential content playlist information is generated, and in step S205, XML information as content playlist configuration information is generated and transmitted to the client. [0119] In step S206, when the server receives a content request including, for example, content designation information (for example, content URL) from the client, the server extracts the content according to the designated information and transmits the content in step S207. In content transmission, data conversion may be performed according to client-side specifications or requests.

665 [0120] The processes of steps S206 and S207 are repeatedly executed when the client is executing continuous playback according to the content playlist. [0121] Further, the server is set to the reset random order No. Random order No. based on After generating sequential

DISH EXHIBIT 2002, Page 788
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

content playback list information and sending it to the client, the random order information is maintained and stored during content playback according to the content playback list on the client, and the content playback list from the client is stored during the storage retention period. When the request is re-requested, the process of generating the content playback list information based on the stored random order information and transmitting it to the client is executed. By this process, the client can play the contents in the specific folder without duplication according to a random sequence. [0122] In the above-described embodiment, the shuffling process for each content has been described, but the shuffling process for a folder storing a playlist of the content or a folder as a set of a plurality of contents is also possible. .. [0123] An example of shuffling processing for each folder will be described with reference to FIG. The server stores attribute information (property information) corresponding to a folder in which a playlist of contents is stored and a folder / folder as a set of a plurality of contents in a storage unit. In the example shown in FIG. 13, a plurality of folders A to N491 to 493 in which playlists of contents are stored, and property information 495,496,497 corresponding to each folder are shown. [0125] The property information is attribute information corresponding to a folder, and includes various information such as a folder creator, an artist, and a playback time. In the configuration of the present invention, as shown in the figure as property information corresponding to the folder, the random order No. Is set. 【０１２６】ランダムオーダＮｏ． Is numbering data (number) as random order information set in each folder. This is rewritable random order information that resets the content playlist included in each folder for each folder. When the server receives a content information acquisition request including sort specification information indicating that it wants to sort a plurality of folders from the client, the random order No. 1 in the property information of the specified plurality of folders.

692 Is replaced and reset. Specifically, the random order information of 1 to n corresponding to the number n of folders to be shuffled is shuffled, and the random order information set for each property information is replaced. For the request data from the client, in the configuration data shown in FIG. 8, a container identifier, that is, a container identifier information as a higher-level object of a plurality of content playback list folder objects is set instead of the folder identification information 402. It is a configuration in which a plurality of identifier information of a plurality of content playback list folder objects is set. 【０１２８】ランダムオーダＮｏ． Is numbering data as a number set for each property information corresponding to a plurality of folders included in the container, for example, which is set as a set of a plurality of folders, and is n for the number of folders n included in the container. Random order numbers of are the information set without duplication. [0129] For example, in a container containing 10 playlist folders, numbers 1 to 10 are random order Nos. In the property information of each playlist folder. Is set as. This is executed for each sort request in random order from the client, and random order Nos. 1 to 10 are executed for each process. Is reset as the property information of each folder. [0130] Random order No. reset for each folder. Based on, for example, when the playlist A folder 491 contains the content playlists of the contents a to f and the playlist N folder 493 contains the content playlists of the contents p to z, as shown in FIG. 13 by shuffling. In addition, the random

DISH EXHIBIT 2002, Page 789
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

order No. of the playlist N folder 493. = 1, Random order No. of playlist A folder 491. When = 2, the playlist in which the contents p to z of the playlist N folder 493 are set ahead of the contents a to f of the playlist A folder 491 is set, and the content reproduction is executed. [0131] As described above, in the configuration of the present invention, not only the content but also various objects stored in the storage unit by the server, such as the content or the data folder, are set as object attribute information (metadata). Random order information is stored in the property information and shuffle is executed in response to the request from the client, so the list order can be reset for each content or folder.

718 [Functional Configuration of Server and Client] The hardware configuration of the server and client device is as described above with reference to FIG. 2, and the various processes described above are stored in the storage unit of each server and client. It is executed under the control of a control unit (CPU, etc.) according to the stored program. [0133] For example, on the server side, the process executed by the CPU is a process of acquiring metadata corresponding to the content and generating XML data based on the property information in accordance with a request from the client, a random order No. of the property information. Shuffle processing, and processing for transmitting content according to the requested data mode from the client. The processing on the client side is the processing of displaying the content playback list on the display based on the XML data consisting of the property information received from the server, the processing of sequentially transmitting the content request with the content URL set according to the content playback list, and the processing of sending the content request to the server. Processing for receiving content, data conversion of received content, playback processing, and the like. [0134] Basically, these processes are executed under the control of the CPU as a control unit of the server and the client device, but the functional configuration of the server and the functions of the client required to execute the above-described processes. The configuration will be described with reference to FIGS. 14 and 15. FIG. 14 is a block diagram showing a main functional configuration of the server. The packet transmission / reception unit 501 receives a packet for the client and a packet from the client. The packet generation and analysis unit 502 performs transmission packet generation processing and reception packet analysis processing. Packet address setting, address recognition, data storage for the data part, data acquisition processing from the data part, etc. The content storage unit 503 stores the content owned by the server. The metadata storage unit 504 is a storage unit that stores metadata as attribute information corresponding to the content. The metadata includes the random order No. described with reference to FIG. Contains other property information. The property information acquisition unit 505 meta-meta data corresponding to the designated folder based on the property information acquisition request received from the client, for example, the browse request having the data structure described with reference to FIG. The process of extracting from the data storage unit 504 is executed.

748 【０１３８】ランダムオーダＮｏ． When the request of the content property list from the client specifies a random order, the setting unit 506 sets the random order No. of the property information of the corresponding content. Shuffle process. [0139] The content information generation unit 507 has the metadata acquired by the property information

DISH EXHIBIT 2002, Page 790
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

acquisition unit 505, the random order No. Based on the information set by the setting unit 506, XML data as content information including the configuration information of the content playlist is generated. The content information generation unit 507 shuffles the random order information of 1 to n corresponding to the number of contents n, and executes the random order information replacement process set for each property information. The data conversion unit 508 executes decoding processing such as coding processing of transmitted content data. For example, data conversion based on ATRAC3 and MPEG4 is executed. Next, the functional configuration of the client device will be described with reference to FIG. The packet transmission / reception unit 601 executes packet transmission to the server and packet reception processing from the server. The packet generation and analysis unit 602 performs transmission packet generation processing and reception packet analysis processing. It includes not only analysis of stored data in packets, but also packet address setting, address recognition, data storage for the data section, data acquisition processing from the data section, and the like. [0141] The content information request processing unit 603 generates request data (see FIG. 8) of the content playlist to be transmitted to the server. That is, a process of generating content information request data storing random order setting information as setting order sort information of the content playback list is executed together with the specification information of the content folder storing a plurality of contents. [0142] The storage unit 604 stores the content included in the packet received from the server, the content information including the content playlist, and the like. [0143] The output unit 605 includes a speaker and a display applied to the content reproduction process. The display is also used for outputting the content information list described above with reference to FIG. 7. The input unit 606 is used, for example, as a start / end of content reproduction, input of other reproduction control setting information, and other data input means. The content information analysis unit 607 analyzes the XML data composed of the property information received from the server, generates the content playback list described above with reference to FIG. 10 based on the analysis data, and serves as an output unit. Executes the process of outputting to the display of.

780 The content reproduction control unit 608 receives from the server and executes the content reproduction process according to the content playlist displayed on the display. The content request sequence is determined according to the content playlist, and the content URL according to the playlist is sequentially sent to the packet generation analysis unit 602. The packet generation analysis unit 602 generates a packet in which the content URL is set, and transmits the content request to the server via the packet transmission / reception unit 601. [0146] The data conversion unit 609 executes various data conversion processes such as decoding of the content data received from the server. For example, data conversion based on ATRAC3 and MPEG4 is executed. The decrypted data may be re-encoded and the re-encoded data may be stored in the storage unit 603. [0147] The server and the client functionally have the functions shown in FIGS. 14 and 15, and execute each of the above-described processes. However, the block diagrams shown in FIGS. 14 and 15 are block diagrams for explaining the functions, and in reality, various processing programs are executed under the control of the CPU in the hardware configuration of the PC or the like

DISH EXHIBIT 2002, Page 791
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

shown in FIG. NS. [0148] The present invention has been described in detail with reference to the specific examples. However, it is self-evident that a person skilled in the art can modify or substitute the embodiment without departing from the gist of the present invention. That is, the present invention has been disclosed in the form of an example, and should not be construed in a limited manner. In order to judge the gist of the present invention, the column of claims described at the beginning should be taken into consideration. [0149] The series of processes described in the specification can be executed by hardware, software, or a composite configuration of both. When executing processing by software, install the program that records the processing sequence in the memory in the computer built in the dedicated hardware and execute it, or execute the program on a general-purpose computer that can execute various processing. It can be installed and run. [0150] For example, the program can be recorded in advance on a hard disk or ROM (Read Only Memory) as a recording medium. Alternatively, the program may be temporarily or permanently placed on a removable recording medium such as a flexible disc, a CD-ROM (Compact Disc Read Only Memory), an MO (Magnet optical) disc, a DVD (Digital Versailles Disc), a magnetic disc, or a semiconductor memory. It can be stored (recorded).

810 Such a removable recording medium can be provided as so-called package software. [0151] In addition to installing the program on the computer from the removable recording medium as described above, the program can be wirelessly transferred from the download site to the computer, or wired to the computer via a network such as LAN (Local Area Network) or the Internet. The computer can receive the program transferred in this way and install it on a recording medium such as a built-in hard disk. [0152] The various processes described in the specification are not only executed in chronological order according to the description, but also executed in parallel or individually as required by the processing capacity of the device that executes the processes. May be good. Further, in the present specification, the system is a logical set configuration of a plurality of devices, and the devices having each configuration are not limited to those in the same housing. [Effect of the Invention] As described above, according to the configuration of the present invention, a list in which the playback order of the contents is randomly set on the server side is generated based on the request from the client and transmitted to the client. Therefore, the client can enjoy the content playback according to a random playback sequence only by performing the playback process according to the list received from the server, and eliminates the need for the user and the client to perform the shuffle process. .. Further, according to the configuration of the present invention, rewritable random order information corresponding to the list order setting information of the content playback list is stored in the property information corresponding to the content held in the server, and browsed from the client. Acquiring content information such as requests Content that acquires property information corresponding to the content in the specified folder, executes shuffle replacement processing of random order information, and sets the list order corresponding to the replaced random order information. Since the playback list is generated and sent to the client, the client can set the content playback sequence depending on the processing on the server side without increasing the processing load on the server side. Further, according to the configuration of the present invention, the

DISH EXHIBIT 2002, Page 792
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

server is set to the reset random order No. Random order No. based on After generating sequential content playback list information and sending it to the client, the random order information is maintained and stored during content playback according to the content playback list on the client, and the content playback list from the client is stored during the storage retention period. When the request is re-requested, the content playback list information based on the stored random order information is generated and sent to the client, so the client executes the process of sending the content in the specific folder to the random sequence. It becomes possible to reproduce without duplication according to.

844 BRIEF DESCRIPTION OF THE DRAWINGS FIG. 1 is a diagram showing an example of an applicable network configuration of the present invention. FIG. 2 is a diagram illustrating a configuration example of a network connection device. FIG. 3 is a diagram illustrating a processing sequence between a server and a client in content data reproduction processing. FIG. 4 is a diagram showing an example of a management class of retained content in a server. FIG. 5 is a diagram illustrating a hierarchical structure of setting classes in a server. FIG. 6 is a diagram showing an example of a content information list displayed on a display based on XML data composed of property information transmitted from a server to a client. FIG. 7 is a diagram showing a data communication sequence between a server and a client when content reproduction is executed by randomly setting the content reproduction order. FIG. 8 is a diagram showing a request data structure of a content playlist requested from a client to a server when executing content reproduction by randomly setting a content reproduction order. FIG. 9 is a diagram for explaining content-corresponding property information held by the server. FIG. 10 is a diagram showing a display example of a content playlist. FIG. 11 is a flowchart illustrating a client-side process when executing content reproduction by randomly setting the content reproduction order. FIG. 12 is a flowchart illustrating a server-side process when executing content reproduction by randomly setting the content reproduction order. FIG. 13 is a diagram illustrating property information corresponding to a folder held by the server. FIG. 14 is a block diagram illustrating a processing function of a server. FIG. 15 is a block diagram illustrating a processing function of a client. [Description of Code] 100 Network 101 Server 121 PC122 Monitor 123 Mobile Phone 124 Player 125 PDA201 CPU202 ROM203 RAM204 HDD205 Bus 206 Input / Output Interface 207 Input Unit 208 Output Unit 209 Communication Unit 210 Drive 211 Removable Recording Medium 301 Root Containers 302 to 306 Class 350 Display 357 Content information list 401 Request identifier 402 Folder identifier 403 Sort information 404 List information 420 Content folder 421-423 Content 425-427 Property information 480 Display 481 Content playback list 482 Play button 483 Continuous play setting button 491-493 Folder 495 ~ 497 Property information 501 Packet transmission / reception unit 502 Packet generation and analysis unit 503 Content storage unit 504 Metadata storage unit 505 Property information acquisition unit 506 Random order No.

874 Setting unit 507 Content information generation unit 508 Data conversion unit 601 Packet transmission / reception unit 602 Packet generation and analysis unit 603 Content information request processing unit 604 Storage unit 605 Output unit 606 Input unit 607 Content information analysis unit 608 Content playback control processing unit 609 Data

DISH EXHIBIT 2002, Page 793
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

conversion Department

DISH EXHIBIT 2002, Page 794
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Patent Translate
Powered by EPO and Google

Notice

This translation is machine-generated. It cannot be guaranteed that it is intelligible, accurate, complete, reliable or fit for specific purposes. Critical decisions, such as commercially relevant or financial decisions, should not be based on machine-translation output.

CLAIMS JP2004295569A

1.

13 An information processing device that executes content information transmission processing, an object containing at least one of contents or a data folder, a storage unit that stores property information as attribute information of the object, and a client as a content information request device. It has a data transmission / reception unit that executes data transmission / reception processing and a content information generation unit that generates content information to be transmitted to the client based on the property information, and the property information is used as list order setting information of the content playback list. It has the corresponding rewritable random order information, and the content information generation unit executes an update process as a replacement reset process of the random order information in response to a content playback list request from the client, and converts the update information into the update information. An information processing device having a configuration for executing a process of generating content playback list information having the following list order information and transmitting it to a client.

2.

29 The random order information is numbering data as a number set for each property information corresponding to each content included in the content folder set as a set of a plurality of contents, and the number of contents n included in the content folder. N random order numbers are set without duplication with respect to the information, and the content information generation unit executes shuffle of 1 to n random order information corresponding to the number of contents n to execute each property information. The information processing apparatus according to claim 1, wherein the random order information exchange processing set for is executed.

DISH EXHIBIT 2002, Page 795
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

3.

40 The random order information is numbering data as a number set for the property information corresponding to the content playback list folder storing the content playback list, and the content information generation unit sets the number of folders to be shuffled to n. Billing characterized in that the corresponding 1 to n random order information is shuffled, the random order information set for each property information is replaced, and the list order setting process is executed for each folder. Item 1. The information processing apparatus according to item 1.

4.

50 The information processing device determines whether or not there is a content playlist generation request by a random order in the content playlist generation request data from the client, and on condition that there is a content playlist generation request by a random order. The information processing apparatus according to claim 1, wherein the information processing apparatus is configured to execute the random order information update process.

5.

58 The information processing device is characterized in that, after executing the update process of the random order information, the information processing device maintains and stores the random order information during content reproduction according to the content reproduction list on the client. The information processing apparatus according to 1.

6.

65 After executing the update process of the random order information, the information processing apparatus maintains and stores the random order information during content reproduction according to the content reproduction list in the client, and also receives the random order information from the client during the storage retention period. The first aspect of claim 1, wherein the process of generating the content playback list information based on the stored random order information and transmitting the content playback list information to the client is executed in response to the re-request of the content playback list request. Information processing equipment.

7.

76 The information processing apparatus according to claim 1, wherein the content information generation unit is configured to execute a process of generating the content playlist information as XML (eXtended Markup Language) data.

DISH EXHIBIT 2002, Page 796
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

8.

82 An information processing device that acquires content information, and executes data transmission / reception processing with the server that holds the content information, and requests processing for the content playback list set in random order for the server. A content information request processing unit, a content information analysis unit that generates a content playback list composed of a plurality of content information based on the content information received from the server via the data transmission / reception unit, and the content information analysis unit. A display unit that displays the generated content playback list, and a content playback control unit that sends a content acquisition request to the server according to the list order of the content playback list and executes a playback control process of the content received from the server. An information processing device characterized by having.

9.

96 The content information request processing unit is configured to execute a process of generating content information request data storing random order setting information as setting order sort information of the content playback list together with the specification information of the content folder storing a plurality of contents. The information processing apparatus according to claim 8, wherein the information processing device is provided.

10.

104 The content information request processing unit is configured to execute a process of generating content information request data in which random order setting information is stored as setting order sort information of the content playback list together with the specified information of a plurality of content playback list folders. 8. The information processing apparatus according to claim 8.

11.

112 The content reproduction control unit is characterized in that it executes a process of sequentially transmitting a content request set with a content corresponding URL included in the content information received from the server to the server according to the list order of the content reproduction list. The information processing apparatus according to claim 8.

12.

119 The content information received from the server is XML (eXteded Markup Language) data that describes property information corresponding to the content, and the content information analysis unit analyzes the XML data to perform a content reproduction list

DISH EXHIBIT 2002, Page 797
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

composed of a plurality of content information. The information processing apparatus according to claim 8, wherein the information processing apparatus is configured to execute a process of generating the information.

13.

128 It is an information processing method that executes the content information transmission process, and the content information acquisition request reception step that receives the content information acquisition request from the client and the list order setting information of the content playback list stored in the property information corresponding to the content. The random order information update step that executes the update process of the random order information as, the list generation step that generates the content playback list information having the list order information according to the updated random order information, and the generation list are sent to the client. An information processing method characterized by having a step to perform.

14.

140 The random order information is numbering data as a number set for each property information corresponding to each content included in the content folder set as a set of a plurality of contents, and the number of contents included in the content folder n. N random order numbers are set without duplication with respect to the information, and the random order information update step executes shuffling of 1 to n random order information corresponding to the number of contents n to execute each property. The information processing method according to claim 13, wherein the random order information replacement process set for the information is executed.

15.

151 The random order information is numbering data as a number set for the property information corresponding to the content playback list folder storing the content playback list, and the random order information update step is the number of folders to be shuffled. It is characterized in that the random order information of 1 to n corresponding to is shuffled, the random order information set for each property information is replaced, and the list order setting process is executed for each folder. The information processing method according to claim 13.

16.

161 The information processing method further includes a step of determining whether or not there is a content playlist generation request by a random order in the content playlist generation request data from the client, and there is a content playlist generation request by

DISH EXHIBIT 2002, Page 798
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

a random order. The information processing method according to claim 13, wherein the random order information update process is executed on condition of the determination of the above.

17.

170 The information processing method is further characterized by having a step of maintaining and storing the random order information during content reproduction according to the content reproduction list in the client after executing the update process of the random order information. The information processing method according to claim 13.

18.

177 The information processing method further maintains and stores the random order information during content reproduction according to the content reproduction list in the client after executing the update process of the random order information, and also during the storage retention period. The thirteenth aspect of claim 13, wherein the process of generating the content playback list information based on the stored random order information and transmitting the content playback list information to the client is executed in response to the re-request of the content playback list request from the client. Information processing method.

19.

188 The information processing method according to claim 13, wherein the content information generation step executes a process of generating the content playlist information as XML (eXtended Markup Language) data.

20.

194 It is an information processing method that performs content acquisition processing, and is based on a content information request processing step that executes request processing of a content playback list set in a random order for a server that holds content information, and content information received from the server. A content information analysis step for generating a content playback list composed of a plurality of content information, a display step for displaying the content playback list generated in the content information analysis step, and a content acquisition request according to the list order of the content playback list. An information processing method comprising: a content reproduction control step of transmitting to a server and executing a reproduction control process of the content received from the server.

DISH EXHIBIT 2002, Page 799
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

21.

207 The content information request processing step executes a process of generating content information request data storing random order setting information as setting order sort information of the content playback list together with the specification information of the content folder storing a plurality of contents. The information processing method according to claim 20, wherein the information processing method is characterized.

22.

215 The content information request processing step is characterized in that it executes a process of generating content information request data in which random order setting information is stored as setting order sort information of the content playback list together with designation information of a plurality of content playback list folders. The information processing method according to claim 20.

23.

223 The content reproduction control step is characterized in that a process of sequentially transmitting a content request set with a content corresponding URL included in the content information received from the server to the server is executed according to the list order of the content reproduction list. Item 20. The information processing method according to Item 20.

24.

231 The content information received from the server is XML (eXteded Markup Language) data that describes property information corresponding to the content, and the content information analysis step is a content reproduction list composed of a plurality of content information by analyzing the XML data. The information processing apparatus according to claim 20, wherein the processing for generating the information processing is executed.

25.

239 A computer program that executes content information transmission processing, and the content information acquisition request reception step that receives the content information acquisition request from the client, and the list order setting information of the content playback list stored in the property information corresponding to the content. The random order information update step that executes the update process of the random order information as, the list generation step that generates the content playback list information having the list order information according to the updated random order information, and the generation list are sent to the client. A computer program characterized by having, and having steps to do.

DISH EXHIBIT 2002, Page 800
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

26.

251 It is a computer program that performs content acquisition processing, and is based on the content information request processing step that executes the request processing of the content playback list set in random order for the server that holds the content information, and the content information received from the server. A content information analysis step for generating a content playback list composed of a plurality of content information, a display step for displaying the content playback list generated in the content information analysis step, and a content acquisition request according to the list order of the content playback list. A computer program comprising: a content reproduction control step of transmitting to a server and executing a reproduction control process of the content received from the server.

DISH EXHIBIT 2002, Page 801
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2004-295569
(P2004-295569A)
(43)公開日　平成16年10月21日(2004.10.21)

(51)Int.Cl.[7]	F I		テーマコード（参考）
G06F 13/00	G06F 13/00	540A	5C064
G10K 15/02	G10K 15/02		
H04N 7/173	H04N 7/173	610Z	

審査請求 未請求　請求項の数 26　OL　（全 32 頁）

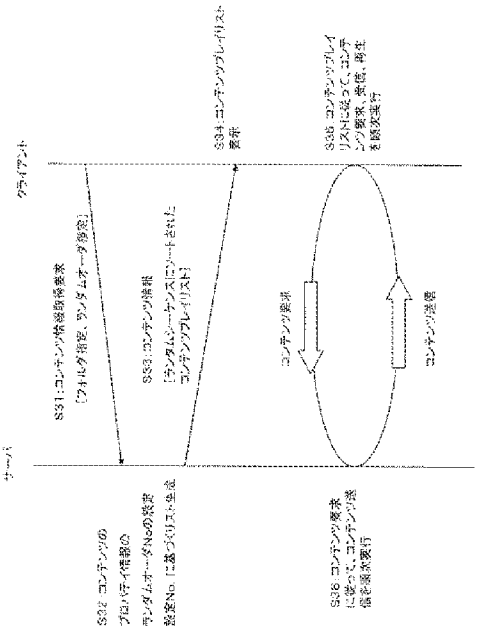
(21)出願番号　特願2003-88010(P2003-88010)
(22)出願日　平成15年3月27日(2003.3.27)

(71)出願人　000002185
ソニー株式会社
東京都品川区北品川６丁目７番３５号
(74)代理人　100093241
弁理士　宮田　正昭
(74)代理人　100101801
弁理士　山田　英治
(74)代理人　100086531
弁理士　澤田　俊夫
(72)発明者　吉川　典史
東京都品川区北品川６丁目７番３５号　ソニー株式会社内
(72)発明者　本田　康晃
東京都品川区北品川６丁目７番３５号　ソニー株式会社内

最終頁に続く

(54)【発明の名称】情報処理装置、および情報処理方法、並びにコンピュータ・プログラム

(57)【要約】
【課題】ランダムオーダによるコンテンツ再生処理をクライアントの負担を減少させて効率的に実行する装置および方法を提供する。
【解決手段】クライアントからの要求に基づいてサーバ側でコンテンツの再生順をランダムに設定したリストを生成し、クライアントに送信する。サーバで保持するコンテンツに対応するプロパティ情報にコンテンツ再生リストのリスト順設定情報に対応するランダムオーダ情報を格納し、クライアントからのブラウズ要求等に応じて、指定フォルダ内のコンテンツのランダムオーダ情報のシャッフル入れ替え処理を実行して入れ替えたランダムオーダ情報に対応するリスト順を設定したコンテンツ再生リストを生成してクライアントに送信する。本構成により、ユーザおよびクライアント側でシャッフル処理を行う必要が排除される。
【選択図】　図7



DISH EXHIBIT 2002, Page 802
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

【特許請求の範囲】
【請求項1】
コンテンツ情報送信処理を実行する情報処理装置であり、
コンテンツまたはデータフォルダの少なくともいずれかを含むオブジェクトと、前記オブジェクトの属性情報としてのプロパティ情報を記憶した記憶部と、
コンテンツ情報要求装置としてのクライアントとのデータ送受信処理を実行するデータ送受信部と、
前記プロパティ情報に基づいて、クライアントに送信するコンテンツ情報を生成するコンテンツ情報生成部とを有し、
前記プロパティ情報は、コンテンツ再生リストのリスト順設定情報に対応する書き換え可能なランダムオーダ情報を有し、
前記コンテンツ情報生成部は、
クライアントからのコンテンツ再生リスト要求に応じて、前記ランダムオーダ情報の入れ替え再設定処理としての更新処理を実行し、更新情報に従ったリスト順情報を持つコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する構成を有することを特徴とする情報処理装置。
【請求項2】
前記ランダムオーダ情報は、複数のコンテンツの集合として設定されるコンテンツフォルダに含まれる各コンテンツに対応する各プロパティ情報に対して設定された番号としてのナンバリングデータであり、コンテンツフォルダに含まれるコンテンツ数ｎに対してｎ個のランダムオーダ番号が重複することなく設定された情報であり、
前記コンテンツ情報生成部は、
コンテンツ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行することを特徴とする請求項１に記載の情報処理装置。
【請求項3】
前記ランダムオーダ情報は、コンテンツ再生リストを格納したコンテンツ再生リストフォルダに対応するプロパティ情報に対して設定された番号としてのナンバリングデータであり、
前記コンテンツ情報生成部は、
シャッフル対象となるフォルダ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行しフォルダ単位でのリスト順設定処理を実行することを特徴とする請求項１に記載の情報処理装置。
【請求項4】
前記情報処理装置は、
クライアントからのコンテンツ再生リストの要求データにランダムオーダによるコンテンツ再生リスト生成要求があるか否かを判定し、ランダムオーダによるコンテンツ再生リスト生成要求があるとの判定を条件として、前記ランダムオーダ情報の更新処理を実行する構成であることを特徴とする請求項１に記載の情報処理装置。
【請求項5】
前記情報処理装置は、
前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持する構成であることを特徴とする請求項１に記載の情報処理装置。
【請求項6】
前記情報処理装置は、
前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持するとともに、該記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求に応じて、該

DISH EXHIBIT 2002, Page 803
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する構成であることを特徴とする請求項１に記載の情報処理装置。
【請求項7】
前記コンテンツ情報生成部は、
前記コンテンツ再生リスト情報をＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データとして生成する処理を実行する構成であることを特徴とする請求項１に記載の情報処理装置。
【請求項8】
コンテンツ情報の取得処理を行う情報処理装置であり、
コンテンツ情報を保有するサーバとのデータ送受信処理を実行するデータ送受信部と、
前記サーバに対してランダムオーダに設定したコンテンツ再生リストの要求処理を実行するコンテンツ情報要求処理部と、
前記データ送受信部を介して前記サーバから受信するコンテンツ情報に基づいて、複数のコンテンツ情報からなるコンテンツ再生リストを生成するコンテンツ情報解析部と、
前記コンテンツ情報解析部の生成したコンテンツ再生リストを表示する表示部と、
コンテンツ再生リストのリスト順に従ってコンテンツ取得要求を前記サーバに送信するとともに、該サーバから受信したコンテンツの再生制御処理を実行するコンテンツ再生制御部と、
を有することを特徴とする情報処理装置。
【請求項9】
前記コンテンツ情報要求処理部は、
複数のコンテンツを格納したコンテンツフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行する構成であることを特徴とする請求項８に記載の情報処理装置。
【請求項10】
前記コンテンツ情報要求処理部は、
複数のコンテンツ再生リストフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行する構成であることを特徴とする請求項８に記載の情報処理装置。
【請求項11】
前記コンテンツ再生制御部は、
コンテンツ再生リストのリスト順に従って、サーバから受信したコンテンツ情報に含まれるコンテンツ対応ＵＲＬを設定したコンテンツ要求を前記サーバに、順次送信する処理を実行する構成であることを特徴とする請求項８に記載の情報処理装置。
【請求項12】
前記サーバから受信するコンテンツ情報は、コンテンツ対応のプロパティ情報を記述したＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データであり、
前記コンテンツ情報解析部は、
前記ＸＭＬデータの解析により、複数のコンテンツ情報からなるコンテンツ再生リストを生成する処理を実行する構成であることを特徴とする請求項８に記載の情報処理装置。
【請求項13】
コンテンツ情報送信処理を実行する情報処理方法であり、
クライアントからのコンテンツ情報取得要求を受信するコンテンツ情報取得要求受信ステップと、
コンテンツに対応するプロパティ情報中に格納されたコンテンツ再生リストのリスト順設定情報としてのランダムオーダ情報の更新処理を実行するランダムオーダ情報更新ステップと、
更新されたランダムオーダ情報に従ったリスト順情報を持つコンテンツ再生リスト情報を

DISH EXHIBIT 2002, Page 804
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

生成するリスト生成ステップと、
生成リストをクライアントに送信するステップと、
を有することを特徴とする情報処理方法。
【請求項14】
前記ランダムオーダ情報は、複数のコンテンツの集合として設定されるコンテンツフォルダに含まれる各コンテンツに対応する各プロパティ情報に対して設定された番号としてのナンバリングデータであってコンテンツフォルダに含まれるコンテンツ数ｎに対してｎ個のランダムオーダ番号が重複することなく設定された情報であり、
前記ランダムオーダ情報更新ステップは、
コンテンツ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行することを特徴とする請求項１３に記載の情報処理方法。
【請求項15】
前記ランダムオーダ情報は、コンテンツ再生リストを格納したコンテンツ再生リストフォルダに対応するプロパティ情報に対して設定された番号としてのナンバリングデータであり、
前記ランダムオーダ情報更新ステップは、
シャッフル対象となるフォルダ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行しフォルダ単位でのリスト順設定処理を実行することを特徴とする請求項１３に記載の情報処理方法。
【請求項16】
前記情報処理方法は、さらに、
クライアントからのコンテンツ再生リストの要求データにランダムオーダによるコンテンツ再生リスト生成要求があるか否かを判定するステップを有し、
ランダムオーダによるコンテンツ再生リスト生成要求があるとの判定を条件として、前記ランダムオーダ情報の更新処理を実行することを特徴とする請求項１３に記載の情報処理方法。
【請求項17】
前記情報処理方法は、さらに、
前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持するステップを有することを特徴とする請求項１３に記載の情報処理方法。
【請求項18】
前記情報処理方法は、さらに、
前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持するとともに、該記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求に応じて、該記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行することを特徴とする請求項１３に記載の情報処理方法。
【請求項19】
前記コンテンツ情報生成ステップは、
前記コンテンツ再生リスト情報をＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データとして生成する処理を実行することを特徴とする請求項１３に記載の情報処理方法。
【請求項20】
コンテンツ取得処理を行う情報処理方法であり、
コンテンツ情報を保有するサーバに対してランダムオーダに設定したコンテンツ再生リストの要求処理を実行するコンテンツ情報要求処理ステップと、
前記サーバから受信するコンテンツ情報に基づいて、複数のコンテンツ情報からなるコン

テンツ再生リストを生成するコンテンツ情報解析ステップと、
前記コンテンツ情報解析ステップにおいて生成したコンテンツ再生リストを表示する表示ステップと、
コンテンツ再生リストのリスト順に従ってコンテンツ取得要求を前記サーバに送信するとともに、該サーバから受信したコンテンツの再生制御処理を実行するコンテンツ再生制御ステップと、
を有することを特徴とする情報処理方法。
【請求項21】
前記コンテンツ情報要求処理ステップは、
複数のコンテンツを格納したコンテンツフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行することを特徴とする請求項２０に記載の情報処理方法。
【請求項22】
前記コンテンツ情報要求処理ステップは、
複数のコンテンツ再生リストフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行することを特徴とする請求項２０に記載の情報処理方法。
【請求項23】
前記コンテンツ再生制御ステップは、
コンテンツ再生リストのリスト順に従って、サーバから受信したコンテンツ情報に含まれるコンテンツ対応ＵＲＬを設定したコンテンツ要求を前記サーバに、順次送信する処理を実行することを特徴とする請求項２０に記載の情報処理方法。
【請求項24】
前記サーバから受信するコンテンツ情報は、コンテンツ対応のプロパティ情報を記述したＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データであり、
前記コンテンツ情報解析ステップは、
前記ＸＭＬデータの解析により、複数のコンテンツ情報からなるコンテンツ再生リストを生成する処理を実行することを特徴とする請求項２０に記載の情報処理装置。
【請求項25】
コンテンツ情報送信処理を実行するコンピュータ・プログラムであり、
クライアントからのコンテンツ情報取得要求を受信するコンテンツ情報取得要求受信ステップと、
コンテンツに対応するプロパティ情報中に格納されたコンテンツ再生リストのリスト順設定情報としてのランダムオーダ情報の更新処理を実行するランダムオーダ情報更新ステップと、
更新されたランダムオーダ情報に従ったリスト順情報を持つコンテンツ再生リスト情報を生成するリスト生成ステップと、
生成リストをクライアントに送信するステップと、
を有することを特徴とするコンピュータ・プログラム。
【請求項26】
コンテンツ取得処理を行うコンピュータ・プログラムであり、
コンテンツ情報を保有するサーバに対してランダムオーダに設定したコンテンツ再生リストの要求処理を実行するコンテンツ情報要求処理ステップと、
前記サーバから受信するコンテンツ情報に基づいて、複数のコンテンツ情報からなるコンテンツ再生リストを生成するコンテンツ情報解析ステップと、
前記コンテンツ情報解析ステップにおいて生成したコンテンツ再生リストを表示する表示ステップと、
コンテンツ再生リストのリスト順に従ってコンテンツ取得要求を前記サーバに送信するとともに、該サーバから受信したコンテンツの再生制御処理を実行するコンテンツ再生制御ステップと、

を有することを特徴とするコンピュータ・プログラム。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】

本発明は、情報処理装置、および情報処理方法、並びにコンピュータ・プログラムに関する。さらに、詳細には、コンテンツ提供サーバの有するコンテンツの再生をクライアント側で実行する場合に、クライアント側に負担を発生させることなく、コンテンツの再生シーケンスを適宜、変更して再生することを可能とした情報処理装置、および情報処理方法、並びにコンピュータ・プログラムに関する。

【０００２】

【従来の技術】

昨今のデータ通信ネットワークの普及に伴い、家庭内においても家電機器やコンピュータ、その他の周辺機器をネットワーク接続し、各機器間での通信を可能とした、いわゆるホームネットワークが浸透しつつある。ホームネットワークは、ネットワーク接続機器間で通信を行なうことにより各機器のデータ処理機能を共有したり、機器間でコンテンツの送受信を行なう等、ユーザに利便性・快適性を提供するものであり、今後、ますます普及することが予測される。

【０００３】

このようなホームネットワークの構成に適するプロトコルとしてユニバーサルプラグアンドプレイ（ＵＰｎＰ：Ｕｎｉｖｅｒｓａｌ　Ｐｌｕｇ　ａｎｄ　Ｐｌａｙ）が知られている。ユニバーサルプラグアンドプレイ（ＵＰｎＰ）は、複雑な操作を伴うことなく容易にネットワークを構築することが可能であり、困難な操作や設定を伴うことなくネットワーク接続された機器において各接続機器の提供サービスを受領可能とするものである。また、ＵＰｎＰはデバイス上のＯＳ（オペレーティングシステム）にも依存せず、容易に機器の追加ができるという利点を持つ。

【０００４】

ＵＰｎＰは、接続機器間で、ＸＭＬ（ｅＸｔｅｎｓｉｂｌｅ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）に準拠した定義ファイルを交換し、機器間において相互認識を行なう。ＵＰｎＰの処理の概要は、以下の通りである。

（１）ＩＰアドレス等の自己のデバイスＩＤを取得するアドレッシング処理。

（２）ネットワーク上の各デバイスの検索を行ない、各デバイスから応答を受信し、応答に含まれるデバイス種別、機能等の情報を取得するディスカバリ処理。

（３）ディスカバリ処理で取得した情報に基づいて、各デバイスにサービスを要求するサービス要求処理。

【０００５】

上記処理手順を行なうことで、ネットワーク接続された機器を適用したサービスの提供および受領が可能となる。ネットワークに新たに接続される機器は、上記のアドレッシング処理によりデバイスＩＤを取得し、ディスカバリ処理によりネットワーク接続された他のデバイスの情報を取得して、取得情報に基づいて他の機器にサービスの要求が可能となる。

【０００６】

例えばサーバに格納された音楽データ、画像データ等のコンテンツをクライアント側デバイスにおいて再生しようとする場合には、クライアントは、サーバの保有するコンテンツについての情報を取得する。サーバは、コンテンツを記憶部に格納するとともに、格納コンテンツに対する属性情報を併せて格納している。属性情報には、例えばコンテンツとしての例えば曲や映画のタイトル、アーティスト名、記録日時、さらにデータの圧縮態様等に関する情報など様々である。これらの属性情報はメタデータあるいはメタ情報と呼ばれる。

【０００７】

例えばサーバに格納された音楽データ、画像データ等のコンテンツをクライアント側デバ

イスにおいて再生しようとする場合には、クライアント側からサーバに対してサーバに格納されたコンテンツ情報、例えば曲や映画のタイトルやアーティスト名、さらにデータの圧縮態様情報（ＡＴＲＡＣ：ａｄａｐｔｉｖｅ　ｔｒａｎｓｆｏｒｍ　ａｃｏｕｓｔｉｃ　ｃｏｄｉｎｇ，　ＭＰＥＧ：ｍｏｖｉｎｇ　ｐｉｃｔｕｒｅ　ｅｘｐｅｒｔｓ　ｇｒｏｕｐ等）、さらに必要に応じて著作権情報などの様々なコンテンツの属性情報の取得要求を送信する。

【０００８】

サーバは、クライアントからの要求に応じてサーバの保有するコンテンツに関するメタデータ（属性情報）をクライアントに送信する。クライアントは、サーバから取得したメタデータに基づいて所定の表示プログラムに従ってクライアントデバイスのディスプレイにコンテンツ情報を表示する。例えばアーティスト名、タイトル等からなる曲目リストなどがディスプレイに表示される。ユーザは、表示情報に基づいて、再生対象コンテンツを確認あるいは選択して、コンテンツの送信要求をサーバに送信する。サーバはクライアントからのコンテンツリクエストを受信し、受信リクエストに応じてサーバからクライアントに対するコンテンツの送信が行われ、クライアント側において受信コンテンツの再生が行われる。

【０００９】

このようにサーバに格納されたコンテンツは、ネットワーク接続された他の機器（クライアント）から検索を行い、特定のコンテンツを指定して再生することが可能となる。

【００１０】

例えば、１つの音楽コンテンツのみを再生対象としてクライアントが選択した場合は、その１つの音楽コンテンツの識別子を含むコンテンツ送信要求がサーバに送信されて、サーバが指定コンテンツを記憶部から取得してクライアントに送信しクライアントにおいて再生され、処理が終了する。複数の音楽コンテンツが再生対象としてクライアントにより選択されると、コンテンツ毎に送信要求がクライアントからサーバに送信され、各音楽コンテンツがサーバからクライアントに順次、提供されて、クライアント側において再生されることになる。

【００１１】

サーバに格納されるコンテンツフォルダには、複数の音楽コンテンツを格納したコンテンツフォルダ、例えばユーザがお気に入りの曲のみを集めて生成したフォルダ、あるいは特定のアーティスト、ジャンル等の複数の音楽コンテンツを格納したフォルダ等を設定可能であり、クライアント側のユーザはこれらの特定のフォルダを指定してフォルダに格納された複数のコンテンツ（曲）をシーケンシャルに再生する処理が可能である。

【００１２】

複数の曲からなる集合体を記録再生装置から、携帯装置等の端末に転送する際に、コンテンツおよびその管理データを併せて送信する構成については、例えば特許文献１に記載されている。

【００１３】

複数コンテンツの格納されたフォルダをクライアントが再生対象としてフォルダ内の複数コンテンツ再生を実行する場合、曲の再生順が常に一定の順番で行われると、コンテンツを聞く側のユーザの楽しみが減退する。そこで、複数のコンテンツ再生の順番の変更処理、すなわち複数のコンテンツ再生順をシャッフルして再生順を変更することが行われる。

【００１４】

従来、このようなコンテンツ再生シーケンスの変更処理は、サーバからクライアントに送信されてきた複数コンテンツに関する曲目等のデータリストに基づいて、ユーザが再生順の決定処理を行うか、あるいは、クライアント側の機器に格納した再生シーケンス決定プログラムによって再生順を決定するなどの処理が行われていた。すなわち、クライアント側が主導的にコンテンツ再生順を決定し、決定したコンテンツ再生順に従ってクライアントがサーバにコンテンツ要求を送信する。サーバは、単にクライアントからの要求情報に基づいて、コンテンツを順次送信するという処理を行っているのが一般的であった。

DISH EXHIBIT 2002, Page 808
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

【００１５】
このような構成では、コンテンツの再生順の設定あるいはシャッフル等、複数コンテンツの再生順を変更する処理をクライアント側で実行することが必要となり、ユーザまたはクライアント側の負担が発生するという問題があった。
【００１６】
【特許文献１】
特許公開２００１－２１６７６６号公報
【００１７】
【発明が解決しようとする課題】
本発明は、上述の問題点に鑑みてなされたものであり、ユーザまたはクライアント側に負担を発生させることなく、コンテンツの再生シーケンスを適宜、変更して再生することを可能とした情報処理装置、および情報処理方法、並びにコンピュータ・プログラムを提供することを目的とする。
【００１８】
【課題を解決するための手段】
本発明の第１の側面は、
コンテンツ情報送信処理を実行する情報処理装置であり、
コンテンツまたはデークフォルダの少なくともいずれかを含むオブジェクトと、前記オブジェクトの属性情報としてのプロパティ情報を記憶した記憶部と、
コンテンツ情報要求装置としてのクライアントとのデータ送受信処理を実行するデータ送受信部と、
前記プロパティ情報に基づいて、クライアントに送信するコンテンツ情報を生成するコンテンツ情報生成部とを有し、
前記プロパティ情報は、コンテンツ再生リストのリスト順設定情報に対応する書き換え可能なランダムオーダ情報を有し、
前記コンテンツ情報生成部は、
クライアントからのコンテンツ再生リスト要求に応じて、前記ランダムオーダ情報の入れ替え再設定処理としての更新処理を実行し、更新情報に従ったリスト順情報を持つコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する構成を有することを特徴とする情報処理装置にある。
【００１９】
さらに、本発明の情報処理装置の一実施態様において、前記ランダムオーダ情報は、複数のコンテンツの集合として設定されるコンテンツフォルダに含まれる各コンテンツに対応する各プロパティ情報に対して設定された番号としてのナンバリングデータであり、コンテンツフォルダに含まれるコンテンツ数ｎに対してｎ個のランダムオーダ番号が重複することなく設定された情報であり、前記コンテンツ情報生成部は、コンテンツ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行することを特徴とする。
【００２０】
さらに、本発明の情報処理装置の一実施態様において、前記ランダムオーダ情報は、コンテンツ再生リストを格納したコンテンツ再生リストフォルダに対応するプロパティ情報に対して設定された番号としてのナンバリングデータであり、前記コンテンツ情報生成部は、シャッフル対象となるフォルダ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行しフォルダ単位でのリスト順設定処理を実行することを特徴とする。
【００２１】
さらに、本発明の情報処理装置の一実施態様において、前記情報処理装置は、クライアントからのコンテンツ再生リストの要求データにランダムオーダによるコンテンツ再生リスト生成要求があるか否かを判定し、ランダムオーダによるコンテンツ再生リスト生成要求があるとの判定を条件として、前記ランダムオーダ情報の更新処理を実行する構成である

DISH EXHIBIT 2002, Page 809
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

ことを特徴とする。
【００２２】
さらに、本発明の情報処理装置の一実施態様において、前記情報処理装置は、前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持する構成であることを特徴とする。
【００２３】
さらに、本発明の情報処理装置の一実施態様において、前記情報処理装置は、前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持するとともに、該記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求に応じて、該記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する構成であることを特徴とする。
【００２４】
さらに、本発明の情報処理装置の一実施態様において、前記コンテンツ情報生成部は、前記コンテンツ再生リスト情報をＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データとして生成する処理を実行する構成であることを特徴とする。
【００２５】
さらに、本発明の第２の側面は、
コンテンツ情報の取得処理を行う情報処理装置であり、
コンテンツ情報を保有するサーバとのデータ送受信処理を実行するデータ送受信部と、
前記サーバに対してランダムオーダに設定したコンテンツ再生リストの要求処理を実行するコンテンツ情報要求処理部と、
前記データ送受信部を介して前記サーバから受信するコンテンツ情報に基づいて、複数のコンテンツ情報からなるコンテンツ再生リストを生成するコンテンツ情報解析部と、
前記コンテンツ情報解析部の生成したコンテンツ再生リストを表示する表示部と、
コンテンツ再生リストのリスト順に従ってコンテンツ取得要求を前記サーバに送信するとともに、該サーバから受信したコンテンツの再生制御処理を実行するコンテンツ再生制御部と、
を有することを特徴とする情報処理装置にある。
【００２６】
さらに、本発明の情報処理装置の一実施態様において、前記コンテンツ情報要求処理部は、複数のコンテンツを格納したコンテンツフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行する構成であることを特徴とする。
【００２７】
さらに、本発明の情報処理装置の一実施態様において、前記コンテンツ情報要求処理部は、複数のコンテンツ再生リストフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行する構成であることを特徴とする。
【００２８】
さらに、本発明の情報処理装置の一実施態様において、前記コンテンツ再生制御部は、コンテンツ再生リストのリスト順に従って、サーバから受信したコンテンツ情報に含まれるコンテンツ対応ＵＲＬを設定したコンテンツ要求を前記サーバに、順次送信する処理を実行する構成であることを特徴とする。
【００２９】
さらに、本発明の情報処理装置の一実施態様において、前記サーバから受信するコンテンツ情報は、コンテンツ対応のプロパティ情報を記述したＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データであり、前記コンテンツ情報解析部は、前記ＸＭＬデータの解析により、複数のコンテンツ情報からなるコンテンツ再生リストを生成する処

DISH EXHIBIT 2002, Page 810
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

理を実行する構成であることを特徴とする。

【００３０】

さらに、本発明の第３の側面は、

コンテンツ情報送信処理を実行する情報処理方法であり、

クライアントからのコンテンツ情報取得要求を受信するコンテンツ情報取得要求受信ステップと、

コンテンツに対応するプロパティ情報中に格納されたコンテンツ再生リストのリスト順設定情報としてのランダムオーダ情報の更新処理を実行するランダムオーダ情報更新ステップと、

更新されたランダムオーダ情報に従ったリスト順情報を持つコンテンツ再生リスト情報を生成するリスト生成ステップと、

生成リストをクライアントに送信するステップと、

を有することを特徴とする情報処理方法にある。

【００３１】

さらに、本発明の情報処理方法の一実施態様において、前記ランダムオーダ情報は、複数のコンテンツの集合として設定されるコンテンツフォルダに含まれる各コンテンツに対応する各プロパティ情報に対して設定された番号としてのナンバリングデータであってコンテンツフォルダに含まれるコンテンツ数ｎに対してｎ個のランダムオーダ番号が重複することなく設定された情報であり、前記ランダムオーダ情報更新ステップは、コンテンツ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行することを特徴とする。

【００３２】

さらに、本発明の情報処理方法の一実施態様において、前記ランダムオーダ情報は、コンテンツ再生リストを格納したコンテンツ再生リストフォルダに対応するプロパティ情報に対して設定された番号としてのナンバリングデータであり、前記ランダムオーダ情報更新ステップは、シャッフル対象となるフォルダ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行しフォルダ単位でのリスト順設定処理を実行することを特徴とする。

【００３３】

さらに、本発明の情報処理方法の一実施態様において、前記情報処理方法は、さらに、クライアントからのコンテンツ再生リストの要求データにランダムオーダによるコンテンツ再生リスト生成要求があるか否かを判定するステップを有し、ランダムオーダによるコンテンツ再生リスト生成要求があるとの判定を条件として、前記ランダムオーダ情報の更新処理を実行することを特徴とする。

【００３４】

さらに、本発明の情報処理方法の一実施態様において、前記情報処理方法は、さらに、前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持するステップを有することを特徴とする。

【００３５】

さらに、本発明の情報処理方法の一実施態様において、前記情報処理方法は、さらに、前記ランダムオーダ情報の更新処理を実行後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持するとともに、該記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求に応じて、該記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行することを特徴とする。

【００３６】

さらに、本発明の情報処理方法の一実施態様において、前記コンテンツ情報生成ステップは、前記コンテンツ再生リスト情報をＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データとして生成する処理を実行することを特徴とする。

【００３７】
さらに、本発明の第４の側面は、
コンテンツ取得処理を行う情報処理方法であり、
コンテンツ情報を保有するサーバに対してランダムオーダに設定したコンテンツ再生リストの要求処理を実行するコンテンツ情報要求処理ステップと、
前記サーバから受信するコンテンツ情報に基づいて、複数のコンテンツ情報からなるコンテンツ再生リストを生成するコンテンツ情報解析ステップと、
前記コンテンツ情報解析ステップにおいて生成したコンテンツ再生リストを表示する表示ステップと、
コンテンツ再生リストのリスト順に従ってコンテンツ取得要求を前記サーバに送信するとともに、該サーバから受信したコンテンツの再生制御処理を実行するコンテンツ再生制御ステップと、
を有することを特徴とする情報処理方法にある。
【００３８】
さらに、本発明の情報処理方法の一実施態様において、前記コンテンツ情報要求処理ステップは、複数のコンテンツを格納したコンテンツフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行することを特徴とする。
【００３９】
さらに、本発明の情報処理方法の一実施態様において、前記コンテンツ情報要求処理ステップは、複数のコンテンツ再生リストフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行することを特徴とする。
【００４０】
さらに、本発明の情報処理方法の一実施態様において、前記コンテンツ再生制御ステップは、コンテンツ再生リストのリスト順に従って、サーバから受信したコンテンツ情報に含まれるコンテンツ対応ＵＲＬを設定したコンテンツ要求を前記サーバに、順次送信する処理を実行することを特徴とする。
【００４１】
さらに、本発明の情報処理方法の一実施態様において、前記サーバから受信するコンテンツ情報は、コンテンツ対応のプロパティ情報を記述したＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データであり、前記コンテンツ情報解析ステップは、前記ＸＭＬデータの解析により、複数のコンテンツ情報からなるコンテンツ再生リストを生成する処理を実行することを特徴とする。
【００４２】
さらに、本発明の第５の側面は、
コンテンツ情報送信処理を実行するコンピュータ・プログラムであり、
クライアントからのコンテンツ情報取得要求を受信するコンテンツ情報取得要求受信ステップと、
コンテンツに対応するプロパティ情報中に格納されたコンテンツ再生リストのリスト順設定情報としてのランダムオーダ情報の更新処理を実行するランダムオーダ情報更新ステップと、
更新されたランダムオーダ情報に従ったリスト順情報を持つコンテンツ再生リスト情報を生成するリスト生成ステップと、
生成リストをクライアントに送信するステップと、
を有することを特徴とするコンピュータ・プログラムにある。
【００４３】
さらに、本発明の第６の側面は、
コンテンツ取得処理を行うコンピュータ・プログラムであり、
コンテンツ情報を保有するサーバに対してランダムオーダに設定したコンテンツ再生リス

トの要求処理を実行するコンテンツ情報要求処理ステップと、
前記サーバから受信するコンテンツ情報に基づいて、複数のコンテンツ情報からなるコンテンツ再生リストを生成するコンテンツ情報解析ステップと、
前記コンテンツ情報解析ステップにおいて生成したコンテンツ再生リストを表示する表示ステップと、
コンテンツ再生リストのリスト順に従ってコンテンツ取得要求を前記サーバに送信するとともに、該サーバから受信したコンテンツの再生制御処理を実行するコンテンツ再生制御ステップと、
を有することを特徴とするコンピュータ・プログラムにある。
【００４４】
【作用】
本発明の構成によれば、クライアントからの要求に基づいてサーバ側でコンテンツの再生順をランダムに設定したリストを生成し、クライアントに送信する構成としたので、クライアントは、サーバから受信するリストに従って再生処理を行うのみで、ランダムな再生シーケンスに従ってコンテンツ再生を楽しむことが可能となり、ユーザおよびクライアント側でシャッフル処理を行う必要が排除される。
【００４５】
さらに、本発明の構成によれば、サーバで保持するコンテンツに対応するプロパティ情報中にコンテンツ再生リストのリスト順設定情報に対応する書き換え可能なランダムオーダ情報を格納し、クライアントからのブラウズ要求等のコンテンツ情報取得要求に応じて、指定フォルダ内のコンテンツに対応するプロパティ情報を取得してランダムオーダ情報のシャッフル入れ替え処理を実行して入れ替えたランダムオーダ情報に対応するリスト順を設定したコンテンツ再生リストを生成してクライアントに送信する構成としたので、サーバ側の処理負担も大きくすることなく、クライアントは、サーバ側の処理に依存したコンテンツ再生シーケンス設定を行うことが可能となる。
【００４６】
さらに、本発明の構成によれば、サーバは、再設定されたランダムオーダＮｏ．に基づいてランダムオーダＮｏ．順のコンテンツ再生リスト情報を生成してクライアントに送信後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持し、記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求があった場合は、記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する構成としたので、クライアントは特定フォルダ内のコンテンツを、ランダムシーケンスに従って重複なく再生することが可能となる。
【００４７】
なお、本発明のコンピュータ・プログラムは、例えば、様々なプログラム・コードを実行可能な汎用コンピュータ・システムに対して、コンピュータ可読な形式で提供する記憶媒体、通信媒体、例えば、ＣＤやＦＤ、ＭＯなどの記憶媒体、あるいは、ネットワークなどの通信媒体によって提供可能なコンピュータ・プログラムである。このようなプログラムをコンピュータ可読な形式で提供することにより、コンピュータ・システム上でプログラムに応じた処理が実現される。
【００４８】
本発明のさらに他の目的、特徴や利点は、後述する本発明の実施例や添付する図面に基づく、より詳細な説明によって明らかになるであろう。なお、本明細書においてシステムとは、複数の装置の論理的集合構成であり、各構成の装置が同一筐体内にあるものには限らない。
【００４９】
【発明の実施の形態】
以下、図面を参照しながら、本発明の情報処理装置、および情報処理方法、並びにコンピュータ・プログラムの詳細について説明する。

【００５０】
［システム概要］
まず、図１を参照して、本発明の適用可能なネットワーク構成例について説明する。図１は、様々なクライアント装置からの処理要求に応じて処理を実行するサーバ１０１と、サーバ１０１に対して処理要求を行なうクライアント装置としてのＰＣ１２１，モニター１２２，携帯電話１２３、再生機１２４、ＰＤＡ１２５がネットワーク１００を介して接続された構成、例えばホームネットワーク構成を示している。クライアント装置としては、この他にも様々な電子機器、家電機器が接続可能である。
【００５１】
サーバ１０１がクライアントからの要求に応じて実行する処理は、例えばサーバ１０１の保有するハードディスク等の記憶手段に格納されたコンテンツの提供、あるいはサーバの実行可能なアプリケーションプログラムの実行によるデータ処理サービス等である。なお、図１においては、サーバ１０１と、クライアント装置とを区別して示しているが、クライアントからの要求に対するサービスを提供する機器をサーバとして示しているものであり、いずれのクライアント装置も、自己のデータ処理サービスを他のクライアントに提供する場合には、サーバとしての機能を提供可能となる。従って、図１に示すネットワーク接続されたクライアント装置もサーバとなり得る。
【００５２】
ネットワーク１００は、有線、無線等いずれかのネットワークであり、各接続機器は、例えばイーサネット（登録商標）フレーム等の通信パケットをネットワーク１００を介して送受信する。すなわち、クライアントは、イーサネットフレームのデータ部に処理要求情報を格納したフレームをサーバ１０１に送信することにより、サーバ１０１に対するデータ処理要求を実行する。サーバ１０１は、処理要求フレームの受信に応じて、データ処理を実行し、必要に応じてデータ処理結果としての結果データを通信パケットのデータ部に格納し、各クライアントに送信する。
【００５３】
ネットワーク接続機器は、例えばユニバーサルプラグアンドプレイ（ＵＰｎＰ：Ｕｎｉｖｅｒｓａｌ　Ｐｌｕｇ　ａｎｄ　Ｐｌａｙ）対応機器によって構成される。従って、ネットワークに対する接続機器の追加、削除が容易な構成である。ネットワークに新たに接続する機器は、
（１）ＩＰアドレス等の自己のデバイスＩＤを取得するアドレッシング処理。
（２）ネットワーク上の各デバイスの検索を行ない、各デバイスから応答を受信し、応答に含まれるデバイス種別、機能等の情報を取得するディスカバリ処理。
（３）ディスカバリ処理で取得した情報に基づいて、各デバイスにサービスを要求するサービス要求処理。
上記処理手順を行なうことで、ネットワーク接続された機器を適用したサービスを受領することが可能となる。
【００５４】
図１に示すサーバおよびクライアント装置を構成する情報処理装置の一例としてＰＣのハードウェア構成例について図２を参照して説明する。
【００５５】
ＣＰＵ（Ｃｅｎｔｒａｌ　Ｐｒｏｃｅｓｓｉｎｇ　Ｕｎｉｔ）２０１は、ＲＯＭ（Ｒｅａｄ　Ｏｎｌｙ　Ｍｅｍｏｒｙ）２０２、またはＨＤＤ２０４等に記憶されているプログラムに従って、各種の処理を実行し、データ処理手段、あるいは通信制御処理手段として機能する。ＲＡＭ２０３には、ＣＰＵ２０１が実行するプログラムやデータが適宜記憶される。ＣＰＵ２０１、ＲＯＭ２０２、およびＲＡＭ２０３、ＨＤＤ２０４は、バス２０５を介して相互に接続されている。
【００５６】
バス２０５には、入出力インタフェース２０６が接続されており、この入出力インタフェース２０６には、例えば、ユーザにより操作されるキーボード、スイッチ、ボタン、ある

いはマウス等により構成される入力部２０７、ユーザに各種の情報を提示するＬＣＤ、ＣＲＴ、スピーカ等により構成される出力部２０８が接続される。さらに、データ送受信手段として機能する通信部２０９、さらに、磁気ディスク、光ディスク、光磁気ディスク、または半導体メモリなどのリムーバブル記録媒体２１１を装着可能で、これらのリムーバブル記録媒体２１１からのデータ読み出しあるいは書き込み処理を実行するドライブ２１０が接続される。

【００５７】

図２に示す構成は、図１に示すネットワーク接続機器の一例としてのサーバ、パーソナルコンピュータ（ＰＣ）の例であるが、ネットワーク接続機器はＰＣに限らず、図１に示すように携帯電話、ＰＤＡ等の携帯通信端末、その他、再生装置、ディスプレイ等の様々な電子機器、情報処理装置によって構成することが可能である。従って、それぞれの機器固有のハードウェア構成を持つことが可能であり、そのハードウェアに従った処理を実行する。

【００５８】

［メタデータ］

次にクライアントに提供するコンテンツを格納したサーバが保有するメタデータについて説明する。サーバは、自己の記憶部に格納した静止画、動画等の画像データ、音楽等の音声データ等のコンテンツ各々に対応する属性情報をメタデータとして保有している。なお、メタデータの構成要素をプロパティ情報と呼ぶ。

【００５９】

なお、サーバの保有する静止画、動画等の画像データ、音楽等の音声データ等のコンテンツを総称してＡＶコンテンツと呼ぶ。サーバにおいて、ＡＶコンテンツは、階層構成を有するコンテンツディレクトリによって管理される。

【００６０】

コンテンツディレクトリは、個々のＡＶコンテンツあるいは複数のＡＶコンテンツを格納したフォルダによって構成される階層構成を持つ。コンテンツディレクトリの個々の要素、すなわち、個々のＡＶコンテンツあるいは複数のＡＶコンテンツを格納したフォルダの各々はオブジェクト（Ｏｂｊｅｃｔ）と呼ばれる。なお、オブジェクトとは、サーバによって処理されるデータ単位の総称であり、個々のＡＶコンテンツあるいは複数のＡＶコンテンツを格納したフォルダ以外にも様々なオブジェクトが存在する。

【００６１】

また、オブジェクトの集合をコンテナ（Ｃｏｎｔａｉｎｅｒ）と呼ぶ、集合の単位は、例えば各オブジェクトの物理的な記憶位置に基づく集合、各オブジェクトの論理的関係に基づく集合、カテゴリに基づく集合等、様々に設定され得る。なお、ＡＶコンテンツの最小単位、すなわち１つの楽曲データ、１つの動画データ、１つの静止画データ等をアイテム（ｉｔｅｍ）とよぶ。

【００６２】

オブジェクトは、その種類、例えば音楽（Ａｕｄｉｏ）、ビデオ（Ｖｉｄｅｏ）、写真（Ｐｈｏｔｏ）等、その種類によりクラスに分類されクラスラベリングがなされる。クライアントは、例えば特定のクラスを指定して、特定の分類に属するオブジェクトのみを対象とした「サーチ」を要求し実行することができる。また特定のフォルダ等のオブジェクトを指定して、そのフォルダに関する情報のみを要求する「ブラウズ」を要求し特定フォルダに関する情報の取得処理をすることが可能である。なお、サーバにおいては、クラスも階層構成で管理されており、１つのクラスの下にサブクラスの設定が可能である。

【００６３】

メタデータは、サーバの持つコンテンツに対応した属性情報、クラスの定義情報、コンテンツディレクトリを構成する階層構成に関する情報等を含むさまざまな管理情報である。個々のオブジェクトに対応付けて定義されたコンテンツの属性情報としてのメタデータには、コンテンツの識別子（ＩＤ）、データサイズ、リソース情報、タイトル、アーティスト名、著作権情報等、様々な情報が含まれる。メタデータに含まれる個々の情報をプロパ

ティと呼ぶ。なお、音楽（Ａｕｄｉｏ）、ビデオ（Ｖｉｄｅｏ）、写真（Ｐｈｏｔｏ）等、前述したクラス毎にどのようなプロパティからなるメタデータを持つかが予め規定されている。

【００６４】

［クライアントによるコンテンツ再生処理］

例えばコンテンツを再生しようとするクライアントは、サーバに対してコンテンツ要求を行い、要求コンテンツをサーバから受信してコンテンツの再生を行うことができる。一般的なコンテンツ再生の手順について図３を参照して説明する。まず、ステップＳ１１において、クライアントは、サーバの保有するコンテンツ情報の取得要求を行う。ステップＳ１２で、サーバは、クライアントの要求に従ってコンテンツ対応のメタデータに基づいて、タイトル、アーティスト名などのコンテンツ情報をＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データにより生成してクライアントに送信する。

【００６５】

クライアントは、ステップＳ１３において、受信ＸＭＬ情報に従って、コンテンツ情報をディスプレイに表示する。例えば音楽コンテンツであれば、サーバの保有する複数の音楽に対応する曲名、アーティスト名、再生時間等からなるリストとして表示される。

【００６６】

次に、クライアントはステップＳ１４において、クライアント装置において、サーバから受信し再生する曲を選択し、コンテンツ指定情報（例えばコンテンツＩＤ）をサーバに送信する。サーバは受信したコンテンツ指定情報に基づいてコンテンツを記憶手段から取得して、送信する。ステップＳ１６において、クライアントはサーバから受信したコンテンツを再生する。なお、コンテンツがＡＴＲＡＣ、ＭＰＥＧ等の圧縮処理がなされている場合は、クライアント側で復号処理を行った後に再生処理を行う。

【００６７】

通常のコンテンツ再生手順は、上述したとおりである。クライアントは、様々なコンテンツ属性情報、すなわち、サーバの保有するコンテンツ対応のメタデータに含まれるプロパティ情報を取得し、プロパティ情報に基づいてクライアントにコンテンツリスト等のＵＩを表示し、コンテンツを選択しサーバに要求することができる。

【００６８】

図３に示すステップＳ１１における処理、すなわち、クライアントがサーバの保有するコンテンツ情報を取得する際、クライアントは、例えばタイトルにワードとして「クリスマス」の入ったコンテンツ情報を要求するといったコンテンツ検索、いわゆるサーチ処理により、特定のコンテンツ情報を選択して取得することが可能である。あるいは、特定のフォルダ、例えばユーザがお気に入りの曲のみを集めて生成したフォルダ、あるいは特定のアーティスト、ジャンル等の複数の音楽コンテンツを格納したフォルダ等を指定してフォルダに格納された複数コンテンツのコンテンツ情報を取得することが可能である。

【００６９】

前述したように、サーバでは、管理コンテンツとしてのオブジェクトを、その種類、例えば音楽（Ａｕｄｉｏ）、ビデオ（Ｖｉｄｅｏ）、写真（Ｐｈｏｔｏ）等、さらに、アーティスト、アルバムなど、様々なカテゴリ（種類）によりクラスに分類して管理しており、階層構成でクラスの管理を行っている。

【００７０】

サーバにおける管理クラスの一例を図４に示す。図４の例は音楽コンテンツ関連のクラス例である。図４に示すように、曲、アルバム、ジャンル、複数のアルバムを集積したアルバムキャビネットなど、様々なクラスが設定され、サーバは、各クラスでのコンテンツおよびコンテンツ属性情報としてのメタデータ、プロパティ情報の管理を行っている。

【００７１】

サーバの管理するクラスの階層構成例を図５に示す。階層構成は図５に示すように分岐ツリー状の図として示すことができる。図５に示す各円の各々が個々のクラスに対応する。この階層構成は、サーバが記憶部に格納し管理するコンテンツに対応する論理的な管理構

成を示すものである。各クラスに対応して属性情報としてのメタデータが設定される。

【００７２】

図５において、最上位はルートコンテナ３０１と呼ばれる。ルートコンテナの下位に例えば音楽（ミュージック）クラス３０２、動画クラス３０３、静止画クラス３０４等が設定される。音楽（ミュージック）クラス３０２の下位には、ジャンル３０５、ジャンルの下位には、アーティスト３０６などのクラス設定がなされる。

【００７３】

コンテンツ検索を実行しようとするクライアントは、クラスを指定して、特定のクラス分類に属するオブジェクトのみを対象としたサーチを要求し実行することができる。また、特定のオブジェクトの指定、例えば複数コンテンツを格納したフォルダ等を指定してフォルダに格納されたコンテンツの情報を取得することが可能である。クライアントは、サーバから受信するコンテンツ情報を記述したＸＭＬデータに基づいてコンテンツ情報をディスプレイに表示する。

【００７４】

コンテンツ情報リストの表示処理例を図６に示す。図６に示す例では、コンテンツＮｏ、タイトル、アーティスト名・・をリスト化したデータ構成を持つコンテンツ情報リスト３５７をディスプレイ３５０に表示した例を示している。

【００７５】

これらのコンテンツ情報は、サーバの管理するコンテンツ対応のメタデータの構成要素としてのプロパティ情報に基づいて生成される。サーバはクライアントから受信したサーチまたはブラウズ要求に基づいて条件に一致するコンテンツのメタデータ中のプロパティ情報を取得し、取得したプロパティ情報に基づいてＸＭＬデータを生成し、クライアントに送信する。

【００７６】

クライアントは、サーバによって抽出されたコンテンツに対応するプロパティ情報に基づくＸＭＬデータを受信し、受信ＸＭＬデータに基づいて図６に示すような表示データを生成し、クライアントのディスプレイに表示する。

【００７７】

クライアント側のユーザはこれらのリストから再生対象コンテンツを選択し、選択コンテンツ情報をサーバに送信することで、サーバからコンテンツ、すなわち音楽や映画、あるいは写真等、様々なコンテンツが送信されクライアント側で再生、出力が実行される。

【００７８】

［コンテンツ再生シーケンス設定処理］

上述したように、クライアントは、サーバに格納されたコンテンツをブラウズまたはサーチにより選択した後、再生要求コンテンツをサーバに指定してコンテンツの実体、すなわち音楽や画像データ等を取得し、クライアントにおいて再生、出力することが可能となる。

【００７９】

例えば、１つの音楽コンテンツのみを再生対象としてクライアントが選択した場合は、その１つの音楽コンテンツの識別子を含むコンテンツ送信要求がサーバに送信されて、サーバが指定コンテンツを記憶部から取得してクライアントに送信しクライアントにおいて再生され、処理が終了する。複数の音楽コンテンツが再生対象としてクライアントにより選択されると、コンテンツ毎に送信要求がクライアントからサーバに送信され、各音楽コンテンツがサーバからクライアントに順次、提供されて、クライアント側において再生されることになる。

【００８０】

サーバに格納されるコンテンツフォルダには、複数の音楽コンテンツを格納したコンテンツフォルダ、例えばユーザがお気に入りの曲のみを集めて生成したフォルダ、あるいは特定のアーティスト、ジャンル等の複数の音楽コンテンツを格納したフォルダ等を設定可能であり、クライアント側のユーザはこれらの特定のフォルダに格納されたコンテンツのリ

ストを上述したブラウズまたはサーチによりサーバから取得することができる。クライアントは、ディスプレイにコンテンツリストを表示して、リストに従った順に順次コンテンツ要求をサーバに送信する設定とすることで、複数コンテンツの連続再生が可能となる。

【００８１】

しかし、従来技術の欄で説明したように、フォルダ内の複数コンテンツ再生を実行する場合、曲の再生順が常に一定の順番で行われると、コンテンツを聞く側のユーザの楽しみが減退する。そこで、複数のコンテンツ再生の順番の変更処理、すなわち複数のコンテンツ再生順をシャッフルして再生順を変更することが行われる。従来、コンテンツ再生シーケンスの変更処理は、サーバからクライアントに送信されてきたコンテンツリストをユーザ側でシャッフルして、リストの順番を変更し、変更したリストに従ってコンテンツ要求をサーバに送信することで実行していた。しかし、この処理はユーザまたはクライアント側における負担を発生させることになる。

【００８２】

本発明の構成においては、例えばクライアントから特定フォルダを指定したコンテンツリストの要求に際し、サーバ側において、ランダムなシーケンスに設定したコンテンツ再生リスト情報を含むコンテンツ情報を生成して、クライアントに送信する。クライアントは、サーバから受信するコンテンツ情報（ＸＭＬデータ）に基づいてコンテンツ再生リスト（コンテンツプレイリスト）をクライアント側ディスプレイに表示する。クライアント側ディスプレイには、サーバ側で設定したランダムオーダ順のコンテンツ再生リストが表示される。従って、クライアント側では、サーバから受信したコンテンツ再生リストに従った順番でコンテンツ再生要求を行うのみで、シャッフルされた、すなわちランダムシーケンスでのコンテンツ再生が可能となる。

【００８３】

図７を参照して、コンテンツのランダムシーケンス再生処理を実行する場合の処理手順について説明する。まず、ステップＳ３１において、クライアントは、サーバからのコンテンツ情報取得処理を実行する。

【００８４】

クライアントは、複数コンテンツを格納したフォルダをサーチまたはブラウズによって特定して、フォルダを指定したコンテンツ情報の取得処理を要求するものとする。このコンテンツ情報要求において、クライアントは、複数コンテンツを格納したフォルダの指定情報とともにフォルダ内のコンテンツ再生リストの設定をランダムシーケンスに設定して送信することを要求する。

【００８５】

図８に、クライアントからサーバに対して送信するコンテンツ再生リストの設定をランダムシーケンスに設定して送信することの要求データ例を示す。図８に示す例は、クライアントが特定のフォルダを指定したブラウズ要求に際して送信するデータ例を示している。

【００８６】

送信データには、要求がブラウズ要求であることを示す要求識別子４０１、フォルダ識別情報４０２、コンテンツ再生リストのソート処理としてランダムオーダでのソートを希望していることを示すソート指定情報４０３、さらにコンテンツ再生リストに含めるリストデータの範囲を示すリスト情報４０４が含まれる。

【００８７】

ソート方式としては、ランダムオーダの他にアーティスト順、曲名順などの指定も可能である。リスト情報４０４に指定するコンテンツ再生リストに含めるリストデータの範囲は任意に設定可能であり、例えば１００曲の音楽コンテンツが格納されたフォルダであれば、リストデータとして１０曲を指定し、ソート処理としてランダムオーダを指定した場合は、サーバ側で設定したランダムシーケンスのコンテンツ１００曲から先頭の１０曲が選択されてリストが生成されクライアントに送信されることになる。

【００８８】

図７のシーケンスに戻り、説明を続ける、ステップＳ３１において、クライアントから、

図８に示すように、コンテンツ再生リストのソート処理としてランダムオーダでのソートを希望していることを示すソート指定情報を含むコンテンツ情報取得要求が送信され、サーバがこれを受信すると、ステップＳ３２において、サーバは、クライアントから指定されたフォルダに格納されたコンテンツに対応するプロパティ情報をそれぞれ取得し、プロパティ情報に設定されたランダムオーダＮｏ．の設定を行う。

【００８９】

図９を参照してサーバの保有するコンテンツ対応のプロパティ情報、およびランダムオーダＮｏ．について説明する。サーバは、記憶手段に格納したコンテンツに対応する属性情報（プロパティ情報）をコンテンツに対応して記憶部に格納している。

【００９０】

例えばサーバが、コンテンツＡ４２１、コンテンツＢ４２２、・・コンテンツＮ４２３の複数コンテンツを格納したコンテンツフォルダ４２０をサーバ内のハードディスク等の記憶部に保持している場合、サーバは、各コンテンツＡ～Ｎに対応するプロパティ情報４２５，４２６，４２７をコンテンツに対応付けて記憶部に保持している。

【００９１】

プロパティ情報は、コンテンツに対応する情報であり、コンテンツのクリエータ、アーティスト、再生時間等の様々な情報を含んだコンテンツの属性情報である。本発明の構成では、コンテンツに対応するプロパティ情報として図に示すように、ランダムオーダＮｏ．が設定される。

【００９２】

ランダムオーダＮｏ．は、各コンテンツ各々に設定されるランダムオーダ情報としてのナンバリングデータ（番号）である。これは、コンテンツ再生リストのリスト順設定情報に対応する書き換え可能なランダムオーダ情報である。サーバは、クライアントから、先に説明した図８に示すような、コンテンツ再生リストのソート処理としてランダムオーダでのソートを希望していることを示すソート指定情報を含むコンテンツ情報取得要求を受信すると、指定フォルダに含まれるコンテンツのプロパティ情報中のランダムオーダＮｏ．の入れ替え、再設定処理を行う。

【００９３】

ランダムオーダＮｏ．は、複数のコンテンツの集合として設定されるコンテンツフォルダに含まれるコンテンツに対応する各プロパティ情報に対して設定された番号としてのナンバリングデータであり、コンテンツフォルダに含まれるコンテンツ数ｎに対してｎ個のランダムオーダ番号が重複することなく設定された情報である。

【００９４】

例えば１００曲の音楽コンテンツが含まれるコンテンツフォルダでは、１～１００の番号が、各コンテンツのプロパティ情報中のランダムオーダＮｏ．として設定される。これは、クライアントからのランダムオーダでのソート要求毎に実行され、処理毎に１～１００のランダムオーダＮｏ．が各コンテンツのプロパティ情報として再設定される。

【００９５】

設定されたランダムオーダＮｏ．がコンテンツ再生リストのシーケンスとなり、再生シーケンスとして設定される。

【００９６】

図７に戻り、コンテンツ再生シーケンス設定について説明を続ける。ステップＳ３２において、サーバは、上述したようにクライアントから指定されたフォルダに含まれるコンテンツに対応するプロパティ情報中のランダムオーダＮｏ．のシャッフルを実行してランダムオーダＮｏ．を設定し、設定したランダムオーダＮｏ．に基づいてコンテンツ再生リストを生成するための構成情報としてのＸＭＬ情報を生成し、ステップＳ３３においてリスト情報を含むコンテンツ情報をクライアントに送信する。

【００９７】

クライアントに送信されるコンテンツ情報には、コンテンツのタイトル、アーティスト名などのコンテンツ情報に加え、コンテンツの所在を示すアドレス情報としてのコンテンツ

DISH EXHIBIT 2002, Page 819
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

のＵＲＬ（Ｕｎｉｆｏｒｍ　Ｒｅｓｏｕｒｃｅ　Ｌｏｃａｔｏｒｓ）情報等が含まれる。これらをＸＭＬ（ｅＸｔｅｎｄｅｄ　Ｍａｒｋｕｐ　Ｌａｎｇｕａｇｅ）データにより生成してクライアントに送信する。

【００９８】

ステップＳ３４で、クライアントは、サーバから受信したコンテンツ情報に基づいて、コンテンツ再生リストをディスプレイに表示する。クライアントは、サーバによって抽出されたコンテンツに対応するプロパティ情報に基づくＸＭＬデータを受信し、受信ＸＭＬデータに基づいて図１０に示すようなコンテンツ再生リストを生成し、クライアントのディスプレイに表示する。

【００９９】

図１０に示すように、コンテンツ再生リストは、再生順にコンテンツ情報を示したリストとして表示される。図に示す例では、表示情報として、再生シーケンス番号、コンテンツ名、タイトル、アーティスト名・・再生時間を、再生順にリスト化したデータ構成を持つコンテンツ情報リスト４８１をディスプレイ４８０に表示した例を示している。

【０１００】

これらのコンテンツ情報は、サーバの管理するコンテンツ対応のメタデータの構成要素としてのプロパティ情報に基づいて生成される。再生シーケンス番号は、サーバが設定したランダムオーダＮｏ．に相当する値として設定されることになる。

【０１０１】

クライアントは、図１０に示すようなコンテンツ再生リストに従ったコンテンツ再生を行うことが可能となる。例えば図１０に示す再生ボタン４８２をクリックすることで、再生が開始され、連続再生設定ボタン４８３をクリックして有効状態に設定することで、各再生コンテンツの再生時間を考慮した制御の下にリスト順にコンテンツ要求がサーバに、順次送信され、クライアント側では、サーバからリスト順にコンテンツを受信し再生することが可能となる。

【０１０２】

なお、コンテンツの再生処理において実行するコンテンツ送信要求、コンテンツの受信、コンテンツの復号、出力処理等の一連のシーケンスは、クライアント側のコンテンツ再生プログラムに従って実行される。コンテンツ再生プログラムは、サーバからのコンテンツ情報としてリストとともに受信しているコンテンツ識別子を設定したコンテンツ要求、例えばコンテンツＵＲＬを設定したコンテンツ取得要求であるＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）ＧＥＴメソッドをサーバにリストに従って順次、送信し、リストの順番に従ってコンテンツを順次サーバから受信し、再生処理を実行する。なお、ユーザはリストから特定のコンテンツのみを指定して指定コンテンツのみを再生することも可能である。

【０１０３】

連続再生処理を有効にした場合は、クライアント側のコンテンツ再生プログラムが、コンテンツの再生時間を考慮してリスト順に従って、順次コンテンツ要求、すなわちコンテンツＵＲＬを切り替えたＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）ＧＥＴメソッドを生成してサーバに送信する処理を実行する。サーバは、リスト順に送られてくるコンテンツ要求（ＨＴＴＰ（Ｈｙｐｅｒ　Ｔｅｘｔ　Ｔｒａｎｓｆｅｒ　Ｐｒｏｔｏｃｏｌ）ＧＥＴメソッド）に従って指定ＵＲＬに基づいてコンテンツをクライアントに送信する。

【０１０４】

図7に示すシーケンス図において、クライアント側のステップＳ３５およびサーバ側のステップＳ３６の処理が、上述の一連の処理に対応する。

【０１０５】

クライアントは、リストにあるコンテンツの再生が終了した場合には、同一フォルダ内の残りのコンテンツに対応するリストを要求し、サーバから受信することができる。サーバでは、クライアント側でコンテンツ再生処理が実行されている間、すなわち、クライアン

DISH EXHIBIT 2002, Page 820
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

トに対するコンテンツ送信およびクライアントでの再生時間を考慮した時間内において、各コンテンツのランダムオーダＮｏ．の設定を変更せずに保持している。

【０１０６】

クライアントからの新たなコンテンツ再生リスト要求、例えば、図８に示すデータにおいて、プレイリストＮｏ．＝１１～２０等の指定のあるリスト要求があった場合に、各コンテンツのプロパティ情報（図９参照）に設定済みのランダムオーダＮｏ．に基づいて、Ｎｏ．１１～２０のランダムオーダＮｏ．を持つコンテンツのプロパティ情報に基づいてコンテンツ再生リスト情報を設定してクライアントに送信する。

【０１０７】

クライアントは、新たに送信されたコンテンツ再生リストをディスプレイに表示して表示したコンテンツ再生リストに従って、コンテンツの再生を行うことが可能となる。

【０１０８】

このように、本発明の構成では、クライアントからの要求に基づいてサーバ側でコンテンツの再生順をランダムに設定したリストを生成し、クライアントに送信する構成としたので、クライアントは、サーバから受信するリストに従って再生処理を行うのみで、ランダムな再生シーケンスに従ってコンテンツ再生を楽しむことが可能となり、ユーザおよびクライアント側でシャッフル処理を行う必要が排除される。

【０１０９】

クライアントおよびサーバ各々における処理シーケンスについて、図１１、図１２のフローチャートを参照して説明する。

【０１１０】

まず、図１１を参照して、クライアントの処理手順について説明する。ステップＳ１０１において、クライアントは、サーバに対して再生リストを要求する。これは、サーバに対するフォルダを指定したブラウス要求に伴って行われ、先に図８を参照して説明したように、サーバに対する要求データにソート処理をランダムオーダとして実行することを要求することができる。

【０１１１】

サーバは、クライアント要求に応じて、上述したように指定フォルダに含まれるコンテンツに対応するプロパティ情報中のランダムオーダＮｏ．のシャッフルを実行してランダムオーダＮｏ．を再設定し、設定したランダムオーダＮｏ．に基づいてコンテンツ再生リストを生成しクライアントに送信する。クライアントは、ステップＳ１０２において、この再生リストを含むコンテンツ情報を受信し、受信したコンテンツ再生リストをディスプレイに表示する。

【０１１２】

ステップＳ１０３において、クライアント側のユーザは、コンテンツの再生を開始する。この際、上述したように連続再生を指定した場合は、クライアント側の再生処理プログラムがコンテンツ再生リスト順に、順次コンテンツＵＲＬを設定したコンテンツ要求をサーバに送信する。

【０１１３】

ステップＳ１０４では、サーバからコンテンツを受信し、ステップＳ１０５において受信コンテンツを再生する。なお、受信コンテンツがＡＴＲＡＣ、ＭＰＥＧ等の圧縮処理がなされている場合は、クライアント側で復号処理を行った後に再生を行う。

【０１１４】

ステップＳ１０６において、リストされた全コンテンツの再生が終了したか否かを判定し、未再生コンテンツがある場合は、ステップＳ１０３以下の処理、すなわちコンテンツ要求、受信、再生を繰り返し実行する。現再生コンテンツの再生時間の終了前に、コンテンツ再生リストの次のコンテンツ要求がサーバに対して出力される。リスト中のコンテンツ再生が終了すると処理を終了する。なお、リストの末尾のコンテンツの再生が終了した後、さらにリストの先頭に戻って、繰り返し再生を行う処理も可能である。これらの処理は、クライアント側のコンテンツ再生処理プログラムの設定に基づいて実行される。

DISH EXHIBIT 2002, Page 821
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

【０１１５】
次に、図１２のフローチャートに基づいて、サーバ側の処理手順について説明する。ステップＳ２０１において、サーバが、クライアントからのコンテンツ情報要求を受信すると、サーバは、ステップＳ２０２において、コンテンツ再生リストの設定をランダムシーケンスとする要求をしているか否かを判定する。
【０１１６】
コンテンツ再生リストの設定をランダムシーケンスに設定して送信することの要求（図８参照）であれば、ステップＳ２０３に進み、そのような指定がない場合は、ステップＳ２１１に進む。ステップＳ２１１では、指定フォルダに格納されたコンテンツに予め設定されたシーケンスＮｏ．に従ったデフォルトの再生リスト情報を生成してステップＳ２０５に進み生成したリスト情報を含むコンテンツ情報をクライアントに送信する。
【０１１７】
コンテンツ再生リストの設定をランダムシーケンスに設定して送信することの要求（図８参照）であれば、ステップＳ２０３に進み、サーバは、クライアントから指定されたフォルダに格納されたコンテンツに対応するプロパティ情報をそれぞれ取得し、プロパティ情報に設定されたランダムオーダＮｏ．の設定を行う。すなわち、指定フォルダに含まれるコンテンツのプロパティ情報中のランダムオーダＮｏ．をシャッフルして再設定処理を行う。
【０１１８】
ステップＳ２０４では、再設定されたランダムオーダＮｏ．に基づいてランダムオーダＮｏ．順のコンテンツ再生リスト情報を生成し、ステップＳ２０５において、コンテンツ再生リスト構成情報としてのＸＭＬ情報を生成しクライアントに送信する。
【０１１９】
ステップＳ２０６において、サーバは、クライアントから例えばコンテンツ指定情報（例えばコンテンツＵＲＬ）を含むコンテンツ要求を受信すると、指定情報に従ってコンテンツを抽出してステップＳ２０７においてコンテンツを送信する。なお、コンテンツ送信においては、クライアント側の仕様または要求に応じたデータ変換を行う場合もある。
【０１２０】
なお、ステップＳ２０６、ステップＳ２０７の処理は、クライアントがコンテンツ再生リストに従った連続再生を実行している場合には、繰り返し実行される。
【０１２１】
また、サーバは、再設定されたランダムオーダＮｏ．に基づいてランダムオーダＮｏ．順のコンテンツ再生リスト情報を生成してクライアントに送信後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持し、記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求があった場合は、記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する。この処理により、クライアントは特定フォルダ内のコンテンツを、ランダムシーケンスに従って重複なく再生することが可能となる。
【０１２２】
なお、上述した実施例においては、コンテンツ個々のシャッフル処理について説明したが、コンテンツのプレイリストを格納したフォルダや、複数のコンテンツの集合としてのフォルダを単位としたシャッフル処理も可能である。
【０１２３】
図１３を参照してフォルダ単位としたシャッフル処理例について説明する。サーバは、コンテンツのプレイリストを格納したフォルダや、複数のコンテンツの集合としてのフォルダフォルダに対応する属性情報（プロパティ情報）を記憶部に格納している。
【０１２４】
図１３に示す例では、コンテンツのプレイリストを格納したフォルダＡ～Ｎ４９１～４９３の複数フォルダ、および各フォルダに対応するプロパティ情報４９５，４９６，４９７を示している。

【０１２５】
プロパティ情報は、フォルダに対応する属性情報であり、フォルダのクリエータ、アーティスト、再生時間等の様々な情報を含んでいる。本発明の構成では、フォルダに対応するプロパティ情報として図に示すように、ランダムオーダＮｏ．が設定される。
【０１２６】
ランダムオーダＮｏ．は、各フォルダ各々に設定されるランダムオーダ情報としてのナンバリングデータ（番号）である。これは、各フォルダに含まれるコンテンツ再生リストをフォルダ単位で再設定する書き換え可能なランダムオーダ情報である。サーバは、クライアントから、複数のフォルダのソートを希望していることを示すソート指定情報を含むコンテンツ情報取得要求を受信すると、指定された複数のフォルダのプロパティ情報中のランダムオーダＮｏ．の入れ替え、再設定処理を行う。具体的には、シャッフル対象となるフォルダ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行する。
【０１２７】
なお、クライアントからの要求データは、図８に示す構成データにおいて、フォルダ識別情報４０２の変わりにコンテナ識別子、すなわち、複数のコンテンツ再生リストフォルダオブジェクトの上位オブジェクトとしてのコンテナの識別子情報を設定した構成、あるいは、複数のコンテンツ再生リストフォルダオブジェクトの複数の識別子情報を設定した構成となる。
【０１２８】
ランダムオーダＮｏ．は、複数のフォルダの集合として設定されるたとえばコンテナに含まれる複数フォルダに対応する各プロパティ情報に対して設定された番号としてのナンバリングデータであり、コンテナに含まれるフォルダ数ｎに対してｎ個のランダムオーダ番号が重複することなく設定された情報である。
【０１２９】
例えば１０のプレイリストフォルダが含まれるコンテナでは、１～１０の番号が、各プレイリストフォルダのプロパティ情報中のランダムオーダＮｏ．として設定される。これは、クライアントからのランダムオーダでのソート要求毎に実行され、処理毎に１～１０のランダムオーダＮｏ．が各フォルダのプロパティ情報として再設定される。
【０１３０】
フォルダ単位で再設定されたランダムオーダＮｏ．に基づいて、例えば、プレイリストＡフォルダ４９１にコンテンツａ～ｆのコンテンツプレイリストが含まれ、プレイリストＮフォルダ４９３にコンテンツｐ～ｚのコンテンツプレイリスト含まれる場合、シャッフルにより、図１３に示すように、プレイリストＮフォルダ４９３のランダムオーダＮｏ．＝１、プレイリストＡフォルダ４９１のランダムオーダＮｏ．＝２として設定された場合は、プレイリストＮフォルダ４９３のコンテンツｐ～ｚをプレイリストＡフォルダ４９１のコンテンツａ～ｆの先に設定したプレイリストが設定されて、コンテンツ再生が実行される。
【０１３１】
このように、本発明の構成においては、コンテンツのみならず、コンテンツまたはデータフォルダ等、サーバが記憶部に格納している様々なオブジェクトについて、オブジェクトの属性情報（メタデータ）として設定されるプロパティ情報に、ランダムオーダ情報を格納し、クライアントからの要求に応じてシャッフルを実行する構成としたので、コンテンツまたはフォルダ単位でのリスト順の再設定が可能となる。
【０１３２】
［サーバおよびクライアントの機能構成］
サーバおよびクライアント装置のハードウェア構成については、先に図２を参照して説明した通りであり、上述した各種の処理は、サーバクライアントそれぞれの記憶部に格納されたプログラムに従って制御部（ＣＰＵ等）の制御の下に実行される。
【０１３３】

ＣＰＵによって実行される処理は、例えばサーバ側では、クライアントからの要求に従って、コンテンツ対応のメタデータを取得しプロパティ情報に基づくＸＭＬデータを生成する処理、プロパティ情報のランダムオーダＮｏ．のシャッフル処理、さらにクライアントからの要求データ態様に応じたコンテンツを送信する処理等である。クライアント側の処理としては、サーバから受信するプロパティ情報からなるＸＭＬデータに基づいてディスプレイにコンテンツ再生リストを表示する処理、コンテンツ再生リストに従って、順次コンテンツＵＲＬを設定したコンテンツ要求をサーバに送信する処理、コンテンツを受信する処理、受信コンテンツのデータ変換、再生処理などである。

【０１３４】

基本的にこれらの処理は、サーバ、クライアント装置の制御部としてのＣＰＵの制御の下に実行されるが、上述した処理を実行するために必要となるサーバの機能構成とクライアントの機能構成について図１４および図１５を参照して説明する。

【０１３５】

図１４は、サーバの主要機能構成を示すブロック図である。パケット送受信部５０１は、クライアントに対するパケット、クライアントからのパケットを受信する。パケット生成、解析部５０２は、送信パケットの生成処理、受信パケットの解析処理を行う。パケットのアドレス設定、アドレス認識、データ部に対するデータ格納、データ部からのデータ取得処理などである。

【０１３６】

コンテンツ記憶部５０３は、サーバの保有するコンテンツを格納する。メタデータ記憶部５０４は、コンテンツに対応する属性情報としてのメタデータを格納した記憶部である。メタデータには、図９を参照して説明したランダムオーダＮｏ．他のプロパティ情報が含まれる。

【０１３７】

プロパティ情報取得部５０５は、クライアントから受信したプロパティ情報取得要求、例えば、先に図８を参照して説明したデータ構成を持つブラウズ要求に基づいて、指定フォルダに対応するメタデータをメタデータ記憶部５０４から取り出す処理を実行する。

【０１３８】

ランダムオーダＮｏ．設定部５０６は、クライアントからのコンテンツプロパティリストの要求にランダムオーダの指定がある場合に、対応コンテンツのプロパティ情報のランダムオーダＮｏ．のシャッフル処理を実行する。

【０１３９】

コンテンツ情報生成部５０７は、プロパティ情報取得部５０５の取得したメタデータ、ランダムオーダＮｏ．設定部５０６の設定した情報に基づいて、コンテンツ再生リストの構成情報を含むコンテンツ情報としてのＸＭＬデータを生成する。コンテンツ情報生成部５０７は、例えばコンテンツ数ｎに対応する１～ｎのランダムオーダ情報のシャッフルを実行して各プロパティ情報に対して設定されたランダムオーダ情報の入れ替え処理を実行する。データ変換部５０８は、送信コンテンツデータの符号化処理等、復号処理を実行する。例えばＡＴＲＡＣ３、ＭＰＥＧ４に基づくデータ変換を実行する。

【０１４０】

次に、クライアント装置の機能構成について、図１５を参照して説明する。パケット送受信部６０１は、サーバに対するパケット送信および、サーバからのパケット受信処理を実行する。パケット生成、解析部６０２は、送信パケットの生成処理、受信パケットの解析処理を行う。パケット内の格納データ解析のみならず、パケットのアドレス設定、アドレス認識、データ部に対するデータ格納、データ部からのデータ取得処理なども含む。

【０１４１】

コンテンツ情報要求処理部６０３は、サーバに対して送信するコンテンツ再生リストの要求データ（図８参照）を生成する。すなわち、複数のコンテンツを格納したコンテンツフォルダの指定情報とともに、コンテンツ再生リストの設定順ソート情報としてランダムオーダ設定情報を格納したコンテンツ情報要求データを生成する処理を実行する。

【０１４２】
記憶部６０４は、サーバから受信したパケットに含まれるコンテンツ、およびコンテンツ再生リストを含むコンテンツ情報等を格納する。
【０１４３】
出力部６０５は、コンテンツ再生処理に適用するスピーカ、ディスプレイを含む。なお、ディスプレイは、先に図７を参照して説明したコンテンツ情報リストの出力にも利用される。入力部６０６は、例えば、コンテンツ再生の開始、終了、その他再生制御設定情報の入力、その他のデータ入力手段として利用される。
【０１４４】
コンテンツ情報解析部６０７は、サーバから受信したプロパティ情報からなるＸＭＬデータを解析し、解析データに基づいて、先に図１０を参照して説明したコンテンツ再生リストを生成し、出力部としてのディスプレイに出力する処理を実行する。
【０１４５】
コンテンツ再生制御部６０８は、サーバから受信し、ディスプレイに表示したコンテンツ再生リストに従ったコンテンツ再生処理を実行する。コンテンツの要求シーケンスをコンテンツ再生リストに従って決定し、再生リストに従ったコンテンツＵＲＬを順次パケット生成解析部６０２に送る。パケット生成解析部６０２では、コンテンツＵＲＬを設定したパケットを生成し、パケット送受信部６０１を介してサーバにコンテンツ要求を送信する。
【０１４６】
データ変換部６０９は、サーバから受信したコンテンツデータの復号当、各種データ変換処理を実行する。例えばＡＴＲＡＣ３、ＭＰＥＧ４に基づくデータ変換を実行する。なお、復号データの再符号化処理を実行し、再符号化データを記憶部６０３に格納する処理を実行する構成としてもよい。
【０１４７】
サーバ、およびクライアントは、機能的には図１４、図１５に示す各機能を有し、上述した各処理を実行する。ただし、図１４、図１５に示すブロック図は、機能を説明するブロック図であり、実際には、図２に示すＰＣ等のハードウェア構成におけるＣＰＵの制御の下に各種の処理プログラムが実行される。
【０１４８】
以上、特定の実施例を参照しながら、本発明について詳解してきた。しかしながら、本発明の要旨を逸脱しない範囲で当業者が該実施例の修正や代用を成し得ることは自明である。すなわち、例示という形態で本発明を開示してきたのであり、限定的に解釈されるべきではない。本発明の要旨を判断するためには、冒頭に記載した特許請求の範囲の欄を参酌すべきである。
【０１４９】
なお、明細書中において説明した一連の処理はハードウェア、またはソフトウェア、あるいは両者の複合構成によって実行することが可能である。ソフトウェアによる処理を実行する場合は、処理シーケンスを記録したプログラムを、専用のハードウェアに組み込まれたコンピュータ内のメモリにインストールして実行させるか、あるいは、各種処理が実行可能な汎用コンピュータにプログラムをインストールして実行させることが可能である。
【０１５０】
例えば、プログラムは記録媒体としてのハードディスクやＲＯＭ（Ｒｅａｄ　Ｏｎｌｙ　Ｍｅｍｏｒｙ）に予め記録しておくことができる。あるいは、プログラムはフレキシブルディスク、ＣＤ－ＲＯＭ（Ｃｏｍｐａｃｔ　Ｄｉｓｃ　Ｒｅａｄ　Ｏｎｌｙ　Ｍｅｍｏｒｙ），ＭＯ（Ｍａｇｎｅｔｏ　ｏｐｔｉｃａｌ）ディスク，ＤＶＤ（Ｄｉｇｉｔａｌ　Ｖｅｒｓａｔｉｌｅ　Ｄｉｓｃ）、磁気ディスク、半導体メモリなどのリムーバブル記録媒体に、一時的あるいは永続的に格納（記録）しておくことができる。このようなリムーバブル記録媒体は、いわゆるパッケージソフトウエアとして提供することができる。
【０１５１】

なお、プログラムは、上述したようなリムーバブル記録媒体からコンピュータにインストールする他、ダウンロードサイトから、コンピュータに無線転送したり、ＬＡＮ（Ｌｏｃａｌ　Ａｒｅａ　Ｎｅｔｗｏｒｋ）、インターネットといったネットワークを介して、コンピュータに有線で転送し、コンピュータでは、そのようにして転送されてくるプログラムを受信し、内蔵するハードディスク等の記録媒体にインストールすることができる。

【０１５２】

なお、明細書に記載された各種の処理は、記載に従って時系列に実行されるのみならず、処理を実行する装置の処理能力あるいは必要に応じて並列的にあるいは個別に実行されてもよい。また、本明細書においてシステムとは、複数の装置の論理的集合構成であり、各構成の装置が同一筐体内にあるものには限らない。

【０１５３】

【発明の効果】

以上、説明したように、本発明の構成によれば、クライアントからの要求に基づいてサーバ側でコンテンツの再生順をランダムに設定したリストを生成し、クライアントに送信する構成としたので、クライアントは、サーバから受信するリストに従って再生処理を行うのみで、ランダムな再生シーケンスに従ってコンテンツ再生を楽しむことが可能となり、ユーザおよびクライアント側でシャッフル処理を行う必要が排除される。

【０１５４】

さらに、本発明の構成によれば、サーバで保持するコンテンツに対応するプロパティ情報中にコンテンツ再生リストのリスト順設定情報に対応する書き換え可能なランダムオーダ情報を格納し、クライアントからのブラウズ要求等のコンテンツ情報取得要求に応じて、指定フォルダ内のコンテンツに対応するプロパティ情報を取得してランダムオーダ情報のシャッフル入れ替え処理を実行して入れ替えたランダムオーダ情報に対応するリスト順を設定したコンテンツ再生リストを生成してクライアントに送信する構成としたので、サーバ側の処理負担も大きくすることなく、クライアントは、サーバ側の処理に依存したコンテンツ再生シーケンス設定を行うことが可能となる。

【０１５５】

さらに、本発明の構成によれば、サーバは、再設定されたランダムオーダＮｏ．に基づいてランダムオーダＮｏ．順のコンテンツ再生リスト情報を生成してクライアントに送信後、クライアントにおけるコンテンツ再生リストに従ったコンテンツ再生中、該ランダムオーダ情報を維持して記憶保持し、記憶保持期間に、クライアントからのコンテンツ再生リスト要求の再要求があった場合は、記憶保持したランダムオーダ情報に基づくコンテンツ再生リスト情報を生成してクライアントに送信する処理を実行する構成としたので、クライアントは特定フォルダ内のコンテンツを、ランダムシーケンスに従って重複なく再生することが可能となる。

【図面の簡単な説明】

【図１】本発明の適用可能なネットワーク構成例を示す図である。

【図２】ネットワーク接続機器の構成例について説明する図である。

【図３】コンテンツデータ再生処理におけるサーバクライアント間の処理シーケンスについて説明する図である。

【図４】サーバにおける保持コンテンツの管理クラスの一例を示す図である。

【図５】サーバにおける設定クラスの階層構成について説明するズである。

【図６】サーバからクライアントに送信されるプロパティ情報からなるＸＭＬデータに基づいてディスプレイに表示されるコンテンツ情報リストの例を示す図である。

【図７】コンテンツ再生順をランダムに設定してコンテンツ再生を実行する際のサーバクライアント間のデータ通信シーケンスを示す図である。

【図８】コンテンツ再生順をランダムに設定してコンテンツ再生を実行する際のクライアントからサーバに要求するコンテンツ再生リストの要求データ構成示す図である。

【図９】サーバの保有するコンテンツ対応のプロパティ情報について説明する図である。

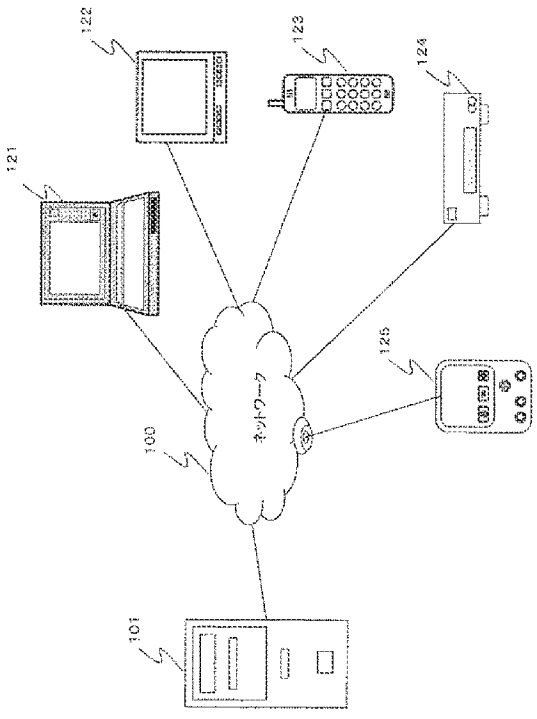
【図１０】コンテンツ再生リストの表示例を示す図である。

DISH EXHIBIT 2002, Page 826
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

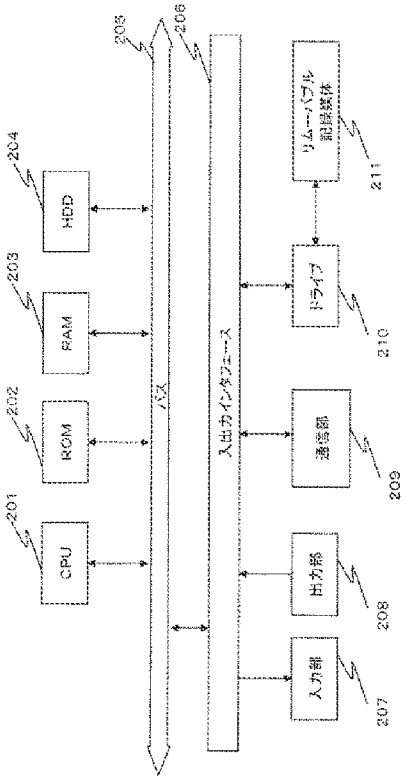
【図１１】コンテンツ再生順をランダムに設定してコンテンツ再生を実行する際のクライアント側の処理を説明するフローチャートである。
【図１２】コンテンツ再生順をランダムに設定してコンテンツ再生を実行する際のサーバ側の処理を説明するフローチャートである。
【図１３】サーバの保有するフォルダ対応のプロパティ情報について説明する図である。
【図１４】サーバの処理機能を説明するブロック図である。
【図１５】クライアントの処理機能を説明するブロック図である。
【符号の説明】
１００　ネットワーク
１０１　サーバ
１２１　ＰＣ
１２２　モニター
１２３　携帯電話
１２４　再生機
１２５　ＰＤＡ
２０１　ＣＰＵ
２０２　ＲＯＭ
２０３　ＲＡＭ
２０４　ＨＤＤ
２０５　バス
２０６　入出力インタフェース
２０７　入力部
２０８　出力部
２０９　通信部
２１０　ドライブ
２１１　リムーバブル記録媒体
３０１　ルートコンテナ
３０２～３０６　クラス
３５０　ディスプレイ
３５７　コンテンツ情報リスト
４０１　要求識別子
４０２　フォルダ識別子
４０３　ソート情報
４０４　リスト情報
４２０　コンテンツフォルダ
４２１～４２３　コンテンツ
４２５～４２７　プロパティ情報
４８０　ディスプレイ
４８１　コンテンツ再生リスト
４８２　再生ボタン
４８３　連続再生設定ボタン
４９１～４９３　フォルダ
４９５～４９７　プロパティ情報
５０１　パケット送受信部
５０２　パケット生成、解析部
５０３　コンテンツ記憶部
５０４　メタデータ記憶部
５０５　プロパティ情報取得部
５０６　ランダムオーダＮｏ．設定部
５０７　コンテンツ情報生成部

５０８　データ変換部
６０１　パケット送受信部
６０２　パケット生成、解析部
６０３　コンテンツ情報要求処理部
６０４　記憶部
６０５　出力部
６０６　入力部
６０７　コンテンツ情報解析部
６０８　コンテンツ再生制御処理部
６０９　データ変換部

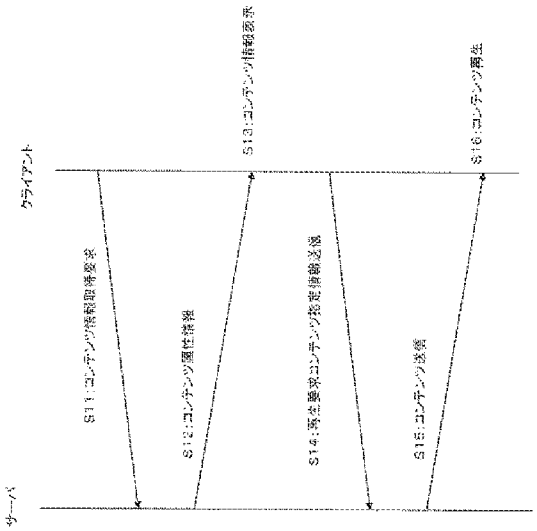
【図1】



【図2】



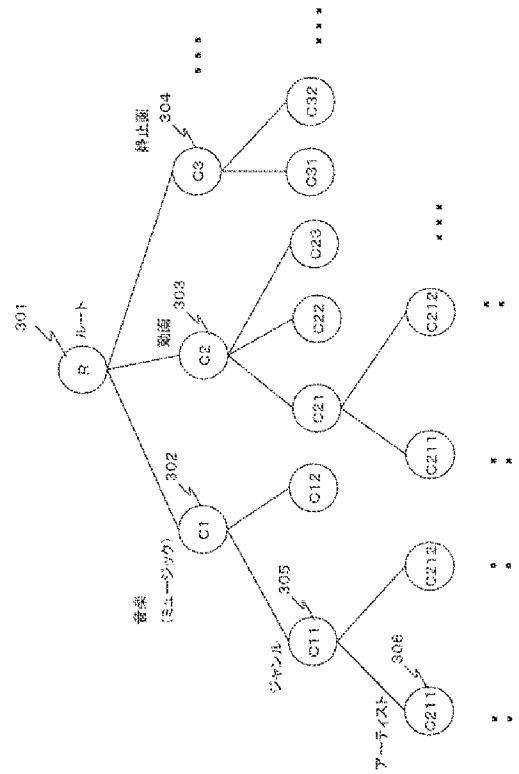
【図3】



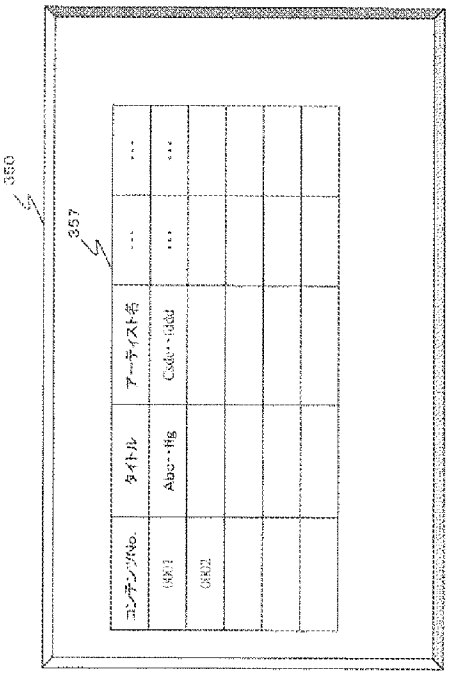
【図4】

class name	説明
avContentsTrack	曲
avMusicAlbum	アルバム。 子として、avMusicTrackを持つ。
avMusicGenre	「ジャンル一覧」の中の各ジャンル 子として、avMusicArtistやavMusicAlbumや avMusicTrackを持つ。
avMusicArtist	「アーティスト一覧」の中の各アーティスト 子として、avMusicAlbumやavMusicTrackを持つ。
avMusicPlaylist	「プレイリスト一覧」コンテナの中のプレイリスト 子として、プレイリストを構成するavMusicTrackを持つ。
avMusicSearchingMusicSearch	「いろいろな検索」コンテナの中のサーバの対話生成するプレイリスト 子として、プレイリストを構成するavMusicTrackを持つ。
avMusicPlaylistFolder	プレイリストコンテナ 子として、avMusicPlaylistFolderやavMusicPlaylistを持つ。 playlistContainerを継承しないのは、文字列マッチングでavMusicPlaylistとかぶるのを避けるため
avMusicAlbumCabinet	アルバムキャビネット 子として、avMusicAlbumを持つ
avAllavAllMusicTracks	「すべての曲」コンテナ 子は、avMusicTrack
avAllavAllMusicAlbums	「アルバム一覧」コンテナ 子はavMusicAlbum
avAllavAllMusicArtists	「アーティスト一覧」コンテナ 子はavMusicArtist
avAllavAllMusicGenre	「ジャンル一覧」コンテナ 子はavMusicGenre
avAllavAllMusicPlaylists	「プレイリスト一覧」コンテナ 子は、avMusicPlaylistやavMusicPlaylistFolder.
avAllMusicSearch	「いろいろな検索」コンテナ 子は、avMusicSearchesやavMusicSearch
avAllMusicAlbumCabinets	「アルバムキャビネット一覧」コンテナ 子は、avMusicAlbumCabinet

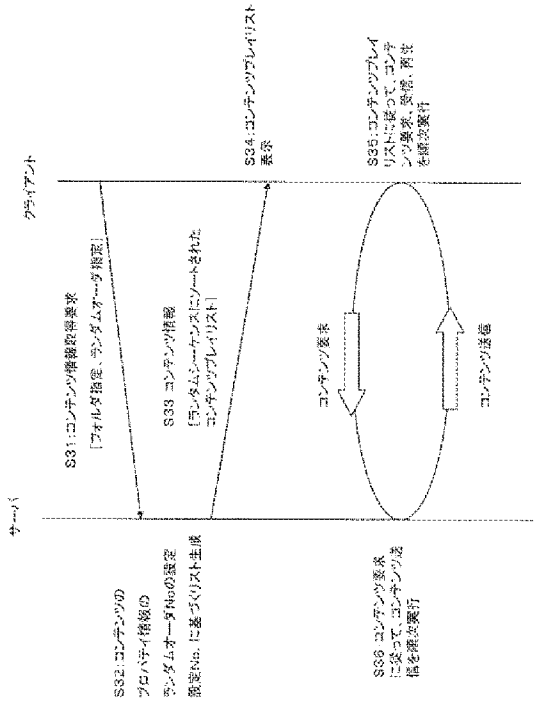
【図5】



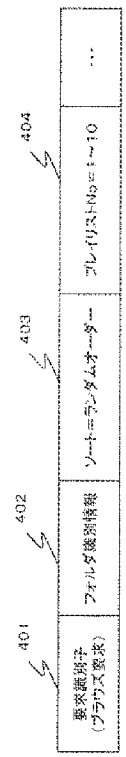
【図6】



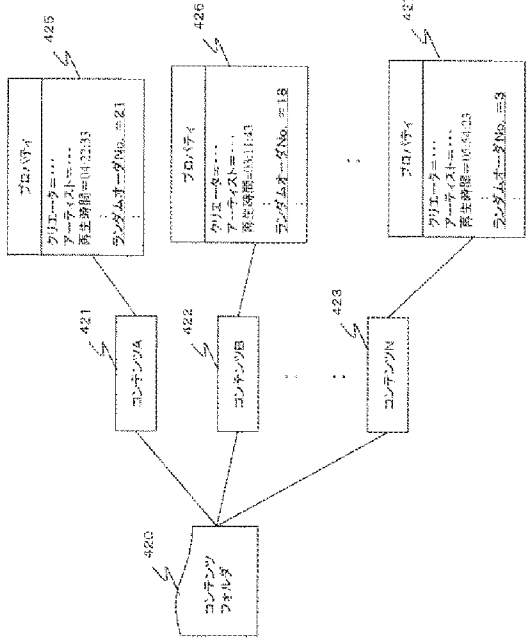
【図7】


クライアント
サーバ
S31:コンテンツ情報設定要求
[フォルダ指定、ランダムオーダ指定]
S32:コンテンツのプロパティ情報のランダムオーダNoの設定
設定No.に基づくリスト生成
S33 コンテンツ情報
[ランダムシーケンスにソートされたコンテンツプレイリスト]
S34:コンテンツプレイリスト表示
S35:コンテンツプレイリストに従って、コンテンツ要求、受信、再生を順次実行
S36 コンテンツ要求に従って、コンテンツ送信を順次実行
コンテンツ要求
コンテンツ送信

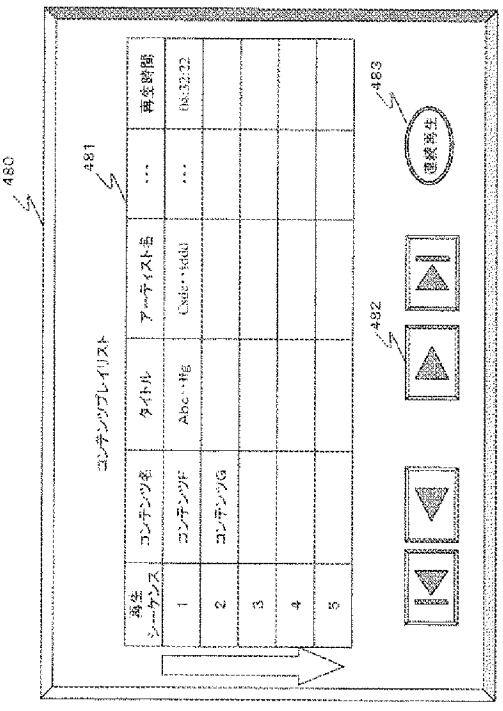
【図8】


401
要求識別子
(ブラウズ要求)
402
フォルダ識別情報
403
ソート＝ランダムオーダー
404
プレイリストNo＝1～10
…

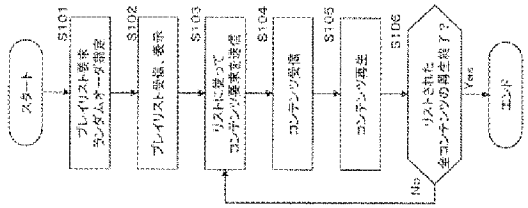
【図9】


420
コンテンツフォルダ
421
コンテンツA
422
コンテンツB
423
コンテンツN
425
プロパティ
クリエータ＝…
アーティスト＝…
再生時間＝04:22:33
ランダムオーダNo.＝21
426
プロパティ
クリエータ＝…
アーティスト＝…
再生時間＝03:11:43
ランダムオーダNo.＝18
427
プロパティ
クリエータ＝…
アーティスト＝…
再生時間＝06:54:23
ランダムオーダNo.＝3

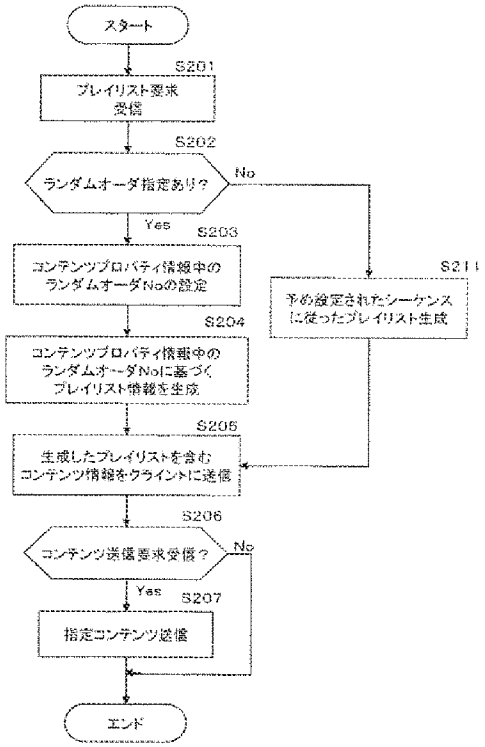
【図10】


480
481
482
483
コンテンツプレイリスト
再生シーケンス
コンテンツ名
タイトル
アーティスト名
…
再生時間
1
コンテンツF
Abc・Hg
Cxdc・Hddd
…
04:32:22
2
コンテンツG
3
4
5
連続再生

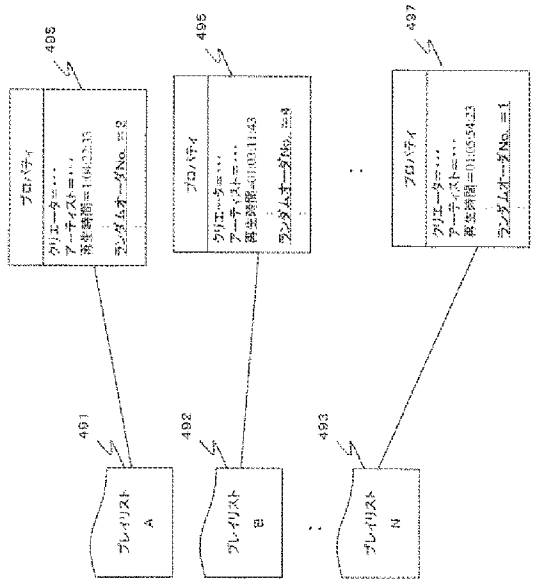
【図11】



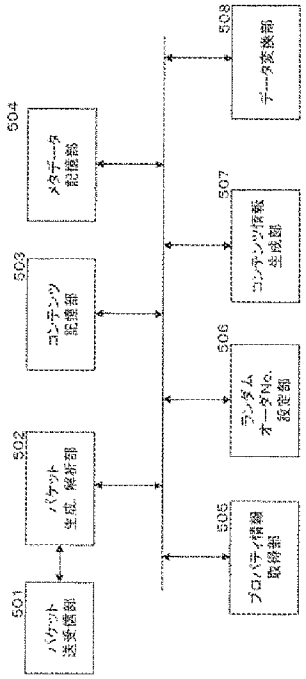
【図12】



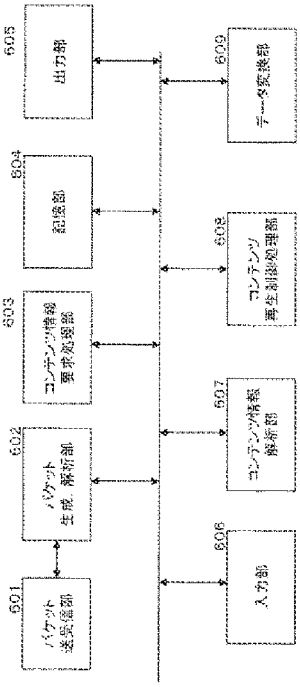
【図13】



【図14】



【図15】


605
出力部
609
データ変換部
604
記憶部
608
コンテンツ
再生制御処理部
603
コンテンツ情報
要求処理部
607
コンテンツ情報
解析部
602
パケット
生成・解析部
606
入力部
601
パケット
送受信部

(72)発明者　森田　利広
東京都品川区北品川６丁目７番３５号　ソニー株式会社内
(72)発明者　日下部　俊昭
東京都品川区北品川６丁目７番３５号　ソニー株式会社内
Ｆターム(参考) 5C064 BA07　BB10　BC06　BC16　BC18　BC20　BC23　BD01　BD08

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 May 2003 (22.05.2003)

PCT

(10) International Publication Number
WO 03/042856 A2

(51) International Patent Classification[7]: G06F 15/173, 15/16

(21) International Application Number: PCT/US02/36853

(22) International Filing Date:
14 November 2002 (14.11.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/002,469 14 November 2001 (14.11.2001) US

(71) Applicant: AEROCAST.COM, INC. [US/US]; 5744 Pacific Center Boulevard, Suite 301, San Diego, CA 92121 (US).

(72) Inventor: KAUFFMAN, Marc, W.; 961 Olive Crest Drive, Encinitas, CA 92024 (US).

(74) Agents: KULAS, Charles, J. et al.; TOWNSEND AND TOWNSEND AND CREW LLP, 2 Embarcadero Center, 8th Floor, San Francisco, CA 94111 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), 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, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

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

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, 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, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

— *without international search report and to be republished upon receipt of that report*

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.

WO 03/042856 A2

(54) Title: QUALITY OF SERVICE CONTROL OF STREAMED CONTENT DELIVERY

(57) Abstract: According to the invention, a method for distributing a content object over a broadband connection to an end-user location is disclosed. In one step, an amount of bandwidth for adequate quality of service (QOS) to transport the content object is determined. A period for transporting the content object is also determined. A check for availability of the amount of bandwidth to the end-user location over the period is performed. If available, the bandwidth is reserved. The content object is streamed to the end-user location.

QUALITY OF SERVICE CONTROL OF STREAMED CONTENT DELIVERY

This application claims priority to US Application Serial No. 10/002,469 filed on November 14, 2001.

BACKGROUND OF THE INVENTION

This invention relates in general to streamed content delivery and, more specifically, to streaming audio or video content originating across a wide area network.

Currently, audio and video is streamed from the Internet to a computer using proprietary formats and transport protocols to proprietary players that are available from Microsoft™, Apple™ and Real Media™. There are also standard transport protocols such as those defined with MPEG-4 and RTSP/RTP that may be used with some proprietary players. The players run on computers such that a user can listen to audio or watch video streamed from a content provider. Cable modems, DSL modems and other broadband modems interface the computer to the Internet to allow reception of the content streams. Because of the so-called digital-divide, families that cannot afford computers and Internet connections cannot take advantage of audio and video over the Internet.

As part of a cable television subscription, many homes today are provided with cable system set top boxes for little or no additional cost to the consumer. Many of the set top boxes, such as the DCT-2000™ available from Motorola™, allow decoding and displaying programs sent in MPEG-2 format using MPEG-2 transport protocols. Program feeds or tapes are supplied to the headend of the cable operator for distribution to the set top boxes using a hybrid fiber / cable (HFC) plant. The programs are provided in a linear schedule such that the user can select any program for viewing.

[01] Telephone companies are beginning to offer very high speed digital subscriber line (VDSL) service to consumers. VDSL provides an approximately 6 Mbps connection to computers and set top boxes. The computers use the bandwidth to connect to the Internet and the set top boxes use the bandwidth to provide video programs from a linear schedule or in a video on demand (VOD) menu along with services such as VOD. Users of the VDSL set top boxes are limited to selecting programs from the linear schedule or VOD menu.

DISH EXHIBIT 2002, Page 835
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

BRIEF SUMMARY OF THE INVENTION

In one embodiment, the present invention provides a method for distributing a content object over a broadband connection to an end-user location. In one step, an amount of bandwidth for adequate quality of service (QOS) to transport the content object is determined. A period for transporting the content object is also determined. A check for availability of the amount of bandwidth to the end-user location over the period is performed. If available, the bandwidth is reserved. The content object is streamed to the end-user location.

In another embodiment, the present invention provides a method for distributing a content object over a broadband connection to an end-user location. In one step, an amount of bandwidth for adequate quality of service (QOS) to transport the content object is determined. A period for transporting the content object is determined. A check for availability of the amount of bandwidth to the end-user location over the period is performed. The bandwidth is reserved if available. A lower bitrate version of the content object is chosen if the check for availability is unsuccessful. The content object is streamed to the end-user location.

In yet another embodiment, the present invention provides a software product embodied on a computer-readable medium for distributing a content object over a broadband connection to an end-user location. The software product comprises: code for determining an amount of bandwidth for adequate quality of service (QOS) to transport the content object; code for determining a period for transporting the content object; code for checking for availability of the amount of bandwidth to the end-user location over the period; code for reserving the bandwidth if available; code for converting the content object to a lower bitrate if the check for availability is unsuccessful; and code for streaming the content object to the end-user location.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is described in conjunction with the appended figures:

FIG. 1A is a block diagram of an embodiment of a content distribution system;

FIG. 1B is a block diagram of another embodiment of a content distribution system that uses video digital subscriber line (VDSL) technology;

DISH EXHIBIT 2002, Page 836
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIG. 2A is a block diagram of an embodiment of a hybrid fiber / coax (HFC) plant interfaced with a headend and content receivers;

FIG. 2B is a block diagram of an embodiment of a hybrid fiber / twisted pair (HFTP) plant interfaced with a point of presence and content receivers;

FIG. 3A is a block diagram of an embodiment of a portion of a headend, which is coupled to content receivers with the HFC plant;

FIG. 3B is a block diagram of an embodiment of another portion of the headend, which is coupled to set top boxes;

FIG. 3C is a block diagram of another embodiment of a portion of the headend, which is coupled to set top boxes;

FIG. 4A is a block diagram of a prior art unassociated content provider;

FIG. 4B is a block diagram of an embodiment of an associated content provider;

FIG. 5A is a block diagram of an embodiment of a content exchange;

FIG. 5B is a block diagram of another embodiment of the content exchange that includes transcoding capability;

FIG. 6A is a block diagram of an embodiment of an associated client computer;

FIG. 6B is a block diagram of an embodiment of an enhanced set top box;

FIG. 6C is a block diagram of an embodiment of a standard set top box that can tune to a channel package for viewing;

FIG. 7 is a flow diagram of an embodiment of a process for streaming a content object to a standard set top box;

FIG. 8 is a flow diagram of an embodiment of a process for streaming a content object to a content receiver; and

FIG. 9 is a flow diagram of an embodiment of a process for controlling quality of service for a streamed content object.

In the appended figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

DISH EXHIBIT 2002, Page 837
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

DESCRIPTION OF THE SPECIFIC EMBODIMENTS

The ensuing description provides preferred exemplary embodiment(s) only, and is not intended to limit the scope, applicability or configuration of the invention. Rather, the ensuing description of the preferred exemplary embodiment(s) will provide those skilled in the art with an enabling description for implementing a preferred exemplary embodiment of the invention. It being understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the invention as set for in the appended claims.

The present invention allows controlling quality of service (QOS) for the so-called "last mile" of content delivery. For example, a set amount of bandwidth is reserved between the headend and a content receiver. The reservation avoids oversubscription of the last mile such that a desired QOS is interrupted. Where a reservation is not possible, the content object may be transcoded to a lower datarate or buffered.

Referring initially to FIG. 1A, a block diagram is shown of an embodiment of a content distribution system 100. In this embodiment, a cable television (TV) system is used to distribute content objects to users. Content objects from either unassociated content providers 108 or associated content providers 112 may be distributed through the Internet 120 or a quality of service (QOS) network 122. Both unassociated and associated content exchanges 116, 124 allow cacheing of content objects before transport of the objects through a headend and hybrid fiber / coaxial plant 132 to the user. Viewing of or listening to the content object is provided by one of a standard set top box 138, an enhanced set top box 136 and an associated client computer 140.

The network operation center 104 provides many functions used by the system 100. Associated client computers 140 sign-up and download viewer object proxy and other software from the network operation center 104. Some billing and logging for the system 100 is also performed in the network operation center 104. Directory information for the system 100 is maintained in the network operation center 104 such that users can see the various content objects registered in the system 100. Requests for those registered objects are routed to the appropriate content provider 108, 112 who originated the content object. Encryption key distribution and management are also performed by the network operation center 104.

A content object can originate from either associated or unassociated content providers 112, 108. Unassociated content providers 108 include any computer

DISH EXHIBIT 2002, Page 838
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

visible from the Internet 120 that supplies content objects that are streamable. Associated content providers 112 have the ability to use the QOS network 122 in addition to the Internet 120. Further, the associated content providers 112 can route a content object query to various content exchanges 116, 124 for better QOS and can publish directory information to the network operation center 104.

Content exchanges 116, 124 source content objects to users to provide enhanced QOS. When a content object is requested from a content provider 108, 112, either the content provider 108, 112, the network operation center 104 or the viewer object proxy may redirect that request to a content exchange 116, 124 for fulfillment. Under some circumstances, the associated content provider 112 may choose to fulfill the request itself rather than passing fulfillment to a content exchange 116, 124. Content objects requested from content exchanges 116, 124 are located by first, searching the content exchange 116, 124; second, searching other interconnected content exchanges 116, 124; and, third, a request to the originating content provider 108, 112.

Unassociated content exchanges 116 are available to any user in the system 100, but associated content exchanges 124 primarily benefit any enhanced set top box (STB) 136, standard STB 138 or associated client computer 140 linked to those associated content exchanges 124. With the proper software, unassociated client computers 142 can receive content objects from the unassociated content exchanges 116.

Receiving a content object at a desired data-rate that does not exceed the data-rate of the client computer's connection to the Internet 120 is defined as adequate QOS. The maximum QOS a user can expect is defined by the speed, delay, jitter and error rate of their network connection, the processing power of their computer and other factors. The minimum QOS is subjectively defined by the user based upon the quality they desire within certain limits. For example, a user with a 400 Kbps network connection and a fast computer may have a choice of a 28 Kbps, 56 Kbps, or 128 Kbps stream for an audio clip from which the user chooses the 128 Kbps stream. So long as the datarate provided to the client computer is in the range of 128 - 400 Kbps, adequate QOS is possible for that stream.

Typically, an associated content exchange 124 is tightly integrated with a particular headend 128 to provide low latency and fewer hops between the associated content exchange 124 and a content receiver. In this way, the associated content exchange 124 is usually the highest QOS source of a content object for the user. Each associated content exchange 124 is assigned to a group of content receivers associated

DISH EXHIBIT 2002, Page 839
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

with the headend 128. The content objects sourced by the users of the content receivers are stored in the associated content exchange 124 along with any content objects they request. Associated content exchanges 124 provide their content objects or portions thereof to other content exchanges 116, 124, however, associated content exchanges 124 do not normally stream content objects not originating from its users to unassociated client computers 142.

The cable operator aggregates network traffic and MPEG-2 transported content objects in the headend 128. For example, a cable operator of a large metropolitan area may have one or more headends 128. Network traffic is sent to and received from a wide area network, which is defined to include the Internet 120 and/or the QOS network. The headend 128 interfaces with the Internet 120 and QOS network 122 to send and receive network traffic. Other program feeds are used by the headend to provide a linear schedule of programs to each STB 136, 138. The HFC plant 132 transports the program feeds and network traffic to each STB 136, 138 and each associated client computer 140.

Each set top box 136, 138 receives channel packages of elementary streams in MPEG-2 format with MPEG-2 transport. In MPEG-2 transport, programs are separated into constituent parts or elementary streams and compressed into packets with timestamps for transport in a multiplexed datastream. The multiplexed datastream may include a number of different MPEG-2 program parts for various channel packages distinguished in the datastream by program identifiers (PIDs). By filtering for the PIDs the elemenary stream, channel package is gathered and aligned, where the time stamp is used for alignment. The datastream is transported in an analog TV channel on a carrier signal.

In the above embodiment, the content providers 108, 112 are located remotely to the content exchanges 116, 124. Some embodiments could co-locate the content providers 108, 112 and content exchanges 116, 124. An intranet could link them together.

With reference to FIG. 1B, a block diagram of another embodiment of a content distribution system 150 is shown that uses video digital subscriber line (VDSL) technology. VDSL uses a high bandwidth data link to send and receive data that could include video channels, phone conversations and/or Internet traffic. A point of presence 154 performs the functions of a headend 128 and communicates with VDSL set tops 136 and associated client computers 140. A hybrid fiber / twisted pair (HFTP) plant 158 is

DISH EXHIBIT 2002, Page 840
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

used for the VDSL data channel and may include fiber and/or twisted pair wire to convey the data where some embodiments could be all twisted pair or all fiber.

Referring next to FIG. 2A, a block diagram of an embodiment of a HFC plant 132 is shown interfaced with the headend 128 and content receivers 216. In this embodiment, the content receivers 216 could include the enhanced STBes 136, the standard STBes 138 and the associated client computers 140. The HFC plant 132 can include a multitude of different configurations to support a unique menu channel for each standard STB 136. The unique menu channel allows the user to choose content objects from a directory supplied by the network operation center 104 or could allow web browsing to find content objects. The menu channel is formulated in the headend 128 and supplied by the HFC plant to the user who can interact with the menu channel to select content objects.

Included for this embodiment of the HFC plant 132 are a neighborhood hub 204 and a number of nodes 208 that receive their content objects from optical fibers. Nodes 208 typically serve around 500 users and interface the optical fibers to coaxial cables. Neighborhood hubs 204 typically serve around 10,000-20,000 users and do the same interfacing of optical fibers to coaxial cables as the nodes 208, but may also include an associated content exchange 124. Further, the neighborhood hubs 204 may serve optical fiber connections to nodes 208. The coaxial cable from either a neighborhood hub 20 or node 208 to a group of content exchanges 216 share a set amount of bandwidth in such a manner that the QOS can be greatly reduced by oversubscription.

With reference to FIG. 2B, a block diagram of an embodiment of a HFTP plant 158 interfaced with a point of presence 154 and content receivers 216 is shown. In this embodiment, the content receivers 216 include VDSL STBes 136 and associated client computers 140 that receive their IP traffic from a twisted pair phone line. Each content receiver 216 gets its own twisted pair conductor from either the central office 254 or neighborhood node 258. Optical fiber feeds the neighborhood nodes 258 and central offices 254. Typically, the central office 254 would include an associated content exhange 124.

Referring next to FIG. 3A, a block diagram of an embodiment 300 of a portion of a headend 128 coupled to content receivers with the HFC plant 132 is shown. The associated content exchange 124 is coupled to a cable modem termination system (CMTS) 304. The depicted embodiment 300 routes network traffic that is IP packet based. The enhanced STBes 136 of this embodiment behaves like a client computer 140

DISH EXHIBIT 2002, Page 841
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

to allow browsing and to run player software. Some embodiments may have multiple associated content exchanges 124 and/or multiple CMTS with a router to direct network traffic between them. Additionally, a single headend 128 could serve any number of HFC plants 132.

The CMTS 304 includes a router to allow routing traffic to the appropriate enhanced STB 136 or associated client computer 140 by way of a DOCSIS or other cable modem. Data is modulated onto and demodulated off the HFC plant 132 by the CMTS. The CMTS also controls media access and other configuring for the DOCSIS cable modems. Reservations for bandwidth are made with the CMTS to guarantee a particular data rate or QOS between the associated content exchange 124 and content receiver 136, 140. Where a reservation is not possible, the datalink between the CMTS 304 and a content receiver 216 may proceed in a best efforts mode where any non reserved bandwidth is shared among many content receivers 136, 140 sharing a common datachannel.

With reference to FIG. 3B, a block diagram of an embodiment 320 of another portion of the headend 128 is shown coupled to set top boxes 136, 138. This embodiment 320 uses MPEG-2 formatted content objects transported in a multiplexed MPEG-2 data stream carried in a TV channel to each STB 138, 136. The enhanced STB 136 of this embodiment 320 can receive content objects from either the DOCSIS port or the MPEG-2 datastream.

In the case where the STB 136, 138 receives content objects through the MPEG-2 datastream, the navigational proxy 322 provides a menu channel for that purpose. The menu channel can be a list or grid showing available content objects or can be a web browser interface that allows selecting any content objects even if those content objects are not registered with the system 100. By having the menu or browser functionality in the navigation proxy 322 instead of the STB 136, 138, the footprint of the client software for the STB 136, 138 may be reduced. Requested content objects are downloaded to the associated content exchange 124 for buffering and/or cacheing before being streamed in a MPEG-2 datastream.

Once the content object is ready for streaming in the associated content exchange 124, the channel controller 324 configures the MPEG-2 transport to the STB 136, 138 such that the content object is transported in a channel package of elementary streams. To accomplish the transfer, the content object is routed to a transcoder 332 and encrypter 334 corresponding to a chosen channel package. The multiplexer 336 and

DISH EXHIBIT 2002, Page 842
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

modulator 340 are used to combine a number of channel packages together into a multiplexed datastream and modulate that datastream onto a carrier frequency for the selected TV channel. The channel controller 324 communicates the index of PIDs for the elementary stream and the selected TV channel to the client on the STB 136, 138 by way of a control data transceiver 328 such that the content object can be received and decoded. The channel controller 324 also records usage by STB 136, 138 such that costs associated with the service can be determined. In various embodiments, the usage could be determined based upon the number of reservations made, the amount of bandwidth reserved, the length of the reservation, and/or the portion of the reserved bandwidth that was used.

The transcoder 332 does any required format conversion on the content object. Format conversion may include changing the bit rate and/or the encoding for the content object. For example, the associated content exchange 124 could store a content object that is Quicktime™ encoded at 1 Mbps and the transcoder 332 could convert the content object to a MPEG-2 encoding at 400 Kbps. In this embodiment, some of the set top boxes 138 can only decode content objects in MPEG-2 format so most content objects are transcoded into MPEG-2 format.

The encrypter 334 scrambles a channel package such that it can only be decoded by the STB 136, 138 with the proper key. Although many STBes 136, 138 may receive the channel package, only the one(s) with the key can decode and view the program. Control through encryption allows conditional access of the content object. In some embodiments, encryption is not activated or keys are given to multiple STB 136, 138 such that many can play the content object.

Referring next to FIG. 3C, a block diagram of another embodiment 350 of the portion of the headend 132 is shown coupled to the standard set top box 136, 138. This embodiment does not have external transcoders 332. Any transcoding in this embodiment could be performed on a content exchange 116, 124 or at the content provider 108, 112.

Referring next to FIG. 4A, a block diagram of an unassociated content provider 108 is shown. The unassociated content provider 108 is simply any web site on the Internet 120 that serves web pages from a web server 404 that includes streamable content objects. The content objects are stored on a content server 408 and originate from a content source 416. The content source 416 could be a web cam, tape drive or any other

DISH EXHIBIT 2002, Page 843
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

mechanism for loading a content object. The web server 404, content server 408 and Internet 120 are all coupled together with a backbone 424.

With reference to FIG. 4B, a block diagram of an embodiment of an associated content provider 112 is shown. This embodiment adds functions to allow the content objects to be cataloged by the system 100 and to allow routing the content receivers 216 to a content source with adequate QOS for fulfillment of a request for a content object.

The Internet 120 and the QOS network 122 interface to a layer 4 switch 412. Requests to the web server 404 are redirected to the system interface 420 by the layer 4 switch 412. The system interface 420 requests the web page from the web server 404 and rewrites the content object links in the web page before presentment to the content receiver 216. The links are rewritten based upon the system interface 420 knowing where the content objects are distributed among the content exchanges 116, 124 and/or knowing which content exchanges 116, 124 are preferred by the content receiver 216.

Once the content receiver is redirected to a content exchange 116, 124 for fulfillment of the request for the content object, the content exchange 116, 124 may request the content object or portions thereof from the associated content provider 112 if no other content exchanges 116, 124 have the content object or portions thereof. Any request to the associated content provider 112 for the content object is intercepted by the system interface 420. After the system interface requests the content object from the content server 408, it may be processed by the system interface 420. The system interface 420 may transcode the content object to different coding formats or bitrates as it is streamed or all-at-once before streaming. Additionally, the content object may be encrypted to avoid illicit interception before reaching the content exchange 124.

The system interface 420 also supplies directory information to the network operation center 104. When content objects are added, removed or otherwise become unavailable on the content server 408 and/or at predetermined intervals, the system interface 420 reports that directory information back to the network operation center 104. A dynamic directory is maintained in the network operation center 104 that is constantly updated by the reports from the associated content providers 112. The directory may be used in generating the directory menu channel or may be browsed to determine the registered content objects available for streaming by the system 100.

DISH EXHIBIT 2002, Page 844
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

With reference to FIG. 5A, a block diagram of an embodiment of an unassociated or associated content exchange 116, 124 is shown connected to both the Internet 120 and the QOS Network 122 by way of the backbone 424. The content exchange 116, 124 includes a cache node 504 and a software subsystem 508. The cache node 504 is part of a distributed network of content exchanges 116, 124 interconnected by a high-speed link 528. This high-speed link 528 could include satellite, microwave, optical fiber, Internet, or other network technologies to allow quick sharing of content objects or portions thereof.

The cache node 504 stores content objects and portions thereof for spooling to multiple users. Buffering is provided even if multiple users do not request the content object. Included in the cache node 504 are a tracking server 502 and a content node 506. The content node 506 stores content objects in a cache or a file system and requests missing portions of a content object from other content exchanges 116, 124. Where the content object cannot be found in any of the content exchanges 116, 124, the tracking server 502 is used to get the content object from the content server 108, 112.

The tracking server 502 determines the content objects stored in the content node 506. Additionally, a list of all associated content providers 112 is maintained by the tracking server 502. All the associated content providers 112 are periodically notified by the tracking server 502 of which content objects are currently cached such that the associated content provider 112 knows where all its content objects are stored in the system 100. The tracking server 502 makes queries to the network operation center 104 to determine which content object portions in the content node 506 or requested by the content node 506 originated from which content providers 108. Health check information is also maintained in the tracking server 502.

Access to content objects may be controlled for billing, among other, purposes. The rights management application 512 manages conditional access to the content object. Conditional access is used to prevent others from using a content object that is not free to distribute. The traffic management application 510 tracks usage by content receiver 216. In various situations, either the user, the content provider or other parties are billed for the content object. The billing management application 520 works with the rights management and traffic management applications 512, 510 to bill the appropriate parties for usage.

The network management application 516 gives the network operation center 104 the ability to manage the content exchange 124 and otherwise collect

DISH EXHIBIT 2002, Page 845
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

information. The network management application 516 may track health information and utilization for network maintenance and other purposes. Also, billing information and rights information may be monitored and reported to the network operation center 104 by the network management application 516.

Referring next to FIG. 5B, a block diagram of another embodiment of the content exchange 116, 124 with transcoding capability is shown. The transcoding function 526 could include hardware and/or software to perform transcoding of bit rates and coding formats for content objects. This processing could be performed while streaming the content object or before a content object is streamed. For example, a VOD movie could be distributed in Quicktime™ format with a 2 Mbps datarate which is transcoded to MPEG-2 format at a 1 Mbps datarate for distribution to a STB 136, 138.

With reference to FIG. 6A, a block diagram of an embodiment of an associated client computer 140 is shown. A network interface 616, such as a cable modem, connects the associated client computer 140 to the HFC plant 132 to send and receive IP packet information. A viewer object proxy 604, a content processing program 620, a digital rights management function 612, and a customizable player skin 624 all run in an application layer 608. The video and/or audio associated with the content object is sent to a player output interface 614 which could include a video function and/or audio function.

The viewer object proxy 604 interfaces with the network interface 616 to determine QOS for content exchanges 116, 124. Suitable content exchanges 116, 124 are ranked in a list and that list is maintained until it is requested by an associated content provider 112. Typically, any associated content exchange 124 would be at the top of the ranked list. Where content objects are sourced from places other than an associated content exchange 124, the unassociated content exchange 116 may receive some compensation.

The digital rights management function 612 works with the content objects to protect copyrighted content objects from unauthorized use. Content objects authorized for use are played by the content processing program 620. Examples of content processing programs 620 include Windows Media Player™, Real Player™, etc. The customizable player skin 624 overlays the content processing program 620 to change the look and feel.

DISH EXHIBIT 2002, Page 846
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Referring next to FIG. 6B, a block diagram of an embodiment of an enhanced STB 136 is shown. This enhanced STB 136 operates in a mode similar to the associated client computer 140 of Fig. 6A where an IP packet datalink transports the content objects by way of a DOCSIS modem that may be embedded in the enhanced STB 136. Although not shown in this embodiment, the enhanced STB 136 could also receive content objects from channel package of elementary streams sent on an MPEG channel. This embodiment, does not include a customizable player skin 624, but other embodiments could include one.

With reference to FIG. 6C, a block diagram of an embodiment of a standard set top box 138 is shown that can tune to TV channel for decoding a multiplexed datastream with a channel package for a content object to play that content object. This embodiment receives control data information and datastreams embedded in TV channels or out of band channels. Other embodiments could use a DOCSIS modem or equivalent to receive control data information.

The navigation function 686 is a client application that supports receiving content objects sent as channel package of elemental streams on a TV channel arranged by the channel controller 324. Preference information for a user may also be stored in the navigation function 686 such that content objects are coded at specified data rates or streamed in various preferred modes.

Menu or browser interaction information from the user is gathered by a navigation function 686 from a wireless receiver. The user may have, for example, a keyboard that communicates with infrared to the wireless receiver 682. The menuing or browser interaction information is sent by the control data transceiver 650 back to the navigational proxy 322.

Control data information such as the channel package index is sent to a control data transceiver 650 for decoding. Once the PIDs and TV channel are known from that index, the standard STB is 138 is configured to receive the content object. The TV channel information is sent to a tuner 658 to change its receiver frequency to that channel. A digital datastream is recovered from the carrier signal in the TV channel by a digital demodulator 662. The channel package is recovered by the digital channel select circuit 670 by filtering the packets based upon PIDs. Presuming receiving the content object is authorized, a decryption engine has a key that allows decoding the channel package into plain text.

DISH EXHIBIT 2002, Page 847
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

A MPEG-2 decoder 674 converts the plain text channel package into a NTSC, PAL or similar video signal. A TV interface 678 provides the video signal to an external monitor for viewing by the user. The above embodiment produces a video program on a TV, but those skilled in the art can appreciate that the invention is easily implemented for audio programs as well.

Referring next to FIG. 7, a flow diagram of an embodiment of a process 700 for streaming a content object to a standard STB 138 is shown. The depicted process picks-up in step 704 where a menu channel is presented by the navigational proxy 322 to the user with a list of possible content objects. The user uses a remote control to select one of the menu choices. The selection is detected by the wireless receiver 682 and relayed to the navigation function 686 in step 708.

In step 712, preparations are made to transport the content object to the standard STB 138. A request is made by the navigational proxy 322 to the content provider 108, 112 that originated the content object. An associated content provider 112 receives a ranking of the content exchanges 116, 124 that could source the content object, whereafter the system interface 420 redirects the request to a content exchange 116, 124 with adequate QOS.

If an unassociated content provider 116 is the source of the content object, the navigational proxy 322 redirects that request to a content exchange 116, 124 with adequate QOS. The content exchange 116, 124 that the request is redirected to will first try to find the content object locally, then request the content object from other content exchanges 116, 124, and last request the content object from the unassociated content provider 116.

The channel controller 324 arranges the transport between the headend 128 and the STB 138 in steps 720 and 724. The multiplexer 336 and modulator 340 for a TV channel with bandwidth available in the datastream for another channel package is determined in step 720. The channel package index of PIDs is communicated with the control data transceivers 328, 650 to the controller 654 in the STB 138. To receive the channel package, the controller 654 configures the STB 138 to tune to the TV channel, demodulate the datastream, filter out the channel package, decrypt that package, and display the content object.

Once the conduit between the headend 128 and the STB 138 is ready, this embodiment uses a transcoder 332 to change the coding format and/or datarate of the

DISH EXHIBIT 2002, Page 848
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

content object in step 728. For example, a content object in Real™ format could be changed to MPEG-2 format. As the channel package stream is converted to MPEG-2 format, it is streamed to the STB 138 in step 732. The content object is processed and played for the user in step 736. In various embodiments, the navigational proxy 322 may arrange the transcoding at either the headend 128, the content exchange 116, 124 or the associated content provider 112.

With reference to FIG. 8, a flow diagram of an embodiment of a process 800 for streaming a content object to a content receiver 216 is shown. This embodiment uses a browser interface in either the enhanced STB 136 or the associated client computer 140 to select the content object. The depicted process takes-up in step 804 where the user browses for possible content objects. The browsing may be done with the directory information stored in the network operation center 104 or could be done by browsing of content providers 108, 112 directly.

Once a content object is located by the user, the link for that object is selected. Where the content object is from an unassociated content provider 108, the viewer object proxy 604 determines the content exchange 116, 124 to redirect the request to and makes the request from that content exchange 116, 124. Alternatively, a request for a content object from an associated content provider 112 is redirected by that associated content provider 112 based upon preference information to a content exchange 116, 124 with adequate QOS.

In step 816, the selected content exchange 116, 124 gathers the content object. After a local check, the high-speed link 528 to other content exchanges 116, 124 is next used to query for any missing portions of the content object. Where peer content exchanges 116, 124 cannot locate the missing portions, a request is made back to the content provider 108, 112 that originated the content object.

Once the initial portions of the content object are found, streaming of the content object begins in step 828. The content object is streamed using IP packet transport over a broadband connection such as a satellite link, a DSL modem, a cable modem, a power line data modem, a microwave dish, cellular data modem, line-of-sight laser modem, etc. In some embodiments, a reservation may be made to guarantee an amount of bandwidth to support the stream or, alternatively, allow "best efforts" streaming of the content object. The content processing program 620 decodes and plays the streamed content object so long as the digital rights management function 612

DISH EXHIBIT 2002, Page 849
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

determines viewing is authorized and provides appropriate decryption of the streamed content.

Referring next to FIG. 9, a flow diagram of an embodiment of a process 900 for controlling QOS for a streamed content object is shown. In step 904, a request for a content object is detected by the CMTS 304. The duration, format and bandwidth for the content object is determined by the CMTS 304 such that the bandwidth and duration of a data channel reservation can be discerned. An attempt is made in step 912 to reserve the data channel. If the data channel can be accommodated as determined in step 916, the data channel reservation is negotiated between the CMTS 304 and DOCSIS modem associated with the content receiver 216. The CMTS 304 and DOCSIS modem are capable of arranging a datalink that cannot normally be oversubscribed as is possible when only "best efforts" bandwidth is available.

Where the datalink cannot be reserved, an attempt to located a lower bitrate version of the content object is performed in step 924. If the lower bitrate version is available, a determination is made as to whether the lower QOS version is acceptable to the user in step 928. Preference information previously stored may be used for this determination. If the lower bitrate version is determined acceptable in step 928, processing loops back to step 916 to determine if a reservation is possible.

Returning to step 924, in some cases a lower bitrate version of the content object is not readily available. In those cases, the next smaller bit rate that could be produced by the transcoding function 526 is determined in step 932. Some embodiments could store a content object in a number of transcoded formats and datarates to anticipate the desire for different encoding. A determination is made in step 928 to see if the reduced QOS is acceptable to the user. If so, the reservation is once again attempted. Presuming the reservation is fulfilled, the transcoding is performed to comply with the reservation.

Under some circumstances, the user may be unwilling to accept a reservation with lower QOS in step 928. If so, a determination is made in step 940 to see if the user will accept a delayed start time. If accepted, a buffer in the content receiver 216 is populated with enough of the content object to overcome interruptions or bandwidth bottlenecks. In some circumstances, "best efforts" delivery may be used and a determination is made on the system 100 loading such that an appropriate buffer size is chosen. In other situations, a reservation for a datarate less than the desired datarate of

DISH EXHIBIT 2002, Page 850
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

the content object is made and the buffer size required is determined such that the content object can be played from beginning to end without interruption.

In some circumstances, the user may further decide that a delayed start is not acceptable in step 940. The user can accept "best efforts" delivery in step 942 and receive the content object in step 922. In "best efforts" mode, there may be skips and other QOS issues experienced during playback. The user would always have the option of pausing playback when QOS deteriorates too far such that buffering is done. Resuming playback after buffering in pause mode results in better QOS. If the user decides that "best efforts" mode is not desired back in step 942, a busy message is displayed in step 944.

In some embodiments, a service plan for the content receiver 216 may limit the amount of bandwidth that can be reserved. Different service levels could allow for differing amounts of reserved bandwidth. These service levels could correspond to service tiers. Various service levels could limit the reservation authority of the user based upon the time of day requested for the reservation, the length of reservation, the bandwidth requested for the reservation, how many other reservations are pending, total time requested for other pending reservations, prioritization of all reservations, etc. Further, the service levels could restrict the duration and/or data rate that can be reserved. Some embodiments could impose a charge to the content receiver 216 for each reservation made, the bandwidth reserved, the length of time for the reservation and/or the amount used of the reserved bandwidth.

The above embodiment attempts to reserve bandwidth as the content object is requested. Other embodiments could allow the user to reserve bandwidth for use at a particular future time. For example, a two-hour block of bandwidth could be reserved for 8:00 on Saturday night in anticipation of watching a movie. In an alternative example, a live event could be selected from a program guide for viewing at the top of the hour.

Some embodiments may include the facilities to record performance statistics. These statistics could include success rate in receiving the content object, bandwidth usage per reservation, actual wait time before receiving a reservation versus expected wait time, actual versus granted bandwidth for a reservation, duration of delayed start, rate at which a content object viewing session is abandoned by users, etc. Information such as this could be used for the purposes of billing, maintenance, capacity engineering, etc.

DISH EXHIBIT 2002, Page 851
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

A number of variations and modifications of the invention can also be used. For example, a reservation for bandwidth may be enlarged in period to accommodate pausing and rewinding of the content object during playback. Other embodiments may buffer the remainder such that the reservation period can remain the same. In still other embodiments, the reserved data rate between a headend and a content receiver can dynamically change along with the encoded bitrate within defined QOS ranges.

In the above embodiments, a HFC or HFTP plant is used to distribute the streamed objects to the set top boxes or client computers that play the streamed objects. Other embodiments could use other distribution plants. For example, a wireless plant could be used that provides wireless data transmission using UHF, microwave, satellite, cellular, or other wireless technologies.

While the principles of the invention have been described above in connection with specific apparatuses and methods, it is to be clearly understood that this description is made only by way of example and not as limitation on the scope of the invention.

DISH EXHIBIT 2002, Page 852
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

WHAT IS CLAIMED IS:

1. A method for distributing a content object over a broadband connection to an end-user location, the method comprising step of:

determining an amount of bandwidth for adequate quality of service (QOS) to transport the content object;

determining a period for transporting the content object;

checking for availability of the amount of bandwidth to the end-user location over the period;

reserving the bandwidth if available; and

streaming the content object to the end-user location.

2. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 1, further comprising a step of beginning to buffer the content object before the streaming step.

3. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 1, further comprising a step of beginning to cache the content before the streaming step.

4. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 1, further comprising a step of converting the content object to a lower bitrate if the check for availability is unsuccessful.

5. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 1, further comprising a step of determining if a lower QOS is acceptable to an end-user if the check for availability is unsuccessful.

6. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 1, further comprising steps of:

determining the amount of bandwidth available over the period, where the amount of bandwidth is less than that required for adequate QOS;

determining a buffer amount to provide adequate QOS; and

storing the buffer amount corresponding to a portion of the content object proximate to the end user location.

DISH EXHIBIT 2002, Page 853
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

7. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 1, further comprising a step of determining usage by the end-user location based upon at least one of a number of reservations made, an amount of bandwidth reserved, a length of a reservation, and a portion of bandwidth used for the amount of bandwidth reserved.

8. A method for distributing a content object over a broadband connection to an end-user location, the method comprising step of:

determining an amount of bandwidth for adequate quality of service (QOS) to transport the content object;

determining a period for transporting the content object;

checking for availability of the amount of bandwidth to the end-user location over the period;

reserving the bandwidth if available;

choosing a lower bitrate version of the content object if the check for availability is unsuccessful; and

streaming the content object to the end-user location.

9. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of beginning to buffer the content object before the streaming step.

10. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of beginning to cache the content before the streaming step.

11. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of determining if a lower QOS is acceptable to an end-user if the check for availability is unsuccessful.

12. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising steps of:

determining the amount of bandwidth available over the period, where the amount of bandwidth is less than that required for adequate QOS;

DISH EXHIBIT 2002, Page 854
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

determining a buffer amount to provide adequate QOS; and

storing the buffer amount corresponding to a portion of the content object proximate to the end user location.

13. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of reserving the bandwidth at a future time.

14. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of checking the service plan associated with the end-user location before allowing the reserving of bandwidth.

15. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of checking the service tier associated with the end-user location before allowing the reserving of bandwidth.

16. The method for distributing the content object over the broadband connection to the end-user location as recited in claim 8, further comprising a step of converting the content object into versions that have different bit rates.

17. A software product embodied on a computer-readable medium for distributing a content object over a broadband connection to an end-user location, the software product comprising code for:

determining an amount of bandwidth for adequate quality of service (QOS) to transport the content object;

determining a period for transporting the content object;

checking for availability of the amount of bandwidth to the end-user location over the period;

reserving the bandwidth if available;

converting the content object to a lower bitrate if the check for availability is unsuccessful; and

streaming the content object to the end-user location.

DISH EXHIBIT 2002, Page 855
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

18. The software product embodied on a computer-readable medium for distributing the content object over the broadband connection to the end-user location as recited in claim 17, further comprising code for beginning to buffer the content object before the streaming step.

19. The software product embodied on a computer-readable medium for distributing the content object over the broadband connection to the end-user location as recited in claim 17, further comprising code for beginning to cache the content before the streaming step.

20. The software product embodied on a computer-readable medium for distributing the content object over the broadband connection to the end-user location as recited in claim 17, further comprising code for determining if a lower QOS is acceptable to an end-user if the check for availability is unsuccessful.

21. The software product embodied on a computer-readable medium for distributing the content object over the broadband connection to the end-user location as recited in claim 17, further comprising code for:

determining the amount of bandwidth available over the period, where the amount of bandwidth is less than that required for adequate QOS;

determining a buffer amount to provide adequate QOS; and

storing the buffer amount corresponding to a portion of the content object proximate to the end user location.

DISH EXHIBIT 2002, Page 856
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

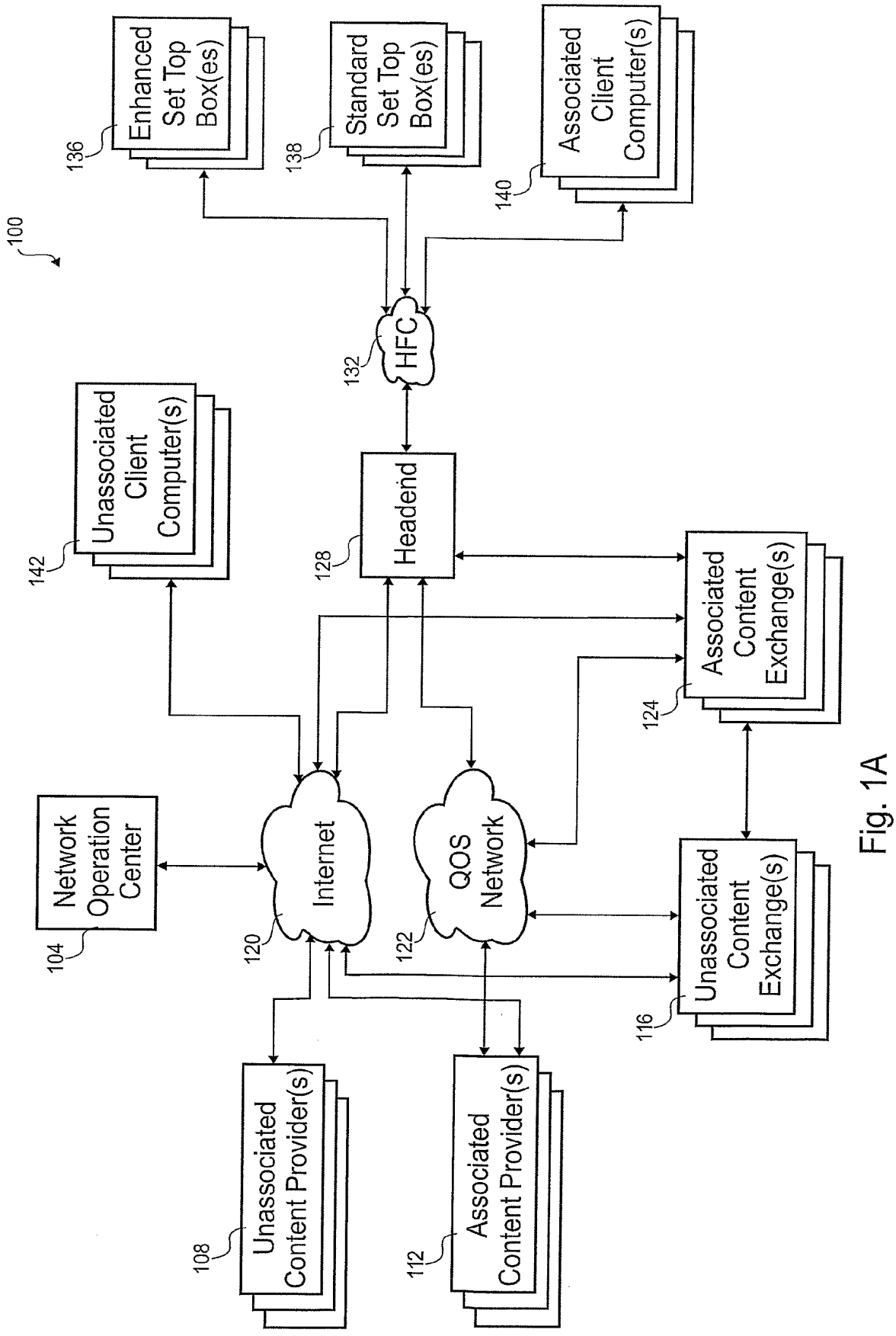

100
Enhanced Set Top Box(es)
136
Standard Set Top Box(es)
138
Associated Client Computer(s)
140
HFC
132
Unassociated Client Computer(s)
142
Headend
128
Associated Content Exchange(s)
124
Network Operation Center
104
Internet
120
QOS Network
122
Unassociated Content Exchange(s)
116
Unassociated Content Provider(s)
108
Associated Content Provider(s)
112

Fig. 1A

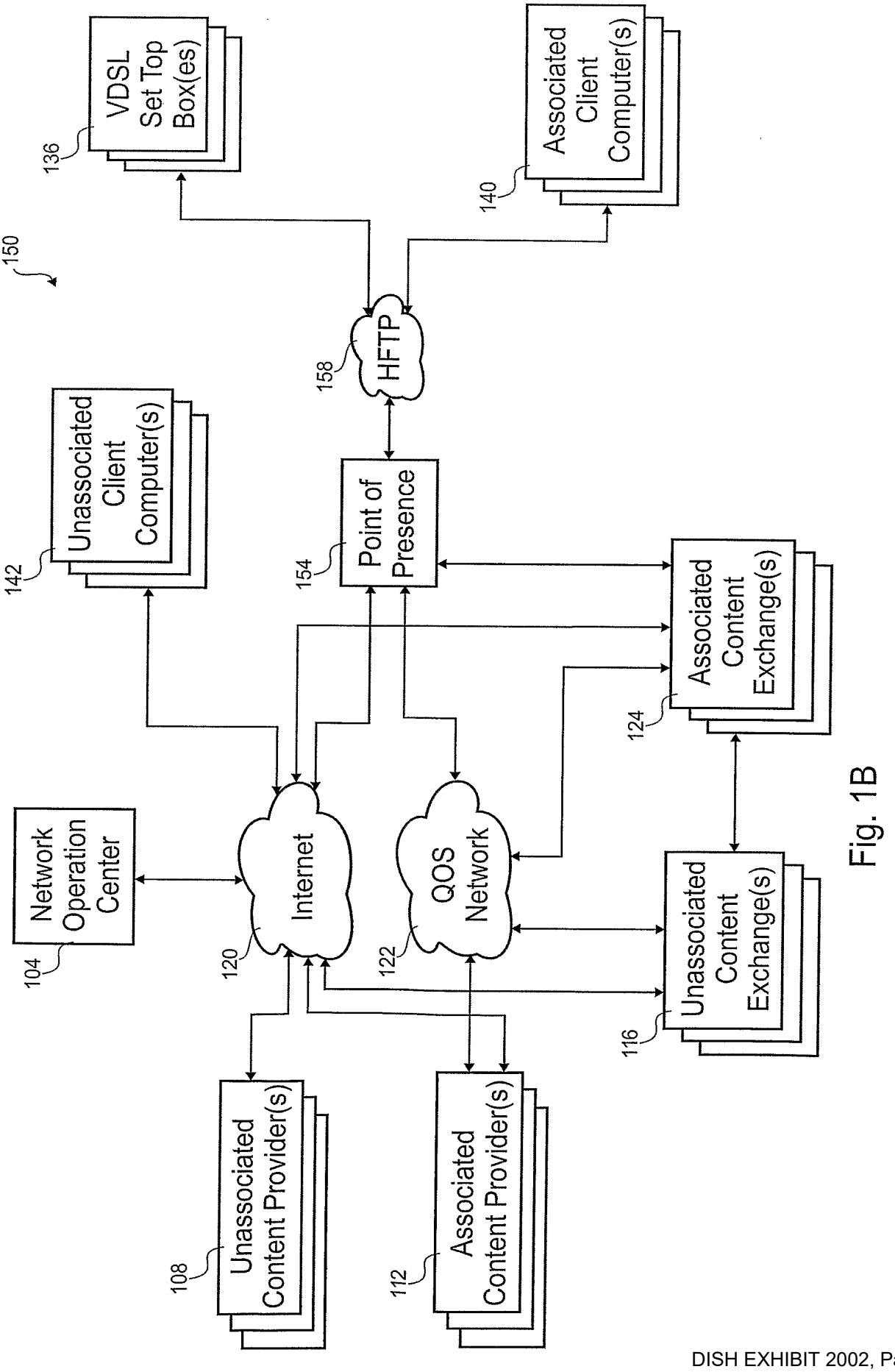

VDSL Set Top Box(es)
136
Associated Client Computer(s)
140
150
HFTP
158
Unassociated Client Computer(s)
142
Point of Presence
154
Associated Content Exchange(s)
124
Network Operation Center
104
Internet
120
QOS Network
122
Unassociated Content Exchange(s)
116
Unassociated Content Provider(s)
108
Associated Content Provider(s)
112

Fig. 1B

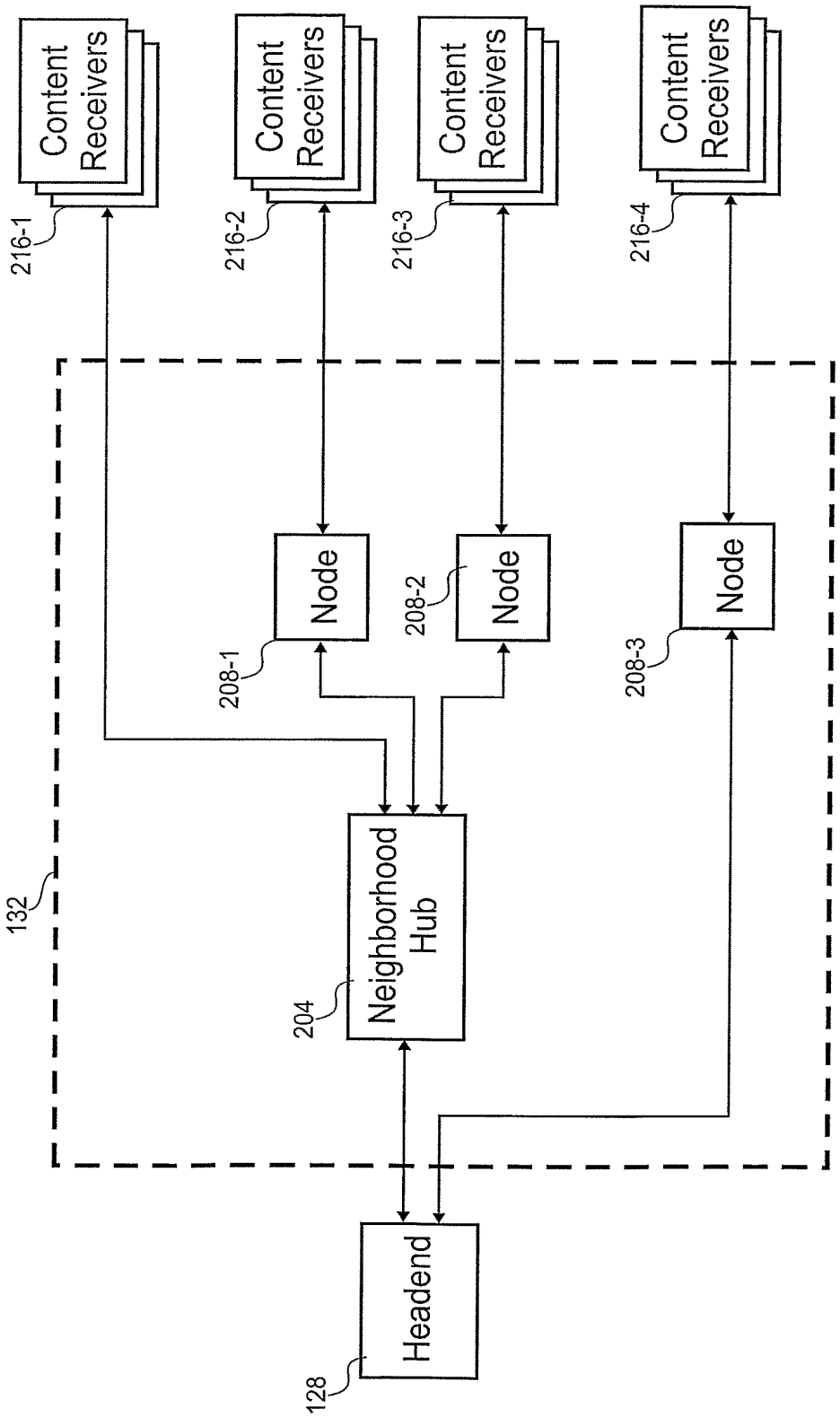

Content Receivers
216-1
Content Receivers
216-2
Content Receivers
216-3
Content Receivers
216-4
Node
208-1
Node
208-2
Node
208-3
132
Neighborhood Hub
204
Headend
128

Fig. 2A

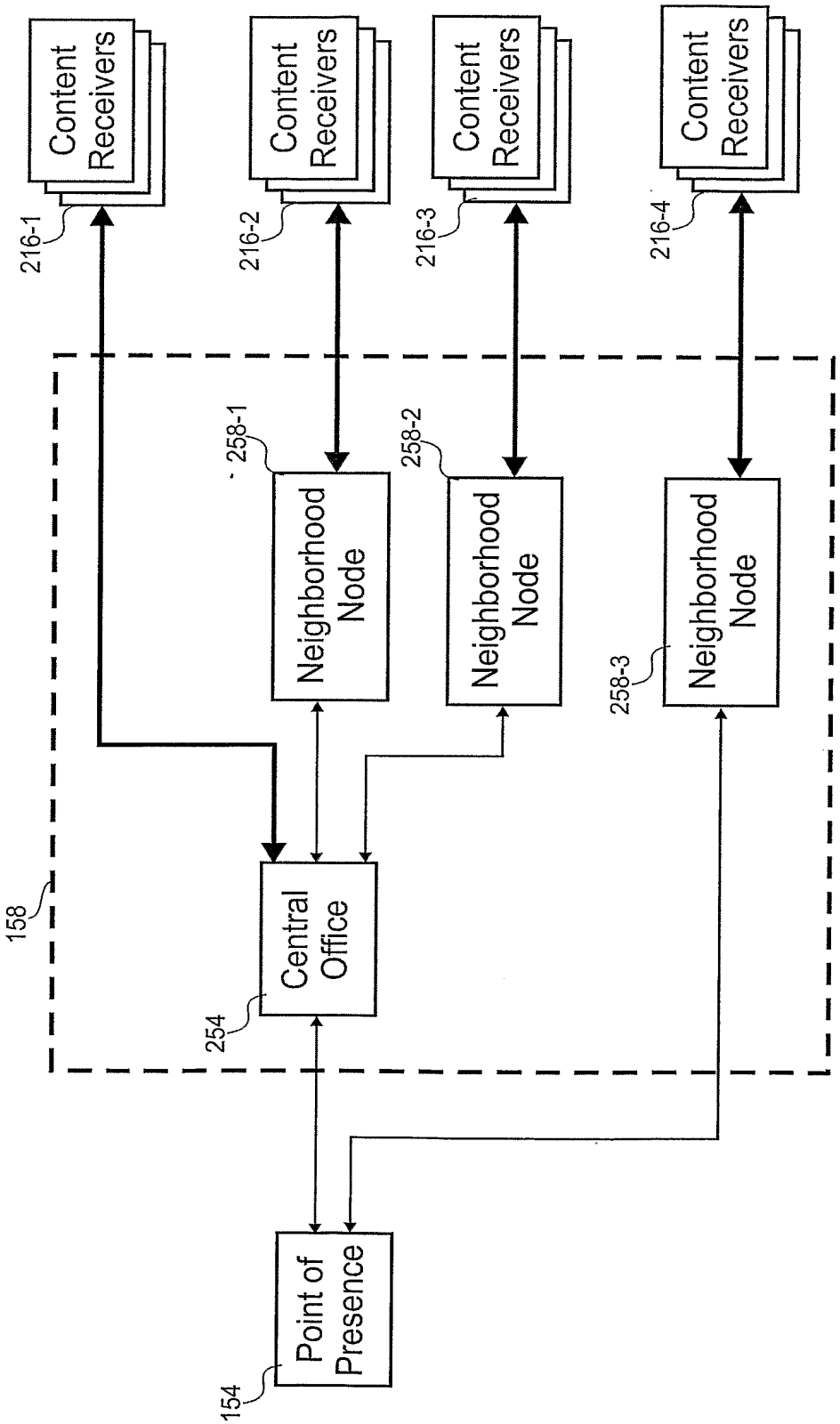

Content Receivers
Content Receivers
Content Receivers
Content Receivers
216-1
216-2
216-3
216-4
258-1
258-2
258-3
Neighborhood Node
Neighborhood Node
Neighborhood Node
158
Central Office
254
Point of Presence
154

Fig. 2B

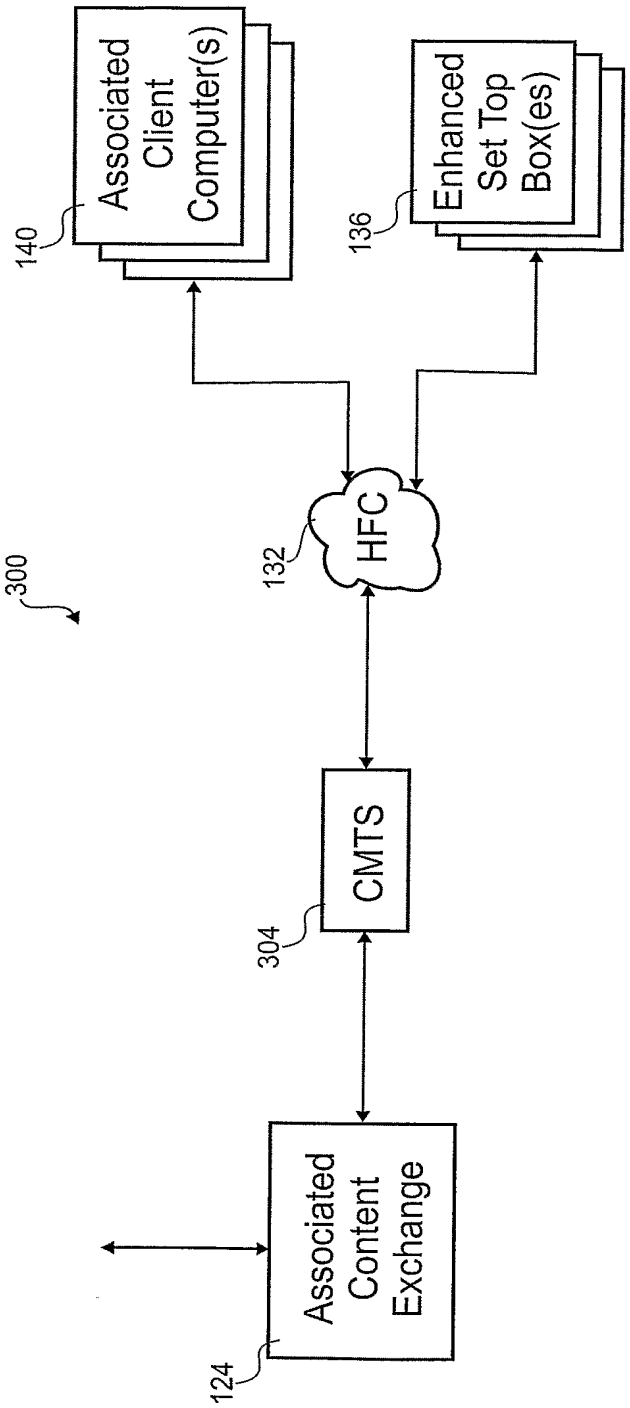

Associated Client Computer(s)
140
Enhanced Set Top Box(es)
136
HFC
132
300
CMTS
304
Associated Content Exchange
124

Fig. 3A

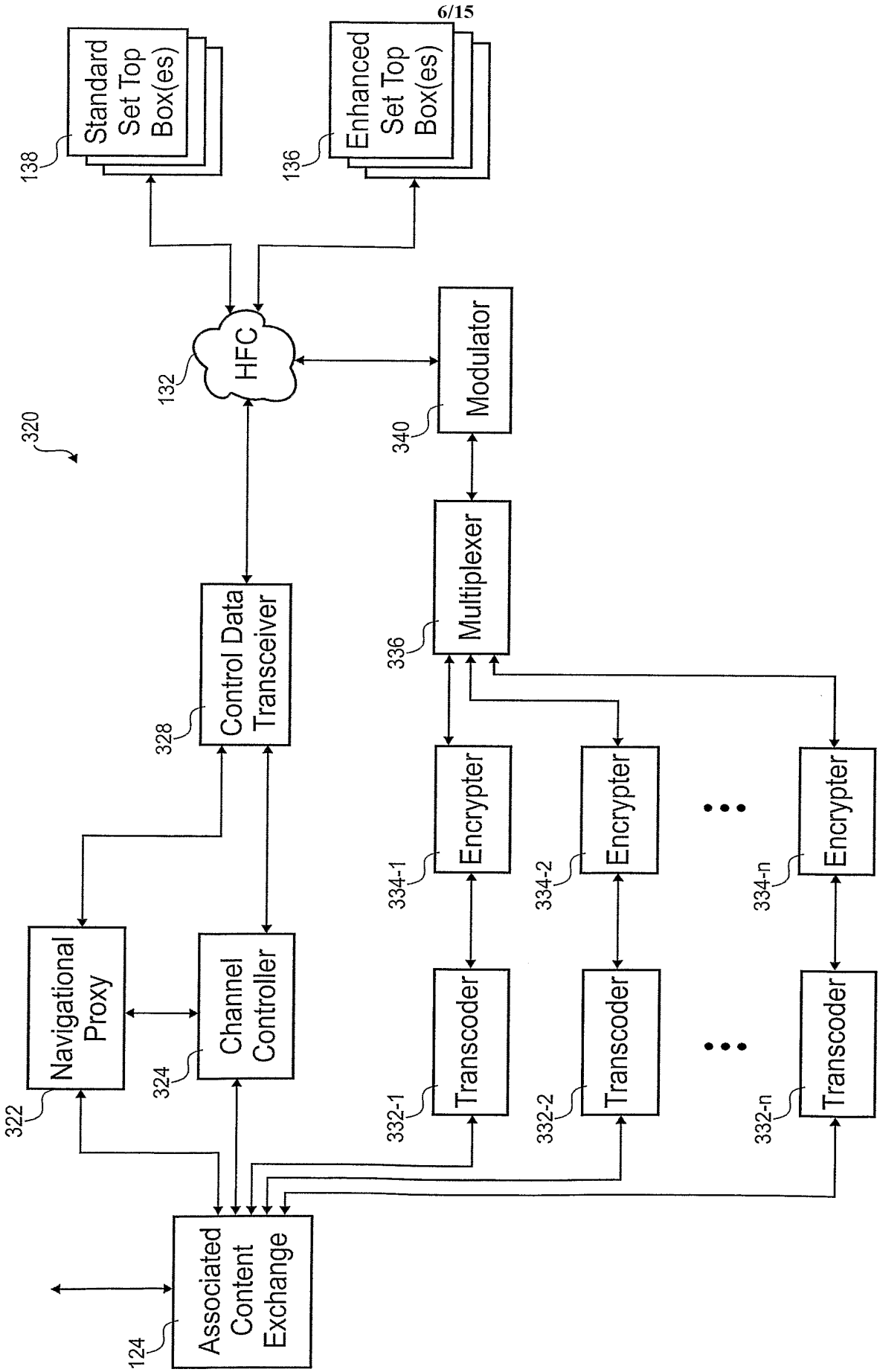

Standard Set Top Box(es)
138
Enhanced Set Top Box(es)
136
HFC
132
320
Modulator
340
Multiplexer
336
Control Data Transceiver
328
Encrypter
334-1
Encrypter
334-2
Encrypter
334-n
Navigational Proxy
322
Channel Controller
324
Transcoder
332-1
Transcoder
332-2
Transcoder
332-n
Associated Content Exchange
124

Fig. 3B

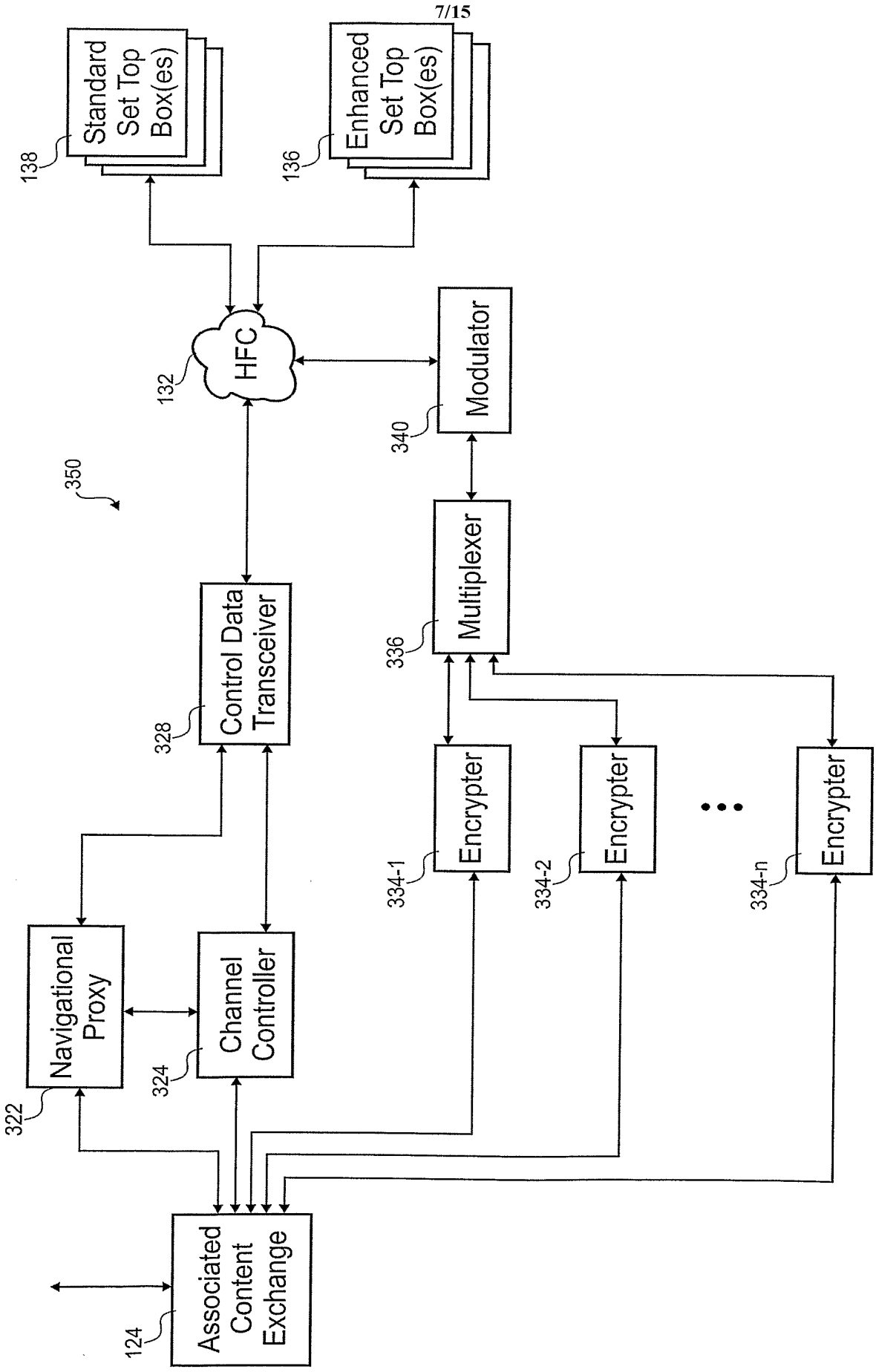

Standard Set Top Box(es)
138
Enhanced Set Top Box(es)
136
HFC
132
Modulator
340
350
Multiplexer
336
Control Data Transceiver
328
Encrypter
334-1
Encrypter
334-2
Encrypter
334-n
Navigational Proxy
322
Channel Controller
324
Associated Content Exchange
124

Fig. 3C

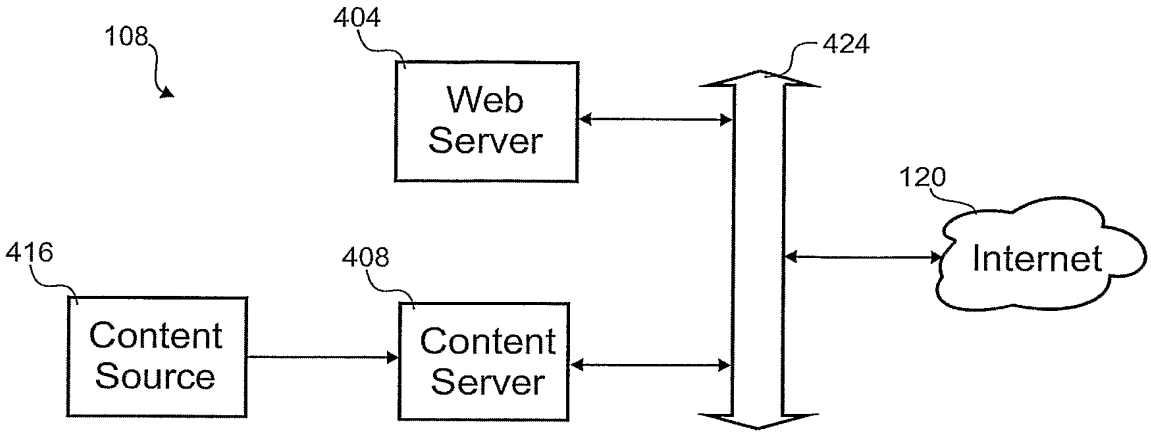


Fig. 4A
(Prior Art)

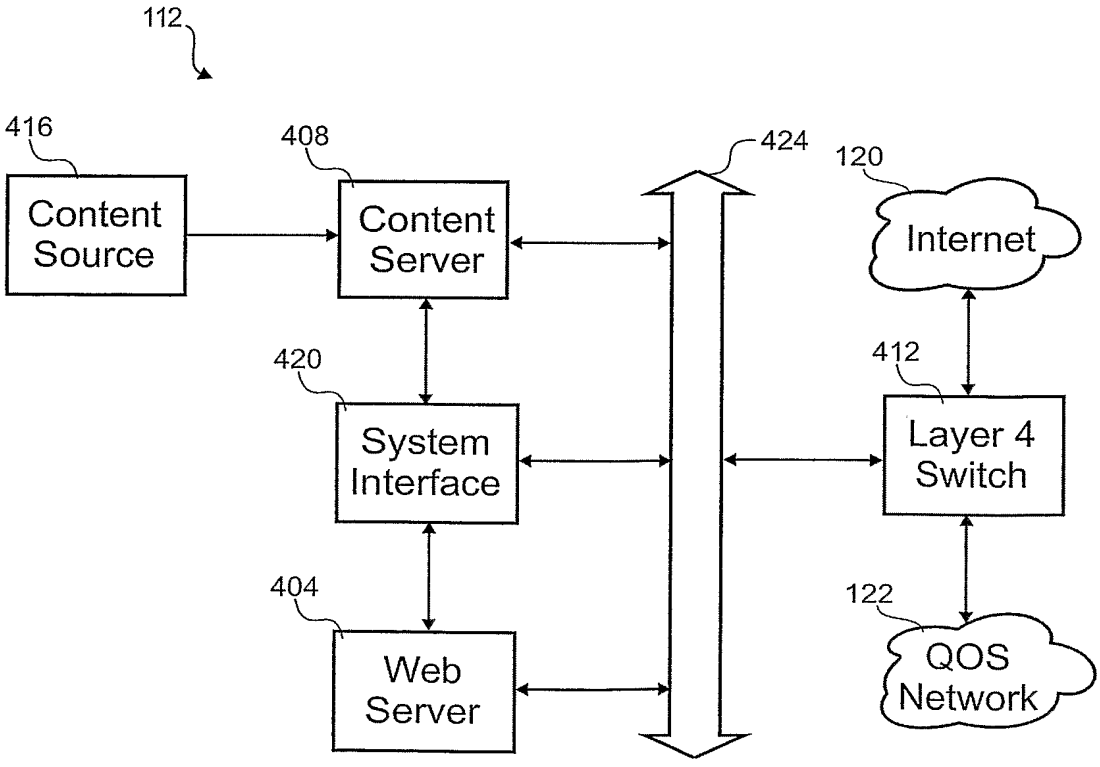


Fig. 4B

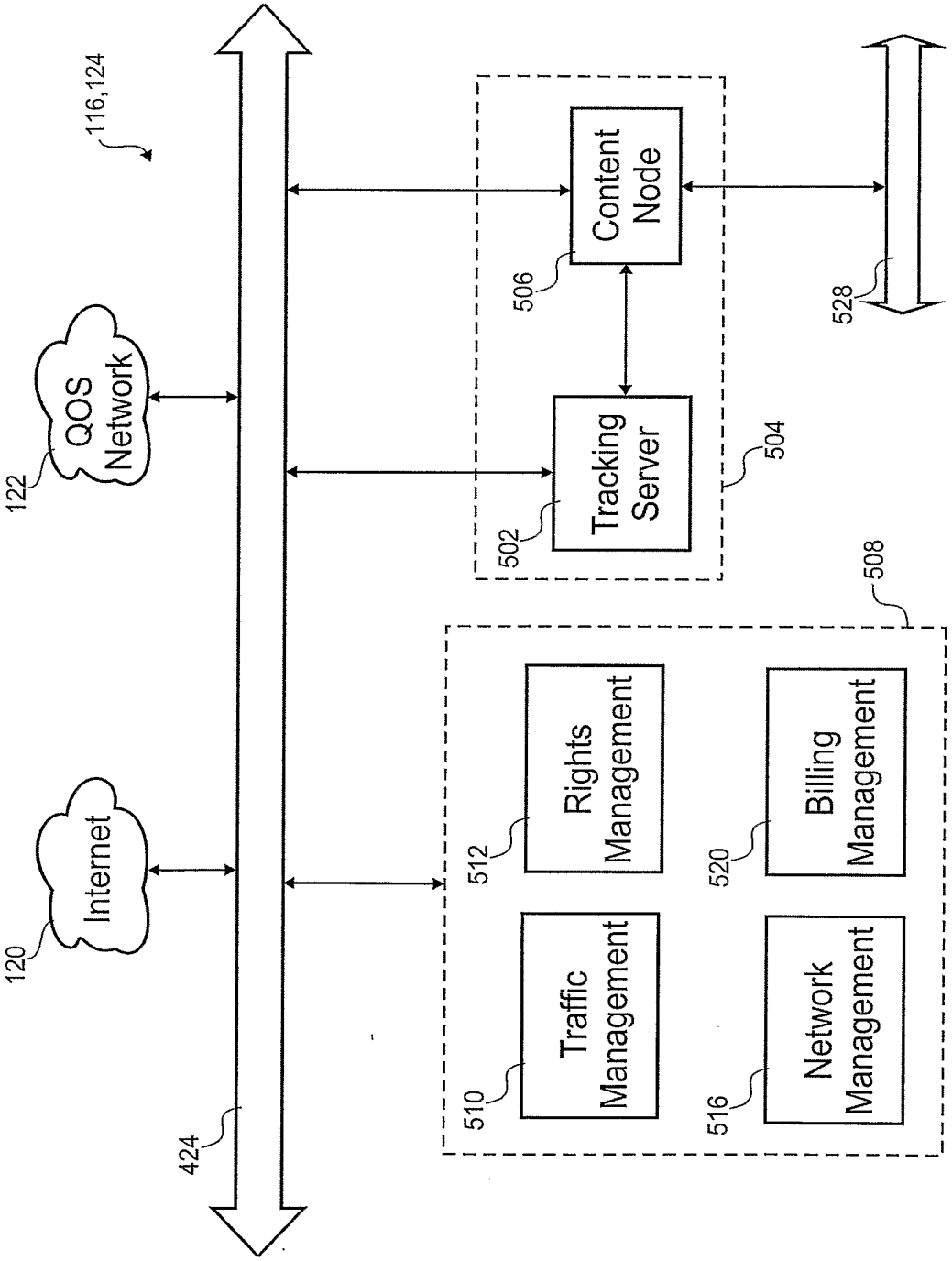

116,124
QOS Network
122
Internet
120
424
Content Node
506
Tracking Server
502
504
528
508
Rights Management
512
Billing Management
520
Traffic Management
510
Network Management
516

Fig. 5A

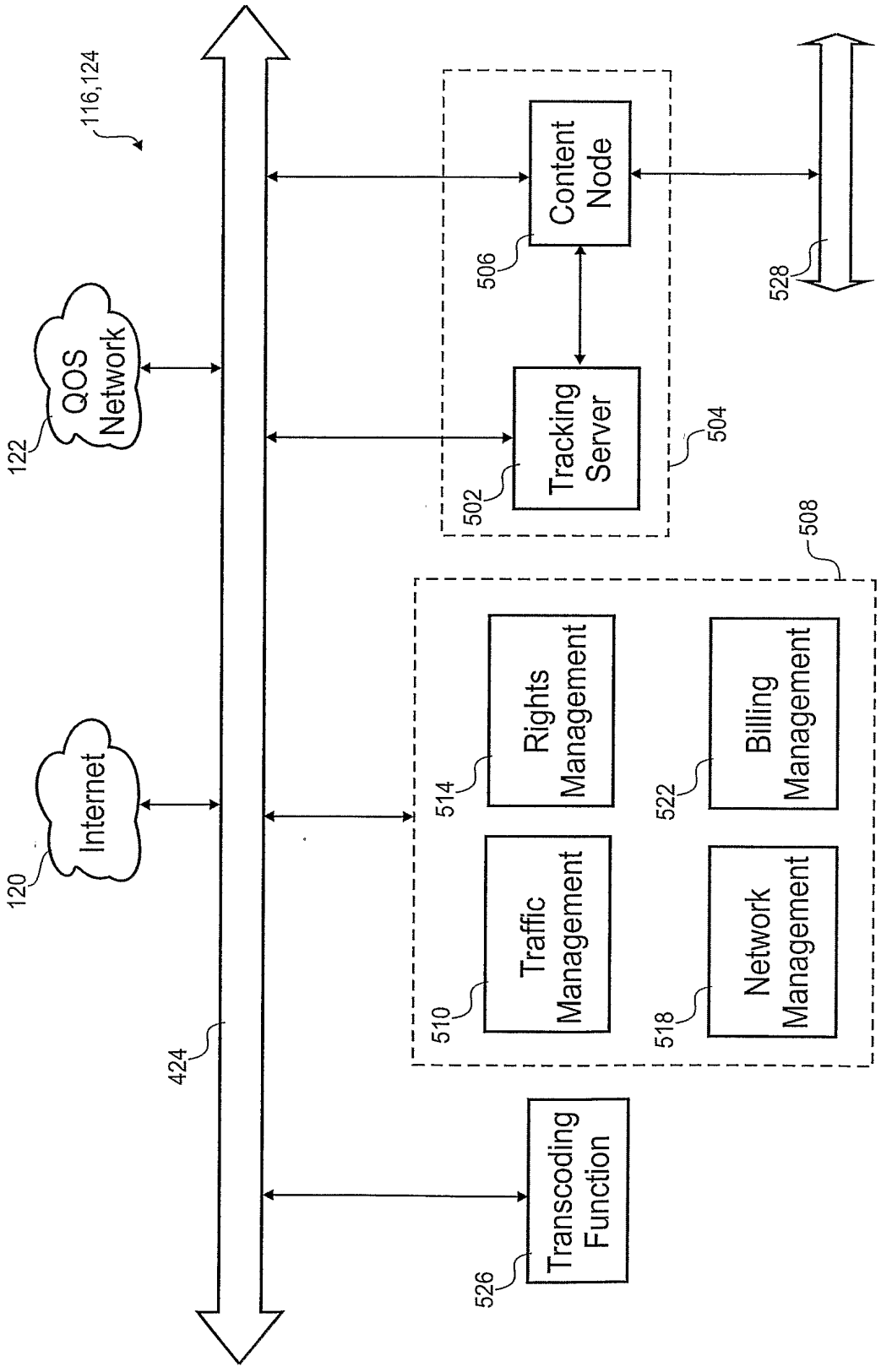

116,124
QOS Network
122
Internet
120
424
Content Node
506
Tracking Server
502
504
528
508
Rights Management
514
Billing Management
522
Traffic Management
510
Network Management
518
Transcoding Function
526

Fig. 5B

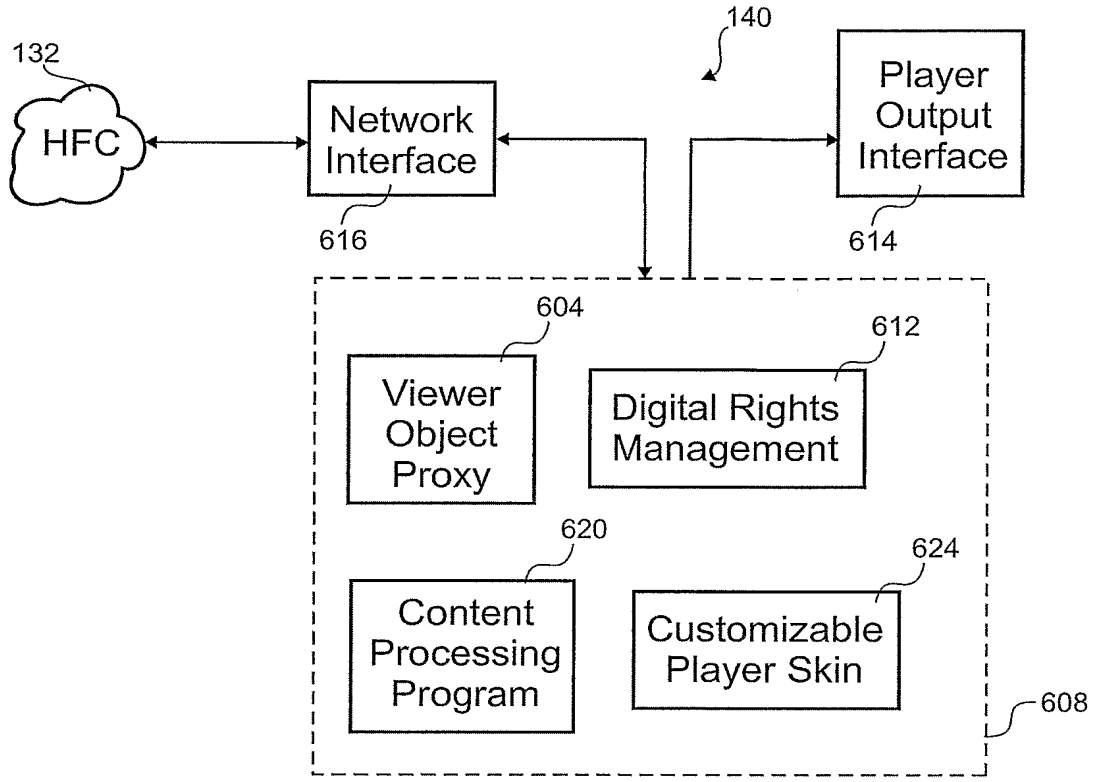

140
132
HFC
Network Interface
Player Output Interface
616
614
604
612
Viewer Object Proxy
Digital Rights Management
620
624
Content Processing Program
Customizable Player Skin
608

Fig. 6A

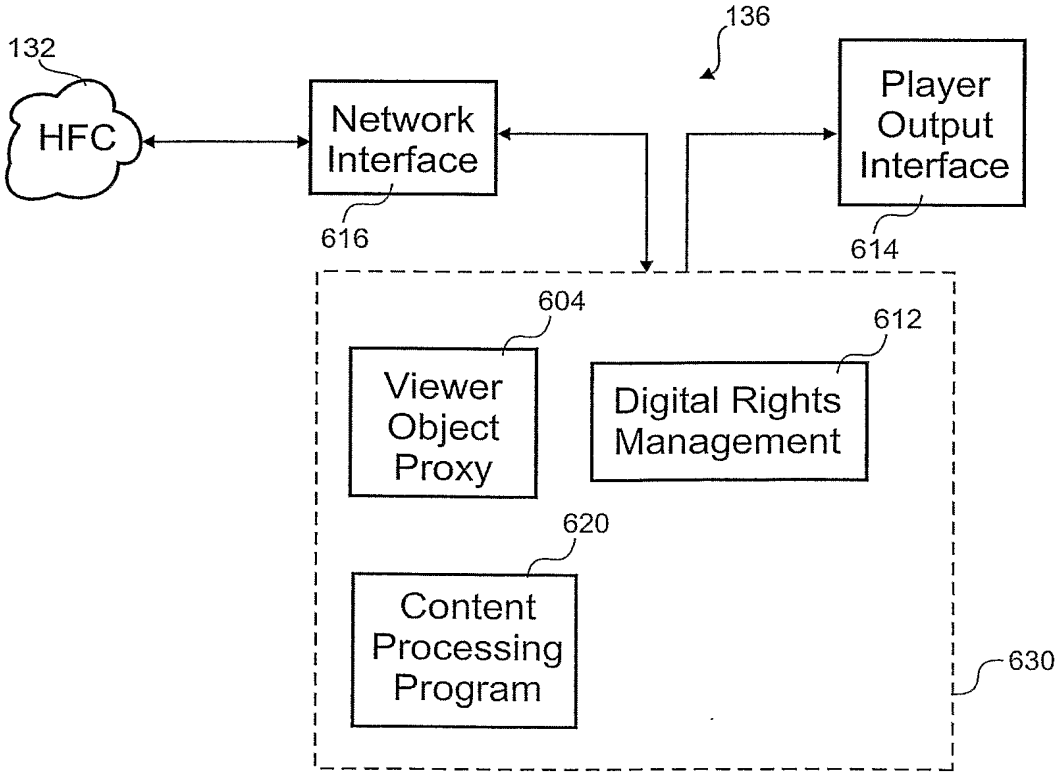

136
132
HFC
Network Interface
Player Output Interface
616
614
604
612
Viewer Object Proxy
Digital Rights Management
620
Content Processing Program
630

Fig. 6B

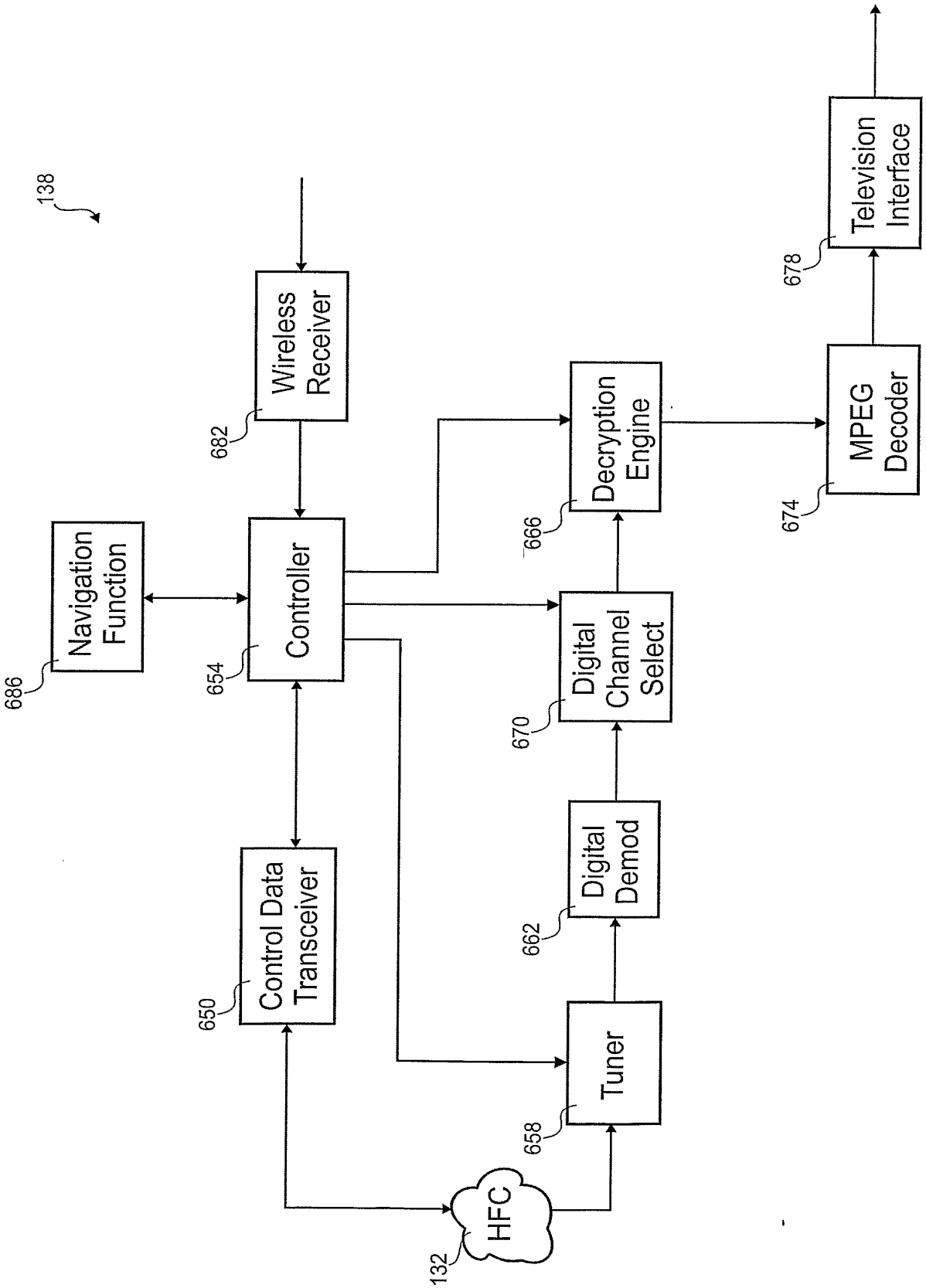

138
Wireless Receiver
682
Navigation Function
686
Controller
654
Decryption Engine
666
Digital Channel Select
670
MPEG Decoder
674
Television Interface
678
Control Data Transceiver
650
Digital Demod
662
Tuner
658
HFC
132

Fig. 6C

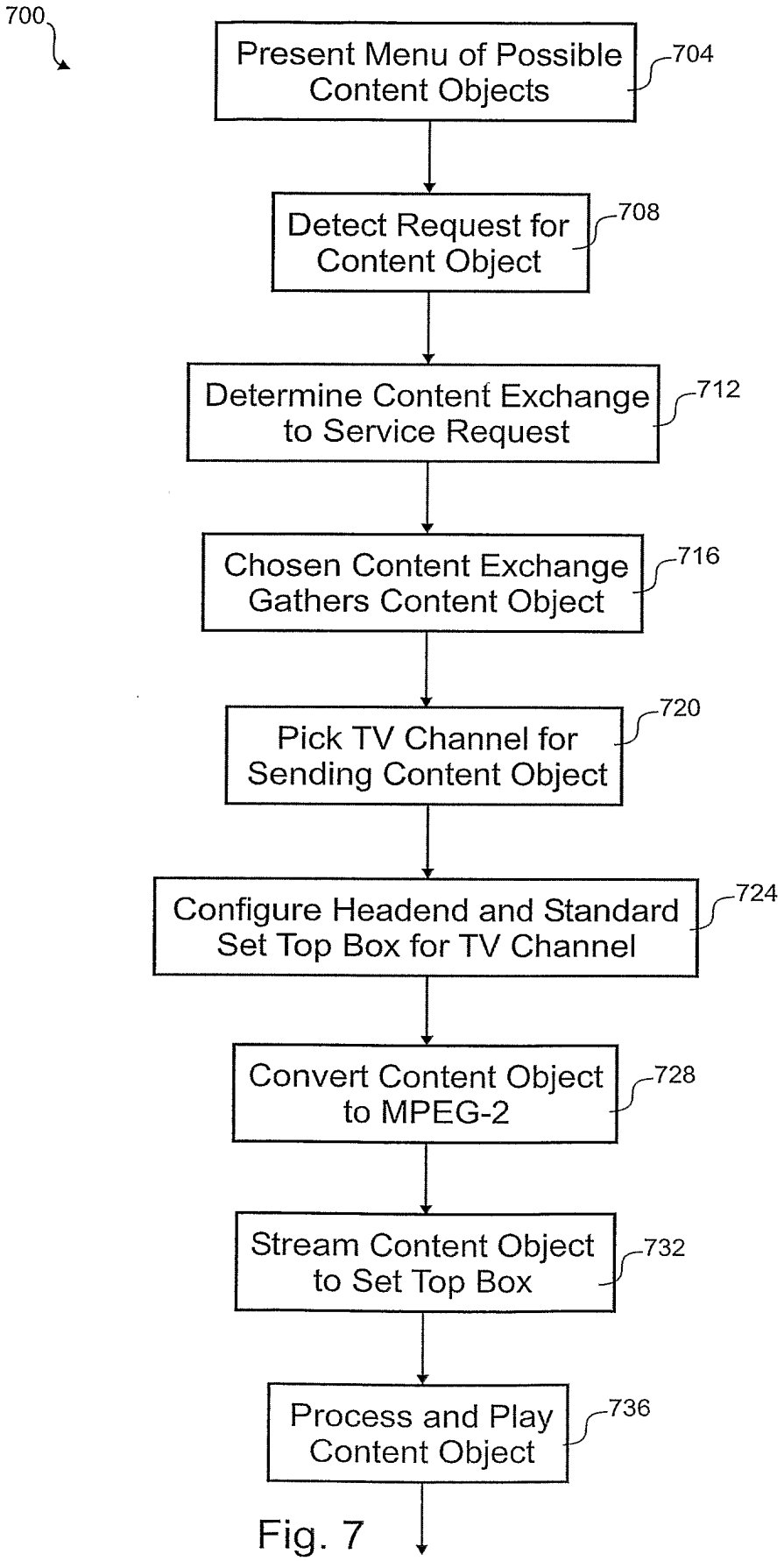

700
Present Menu of Possible Content Objects
704
Detect Request for Content Object
708
Determine Content Exchange to Service Request
712
Chosen Content Exchange Gathers Content Object
716
Pick TV Channel for Sending Content Object
720
Configure Headend and Standard Set Top Box for TV Channel
724
Convert Content Object to MPEG-2
728
Stream Content Object to Set Top Box
732
Process and Play Content Object
736

Fig. 7

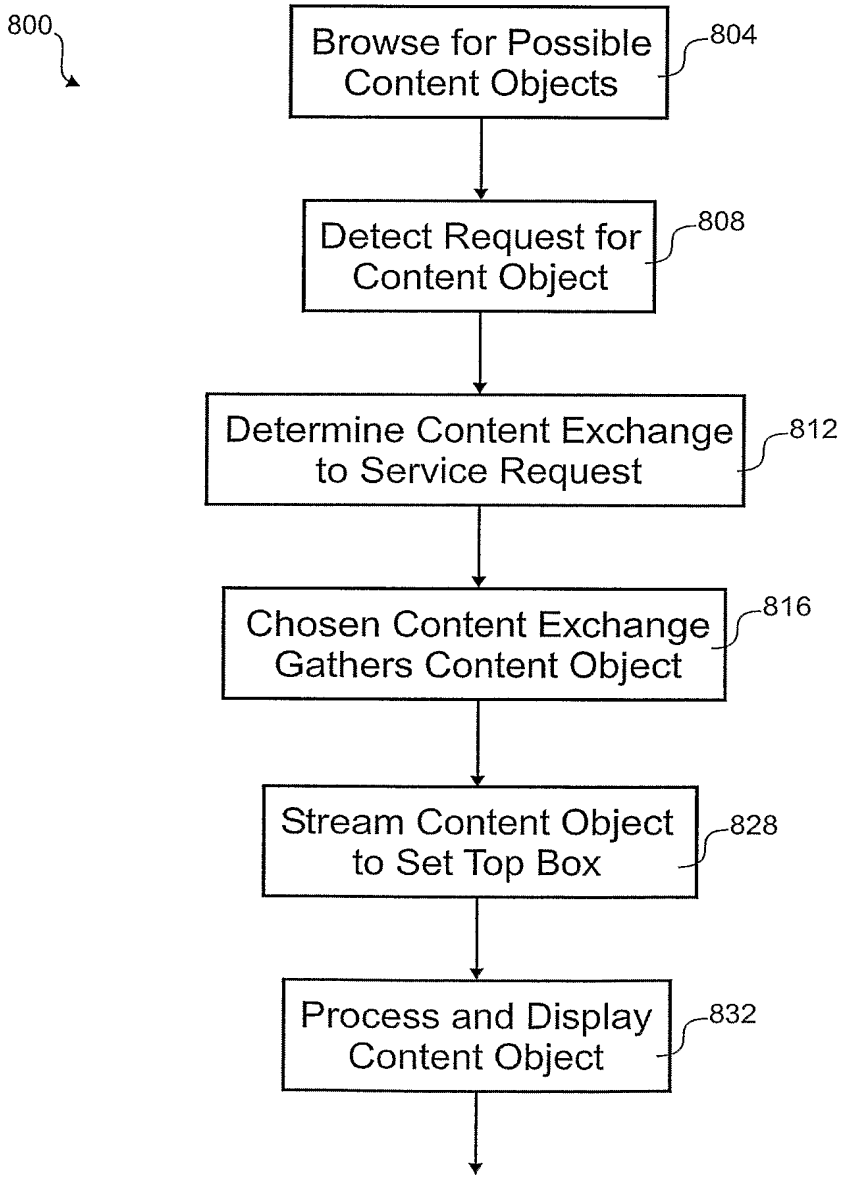

800
Browse for Possible Content Objects
804
Detect Request for Content Object
808
Determine Content Exchange to Service Request
812
Chosen Content Exchange Gathers Content Object
816
Stream Content Object to Set Top Box
828
Process and Display Content Object
832

Fig. 8

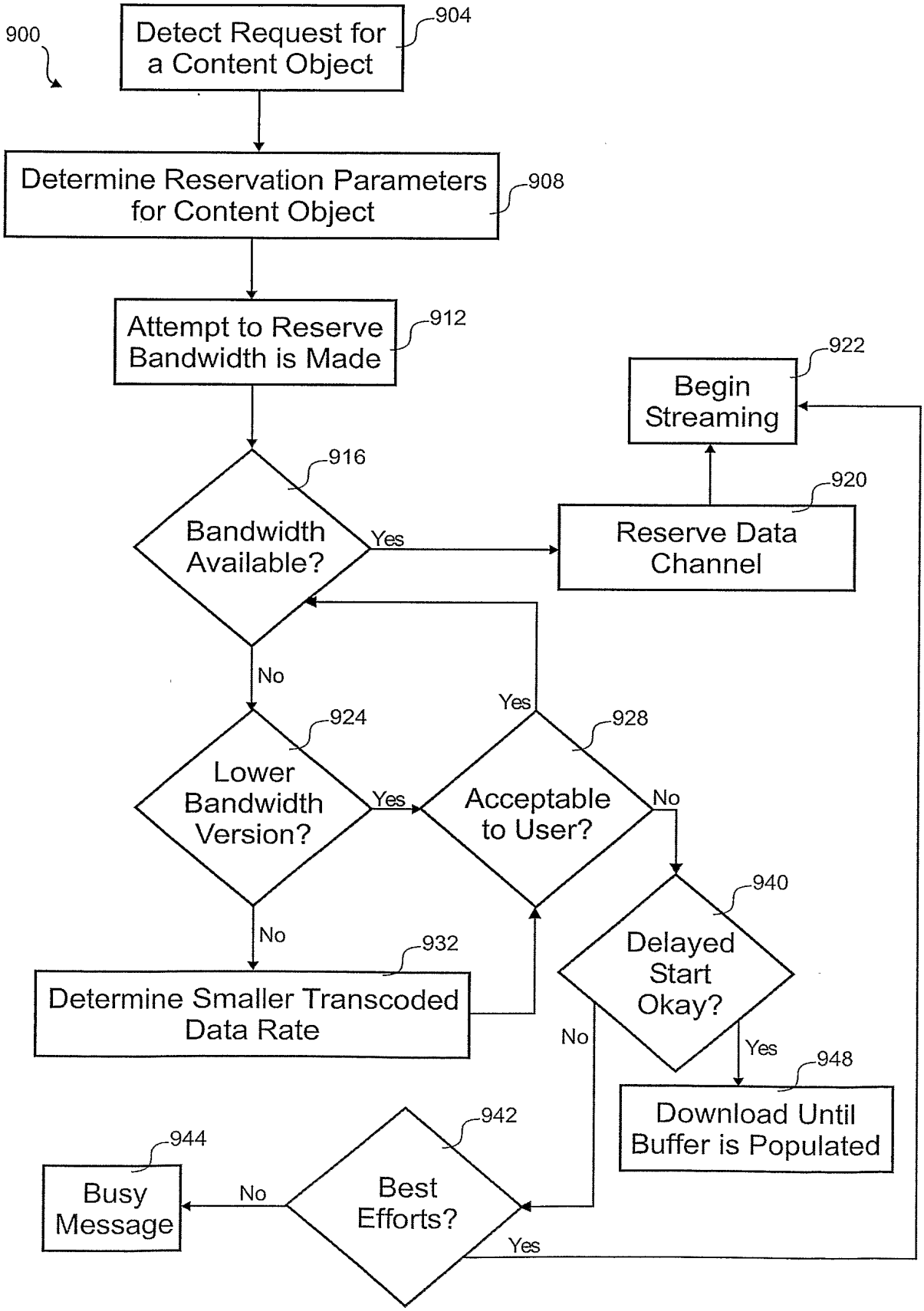

900
Detect Request for a Content Object
904
Determine Reservation Parameters for Content Object
908
Attempt to Reserve Bandwidth is Made
912
Bandwidth Available?
916
Yes
Reserve Data Channel
920
Begin Streaming
922
No
Lower Bandwidth Version?
924
Yes
Acceptable to User?
928
Yes
No
No
Determine Smaller Transcoded Data Rate
932
Delayed Start Okay?
940
No
Yes
Download Until Buffer is Populated
948
Best Efforts?
942
No
Busy Message
944
Yes

Fig. 9

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 May 2003 (15.05.2003)

PCT

(10) International Publication Number
WO 03/041413 A1

(51) International Patent Classification[7]: H04N 7/24

(21) International Application Number: PCT/GB01/04924

(22) International Filing Date:
5 November 2001 (05.11.2001)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant *(for all designated States except US)*: **PA CONSULTING SERVICES LIMITED** [GB/GB]; 123 Buckingham Palace Road, London SW1W 9SR (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **DURRANT, Simon** [GB/GB]; 43 Withipoll Street, Ipswich, Suffolk IP4 2BZ (GB). **MULROY, Pat** [IE/GB]; 61 Cemetary Road, Ipswich, Suffolk IP4 2JA (GB). **YANG, Dekun** [CN/GB]; 24 Arreton Close, Leicester, Leicestershire LE2 3PP (GB).

(74) Agents: **DRIVER, Virginia, Rozanne** et al.; Page White & Farrer, 54 Doughty Street, London WC1N 2LS (GB).

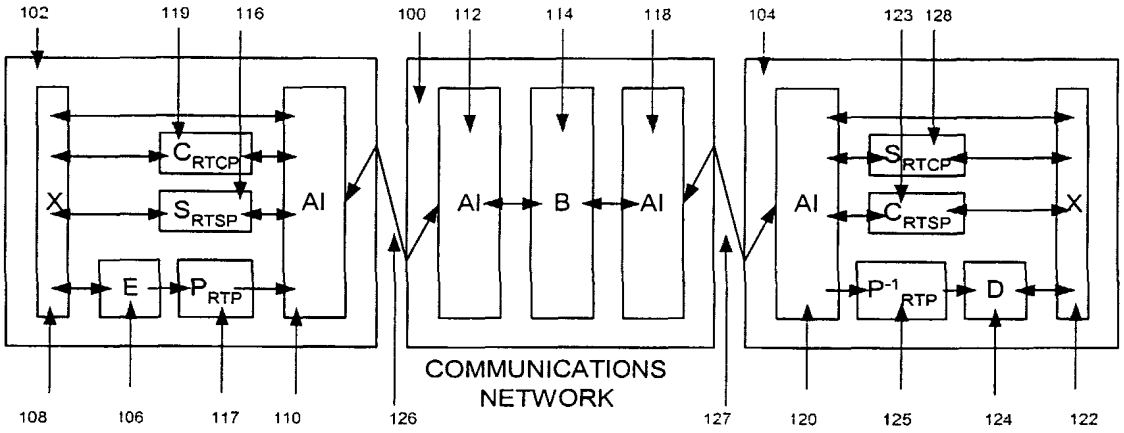
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, 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, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

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: ERROR CONTROL TO VIDEO ENCODER



(57) Abstract: A method of generating a compressed video data stream (CVDS) from a video stream, for transmission from a transmitter to a receiver over a wireless channel within a communications network, the method including the steps of: (a) determining values of one or more error rate parameters associated with the wireless channel; (b) determining values of one or more bit rate parameters associated with the wireless channel; (c) calculating values of one or more encoding parameters using the values of the error rate parameters and the bit rate parameters; (d) controlling encoding of the video stream on the basis of the encoding parameters, thereby to generate the CVDS.

WO 03/041413 A1

ERROR CONTROL TO VIDEO ENCODER

FIELD OF THE INVENTION

The present invention relates to video streaming, and, more particularly, to the streaming of video data over a wireless communications network.

The invention has been developed primarily to allow video to be streamed in a UMTS or GPRS mobile telecommunications network using streamable formats such as MPEG-4 and H.263. However it will be appreciated by those skilled in the art that the invention is not limited to use with those particular standards

BACKGROUND TO THE INVENTION

Robust transmission of real time video data over wireless networks promises to be one of important applications of the wireless packet data services. Robustness is one of the key issues because a wireless network is a bandwidth-constrained as well as error-prone environment. Bandwidth constraint forces video data to be compressed into lower bit-rate video streams before it can be transmitted over a wireless mobile network. Channel errors in a wireless mobile network range from random bit errors to burst errors.

Existing video compression standards such as MPEG-4 and H.263 use three kinds of coding techniques: motion compensated prediction to encode temporal redundancy, Discrete Cosine Transform (DCT) with quantisation to encode spatial redundancy, and Variable-Length Code (VLC) for entropy encoding. These compression mechanisms are based on exploiting both the spatial dependency and temporal dependency which make the compressed video stream susceptive to any transmission errors. Both motion-compensation based predictive coding and VLC are sensitive to transmission errors. A single bit error can cause failure in VLC decoding. Use of predictive coding leads to error

propagation. Error resilient encoding is one of important issues in the reliable transmission of video data over noisy channels.

Existing video compression standards provide some error resilience to minimise the amount of data that has to be discarded whenever errors are detected: for example, the use of reversible VLC and the periodic insertion of resynchronisation markers so that the decoder regains synchronisation more quickly when transmission errors occur. Another mechanism is to increase the ratio of intra to inter-coding both at frame and block level to stop any residual error propagation at the expense of reducing the compression gain.

For real-time wireless streaming video applications, one of the key issues is how to achieve best possible encoding robustness under the bandwidth and time constraints of the wireless networks. Each wireless channel is associated with Quality of Service (QoS) parameters indicative of among other things the error rate parameters. During the transmission of video data between a transmitter and a receiver, QoS parameters vary with time randomly and asynchronously for the transmitter and the receiver. It is important for the transmitter to exploit wireless channel conditions and select appropriate error resilient mechanisms for successful end to end real time video transmission over the wireless channel.

It is the object of this invention to provide a method of making best use of error rate parameters associated with wireless channels for generating compressed video data stream with improved quality when transmitted over the wireless channels.

SUMMARY OF INVENTION

The present invention provides a method of generating a Compressed Video Data Stream (CVDS) for transmission from a transmitter to a receiver over a wireless channel within a communications network, the method including the steps of:

a) determining values of one or more error rate parameters associated with the wireless channel;
b) determining values of one or more bit rate parameters associated with the wireless channel;
c) calculating values of one or more encoding parameters using the values of the error rate parameters and the bit rate parameters;
d) controlling encoding of the video stream on the basis of the encoding parameters, thereby to generate the CVDS.

In accordance with the described embodiment of the present invention, a CVDS transmitter in a mobile handset comprises an encoder controller and a prior art video encoder. Preferably the video encoder has several adjustable encoding parameters for altering the degree of error resilience of the generated CVDS. The encoder controller ascertains the error rate parameters associated with the wireless channel between the transmitter and the receiver, and derives the encoding parameters for generating the CVDS with improved error resilience while meeting the bandwidth constraints of the wireless channel.

The basic idea underlying the present invention is to make best use of error rate parameters associated with the wireless channels for generating CVDS with improved quality when transmitted over said wireless channels. The encoder controller may ascertain the error rate parameters from several sources. In an embodiment of the invention where the transmitter is a mobile transmitter and the receiver is a network receiver, the encoder controller can ascertain the error rate parameters associated with the wireless channel between the transmitter and the network from the air interface. In another embodiment of the invention where the transmitter is a network transmitter and the receiver is a mobile receiver, the encoder controller can ascertain the error rate parameters associated with the wireless channel between the network and the receiver. In yet another embodiment of the invention where a mobile transmitter transmits CVDS to a mobile receiver, the encoder controller can ascertain the error rate parameters from the two sources described above. The end to end feedback from the receiver and the transmitter is used to convey the information related to the error rate parameters.

In a preferred embodiment of the invention, the CVDS is packetised into IP format packet before being sent to the transmitter air interface. The IP packet is constructed by three wrapping operations respectively: (1) wrapping the CVDS in an RTP format packet, (2) wrapping the RTP packet in a UDP format packet, and (3) wrapping the UDP packet in a IP format packet.

The present invention can apply to both unidirectional streaming arrangement and bidirectional conversational arrangement. In the streaming arrangement the end to end feedback of error rate parameters can be performed via an RTCP session or an RTSP session. RTCP packets are wrapped in UDP and further IP format. RTSP packets are wrapped in TCP format and further IP format packets. In the conversational arrangement the end to end feedback of error rate parameters can be performed via a SIP session. SIP packets are wrapped in UDP format and further IP format packets.

Preferably, the wireless networks are UMTS or GPRS mobile telecommunications networks. Each wireless channel is associated with Quality of Service (QoS) parameters indicative of among other things the error rate information. At session initiation and when wireless channel characteristics are to be modified, the network provides each mobile handset with a QoS parameter set that is indicative of the available bit rate, error rate conditions of the wireless channel between the mobile handset and the network. The QoS parameter set is read at the mobile handset by the encoder controller or the decoder controller. The error rate parameters are derived from the QoS parameters associated with the wireless channels.

In a preferred embodiment of the invention, the video data is divided into a sequence of frames, with each frame being further divided into a number of Group of Blocks (GOB) or a number of slices, and with each GOB or slice being further divided into a number of blocks. Preferably, the encoder parameters including frame rate, frame type indicative of either intra-coded frame or inter-coded frame, block type indicative of either intra-coded block or inter-coded block, and quantisation parameter.

According to the preferred embodiment, the error control of video encoding is achieved by a combination of the following operations:

a) setting proper ratio of intra-coded frames and inter-coded frames;
b) allocating GOBs or slices with suitable sizes such that the headers of GOBs or slices can be used as resynchronisation markers for the decoder to regain synchronisation quickly when transmission errors occur;
c) setting proper ratio of intra-coded blocks and inter-coded blocks for each GOB or slices in each inter-coded frame.

In a preferred embodiment of the invention, the rate control of video encoding operates in conjunction with the error control such that the generated CVDS is error resilient as well as within the bit rate budget associated with the channel bandwidth. Preferably, the encoder controller performs the rate control based on the derived parameters of the error control and the current encoding status information (e.g. instantaneous bit rate generated by the encoder and the motion estimation). The rate control is used for:

a) setting proper frame rate;
b) setting proper quantisation parameters;

such that the generated CVDS can match the bit rate constraints of the wireless channels.

In an embodiment of the present invention, the CVDS comprises a plurality of layers including the base layer and enhanced layers in which each layer comprises a sequence of frames which may be of the same type (intra-coded or inter-coded) or a mixture of types. Each layer can be carried via an RTP session. Preferably, more than one wireless channels are available and each wireless channel is used to transmit an RTP session. In this embodiment, in conjunction with the above error control operations, the error control also includes mapping CVDS layers into wireless channels such that the base layer is mapped into the wireless channel with better transmission quality.

BRIEF DESCRIPTION OF DRAWINGS

Preferred embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a simplified schematic diagram of a UMTS communication system showing a network and two mobile handsets, where one handset is the transmitter and the other a receiver, for streaming video;

Figure 2 is a simplified schematic diagram of a UMTS communication system showing a network and two mobile handsets, where each handset is simultaneously a transmitter and a receiver for conversational video;

Figure 3 shows the construction of a UDP/IP packet containing MPEG-4 video payload data;

Figure 4 shows the construction of a UDP/IP packet containing RTCP data;

Figure 5 shows the construction of multiple substreams with a common IP address and different UDP addresses per substream;

Figure 6 shows the construction of a TCP/IP packet containing RTSP and SDP data;

Figure 7 shows the construction of a TCP/IP packet containing SIP and SDP data;

Figure 8, Figure 10 and Figure 12 show single and multiple RTP/RTCP sessions and an RTSP session (also labelled more generically as IP Sessions), mapped onto single and multiple wireless channels for streaming video;

Figure 9, Figure 11 and Figure 13 show single and multiple RTP/RTCP sessions and a SIP session (also labelled more generically as IP Sessions), mapped onto single and multiple wireless channels for conversational video;

Figure 14 shows Quality of Service (QoS) parameters associated with the wireless channels between mobile handsets and networks, and the sending of these and other QoS parameters between the mobile handsets via IP sessions for streaming video;

Figure 15 shows QoS parameters associated with the wireless channels between mobile handsets and networks, and the sending of these and other QoS parameters between the mobile handsets via IP sessions for conversational video;

Figure 16 and Figure 17 shows typical mapping of compressed video data stream frames onto base and enhanced substreams;

Figure 18 is a flowchart showing sequential operations performed by the encoder controller;

Figure 19 is a flowchart showing sequential operations performed by the decoder controller; and

Figure 20 is a flowchart showing sequential operations performed by the encoder.

DETAILED DESCRIPTION OF PREFERRED AND OTHER EMBODIMENTS

The preferred embodiment of the present invention is applied to a network and associated mobile handsets designed to operate under the current GPRS or proposed UMTS standard.

Referring to the drawings, and Figure 1 in particular, there is shown a UMTS network 100 that is used to establish an end to end link between a first mobile handset 102 and a second mobile handset 104. The communication session between the first mobile handset 102 and the second mobile handset 104 is unidirectional. Mobile handset 102 is acting solely as a transmitter of compressed video data, whilst mobile handset 104 is acting solely as a receiver of compressed video data. This is termed the streaming arrangement.

In the embodiment shown in Figure 2, the communication session between the first mobile handset 142 and the second mobile handset 144 is bi-directional. Mobile handset 142 is acting both as a transmitter and a receiver of compressed video data, and mobile handset 144 is also acting as a transmitter and receiver of compressed video data. This is termed the conversational arrangement. In Figure 2 the functions and operations of the second mobile handset 144 are identical to the functions and operations of the first mobile handset 142.

It will be appreciated that the transmitter function and operation of mobile handsets 142 and 144 is identical to that of the transmitter function and operation of mobile handset 102. It will also be appreciated that the receiver function and operation of mobile handsets 142 and 144 is identical to that of the receiver function and operation of mobile handset 104. In the case of mobile handsets 142 and 144, the receiver and transmitter functions and operations are present within

the same mobile handset. In mobile handsets 102 and 104 only the transmitter or the receiver function is present respectively. It will be appreciated that the mobile handsets 142 and 144 can also operate exclusively as transmitters or receivers to produce the streaming arrangement, in addition to their conventional conversational arrangement, if so configured.

In Figure 1 the first mobile handset includes a transmitter controller 108, a Real Time Streaming Protocol (RTSP) server 116, an encoder 106, a Real Time Protocol (RTP) packetiser 117, a Real Time Control Protocol (RTCP) client 119 and a transmitter air interface 110, which are operatively interconnected with each other as shown. The encoder 106 accepts raw video data (RVD) from a video source such as a camera (not shown) associated with the first mobile handset 102 and encodes it into a compressed video data stream (CVDS) format, as discussed in detail below. This is then packetised by the RTP packetiser 117. According to the normal operation of a mobile communications network, the transmitter air interface 110 establishes a wireless channel with a transmit side air interface 112 in the network 100, which in turn is in communication with a network backbone 114.

The network 100 also includes a receive side air interface 118 that establishes a wireless channel with a receiver air interface 120 disposed in the second mobile handset 104. The second mobile handset 104 also includes a receiver controller 122, an RTSP client 123, an RTP depacketiser 125, an RTCP server 128 and a decoder 124. These are operatively interconnected with each other as shown.

In Figure 2 the mobile handsets 142 and 144 includes all the components that are present in both the mobile handset 102 for the transmitter function, with the exception of the RTSP server 116, and the mobile handset 104 for the receiver function, with the exception of the RTSP client 123. The RTSP server 116 is replaced by a SIP User Agent (UA) 146 in mobile handset 142 and the RTSP client 123 is replaced by a SIP UA 148 in mobile handset 144. The components of the transmitter function, the components of the receiver function, the User Agent and the air interface for mobile handsets 142 and 144 are operatively interconnected with each other as shown. It will be appreciated that

the function and operation of the mobile communications network shown in Figure 2 is as above.

In a UMTS network, the mobile handsets 102, 104, 142 and 144 are designated User Equipment (UE), the air interface elements 112 and 118 correspond to the Universal Terrestrial Radio Access Network (UTRAN), the backbone element 114 corresponds to the Core Network (CN).

According to normal mobile communications network operation, an end to end link is established between the first and second mobile handsets 102, and 104 (or 142 and 144), comprising a first wireless channel 126 between the first mobile handset and the network and a second wireless channel 127 between the network and the second mobile handset. Wireless channels are established using different frequencies and/or spreading codes and/or time slots in a manner well known in the mobile communications art. They allow for bi-directional communication, both for data and control information.

As part of the wireless channel control information, the wireless channel 126 between the transmitter air interface 110 and the transmit side air interface 112 carries Quality of Service parameters (QoS), from the network 100 to the first mobile handset 102 (or 142). Similarly, the wireless channel 127 between the air interface 118 and the receiver side air interface 120 carries Quality of Service parameters (QoS), from the network 100 to the second mobile handset 104 (or 144).

The packetised CVDS is transmitted over the end to end link defined between the two mobile handsets 102 and 104 (or 142 and 144), across wireless channels 126 and 127. In the preferred embodiment, the CVDS takes the form of an MPEG-4 stream, but other suitable streaming formats, such as H.263 can also be used. Both of these standards are applicable to variable bitrate and low bitrate video, e.g. bitrates of 10kbps or higher. It is particularly preferred that the transmission be in RTP format, as discussed in detail below in relation to Figure 3, Figure 4, Figure 5.

Turning to Figure 3, the packetisation of the raw MPEG-4 data for transmission is shown. This packetisation takes place in the first mobile handset 102 or 142 under the control of the transmitter controller 108 before sending the

packets to the transmitter air interface 110. Upon emerging from the wireless network of the transmitter the packets travel over a packet switched network to the wireless network of the receiver. Here the packets are sent to the receive side air interface 118 and on to the second mobile handset 104 or 144 via wireless channel 127.

Figure 3 shows the packetisation layers for a single MPEG-4 packet 200 in the form in which it leaves the encoder 106. It will be appreciated that a stream of such packets will be generated from the incoming RVD. The MPEG-4 video data 200 is wrapped in an RTP format packet layer 201. This, in turn, is wrapped in a UDP format packet layer 202, which in turn is packetised into an Internet Protocol (IP) packet 203. It is this IP packet 203 that is presented by the RTP packetiser 117 to the transmitter air interface 110 for transmission over the wireless channel. This layering format, defined by IETF, is known and is included in the developing UMTS standard for video transmission.

Each of the packetisation layers of the packet is directed to a particular part of the overall communication. They will not be described in detail because they are already known in the art and conform to the respective standards. However the principal component of each packet will be described insofar as is necessary to understand the embodiments of the invention that follow.

The MPEG-4 layer 200 contains the coded video data. The RTP layer 201 contains sequence numbers, time stamps, and payload bits that enable a depacketiser and decoder to decode it and replay at the correct time and in the correct sequence in relation to other packets from the same stream. The UDP layer is used for asynchronous communication of the data over the wireless communications channel and is a "best effort" connectionless protocol. The IP packet 203 contains an IP address which identifies the mobile receiver 104 or 144 as the destination. The IP packet header may also contain a Differentiated Services Code Point (DSCP) which could be used by a diffserv-enabled core network to determine how that packet should be forwarded by nodes inside that network.

Figure 4 shows the packetisation layers for a single RTCP packet 205 in the form in which it leaves the RTCP server 128. The RTCP packet is wrapped in a UDP format packet layer 206, and packetised into an IP packet 207.

Turning to Figure 5, the CVDS can be transmitted over the wireless channels in one or multiple substreams, each transported by an RTP session, (and an associated RTCP session) where these are mapped to one or multiple wireless channels that may have different quality parameters. In this case the IP address 208 is common to both substreams. Routing through the transmission chain is achieved by characterising different substreams by different socket numbers 210 and 212 in the UDP address.

It will be understood that some of the receiving handsets, or, indeed, the transmitting handset may not be capable of forming a multi wireless channel connection with the network. This may be because of equipment incompatibilities or network resource issues, for example. In this case, it is still possible for the video layers to be allocated to multiple wireless channels in accordance with the above embodiment, whilst multiplexing the video onto a single wireless channel for those not capable of forming the requisite multi wireless channel connection.

In the streaming arrangement of Figure 1, the IP packet of Figure 3 is transmitted directly from the first mobile handset 102, via the network 100, to the second mobile handset 104.

Once received at the receiver air interface 120, the packets are forwarded to the RTP depacketiser 125, where the MPEG-4 data 200 is re-constructed. The packets must be re-ordered using RTP layer data 201 such as frame timestamps and the data from the plurality of substreams must be re-assembled. The re-constructed MPEG-4 data 200 is then sent from the RTP depacketiser 125 to the decoder 124, where it is decoded for replay on, for example, a visual display (not shown) on the second mobile handset 104.

In the return direction (i.e., from the second mobile handset 104 to the first mobile handset 102 in this example), control information is returned in accordance with the known RTCP and RTSP protocols, with the latter using the known Session Description Protocol (SDP).

Figure 8 and Figure 10 show the IP sessions between a streaming server and client. The RTCP sessions provide feedback on the data transmission quality for each RTP session. RTSP additionally provides an overriding control connection from RTSP client 123 to RTSP server 116, using SDP to provide a description of the connection between client and server. It is known in the art that, when a session changes, an RTSP control packet containing a new SDP packet is sent to the remote entity.

The packetisation of the SDP and RTSP information is shown in Figure 6. The SDP information 306 is wrapped in an RTSP packet 300. An RTSP packet 300 is wrapped in a Transport Control Protocol (TCP) packet 302, which is within an IP packet 304. This packet is built up by the RTSP client 123 and supplied to the receiver air interface 120 for transmission to the receive side air interface 118 of the network 100. The destination address of this RTSP packet is that of the first mobile handset 102.

In the preferred embodiment shown in Figure 1, the RTSP packet passes to the transmit side air interface 112 via the backbone 114 for transmission to the transmitter air interface 110, to the RTSP server 116 and thence to the transmitter controller 108. Also, control information is exchanged between both mobile handsets 102 and 104 in accordance with the known RTCP protocol.

In the conversational arrangement of Figure 2 the IP packet of Figure 3 is transmitted and received between the mobile handsets 142 and 144, via the network 100, in the same way as for the streaming arrangement described above. The encoded video packet is also processed in the same way as for the streaming arrangement described above.

For the control of bi-directional communications sessions the Session Initiation Protocol (SIP) is used instead of RTSP. This is managed by user agents 146 and 148 in mobile handsets 142 and 144 respectively. SIP uses SDP to provide a description of the connection between two peer user agents. It is known in the art that, when a session changes, a SIP control packet containing a new SDP payload is sent to the peer user agent.

Figure 9 and Figure 11 show the IP sessions between two peer user agents 146 and 148. The SIP session provides an overriding connection control

between user agents 146 and 148 using the SDP. Again, control information is also exchanged between both mobile handsets 142 and 144 in accordance with the known RTCP protocol. The RTCP session will provide feedback on the data transmission quality for each RTP session.

The packetisation of the SIP information is shown in Figure 7, where the packet is denoted 308. An SDP payload 307 is encapsulated within the SIP packet 308. A SIP packet 308 is wrapped in a User Datagram Protocol (UDP) packet 310, which is within an IP packet 305. This packet is built up by the user agent 148 and supplied to the air interface 127 for transmission to the receive side air interface 118 of the network 100. The destination address of this SIP packet is that of the other mobile handset 142. It will be understood that user agents 146 and 148 are interchangeable in this scenario.

In the preferred embodiment shown in Figure 2, the SIP packet passes to the transmit side air interface 112 via the backbone 114 for transmission to the transmitter air interface 126 and thence to the transmitter controller 108 via the user agent 146.

In use, a user of, say, the first mobile handset, 102 or 142, places a call to the second mobile handset 104 or 144, by dialling the second handset's mobile number.

The first mobile handset's number is mapped to a first IP address taken from a pool of IP addresses, and the second mobile handset's number is mapped to a second IP address taken from the pool of IP addresses. This mapping persists for as long as the connection is maintained. Once the connection is broken, usually because one or both of the users hang up, the mapping is removed and the IP addresses are returned to the pool for reuse. It will be appreciated that this arrangement means that packets can be routed using the allocated IP addresses instead of the phone numbers.

There follows a description of the basic elements of call set-up at the wireless level to aid understanding of the invention.

When a user requests a call, the requested quality class of the wireless channel is communicated to the network 100. In particular, the first mobile handset 102 or 142 can request a particular QoS from the UMTS network, which

specifies, for example, guaranteed and maximum bitrates. On this basis, and assuming there are sufficient network resources available, a wireless communications channel is established between the first mobile handset 102 or 142 and the network 100, the wireless channel having defined QoS criteria.

Alternatively the first mobile handset 102 or 142 might request the network resources as a number of wireless channels each with associated QoS (see later for multiple wireless channel discussion).

The second mobile handset 104 or 144 must similarly establish a connection with the network 100, establishing a wireless communications channel with an independent QoS criteria to that of the wireless channel established by the first handset 102 or 142.

Once the wireless communications channel or set of channels is established, video data from, say, a camera (not shown) associated with the first mobile handset 102 or 142 is received by the encoder 106, which in turn generates a sequence of CVDS video data. The video data is sent to the RTP packetiser 117, where it is packetised as described above and sent to the second mobile handset as described above. The receiving mobile handset is mobile handset 104 if mobile handset 102 is the transmitter; mobile handset 144 if mobile handset 142 is the transmitter; and mobile handset 142 if mobile handset 144 is the transmitter.

As other users make and break wireless communications channels and the network 100 continuously monitors user resource allocations, it can be the case that available bandwidth for any particular call changes, either increasing or decreasing. If a user has a multiple wireless channel allocation, one or more of the wireless channels may be terminated. It will be understood that these bandwidth changes can take place at a number of points along a given wireless communications channel. For example, it could take place between the first mobile handset 102 (or 142) and the network, or between the network and the second handset 104 (or 144).

Other factors, such as distance of a handset from a base station with which it is communicating, or strong multi-path reflections, can also cause the effective bandwidth or quality of a wireless channel to be reduced.

Any change in effective bandwidth or quality can have two consequences. If the bandwidth increases it could in principle be possible to transmit video data at a higher bitrate. If it decreases, however, the rate at which video data can reliably be transmitted also decreases, possibly below the value that was set at the start of transmission. To accommodate these consequences the QoS parameter set including the available bitrate and bit error rate on the wireless channel between the first mobile handset 102 or 142 and the network 100 is monitored by the controller 108 at the first mobile handset 102 or 142.

In the preferred form, at session initiation and when wireless channel characteristics are to be modified, the UMTS network provides the first mobile handset with a QoS parameter set that is indicative of the available bitrate (i.e. bandwidth) on the wireless communications channel. Such a QoS parameter set is supplied through the protocol stack in known wireless systems from the air interface 112 of the network to the air interface 110 of the transmitting mobile handset 102 or 142. It is normally supplied across a wireless control channel on the downlink of the call.

According to the developing UMTS standard, the QoS parameter set is indicative of various transmission parameters, including the transmissible bitrate over the wireless channel, the signal to noise ratio, the error rate and a priority indicator which is an indication provided from the network to the transmitting mobile handset of the likely priority to be placed on the call. This is therefore an indicator of the bandwidth and likely reliability of the wireless communication channel that has been opened for the particular wireless channel. It will be appreciated in this context that the word "call" is used herein to describe the transmission of video data as well or instead of voice data. The QoS parameter set is read at the mobile handset 102 or 142 by the controller 108 and the transmissible bitrate is extracted from it.

The quality of the wireless communication channel between the network 100 and the second mobile handset 104 or 144 is also monitored. In the preferred form, a QoS parameter set indicative of, amongst other things, the available bandwidth for the RTP session mapped onto this wireless channel is ascertained in the second mobile handset 104 or 144 derived from the wireless control

channel information it receives from the network according to the relevant wireless standard (in this case UMTS).

The QoS parameter set is dealt with at the second mobile handset 104 or 144 in a novel manner. The session control protocol (both bi-directional using SIP and unidirectional using RTSP) and have already been discussed. SDP provides for the exchange and updating of session description information such as codec and bitrate.

For the streaming arrangement (shown in Figure 1), according to the existing RTSP standard, various control parameters are conveyed by the RTSP packets including, for example, video commands such as PLAY and PAUSE. The standard also provides an ANNOUNCE instruction The system described herein uses the ANNOUNCE provision in the RTSP standard to cause elements of the QoS parameter set determined in the wireless environment and/or other derived parameters to be placed into an SDP payload which itself is placed in an RTSP packet for transmission from the second mobile handset 104 to the mobile handset 102. The thus constructed novel packets are transmitted by the RTSP client 123, via the receiver air interface and the received side air interface to the network backbone 114. From here they travel to the RTSP server 116 via the transmission side air interface 112 and the transmitter air interface 110.

For the conversational arrangement (in Figure 2), according to the existing SIP standard, SDP payload are conveyed by the SIP packets to control the bi-directional communication between two mobile handsets. A session is initiated using the INVITE instruction, which itself contains a session description in the SDP format. The standard provides for a session to be modified by either agent by issuing a subsequent INVITE instruction. The system described herein uses the re-INVITE provision in the SIP standard to cause the quality parameter determined in the wireless environment and/or other derived parameters to be placed into an SDP packet which itself is placed in a SIP packet for transmission from the receiving mobile handset 144 to the transmitting mobile handset 142. The thus constructed novel packets are transmitted by the session control agent 148, via the receiver air interface 120 and the received side air interface 118 to

the network backbone 114. From here they travel to the session control agent 146 via the transmission side air interface 112 and the transmitter air interface 120.

It can be understood that user agents 146 and 148 are interchangeable in this scenario. For both streaming and conversational arrangements the RTP sessions carrying the video data each have associated RTCP sessions carrying control information back to the transmitter. The system described herein can, in addition to or instead of using RTSP or SIP, use the RTCP application defined (APP) packet to transfer application data (in this case the wireless and other derived QoS parameters) from the receiver to the transmitter.

In both the streaming (Figure 1) and conversational (Figure 2) arrangements, when a session control packet is received at the transmitting mobile handset, this along with locally derived QoS parameters can be used to modify the encoded bitrate as already discussed above. In this way, the bitrate of the video stream transmitted from the encoder can be adapted to the wireless channel between a transmitting mobile handset and the network and also to the wireless channel between the network and a receiving mobile handset. In the streaming arrangement and now referencing Figure 8 and Figure 10, there are shown two ways of transmitting a CVDS from an encoder 106 to a decoder 124 using RTP between an RTP packetiser 117 and an RTP depacketiser 125. RTCP control messages are sent between RTCP server 128 and RTCP client 119. RTSP control messages are sent between an RTSP server 116 and an RTSP client 123. Figure 8 shows a prior art method of streaming CVDS transported by an RTP session 804 and associated RTCP session 805. RTSP control messages are sent via RTSP session 806. It will be appreciated that at least some part of the end to end communications channel is wireless. In Figure 8 the RTP session containing all the frames of the video stream and the RTCP session containing all RTCP control messages are multiplexed onto a single wireless channel, with the CVDS parameters and frame sequencing being derived according to the QoS parameter of the wireless channel at call set up.

Figure 9 shows the prior art for conversational arrangement. Each mobile handset is depicted with an RTP packetiser (117 or 134), an RTP depacketiser (133 or 125) and a user agent (146 or 148). For a conversational arrangement, a

CVDS is transmitted from RTP packetiser 117 to RTP depacketiser 125 using RTP session 814 and RTCP session 815 simultaneously with a CVDS transmitted from RTP packetiser 134 to RTP depacketiser 133 using RTP session 816 and RTCP session 817. A single SIP session 818 controls all the RTP/RTCP sessions. In Figure 9, as in Figure 8, the RTP sessions containing all the frames of the video stream, the RTCP sessions corresponding to these and the SIP session containing all of the SIP control messages are multiplexed onto a single wireless channel, with the CVDS parameters and frame sequencing being selected according to the QoS parameter of the wireless channel at call set up.

Figure 10 shows a preferred embodiment of the invention for the streaming arrangement, in which there is a plurality of wireless channels. In the example shown there are three wireless channels. RTP/RTCP sessions 824/825 and 826/827 are used for transmitting the two substreams of a CVDS and RTSP control messages are sent via RTSP session 828. The wireless channels are provided at call set up as previously described in a situation where the encoder 106, RTP packetiser 117, RTCP client 119 and RTSP server 116 are in a first mobile handset, and the decoder 124, RTP depacketiser 125, RTCP server 128 and RTSP client 123 are in a second mobile handset in accordance with requested QoS and bandwidth parameters according to the UMTS standard.

As with previous embodiments, the CVDS substreams are transported via RTP between the RTP packetiser 117 and RTP depacketiser 125, RTCP control messages are sent between RTCP server 128 and RTCP client 119 and control messages are transmitted via an RTSP session between the RTSP server 116 and RTSP client 123. As shown in the example Figure 8, one RTSP session covers all the RTP/RTCP sessions between any two entities while each CVDS substream requires an individual RTP session and an associated RTCP session.

Figure 11 shows a preferred embodiment of the invention for the conversational arrangement, in which there is a plurality of wireless channels. In the example shown there are three wireless channels. RTP/RTCP sessions 834/835 and 836/837 are used for transmitting the two substreams of a CVDS generated by the encoder 106. RTP/RTCP sessions 838/839 and 840/841 are used for transmitting the two substreams of a CVDS generated by the encoder

129. The SIP control messages are sent via SIP session 842. Figure 11 shows that the base layers produced by encoders 106 and 129, carried by RTP sessions 834 and 838 and packetised by RTP packetisers 117 and 134, use the up and down links of the same wireless bearer at each mobile handset. Similarly, the enhanced layers from the encoders 106 and 129, carried by RTP sessions 836 and 840 and packetised by RTP packetisers 117 and 134, use the up and down links of the same wireless bearer at each mobile handset. It will be appreciated that there are many other possible mappings between RTP/RTCP sessions to wireless bearer. The wireless channels are provided at call set up as previously described and in accordance with requested QoS and bandwidth parameters according to the UMTS standard. As shown in the example, one SIP session 845 covers all the RTP/RTCP sessions between any two entities while each CVDS substream requires an individual RTP session and an associated RTCP session.

Since wireless channels for the transmit side and receive side are allocated separately there is no guarantee that the number of transmit side and receive side wireless channels will be the same. In the streaming arrangement shown in Figure 12 there is one transmit side wireless channel and three receive side wireless channels. On the receive side RTP/RTCP sessions 844/845 and 846/847 and RTSP session 848 are each mapped to a separate wireless channel. On the transmit side all IP sessions 844-848 are mapped to the same wireless channel.

Figure 13 shows the situation for the conversational arrangement, where for the handset containing user agent 146 there is only one wireless channel, whilst for the handset containing user agent 148 there are three wireless channels. In the handset containing user agent 148 the RTP/RTCP sessions 853/854 and 857/858 are mapped to the same wireless channel. However the RTP/RTCP sessions 851/852 and 855/856 are mapped to another wireless channel and the SIP control 859 is mapped to yet another wireless channel. In the handset containing user agent 146 all IP sessions of all types 851-859 are mapped to the same wireless channel.

Under the proposed UTMS standard (and others), wireless channels can be defined in terms of a number of quality of service parameters, such as priority, maximum and guaranteed bandwidth, residual bit error rate and delay.

In the embodiment of Figure 10, the first RTP session 824 is defined as carrying the base substream, having an example bitrate of 16kbps, whilst the second RTP session 826 has a bitrate of 32kbps. The first wireless channel has the lowest bitrate but highest priority and the base substream is allocated to it. The enhancement substream is allocated to the second wireless channel, since it has the lower priority. This ensures that the most important video data is allocated to the wireless channel with the highest priority. The first RTP session can also be marked with the highest priority DSCP for prioritised transport over the IP component of a diffserv enabled core network.

As discussed above in relation to other embodiments, the allocation of resources within a UMTS network is dynamic, and this can mean that bandwidths allocated to either of the RTP sessions can fluctuate with (amongst other things) network load. In the preferred embodiment shown in Figure 1 and Figure 2, the bandwidth available for each wireless channel is known to the transmitter controller 108 as it monitors the network messages at the transmitter air interface 110. In the event that the available bandwidth on one or more of the wireless channels is commanded by the network 100 to be reduced, an assessment is made as to whether it is desirable to reallocate the frames between substreams. For example, assuming the substream frame structure of Figure 16, if the second RTP session bandwidth fell to, say, 16kbps an assessment would be taken to determine whether to simply reduce the number of P and B frames generated and leave other substreams unchanged, or whether a better overall quality would be achieved by including some of the P and B frames on the base substream at the expense of say, reduced resolution in the I frames.

It is not necessarily the case that reallocation will happen automatically and immediately without any assessment of context. In one form, the preferred embodiment is configured to maintain a history of wireless channel behaviour in relation to the quality parameter. As an example, a sudden drop in bandwidth on a wireless channel to which relatively high priority substream or frame type is

mapped may not be a trigger for the frame mapping to be changed. If there is a history of short-term bursts of bandwidth loss, it is likely that the higher bandwidth will be available shortly, and it may ultimately be more efficient to allow the short-term reduction to be ignored. Typically, an assessment of this type will be made by the transmitter controller 108. It will be understood that quite sophisticated proportional, integral and differential factors can be taken in to account to build a relatively sophisticated model of any wireless channel's behaviour (and likely future behaviour) over time. Such modelling well known to those skilled in the relevant art, and so is not described further here.

Similar history data can be collected for the other types of a quality data collected in earlier embodiments of the invention, and similarly used to make decisions about how and when to alter outputs of, for example, the encoder. In general, if there is a history of short-term bandwidth problems, then it may be more efficient or may provide a visibly better overall video streamed image if the bitrate out of the encoder is not immediately altered when the bandwidth initially drops. Rather, it will in some cases be preferable to wait until the bandwidth has remained low for a predetermined time period or number of frames before changing the output of the encoder.

Wireless channels between mobile handset and network have a certain QoS, which is provided for the mobile user of a network service. In an embodiment of the invention, a set of QoS parameters including Bitrate (BR) and Bit Error Rate (BER) are used for controlling the video encoder. These QoS parameters are conveyed between the encoder controller and the decoder controller via IP sessions. Referring to Figure 14, a wireless channel between transmitter 102 and network has QoS parameters BR and BER. A wireless channel between network and receiver 104 has QoS parameters BR' and BER'. The encoder controller 108 sends BR to decoder controller 122 via an RTSP session 866. Having received BR from the encoder controller 108, the decoder controller 122 sends BER' and the calculated Request Bitrate (RBR) to the encoder controller 108 via an RTSP session 866 or RTCP session 865. The encoder controller and the decoder controller will be discussed in detail below.

The encoder controller 108 is used to control the video encoder 106 with the objective of improving the error resilience of video encoding while meeting the bitrate constraint of wireless channels.

In a preferred embodiment of the invention, the video encoder is an MPEG-4 or H.263 compliant encoder. The input video source is encoded into an MPEG-4 or H.263 compliant bit stream. The video data can be constructed using a plurality of different types of frames, which are referred to as I, P and B frames. I frames are self-contained still frames of video data, whereas P and B frames constitute intermediate frames that are predicatively encoded. The precise composition of the frames varies in accordance with the particular standards and application of the standards and is known *per se*.

MPEG-4 specifies a plurality of layers, including the base layer and enhanced layers, in which each layer is comprised of a sequence of frames which may be of the same type (I, P, B) or a mixture of types. As already described, in a wireless network the mobile may be allocated one wireless channel or a plurality of wireless channels. In the preferred form, each wireless channel is used to transmit a single RTP/RTCP session pair. Each RTP session carries an optimum sequence of I, P and B frames, known as a substream. The term "substream" is used rather than "layer" because the frame sequencing onto wireless channels can be varied dynamically and need not be one of the layer sequences pre-defined in MPEG-4 or other known video encoding standards. Other partitions of coded video data for error resilient purposes (e.g. Data Partitioning Modes of MPEG-4/H.263) are also possible and could be represented by substreams.

Figure 16 and Figure 17 illustrate example compositions of a video data stream in accordance with the MPEG-4 video standard. In the example two temporally scalable substreams are used with I frames on the base substream while P and B frames are carried on the enhanced substream. In the illustrated example in Figure 17, only the base substream is used, comprising interleaved I and P frames. The encoder controller can thus control the bitrate of the video data stream for each wireless channel by manipulation of the number of substreams used for transmission, and the number and type of frames per substream.

Video encoding under MPEG-4 or H.263 standards operates on a frame-by-frame basis. Each frame is divided into either Group of Blocks (GOBs) or slices. A GOB comprises of macroblocks of one or several rows in a video frame. Slices are more flexible and can partition the frame into a variable number of macroblocks. A macroblock in turn comprises of four luminance and two spatially corresponding colour difference blocks of image data. All blocks in an I-frame are intra-coded. Blocks in an inter-coded P or B-frame can be of both intra-coded blocks (I-blocks) and inter-coded blocks (P-blocks or B-blocks).

The increase of I-block/P-block ratio (I_b/P_b) in P-frames or I-block/B-block ratio (I_b/B_b) in B-frames has two consequences: (1) improving the error resilience because more intra-coded blocks result in less error propagation; (2) increasing the bitrate because inter-coded blocks comprise substantially smaller amounts of data than intra-coded blocks. The encoder controller controls the encoder to make the best use of wireless channel utilisation for error resilient video encoding.

The error control can also be achieved by allocating GOBs or slices in a frame wherein the header of each GOB or slice can serve as synchronisation markers for decoder to regain synchronisation.

Figure 18 illustrates the operation of the encoder controller 108. The encoder controller operates by a closed-loop process. In the first step 400, the encoder controller obtains relevant information from various sources including the BR and BER associated with the wireless channel between the encoder and the network from air interface, the RBR and BER' via IP control session from the decoder, latency jitter (ΔL) of RTP packets from the RTCP client 123 and the instantaneous bitrate (IBR) from the encoder. In the second step 410, the encoder controller determines the target BR (BR_{target}) and the frame type (FT) based on the BR, RBR and IBR. In the third step 420, the encoder controller determines the I_b/P_b ratio for P-frames and the I_b/B_b for B-frames and the synchronisation marker rate R_{sync} for all frames. In the fourth step 430, the encoder controller determines the QP and the frame rate (FR) for the frame based on the I_b/P_b or I_b/B_b, and BR_{target}. In the fifth step 440, the encoder controller sends the encoding parameters FT, FR, R_{sync}, I_b/P_b or I_b/B_b, and QP to the encoder. In the sixth step 445, the encoder controller sends BR via IP control

session to the decoder. Then the encoder controller goes back to the first step 400.

Figure 19 illustrates the operation of the decoder controller 122. The decoder controller operates by a closed-loop process. In the first step 450, the decoder controller obtains relevant information from various sources including the BR' and BER' associated with the wireless channel between the decoder and the network from air interface, the BR associated with the wireless channel between the encoder and the network via IP session from the encoder. In the second step 460, the decoder controller determines ΔL of RTP packets received. In the third step 470, the decoder controller calculates RBR based on ΔL, BR and BR'. In the fourth step 480, the decoder controller sends the RBR and BER' via IP control session to the encoder controller. Then the decoder controller goes back to the first step 450 .Figure 20 illustrates the operation of the encoder 106. The encoder operates on a frame-by-frame basis. In the first step 490, the encoder obtains the encoding parameters including FT, FR, R_{sync}, I_b/P_b or I_b/B_b, and QP from the encoder controller. In the second step 492, the encoder allocates GOBs or slices for inter-coded frames based on R_{sync}. In the third step 494, the encoder further allocates the I-block distribution within P or B-frames based on I_b/P_b or I_b/B_b. In the fourth step 496, the encoder encodes the frame using the above encoding parameters and adds it to the CVDS. In the fifth step 498, the encoder calculates the IBR and sends it to the encoder controller. Then the encoder goes back to the first step, to process the next frame.

Although various aspects of the invention have been described with reference to specific embodiments, it will be appreciated by those skilled in the art that the invention can be embodied in many other forms.

DEFINITIONS

Unless the contrary intention clearly appears from the context in which certain words are used, the following definitions apply to words used in this specification:

WIRELESS CHANNEL; a physical radio channel with associated QoS parameters, e.g. UMTS Radio Access Bearer.

END TO END LINK; an end to end communications link between transmitter and receiver containing a transmit side wireless channel and / or a receive side wireless channel;

IP SESSION; An IP communications session between two IP hosts carrying either control or application data. Examples are a RTP session, a RTCP session, a RTSP session and a SIP session. One or more IP sessions can be mapped to a wireless channel;

COMPRESSED VIDEO DATA STREAM (CVDS); an overall video stream, where the original stream of image frames is compressed by means of an encoder;

FRAME; a video encoder outputs a number of different frame types. These include full still images and derivative images that have different data transmission requirements, have different sensitivity to errors and may have dependency on other frames. In the MPEG-4 video standard, frames are also known as Video Object Planes (VOPS);

SUBSTREAM; a CVDS may be split into a number of substreams for the purposes of transmission over a channel or plurality of channels. Each substream can be used as a means of transmitting a sequence of video frames that may be of different types. A substream is not necessarily the same as a layer as defined in video standards such as MPEG-4 and H.263. A substream could also be used to transmit any part of the coded frame data that can be successfully partitioned for error resilient purposes (e.g. DCT coefficients and motion vector data in data partitioning modes of MPEG-4/H.263). Each substream is transported by an RTP session and an associated RTCP session.

RTCP SERVER; an entity generating RTCP Receiver Reports based on the reception of RTP packets. These are sent to the transmitter of the RTP packets, where an RTCP client uses them.

RTCP CLIENT; an entity that uses RTCP Receiver Reports. These are sent from the receiver of the RTP packets, where an RTCP server generates them.

CLAIMS

1. A method of generating a compressed video data stream (CVDS) from a video stream, for transmission from a transmitter to a receiver over a wireless channel within a communications network, the method including the steps of:

(a) determining values of one or more error rate parameters associated with the wireless channel;

(b) determining values of one or more bit rate parameters associated with the wireless channel;

(c) calculating values of one or more encoding parameters using the values of the error rate parameters and the bit rate parameters;

(d) controlling encoding of the video stream on the basis of the encoding parameters, thereby to generate the CVDS.

2. A method according to claim 1, wherein step (a) includes ascertaining the error rate parameters associated with the wireless channel between the transmitter and the receiver, and step (d) includes controlling encoding of the video stream to improve an error resilience of the CVDS whilst meeting the bandwidth constraints of the wireless channel.

3. A method according to claim 2, where the transmitter is a mobile transmitter and the receiver is a network receiver, wherein the error rate parameters are derived from data taken from an air interface associated with the transmitter.

4. A method according to claim 2, where the transmitter is a network transmitter and the receiver is a mobile receiver, wherein the error rate parameters are derived from data taken from an air interface associated with the receiver and communicated via end to end feedback between the receiver and the transmitter.

5. A method according to 2, where both receiver and transmitter are mobile, wherein the error rate parameters are derived as in 3 and 4 and are combined in the transmitter.

6. A method according to claims 4 & 5, wherein the end to end feedback is carried out by one or more IP sessions between the receiver and the transmitter, wherein each IP session is one of an RTCP, RTSP or SIP session.

7. A method according to any one of the preceding claims, wherein the communications network is a UMTS or GPRS mobile telecommunications network.

8. A method according to claim 7, wherein the error rate and bit rate parameters are derived from Quality of Service (QoS) parameters associated with the wireless channel

9. A method according to claim 8, further including the step, prior to step (a), of initiating a session in which one or more of the wireless channels is established for transmission of the CVDS, the initiation of the session including receiving in the transmitter the QoS parameters from the network.

10. A method according to claim 9, when the QoS parameters are provided to the transmitter again in the event that they are modified.

11. A method according to any one of the preceding claims, wherein the CVDS is packetised into IP format packet prior to transmission.

12. A method according to claim 11, wherein the transmitter is a mobile handset and the IP packetisation includes the substeps of:

wrapping the CVDS in an RTP format packet;

wrapping the RTP packet in a UDP format packet; and

wrapping the UDP packet in an IP format packet for supply to an air interface associated with the transmitter for transmission to the receiver via the network

13. A method according to claim 12, wherein the receiver is configured to transmit a CVDS to the transmitter in accordance with any one of the preceding claims.

14. A method according to any one of the preceding claims, wherein the encoding parameters include any one or more of the following:

a frame rate;

a frame type, being indicative of either intra-coded frame or inter-coded frame;

a block type, being indicative of either intra-coded block or inter-coded block; and

a quantisation parameter.

15. A method according to claim 14, wherein the video data is divided into a sequence of frames, with each frame being further divided into Groups of Blocks (GOBs) or slices, each GOB or slice being further divided into a number of macroblocks.

16. A method according to claim 15, wherein the encoding parameters include any one or more of the following;

a ratio of intra-coded frames to inter-coded frames;

sizes of GOBs or slices, the sizes being selected such that headers of GOBs or slices can be used as resynchronisation markers for the decoder to regain synchronisation quickly when transmission errors occur;

a ratio of intra-coded blocks and inter-coded blocks for each GOB or slices in each inter-coded frame;

17. A method according to any one of the preceding claims, wherein the CVDS comprises a plurality of layers including a base layer and enhanced layers, each layer comprising a sequence of frames.

18. A method according to claim 17, wherein each layer is carried via an RTP session.

19. A method according to claim 18, wherein more than one transmit side and/or receive side wireless channel is open between the transmitter and the receiver, and each wireless channel is used to transmit an RTP session.

20. A method according to claim 19, wherein layers of the CVDS are mapped onto the wireless channels such that the base layer is mapped into the wireless channel with better transmission quality.

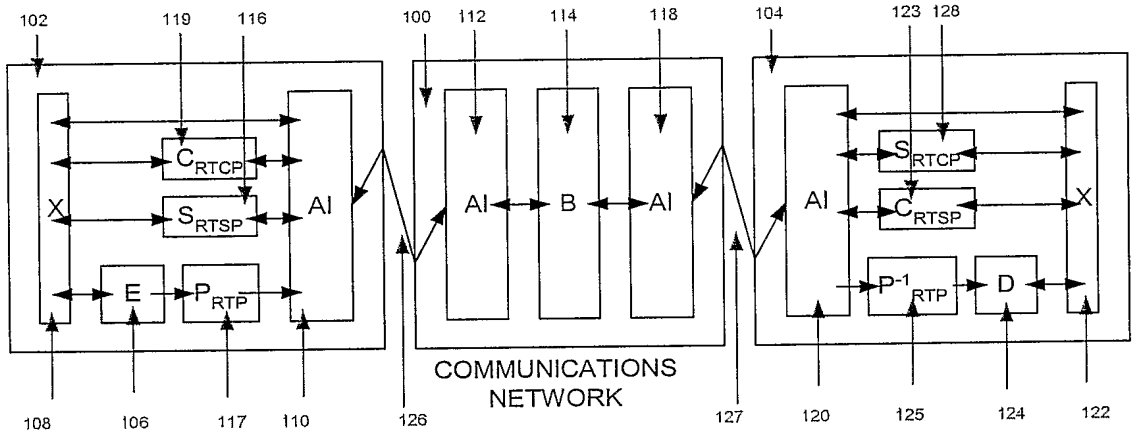


Figure 1

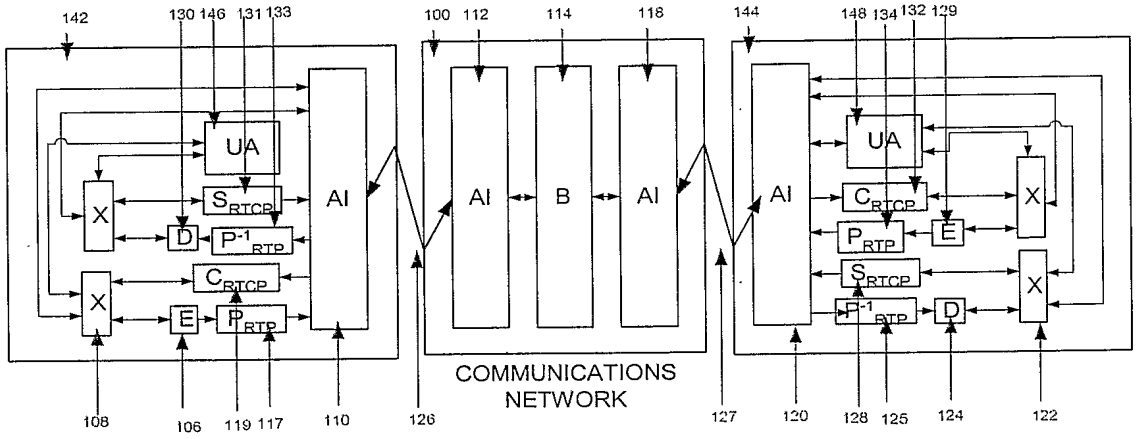


Figure 2

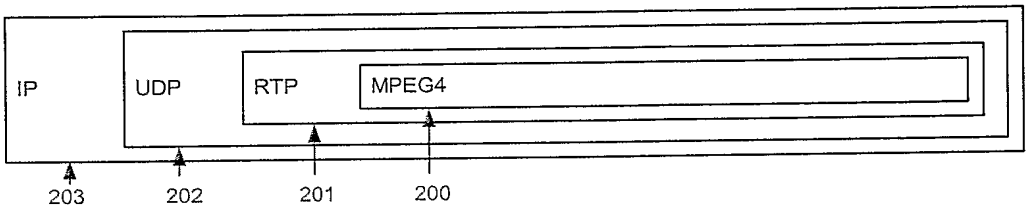


Figure 3

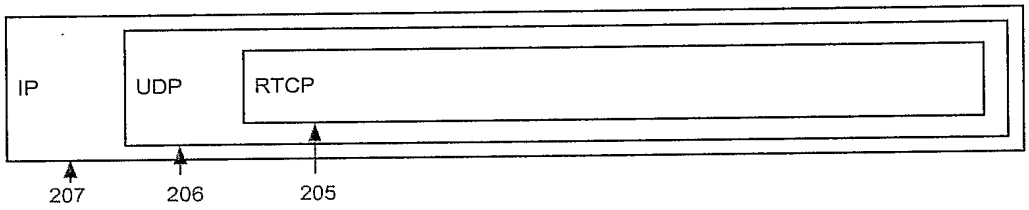


Figure 4

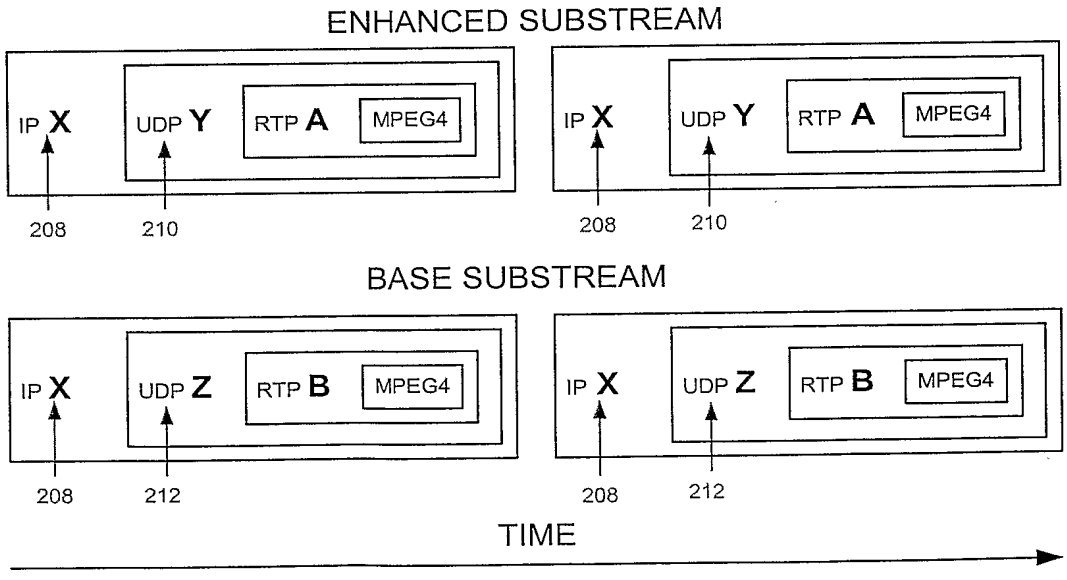


Figure 5

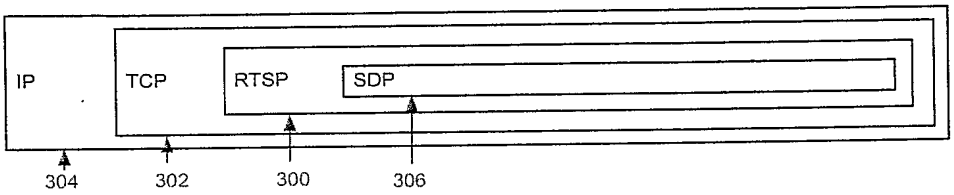


Figure 6

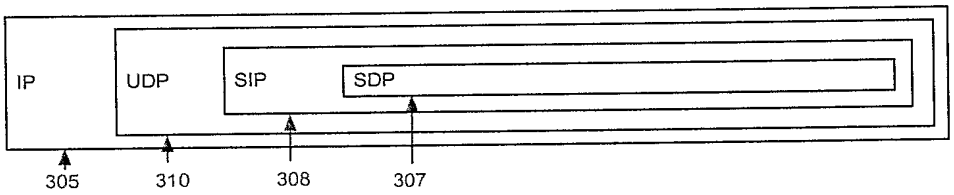


Figure 7

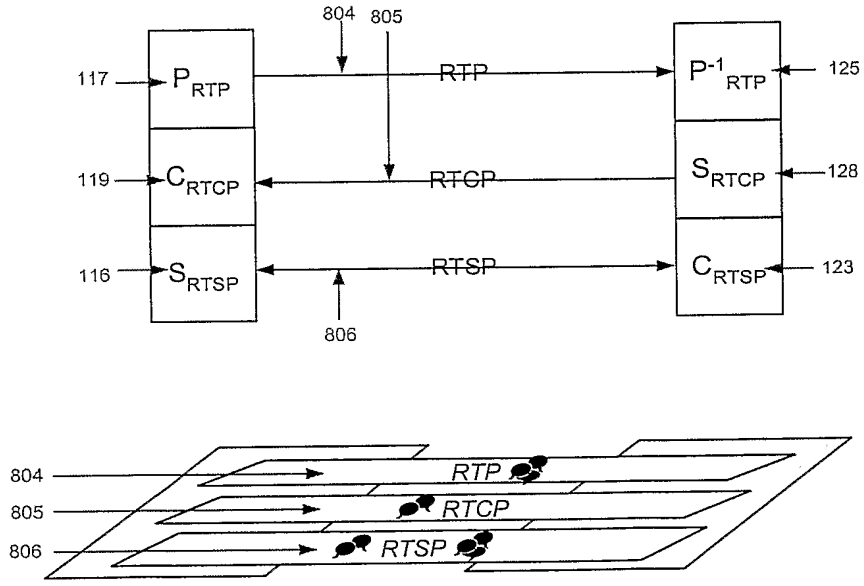


Figure 8

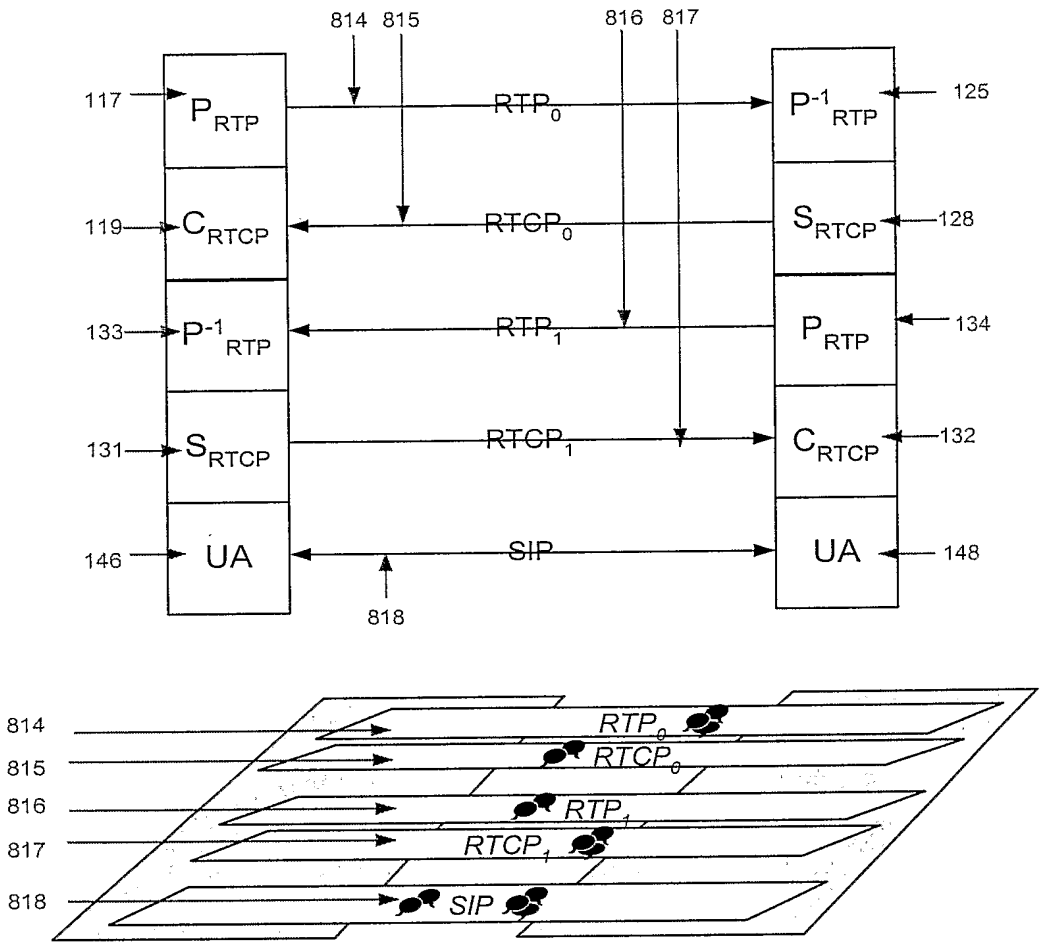

814
815
816
817
117
P_{RTP}
RTP_0
P^{-1}_{RTP}
125
119
C_{RTCP}
$RTCP_0$
S_{RTCP}
128
133
P^{-1}_{RTP}
RTP_1
P_{RTP}
134
131
S_{RTCP}
$RTCP_1$
C_{RTCP}
132
146
UA
SIP
UA
148
818
814
815
816
817
818
RTP_0
$RTCP_0$
RTP_1
$RTCP_1$
SIP

Figure 9

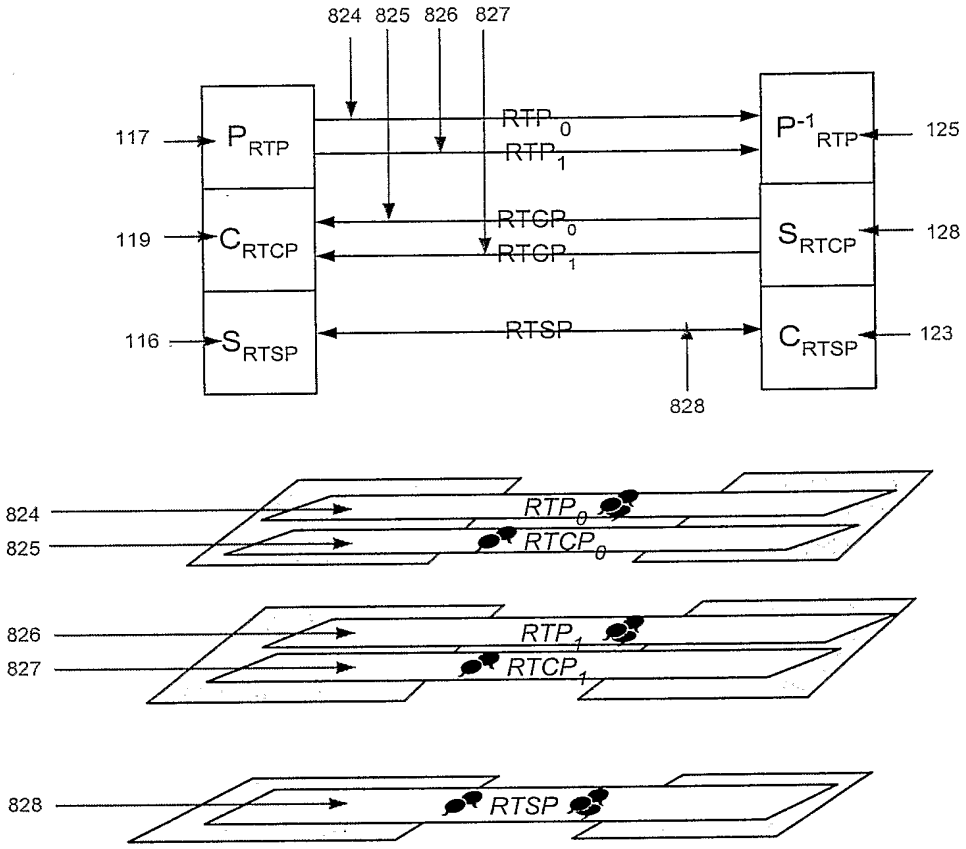

824
825
826
827
117
P_{RTP}
RTP_0
RTP_1
P^{-1}_{RTP}
125
119
C_{RTCP}
$RTCP_0$
$RTCP_1$
S_{RTCP}
128
116
S_{RTSP}
RTSP
C_{RTSP}
123
828
824
825
RTP_0
$RTCP_0$
826
827
RTP_1
$RTCP_1$
828
RTSP

Figure 10

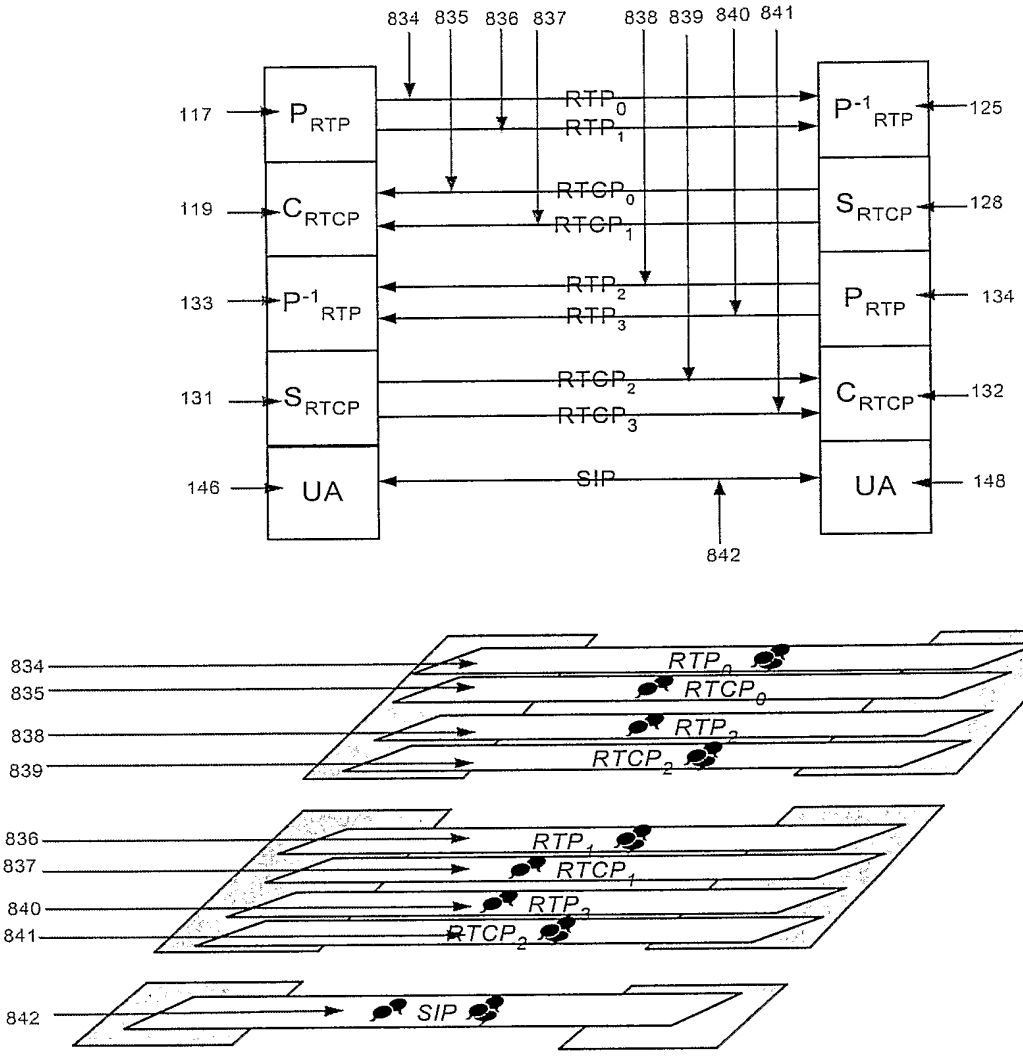

834
835
836
837
838
839
840
841
117
119
133
131
146
125
128
134
132
148
842
P_{RTP}
C_{RTCP}
P^{-1}_{RTP}
S_{RTCP}
UA
RTP_0
RTP_1
$RTCP_0$
$RTCP_1$
RTP_2
RTP_3
$RTCP_2$
$RTCP_3$
SIP

Figure 11

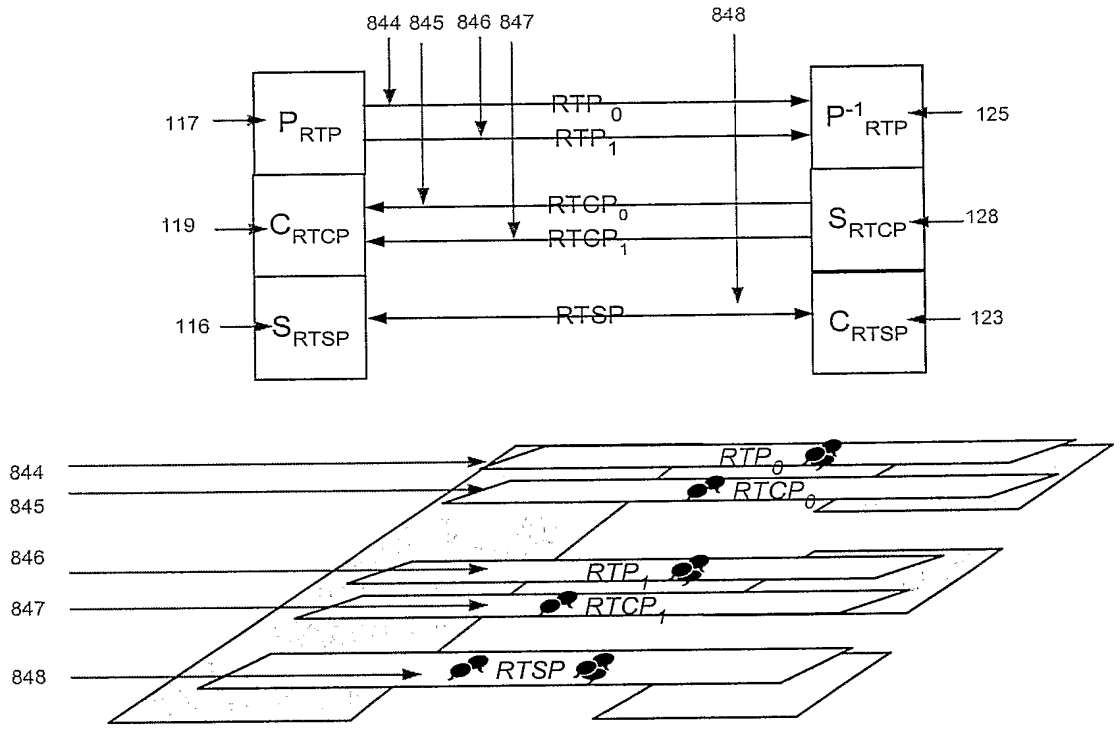

844 845 846 847
848
117
P_{RTP}
RTP_0
RTP_1
P^{-1}_{RTP}
125
119
C_{RTCP}
$RTCP_0$
$RTCP_1$
S_{RTCP}
128
116
S_{RTSP}
RTSP
C_{RTSP}
123
844
845
846
847
848
RTP_0
$RTCP_0$
RTP_1
$RTCP_1$
RTSP

Figure 12

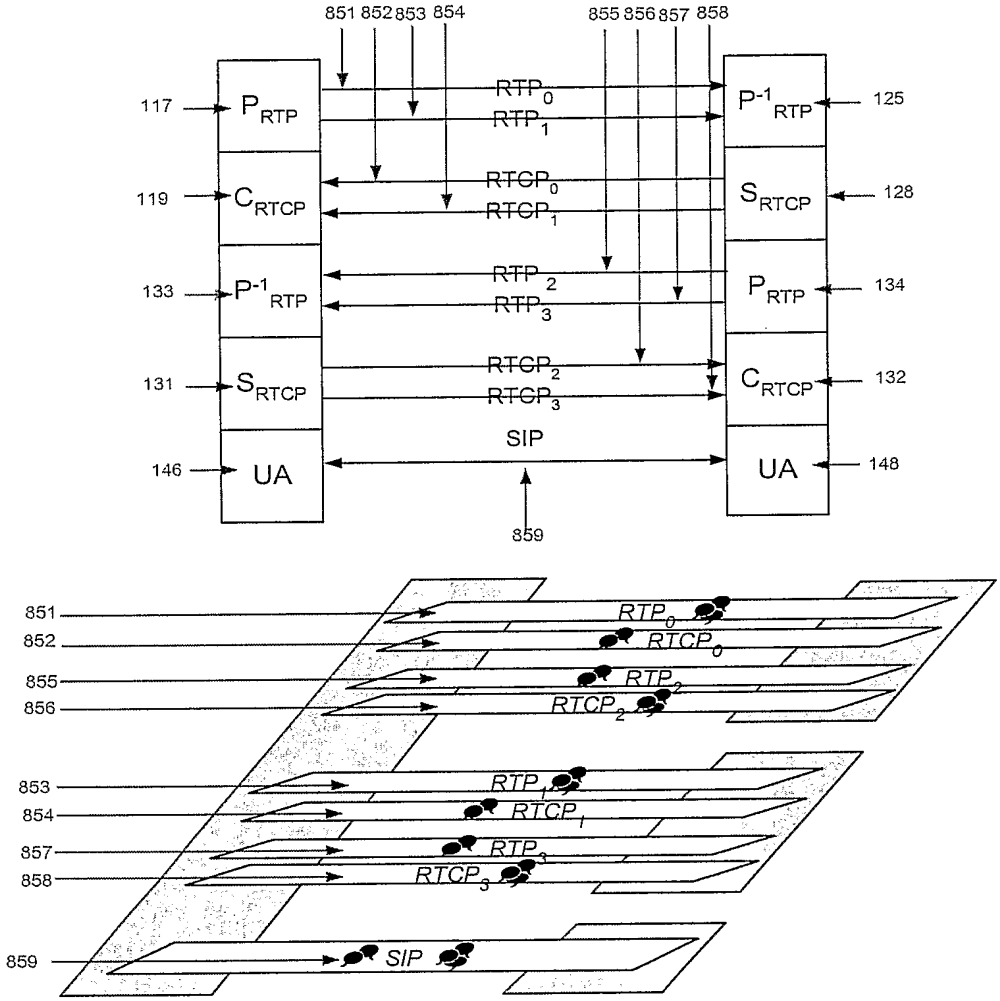

851 852 853 854
855 856 857 858
117
P_{RTP}
RTP_0
RTP_1
P^{-1}_{RTP}
125
119
C_{RTCP}
$RTCP_0$
$RTCP_1$
S_{RTCP}
128
133
P^{-1}_{RTP}
RTP_2
RTP_3
P_{RTP}
134
131
S_{RTCP}
$RTCP_2$
$RTCP_3$
C_{RTCP}
132
SIP
146
UA
UA
148
859
851
852
855
856
853
854
857
858
859
RTP_0
$RTCP_0$
RTP_2
$RTCP_2$
RTP_1
$RTCP_1$
RTP_3
$RTCP_3$
SIP

Figure 13

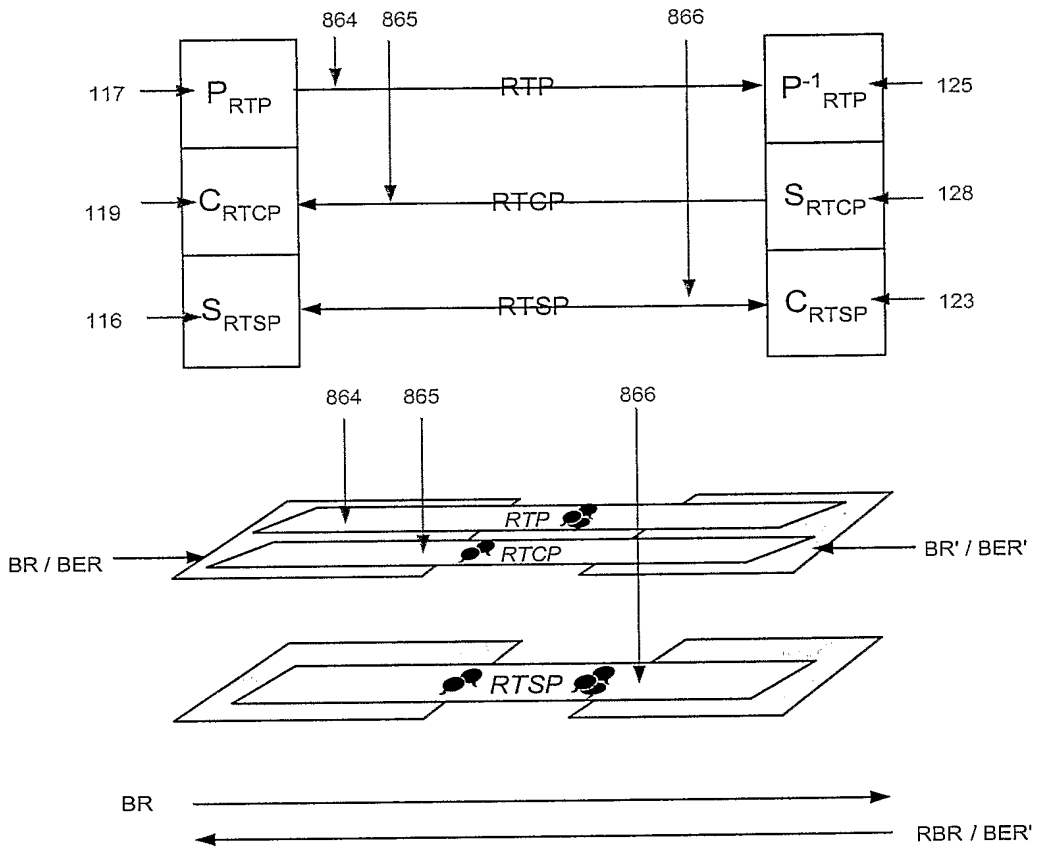

864
865
866
117
P_{RTP}
RTP
P^{-1}_{RTP}
125
119
C_{RTCP}
RTCP
S_{RTCP}
128
116
S_{RTSP}
RTSP
C_{RTSP}
123
BR / BER
RTP
RTCP
BR' / BER'
RTSP
BR
RBR / BER'

Figure 14

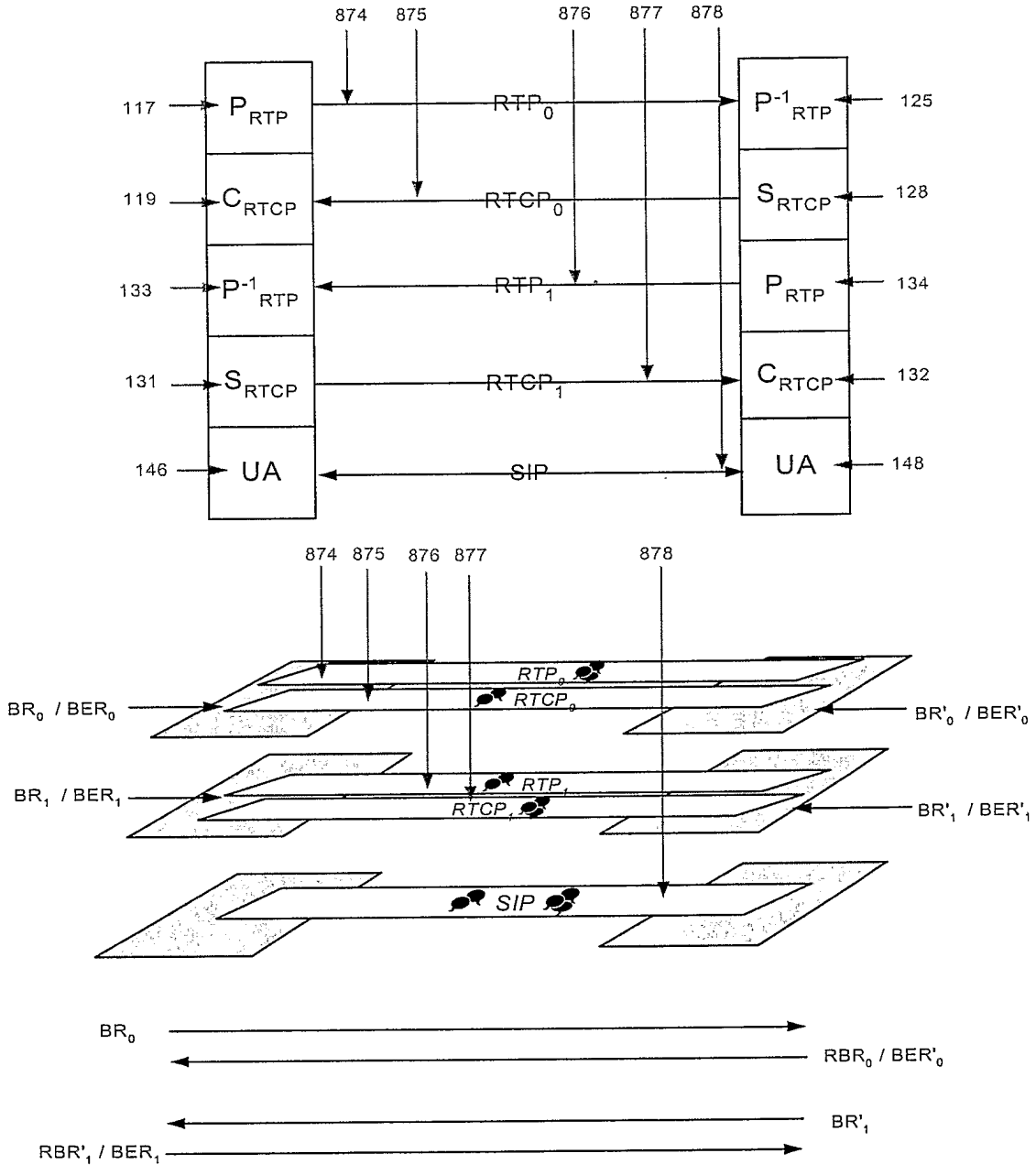

874
875
876
877
878
117
P_{RTP}
RTP_0
P^{-1}_{RTP}
125
119
C_{RTCP}
$RTCP_0$
S_{RTCP}
128
133
P^{-1}_{RTP}
RTP_1
P_{RTP}
134
131
S_{RTCP}
$RTCP_1$
C_{RTCP}
132
146
UA
SIP
UA
148
874
875
876
877
878
RTP_0
$RTCP_0$
BR_0 / BER_0
BR'_0 / BER'_0
RTP_1
$RTCP_1$
BR_1 / BER_1
BR'_1 / BER'_1
SIP
BR_0
RBR_0 / BER'_0
BR'_1
RBR'_1 / BER_1

Figure 15

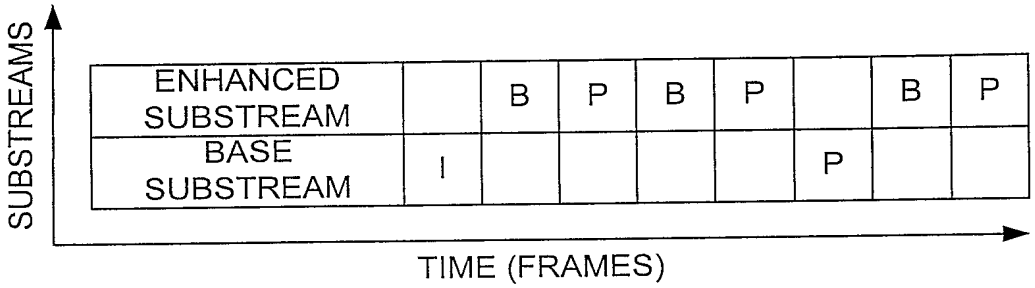


Figure 16

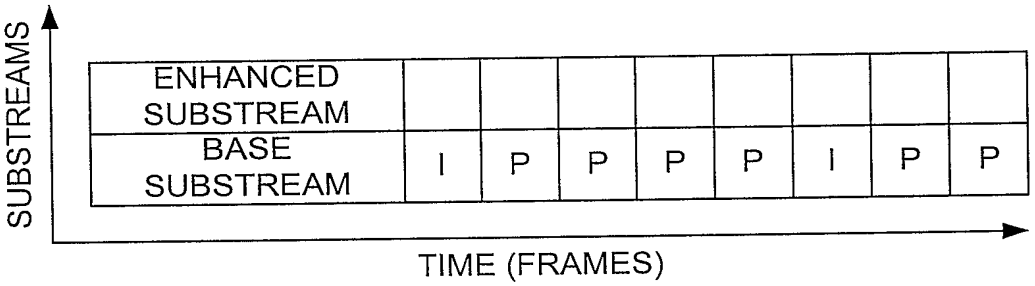


Figure 17

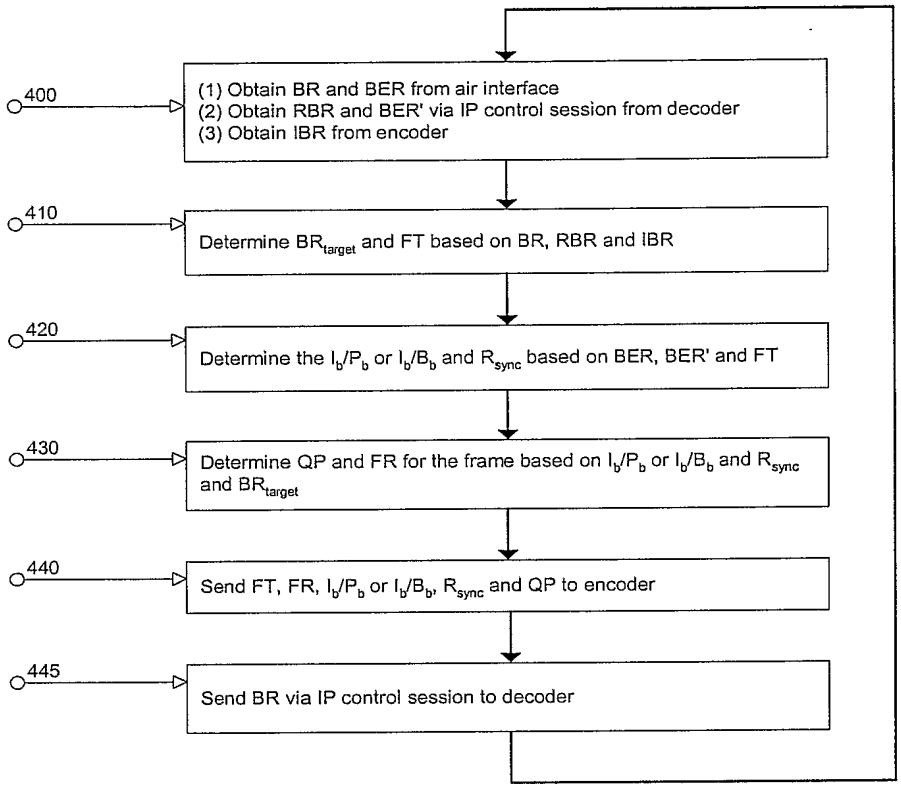


Figure 18

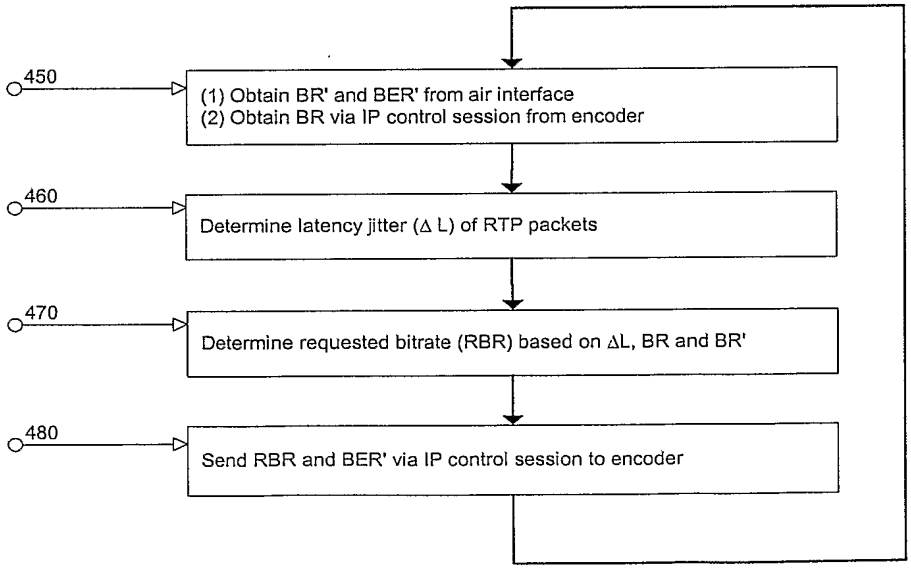


Figure 19

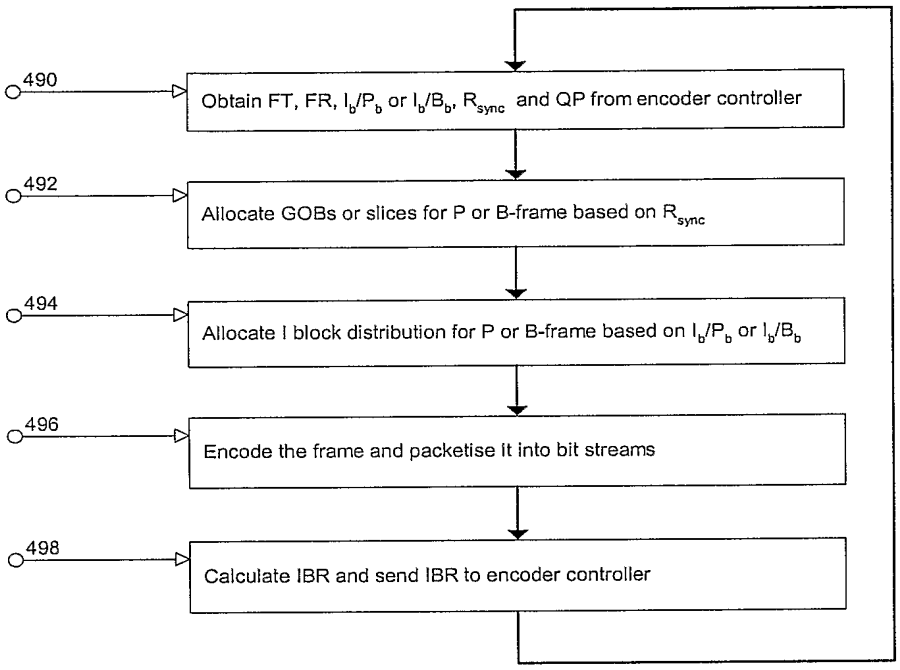

490
Obtain FT, FR, I_b/P_b or I_b/B_b, R_{sync} and QP from encoder controller
492
Allocate GOBs or slices for P or B-frame based on R_{sync}
494
Allocate I block distribution for P or B-frame based on I_b/P_b or I_b/B_b
496
Encode the frame and packetise it into bit streams
498
Calculate IBR and send IBR to encoder controller

Figure 20

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/04924

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N7/24

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 282 240 B1 (NAKAI TOSHIHISA ET AL) 28 August 2001 (2001-08-28) column 5, line 18 - line 49 ---	1-4, 14-16
X	GUERRI J C ET AL: "A feedback packet-level error control for real-time applications in wireless networks" VEHICULAR TECHNOLOGY CONFERENCE, 1999. VTC 1999 - FALL. IEEE VTS 50TH AMSTERDAM, NETHERLANDS 19-22 SEPT. 1999, PISCATAWAY, NJ, USA,IEEE, US, 19 September 1999 (1999-09-19), pages 879-883, XP010353105 ISBN: 0-7803-5435-4	1,2,4, 6-11,14, 15
A	paragraph '0001! paragraph '0003! --- -/--	3,5,12, 16,17

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in 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 document but published on or after the international filing date

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 July 2002	19/07/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Marie-Julie, J-M

Form PCT/ISA/210 (second sheet) (July 1992)

DISH EXHIBIT 2002, Page 915
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/04924

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 757 490 A (MATSUSHITA ELECTRIC IND CO LTD) 5 February 1997 (1997-02-05) page 13, line 3 -page 16, line 17 page 17, line 21 - line 57	1,2,4
A	HOFFMAN D ET AL: "Hierarchical video distribution over Internet-style networks" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON IMAGE PROCESSING (ICIP) LAUSANNE, SEPT. 16 - 19, 1996, NEW YORK, IEEE, US, vol. 1, 16 September 1996 (1996-09-16), pages 5-8, XP010202065 ISBN: 0-7803-3259-8 paragraph '0001!	1,17,20
A	US 5 825 430 A (ADOLPH DIRK ET AL) 20 October 1998 (1998-10-20) abstract	1,17-20
A	KYUNGRAN KANG ET AL: "Dynamic rate control mechanism for large scale sessions" INFORMATION NETWORKING, 1998. (ICOIN-12). PROCEEDINGS., TWELFTH INTERNATIONAL CONFERENCE ON TOKYO, JAPAN 21-23 JAN. 1998, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 21 January 1998 (1998-01-21), pages 21-24, XP010265270 ISBN: 0-8186-7225-0 the whole document	1,17-20
A	RADHA H ET AL: "Scalable Internet video using MPEG-4" SIGNAL PROCESSING. IMAGE COMMUNICATION, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 15, no. 1-2, September 1999 (1999-09), pages 95-126, XP004180640 ISSN: 0923-5965 the whole document	1,17-20
A	US 6 014 694 A (AHARONI AMIR ET AL) 11 January 2000 (2000-01-11) abstract column 2, line 10 - line 53 column 3, line 61 -column 4, line 7 column 6, line 61 -column 7, line 42	1,17

-/--

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

DISH EXHIBIT 2002, Page 916
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/04924

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	KASSLER A ET AL: "Support for multimedia applications in a wireless ATM system" 1998 1ST. IEEE INTERNATIONAL CONFERENCE ON ATM. ICATM'98. CONFERENCE PROCEEDINGS. COLMAR, FRANCE, JUNE 22 - 24, 1998, IEEE INTERNATIONAL CONFERENCE ON ATM, NEW YORK, NY: IEEE, US, 22 June 1998 (1998-06-22), pages 31-40, XP010290987 ISBN: 0-7803-4982-2 the whole document	1
A	RAMANUJAN R S ET AL: "Adaptive streaming of MPEG video over IP networks" LOCAL COMPUTER NETWORKS, 1997. PROCEEDINGS., 22ND ANNUAL CONFERENCE ON MINNEAPOLIS, MN, USA 2-5 NOV. 1997, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 2 November 1997 (1997-11-02), pages 398-409, XP010252445 ISBN: 0-8186-8141-1 the whole document	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

DISH EXHIBIT 2002, Page 917
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 01/04924

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 6282240	B1	28-08-2001	NONE		
EP 0757490	A	05-02-1997	CN	1152242 A	18-06-1997
			EP	0757490 A2	05-02-1997
			JP	10028269 A	27-01-1998
			KR	255229 B1	01-05-2000
			SG	74565 A1	22-08-2000
			US	6356309 B1	12-03-2002
US 5825430	A	20-10-1998	DE	19547707 A1	03-07-1997
			CN	1160321 A	24-09-1997
			EP	0781051 A2	25-06-1997
			JP	9186998 A	15-07-1997
US 6014694	A	11-01-2000	AU	7928998 A	19-01-1999
			EP	0992160 A1	12-04-2000
			WO	9900984 A1	07-01-1999
			JP	2002511216 T	09-04-2002

DISH EXHIBIT 2002, Page 918
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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 09/21/2021

LKGLOBAL (Dish Technologies L.L.C.)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

EXAMINER
PATEL, CHIRAG R

ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 09/21/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/876,579	05/18/2020	DAVID F. BRUECK	066.0141X1C9	3720

TITLE OF INVENTION: APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	12/21/2021

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

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

HOW TO REPLY TO THIS NOTICE:

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

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

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

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

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

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

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

DISH EXHIBIT 2002, Page 919
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

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

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

70560 7590 09/21/2021

LKGLOBAL (Dish Technologies L.L.C.)
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 transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/876,579	05/18/2020	DAVID F. BRUECK	066.0141X1C9	3720

TITLE OF INVENTION: APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	12/21/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
PATEL, CHIRAG R	2454	709-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

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

1 _____
2 _____
3 _____

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

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

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

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

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

DISH EXHIBIT 2002, Page 920
Avio Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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.
16/876,579	05/18/2020	DAVID F. BRUECK	066.0141X1C9	3720

70560 7590 09/21/2021

LKGLOBAL (Dish Technologies L.L.C.)
7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253

EXAMINER	
PATEL, CHIRAG R	
ART UNIT	PAPER NUMBER
2454	

DATE MAILED: 09/21/2021

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.

DISH EXHIBIT 2002, Page 921
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

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

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

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

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

DISH EXHIBIT 2002 Page 922
AvoFreesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Notice of Allowability	Application No. 16/876,579	Applicant(s) BRUECK et al.	
	Examiner CHIRAG R PATEL	Art Unit 2454	AIA (FITF) Status No

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

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

1. ☑ This communication is responsive to the amendments filed on August 5, 2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-30 . 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 8/19/21.
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 _____.

/CHIRAG R PATEL/
Primary Examiner, Art Unit 2454

Notice of Pre-AIA or AIA Status

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

Allowable Subject Matter

Claims 1-30 are allowed.

The following is an examiner's statement of reasons for allowance: Applicants have filed a terminal disclaimer to overcome the obvious double patent rejections with respect to US 10,469,555. A relevant prior art, Grigorovitch et al. (US 2005/0066063) teaches that a single file stores a portion of a video stream and audio stream in multiple bit-rates as performing multi-bit-rate encoding and are selected based on a bandwidth. It also teaches that the media cache will create a segment for each portion of the received stream that is not immediately adjacent in time, when the user uses a seek bar to forward or rewind the playback media. Srivara (US 2003/0204519) stores the entire song in multiple bit-rate encoding files and transmit the entire file in a single bit-rate in accordance with the quality selection. The prior art are different from the claimed invention in that the each streamlet correspond to a portion of a video, and is encoded at a response one of the plurality of different bitrate and refers to the same portion of the video in the low stream, medium quality and high quality stream and transmit only that portion which has the same duration at the at the requested bitrate for playback as requested, as claimed.

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."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chirag R Patel whose telephone number is (571)272-7966. The examiner can normally be reached on Monday to Friday from 8:00AM to 4:30PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenton Burgess, can be reached on 571-272-3949. 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://pairdirect.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).

/Chirag R Patel/
Primary Examiner, Art Unit 2454

Notice of References Cited	Application/Control No. 16/876,579	Applicant(s)/Patent Under Reexamination BRUECK et al.	
	Examiner CHIRAG R PATEL	Art Unit 2454	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20050066063-A1	03-2005	Grigorovitch, Alexandre V.	H04N21/6125	710/1
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC 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
	16/876,579	BRUECK et al.
	Examiner	**Art Unit**
	CHIRAG R PATEL	2454

CPC						
Symbol					**Type**	**Version**
H04L	/	65	/	607	F	2013-01-01
H04L	/	47	/	801	I	2013-01-01
H04L	/	47	/	12	I	2013-01-01
H04L	/	65	/	4069	I	2013-01-01
G06F	/	16	/	71	I	2019-01-01
G06F	/	16	/	183	I	2019-01-01
H04L	/	29	/	06027	I	2013-01-01
H04N	/	7	/	24	I	2013-01-01
H04N	/	21	/	23439	I	2013-01-01
H04N	/	21	/	4331	I	2013-01-01
H04N	/	21	/	84	I	2013-01-01
H04N	/	21	/	8456	I	2013-01-01
H04L	/	65	/	80	I	2013-01-01
H04L	/	65	/	608	I	2013-01-01
H04L	/	67	/	02	I	2013-01-01
H04L	/	65	/	1069	I	2013-01-01
H04L	/	67	/	2842	I	2013-01-01
H04L	/	67	/	32	I	2013-01-01
H04N	/	21	/	2662	I	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	30	
/CHIRAG R PATEL/ Primary Examiner, Art Unit 2454	10 September 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

U.S. Patent and Trademark Office — Part of Paper No.: 20210910

DISH EXHIBIT 2002, Page 927
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/876,579	BRUECK et al.
	Examiner	**Art Unit**
	CHIRAG R PATEL	2454

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04L	/	29	/	06

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	30	
/CHIRAG R PATEL/ Primary Examiner, Art Unit 2454	10 September 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

U.S. Patent and Trademark Office

Part of Paper No.: 20210910

DISH EXHIBIT 2002, Page 928
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/876,579	BRUECK et al.
	Examiner	**Art Unit**
	CHIRAG R PATEL	2454

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

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10		19		28								
	2		11		20		29								
	3		12		21		30								
	4		13		22										
	5		14		23										
	6		15		24										
	7		16		25										
	8		17		26										
	9		18		27										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	30	
/CHIRAG R PATEL/ Primary Examiner, Art Unit 2454	10 September 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	4

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/876,579	BRUECK et al.
	Examiner	Art Unit
	CHIRAG R PATEL	2454

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

CLAIMS

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

CLAIM		DATE								
Final	Original	06/12/2020	09/10/2021							
	1	✓	=							
	2	✓	=							
	3	✓	=							
	4	✓	=							
	5	✓	=							
	6	✓	=							
	7	✓	=							
	8	✓	=							
	9	✓	=							
	10	✓	=							
	11	✓	=							
	12	✓	=							
	13	✓	=							
	14	✓	=							
	15	✓	=							
	16	✓	=							
	17	✓	=							
	18	✓	=							
	19	✓	=							
	20	✓	=							
	21	✓	=							
	22	✓	=							
	23	✓	=							
	24	✓	=							
	25	✓	=							
	26	✓	=							
	27	✓	=							
	28	✓	=							
	29	✓	=							
	30	✓	=							

DISH EXHIBIT 2002, Page 930
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/876,579	BRUECK et al.
	Examiner	Art Unit
	CHIRAG R PATEL	2454

CPC - Searched*		
Symbol	Date	Examiner
H04N21/2662, H04N21/8456, H04L65/607,H04L65/608, H04L67/02	06/12/2020	C.P.

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST	06/12/2020	C.P.
EAST	02/01/2021	C.P.
EAST	09/10/2021	C.P.
Google Patents / Scholar	09/10/2021	C.P.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
H04N	H04N21/2662, H04N21/8456,	09/10/2021	C.P.
H04L	H04L65/607,H04L65/608, H04L67/02	09/10/2021	C.P.

DISH EXHIBIT 2002, Page 931
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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	5424455		1995-06-13	Yamamoto et al.	
	2	5544318		1996-08-06	Schmitz et al.	
	3	5867230		1999-02-02	Wang et al.	
	4	5933603		1999-08-03	Vahalia et al.	
	5	5941951		1999-08-24	Day et al.	
	6	5966015		1999-10-12	Horii	
	7	5966025		1999-10-12	Beffa	
	8	6003030		1999-12-14	Kenner et al.	

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

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

	9	6112239		2000-08-29	Kenner et al.	
	10	6154744		2000-11-28	Kenner et al.	
	11	6181867	B1	2001-01-30	Kenner et al.	
	12	6292383	B1	2001-09-18	Worley	
	13	6498897	B1	2002-12-24	Nelson et al.	
	14	6625643	B1	2003-09-23	Colby et al.	
	15	6637031	B1	2003-10-21	Chou	
	16	6665726	B1	2003-12-16	Leighton et al.	
	17	6766407	B1	2004-07-20	Lisitsa et al.	
	18	6795863	B1	2004-09-21	Doty, Jr.	
	19	7047307	B2	2006-05-16	Li	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/
DISH EXHIBIT 2002, Page 933
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	20	7386627	B1	2008-06-10	Lango et al.	
	21	7974200	B2	2011-07-05	Walker 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	20030072376	A1	2003-04-17	Krishnamachari et al.	
	2	20030061305	A1	2003-03-27	Copley et al.	
	3	20020170062	A1	2002-11-14	Chen et al.	
	4	20020044528	A1	2002-04-18	Pogrebinsky et al.	
	5	20020002708	A1	2002-01-03	Arye	
	6	20030009578	A1	2003-01-09	Apostolopoulos et al.	
	7	20030236906	A1	2003-12-25	Klemets et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/
DISH EXHIBIT 2002, Page 934
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	8	20040136327	A1	2004-07-15	Sitaraman et al.	
	9	20040260827	A1	2004-12-23	Wang	
	10	20040202109	A1	2004-10-14	Akiyama et al.	
	11	20050177618	A1	2005-08-11	Zimler et al.	
	12	20050207569	A1	2005-09-22	Zhang et al.	
	13	20080022343	A1	2008-01-24	Hodzic et al.	
	14	20080086570	A1	2008-04-10	Dey 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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2002045372	WO	A1	2002-06-06	BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		
	2	2003009581	WO	A1	2003-01-30	BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY		

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/
DISH EXHIBIT 2002, Page 935
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	3	2003041413	WO	A1	2003-05-15	PA CONSULTING SERVICES LIMITED		
	4	2003042856	WO	A1	2003-05-22	AEROCAST.COM, INC.		
	5	2004021668	WO	A1	2004-03-11	KONINKLIJKE PHILIPS ELECTRONICS N.V.		
	6	2004057832	WO	A1	2004-07-08	KONINKLIJKE PHILIPS ELECTRONICS N.V.		
	7	2006086717	WO	A1	2006-08-17	VIDIATOR ENTERPRISES INC.		
	8	2004295569	JP	A	2004-10-21	SONY CORP		
	9	139497	EP	A2	2004-03-03	MATSUSHITA ELECTRIC INDUSTRIAL CO. LTD.		

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	RealPlayer Plus™ G2 Manual", RealNetworks Inc., Seattle, WA (1998-1999), pp. 1-77	
	2	Kontothanassis, L. et al., "A Transport Layer for Live Streaming in a Content Delivery Network," Proceedings of the IEEE, 2004. pp.1408 - 1419. (Retrieved August 18, 2021 from https://www.akamai.com/it/it/multimedia/documents/technical-publication/a-transport-layer-forlive-streaming-in-a-content-delivery-network-technical-publication.pdf).	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	3	Dawson, F. "Improving Quality May Help to Boost Streaming Media," Multichannel News, December 19, 1999. pp. 1-17 (retrieved August 18, 2021 from https://www.nexttv.com/news/improving-quality-may-help-boost-streaming-media-143325).
	4	"InterVu Granted Key Internet Patent," Bloomberg Business, December 16, 1999 pp. 1-3 (retrieved August 18, 2021 from https://www.bloomberg.com/press-releases/1999-12-16/intervu-granted-key-internet-patent).
	5	"InterVu Streams Ahead Behind the Scenes", Paul Festa, cnet, January 2, 2002 (retrieved August 18, 2021 from https://www.cnet.com/news/intervu-streams-ahead-behind-the-scenes/).
	6	"Microsoft Announces Beta Release of Windows Media Technologies 4.0," April 13, 1999, pp. 1-5 (retrieved August 18, 2021 from https://news.microsoft.com/1999/04/13/microsoft-announcesbeta-release-of-windows-media-technologies-4-0/).
	7	"Sandpiper Adds RealSystem G2 to its Content Delivery Network," CBR Staff, August 4, 1999, pp. 1-4 (retrieved August 18, 2021 from https://techmonitor.ai/techonology/sandpiper_adds_realsystem_g2_to_its_content_delivery_nnetwork.
	8	"Speedera Posts Another Record Fiscal Year, Revenue Jumps 60 Percent," BusinessWire Digital Commerce 360, July 14, 2004, pp. 1-5 (retrieved August 18, 2021 from https://www.digitalcommerce360.com/2004/07/14/speedera-posts-another-record-fiscal-yearrevenue-jumps-60-perc/)
	9	"Developer Documentation QuickTime 6", Apple Computer Inc., Cupertino, CA (2002), pp. 1-240.
	10	"IBM Digital Library Version 2 Expands Its Comprehensive Solution Framework", Software Announcement, August 12, 1997, pp. 1-26 (retrieved August 18, 2021 from https://www-01.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_ca/2/897/ENUS297-312/index.html&request_locale=en).
	11	"Fresh Approach: Axient founder finds another way to make networking pay off", Y. Tara Teichgraeber, Phoenix Business Journal, January 13, 2002, pp. 1-6 (retrieved August 18, 2021 from https://www.bizjournals.com/phoenix/stories/2002/01/14/story6.html).
	12	Mac OS X Server QuickTime Streaming Server 5.0 Administration, Apple Computer Inc., Cupertino, CA (2003), pp. 1-65. no date
	13	RESPONDENTS LULULEMON ATHLETICA INC. AND CURIOUSER PRODUCTS INC. RESPONSE TO COMPLAINT US Int'l Trade Commission Investigation. No. 337-TA-1265. no date

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /C.R.P/

	14	RESPONDENT PELOTON INTERACTIVE, INC.'S RESPONSE TO COMPLAINT US Int'l Trade Commission Investigation. No. 337-TA-1265. no date
	15	VERIFIED RESPONSE OF ICON HEALTH & FITNESS, INC., FREE MOTION FITNESS, INC., AND NORDICTRACK, INC. TO COMPLAINT US Int'l Trade Commission Investigation. No. 337-TA-1265. no date

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

EXAMINER SIGNATURE

Examiner Signature	/CHIRAG R PATEL/	Date Considered	09/10/2021

*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. /C.R.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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)	2021-08-19
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.

Patents

streamlets multiple bitrates same duration

About 335 results

Download with Concepts Side-by-side

Sort by · Relevance · Group by · None · Deduplicate by · Family · Results / page · 10

Http adaptive streaming server with automatic rate shaping

WO EP US CN BR CA · EP2748721B1 · Kevin Mchugh · Ericsson AB

Priority 2011-10-07 • Filed 2012-09-03 • Granted 2017-03-29 • Published 2017-03-29

An adaptive streaming server (206) for transmitting a content stream through a network to a client, the adaptive streaming server comprising: a server (212) comprising an input interface (216) configured to receive a request from the client to play the content stream; a segmenting unit (210) ...

Http adaptive streaming in practice

Google Scholar · www.sigmm.org · Watson M · Proceedings of the ACM Multimedia Systems Conference (MMSys)--Keynote, San Jose, CA, USA, Febrary

Published 2011

... Millions of hours of content every day -- **Bitrates** up to 4.8Mbit/s -- Almost no dedicated infrastructure • Control servers in AWS ... Small media chunks (“**streamlets**”) Chunks created at ... Tractable representations of future choices -- Including scalability, **multiple** streams ...

Systems and methods for controlling the encoding of a segmented media stream ...

WO EP US BR CA MX · US10587664B2 · Conrad Savio Jude Gomes · Sling Media Pvt Ltd

Priority 2011-08-29 • Filed 2017-01-27 • Granted 2020-03-10 • Published 2020-03-10

Systems and methods are described for providing a media stream transmitted from an encoding system to a remotely-located media player that requests segments of the media stream. The media stream is encoded into segments according to an encoding parameter. Data is gathered about current conditions ...

Audio splitting at codec applicable frame size

WO EP US CN JP KR AU BR CA IL MX SG · JP5728736B2 · ライアンオーウェン、カルバン・エコスター テクノロジーズエル、エル、シー、Ｅｃｈｏｓｔａｒ Ｔｅｃｈｎｏｌｏｇｉｅｓ Ｌ．Ｌ．Ｃ．

Priority 2009-12-21 • Filed 2010-12-21 • Granted 2015-06-03 • Published 2015-06-03

Receiving media content including audio and video by a computing system; Encoding the video into a plurality of video frames by the computing system according to a predetermined video encoding frame rate; Encoding the speech by the computing system into a plurality of uninterrupted speech frames ...

Playback stall avoidance in adaptive media streaming

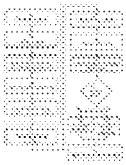
WO EP US CA · CA2888218C · Mark B. Hurst · Echostar Technologies Llc

Priority 2013-03-15 • Filed 2014-03-13 • Granted 2018-10-02 • Published 2018-10-02

Methods, systems and devices are described to avoid stalling during playback of an adaptive media stream delivered to a media player device over a network. The media device requests segments of the media stream that are received in a buffer. Buffer utilization is monitored over time to determine a ...

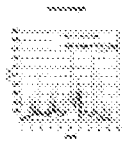
Determining a time budget for transcoding of video

US · US10531134B2 · Thomas George · Akamai Technologies, Inc.



Priority 2017-11-10 • Filed 2017-11-10 • Granted 2020-01-07 • Published 2020-01-07
This document describes systems, methods, and apparatus for determining a time budget for transcoding a video. By calculating and/or monitoring the time budget in accordance with the teachings hereof, a transcoder can assess the effect its transcode duration will have on a client buffer. As a ...

Content delivery



WO EP US • US20130185399A1 • Stephen Clifford Appleby • British Telecommunications Public Limited Company
Priority 2010-09-30 • Filed 2011-09-30 • Published 2013-07-18
A method for providing equitable media streaming between an HTTP server and a number of receivers via shared network. The streaming data is processed to split the data across a number of sub-streams. Each sub-stream contains non-contiguous data. A receiver requesting the streaming media ...

Frame-rate conversion in a distributed computing system

US • US9609049B2 • Kourosh Soroushian • Akamai Technologies, Inc.
Priority 2013-12-30 • Filed 2016-09-30 • Granted 2017-03-28 • Published 2017-03-28
Described herein are, among other things, distributed processing methods and systems for frame rate conversion. In an embodiment, a transcoding management machine manages a distributed transcoding process, creating a plurality of video segments and assigning the video segments across a set of ...

Apparatus, system, and method for multi-bitrate content streaming

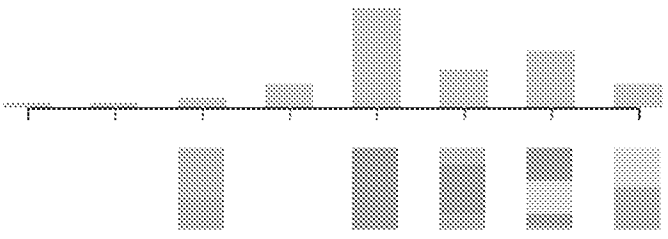
US • US9071668B2 • David F. Brueck • Echostar Technologies L.L.C.
Priority 2004-04-30 • Filed 2013-12-13 • Granted 2015-06-30 • Published 2015-06-30
An apparatus for multi-bitrate content streaming includes a receiving module configured to capture media content, a streamlet module configured to segment the media content and generate a plurality of streamlets, and an encoding module configured to generate a set of streamlets. The system ...

Adaptive multicast delivery of media streams

WO US • US9716918B2 • Robert Drew Major • Echostar Technologies L.L.C.
Priority 2012-12-28 • Filed 2013-12-30 • Granted 2017-07-25 • Published 2017-07-25
Various systems, methods and devices adaptively manage the multicast delivery of multiple media programs. Each of the media programs is encoded into multiple media streams, each stream having a different bitrate, frame rate, resolution or other encoding parameter. A computer receives feedback ...

Next › » About 335 results

Top 1000 results by filing date



Relative count of top 5 values

Assignees	Inventors	CPCs
DISH Technologies L.L.C.		14.2%
Echostar Technologies L.L.C.		12.5%
Sling Media Pvt Ltd		8.9%
Akamai Technologies, Inc.		5.3%
Echostar Technologies Llc		3.5%

Expand

Bibliographic Data

Application No: 16/876,579

Foreign Priority claimed: ○ Yes ◉ No

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

Verified and Acknowledged: /CHIRAG R PATEL/ Examiner's Signature | Initials

Title: APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/18/2020	709	2454	066.0141X1C9
RULE			

APPLICANTS

DISH Technologies L.L.C., Englewood, CO, UNITED STATES

INVENTORS

DAVID F. BRUECK, SARATOGA SPRINGS, UT, UNITED STATES

MARK B. HURST, CEDAR HILLS, UT, UNITED STATES

R. DREW MAJOR, OREM, UT, UNITED STATES

CONTINUING DATA

This application is a CON of 16004056 06/08/2018 PAT 10659513

16004056 is a CON of 15414025 01/24/2017 PAT 9998516

15414025 is a CON of 14719122 05/21/2015 PAT 9571551

14719122 is a CON of 14106051 12/13/2013 PAT 9071668

14106051 is a CON of 13617114 09/14/2012 PAT 8612624

13617114 is a CON of 12906940 10/18/2010 PAT 8402156

12906940 is a CON of 11673483 02/09/2007 PAT 7818444

11673483 is a CIP of 11116783 04/28/2005 PAT 8868772

11116783 has PRO of 60566831 04/30/2004

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

05/26/2020

STATE OR COUNTRY

UNITED STATES

ADDRESS

LKGLOBAL (Dish Technologies L.L.C.)

7010 E. COCHISE ROAD
SCOTTSDALE, AZ 85253
UNITED STATES

FILING FEE RECEIVED

$7,320

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	4	streamlet near3 bit$2rates with duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/09/10 09:45
L2	9	portion near2 stream with duration with bit$2rate	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/09/10 09:51
L3	0	slic$3 near5 portion near2 stream with duration with bit$2rate	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/09/10 09:52
L4	6	slicing with stream with bit$2rate	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/09/10 09:52
L5	2	(("20030135631") or ("20020188745")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2021/09/10 10:09
L6	24	multi-bit near rate near2 encod$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/09/10 10:28
L7	35	("20020002708" | "20020044528" | "20020170062" | "20030009578" | "20030061305" | "20030072376" | "20030236906" | "20040136327" | "20040202109" | "20040260827" | "20050177618" | "20050207569" | "20080022343" | "20080086570" |	US-PGPUB; USPAT	OR	ON	2021/09/10 10:38

		"5424455" | "5544318" | "5867230" | "5933603" | "5941951" | "5966015" | "5966025" | "6003030" | "6112239" | "6154744" | "6181867" | "6292383" | "6498897" | "6625643" | "6637031" | "6665726" | "6766407" | "6795863" | "7047307" | "7386627" | "7974200").PN.				
S1	1	("10659513").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 07:55
S2	8	(("9571551") or ("9071668") or ("8612624") or ("8402156") or ("7818444") or ("8868772") or ("10469554") or ("10659513")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 07:58
S3	2	(("73369610") or ("20050055425") or ("20030103571")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:29
S4	3	(("7369610") or ("20050055425") or ("20030103571")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:30
S5	27	encod$3 near2 streamlets with bitrates	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 10:36
S6	1	("9751551").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:45
S7	1	("9571551").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:46
S8	1	("8402156").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:53
S9	1	("7818444").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 10:55
S10	7	(("20080162713") or ("20040170392") or ("20040143672") or ("6486803") or ("20030204519") or ("6486803") or	US-PGPUB;	OR	OFF	2020/06/12 11:02

		("20030005455") or ("20040054551") or ("20040170392")).PN.	USPAT; USOCR			
S11	54	streamlets with bitrates	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 11:33
S12	74	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 12:37
S13	0	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3 and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:03
S14	5	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlets and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:03
S15	33,997	portions with stream and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:28
S16	1,761,238	portions with stream with bitrat$3and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:29
S17	24	portions with stream with bitrat$3 and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:29
S18	2	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and divid$3 with stream same bitrate and @rlad<"20040430"	US-PGPUB; USPAT; USOCR;	OR	ON	2020/06/12 13:30

			FPRS; EPO			
S19	3	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and (divid$3 split$3)with stream same bitrate and @rlad<"20040430"	US-PGPUB; USPAT; USOCR; FPRS; EPO	OR	ON	2020/06/12 13:30
S20	1	("10469554").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 14:26
S21	1	("10469554").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 14:44
S22	1	("10469555").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/06/12 14:47
S23	1	("10,469,554").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/01 16:44
S24	1	("10,469,555").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2021/02/01 16:47
S25	211	("20010013128" | "20010047423" | "20020029274" | "20020073167" | "20020091840" | "20020097750" | "20020131496" | "20020144276" | "20020152317" | "20020152318" | "20020156912" | "20020161898" | "20020161908" | "20020161911" | "20020169926" | "20020174434" | "20020176418" | "20020178330" | "20020188745" | "20030005455" | "20030014684" | "20030018966" | "20030021166" | "20030021282" | "20030055995" | "20030065803" | "20030067872" | "20030081582" | "20030093790" | "20030107994" | "20030135631" | "20030135863" | "20030140159" | "20030151753" | "20030152036" | "20030154239" | "20030195977" | "20030204519" | "20030204602" | "20030233464" | "20030236904" | "20040003101" | "20040010613" | "20040030547" |	US-PGPUB; USPAT	OR	ON	2021/02/01 16:51

"20040030599" | "20040030797" |
"20040031054" | "20040049780" |
"20040054551" | "20040071209" |
"20040083283" | "20040093420" |
"20040103444" | "20040117427" |
"20040143672" | "20040168052" |
"20040170392" | "20040179032" |
"20040199655" | "20040220926" |
"20040221088" | "20040260701" |
"20040267956" | "20050015509" |
"20050033855" | "20050055425" |
"20050066063" | "20050076136" |
"20050084166" | "20050108414" |
"20050120107" | "20050123058" |
"20050185578" | "20050188051" |
"20050204046" | "20050251832" |
"20050262257" | "20060010003" |
"20060059223" | "20060075446" |
"20060080718" | "20060130118" |
"20060133809" | "20060165166" |
"20060168290" | "20060206246" |
"20060236219" | "20060277564" |
"20061068295" | "20070024705" |
"20070030833" | "20070067480" |
"20070079325" | "20070094405" |
"20070204310" | "20070280255" |
"20080028428" | "20080037527" |
"20080046939" | "20080056373" |
"20080104647" | "20080120330" |
"20080120342" | "20080133766" |
"20080162713" | "20080184688" |
"20080195744" | "20080205291" |
"20080219151" | "20080222235" |
"20080263180" | "20080281803" |
"20090043906" | "20090055471" |
"20090055547" | "20090210549" |
"20100098103" | "20100262711" |
"20110307545" | "20150058496" |
"4535355" | "5168356" | "5267334" |
"5404446" | "5687095" | "5732183" |
"57685627" | "5841432" | "5953506" |
"6091775" | "6091777" | "6122660" |
"6172672" | "6185736" | "6195680" |
"6366614" | "6374289" | "6389473" |
"6449719" | "6486803" | "6490627" |
"6510553" | "6574591" | "6604118" |
"6618752" | "6708213" | "6721723" |
"6731600" | "6757796" | "6760772" |
"6795863" | "6845107" | "6850965" |
"6859839" | "6874015" | "6968387" |
"6976090" | "7054365" | "7054774" |
"7054911" | "7075986" | "7093001" |
"7096271" | "7099954" | "7116894" |

		"7174385" | "7194549" | "7240100" | "7260640" | "7274740" | "7295520" | "7310678" | "7325073" | "7328243" | "7330908" | "7334044" | "7349358" | "7349976" | "7369610" | "7376747" | "7391717" | "7408984" | "7412531" | "7477688" | "7523181" | "7536469" | "7546355" | "7558869" | "7577750" | "7593333" | "7599307" | "7609652" | "7653735" | "7707303" | "7719985" | "7760801" | "7779135" | "7788395" | "7797439" | "7817985" | "7818444" | "7925781" | "8036265" | "8370514" | "8402156" | "8521836" | "8612624" | "8683066" | "8686066" | "8868772" | "8880721" | "9344496" | "9462074").PN.				
S26	211	("20010013128" | "20010047423" | "20020029274" | "20020073167" | "20020091840" | "20020097750" | "20020131496" | "20020144276" | "20020152317" | "20020152318" | "20020156912" | "20020161898" | "20020161908" | "20020161911" | "20020169926" | "20020174434" | "20020176418" | "20020178330" | "20020188745" | "20030005455" | "20030014684" | "20030018966" | "20030021166" | "20030021282" | "20030055995" | "20030065803" | "20030067872" | "20030081582" | "20030093790" | "20030107994" | "20030135631" | "20030135863" | "20030140159" | "20030151753" | "20030152036" | "20030154239" | "20030195977" | "20030204519" | "20030204602" | "20030233464" | "20030236904" | "20040003101" | "20040010613" | "20040030547" | "20040030599" | "20040030797" | "20040031054" | "20040049780" | "20040054551" | "20040071209" | "20040083283" | "20040093420" | "20040103444" | "20040117427" | "20040143672" | "20040168052" | "20040170392" | "20040179032" | "20040199655" | "20040220926" | "20040221088" | "20040260701" | "20040267956" | "20050015509" | "20050033855" | "20050055425" | "20050066063" | "20050076136" | "20050084166" | "20050108414" | "20050120107" | "20050123058" |	US-PGPUB; USPAT	OR	ON	2021/02/01 16:52

"20050185578" | "20050188051" |
"20050204046" | "20050251832" |
"20050262257" | "20060010003" |
"20060059223" | "20060075446" |
"20060080718" | "20060130118" |
"20060133809" | "20060165166" |
"20060168290" | "20060206246" |
"20060236219" | "20060277564" |
"20061068295" | "20070024705" |
"20070030833" | "20070067480" |
"20070079325" | "20070094405" |
"20070204310" | "20070280255" |
"20080028428" | "20080037527" |
"20080046939" | "20080056373" |
"20080104647" | "20080120330" |
"20080120342" | "20080133766" |
"20080162713" | "20080184688" |
"20080195744" | "20080205291" |
"20080219151" | "20080222235" |
"20080263180" | "20080281803" |
"20090043906" | "20090055471" |
"20090055547" | "20090210549" |
"20100098103" | "20100262711" |
"20110307545" | "20150058496" |
"4535355" | "5168356" | "5267334" |
"5404446" | "5687095" | "5732183" |
"57685627" | "5841432" | "5953506" |
"6091775" | "6091777" | "6122660" |
"6172672" | "6185736" | "6195680" |
"6366614" | "6374289" | "6389473" |
"6449719" | "6486803" | "6490627" |
"6510553" | "6574591" | "6604118" |
"6618752" | "6708213" | "6721723" |
"6731600" | "6757796" | "6760772" |
"6795863" | "6845107" | "6850965" |
"6859839" | "6874015" | "6968387" |
"6976090" | "7054365" | "7054774" |
"7054911" | "7075986" | "7093001" |
"7096271" | "7099954" | "7116894" |
"7174385" | "7194549" | "7240100" |
"7260640" | "7274740" | "7295520" |
"7310678" | "7325073" | "7328243" |
"7330908" | "7334044" | "7349358" |
"7349976" | "7369610" | "7376747" |
"7391717" | "7408984" | "7412531" |
"7477688" | "7523181" | "7536469" |
"7546355" | "7558869" | "7577750" |
"7593333" | "7599307" | "7609652" |
"7653735" | "7707303" | "7719985" |
"7760801" | "7779135" | "7788395" |
"7797439" | "7817985" | "7818444" |
"7925781" | "8036265" | "8370514" |
"8402156" | "8521836" | "8612624" |

		"8683066" | "8686066" | "8868772" | "8880721" | "9344496" | "9462074").PN.				
S27	17	(("5267334") or ("5404446") or ("5841432") or ("5389473") or ("6172672") or ("20020156912") or ("20030055995") or ("20030233464") or ("20020131496") or ("20030135863")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2021/02/01 16:57
S28	211	("20010013128" | "20010047423" | "20020029274" | "20020073167" | "20020091840" | "20020097750" | "20020131496" | "20020144276" | "20020152317" | "20020152318" | "20020156912" | "20020161898" | "20020161908" | "20020161911" | "20020169926" | "20020174434" | "20020176418" | "20020178330" | "20020188745" | "20030005455" | "20030014684" | "20030018966" | "20030021166" | "20030021282" | "20030055995" | "20030065803" | "20030067872" | "20030081582" | "20030093790" | "20030107994" | "20030135631" | "20030135863" | "20030140159" | "20030151753" | "20030152036" | "20030154239" | "20030195977" | "20030204519" | "20030204602" | "20030233464" | "20030236904" | "20040003101" | "20040010613" | "20040030547" | "20040030599" | "20040030797" | "20040031054" | "20040049780" | "20040054551" | "20040071209" | "20040083283" | "20040093420" | "20040103444" | "20040117427" | "20040143672" | "20040168052" | "20040170392" | "20040179032" | "20040199655" | "20040220926" | "20040221088" | "20040260701" | "20040267956" | "20050015509" | "20050033855" | "20050055425" | "20050066063" | "20050076136" | "20050084166" | "20050108414" | "20050120107" | "20050123058" | "20050185578" | "20050188051" | "20050204046" | "20050251832" | "20050262257" | "20060010003" | "20060059223" | "20060075446" | "20060080718" | "20060130118" | "20060133809" | "20060165166" | "20060168290" | "20060206246" | "20060236219" | "20060277564" |	US-PGPUB; USPAT	OR	ON	2021/02/01 16:58

		"20061068295" | "20070024705" | "20070030833" | "20070067480" | "20070079325" | "20070094405" | "20070204310" | "20070280255" | "20080028428" | "20080037527" | "20080046939" | "20080056373" | "20080104647" | "20080120330" | "20080120342" | "20080133766" | "20080162713" | "20080184688" | "20080195744" | "20080205291" | "20080219151" | "20080222235" | "20080263180" | "20080281803" | "20090043906" | "20090055471" | "20090055547" | "20090210549" | "20100098103" | "20100262711" | "20110307545" | "20150058496" | "4535355" | "5168356" | "5267334" | "5404446" | "5687095" | "5732183" | "57685627" | "5841432" | "5953506" | "6091775" | "6091777" | "6122660" | "6172672" | "6185736" | "6195680" | "6366614" | "6374289" | "6389473" | "6449719" | "6486803" | "6490627" | "6510553" | "6574591" | "6604118" | "6618752" | "6708213" | "6721723" | "6731600" | "6757796" | "6760772" | "6795863" | "6845107" | "6850965" | "6859839" | "6874015" | "6968387" | "6976090" | "7054365" | "7054774" | "7054911" | "7075986" | "7093001" | "7096271" | "7099954" | "7116894" | "7174385" | "7194549" | "7240100" | "7260640" | "7274740" | "7295520" | "7310678" | "7325073" | "7328243" | "7330908" | "7334044" | "7349358" | "7349976" | "7369610" | "7376747" | "7391717" | "7408984" | "7412531" | "7477688" | "7523181" | "7536469" | "7546355" | "7558869" | "7577750" | "7593333" | "7599307" | "7609652" | "7653735" | "7707303" | "7719985" | "7760801" | "7779135" | "7788395" | "7797439" | "7817985" | "7818444" | "7925781" | "8036265" | "8370514" | "8402156" | "8521836" | "8612624" | "8683066" | "8686066" | "8868772" | "8880721" | "9344496" | "9462074").PN.				
S29	0	(S25 S26 S27 S28) and streamlet with "same" near2 duration	US-PGPUB; USPAT	OR	ON	2021/02/01 17:05

S30	7	(S25 S26 S27 S28) and streamlet with duration	US-PGPUB; USPAT	OR	ON	2021/02/01 17:06
S31	46	(("8521836") or ("7558869") or ("7707303") or ("7925781") or ("8880721") or ("9344496") or ("8683066") or ("8686066") or ("6708213") or ("6757796") or ("9462074") or ("20050033855") or ("20030093790") or ("20030195977") or ("20040199655") or ("20040267956") or ("20040220926") or ("20060010003") or ("20060277564") or ("20150058496") or ("20100262711") or ("20050251832") or ("20040221088") or ("20040179032") or ("20020161908") or ("20030021282") or ("20080120330") or ("20080120342") or ("20110307545") or ("20050262257") or ("20030236904")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2021/02/01 17:13
S32	0	(S27 S28 S31) and streamlet with multiple near2 bitrates with duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:14
S33	0	streamlet with multiple near2 bitrates with duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:14
S34	27	streamlet with multiple near2 bitrates	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:15
S35	27	streamlet with multiple near2 bitrates and duration	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2021/02/01 17:15

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp

L9	84	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3 and ((multi near bit$2rate)multiple)	US-PGPUB; USPAT	OR	ON	2021/09/10 11:31
L10	42	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3 and ((multi near bit$2rate) (multiple near2 bit$2rate))	US-PGPUB; USPAT	OR	ON	2021/09/10 11:32
L11	69	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 duration	US-PGPUB; USPAT	OR	ON	2021/09/10 12:08
L12	22	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 duration with bit$2rate	US-PGPUB; USPAT	OR	ON	2021/09/10 12:08
L13	0	file with portion near2 stream near3 duration with bit$2rate	US-PGPUB; USPAT	OR	ON	2021/09/10 12:14
L14	0	((H04N21/2662 OR H04N21/8456 OR H04L65/607 OR H04L65/608 OR H04L67/02).CPC.) and streamlet near3 encod$3 and ((multi near bit$2rate)multiple) and @rlad<"20040205"	US-PGPUB; USPAT	OR	ON	2021/09/10 12:15

9/10/2021 12:42:02 PM
C:\Users\cpatel\Documents\EAST\Workspaces\16876579.wsp

Patents

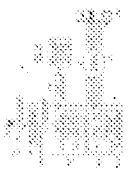
streamlets multiple bitrates same duration

About 335 results

Download with Concepts Side-by-side

Sort by · Relevance · Group by · None · Deduplicate by · Family · Results / page · 10

Http adaptive streaming server with automatic rate shaping



WO EP US CN BR CA · EP2748721B1 · Kevin Mchugh · Ericsson AB

Priority 2011-10-07 • Filed 2012-09-03 • Granted 2017-03-29 • Published 2017-03-29

An adaptive streaming server (206) for transmitting a content stream through a network to a client, the adaptive streaming server comprising: a server (212) comprising an input interface (216) configured to receive a request from the client to play the content stream; a segmenting unit (210) ...

Http adaptive streaming in practice

Google Scholar · www.sigmm.org · Watson M · Proceedings of the ACM Multimedia Systems Conference (MMSys)--Keynote, San Jose, CA, USA, Febrary

Published 2011

... Millions of hours of content every day -- **Bitrates** up to 4.8Mbit/s -- Almost no dedicated infrastructure • Control servers in AWS ... Small media chunks (“**streamlets**”) Chunks created at ... Tractable representations of future choices -- Including scalability, **multiple** streams ...

Systems and methods for controlling the encoding of a segmented media stream ...

WO EP US BR CA MX · US10587664B2 · Conrad Savio Jude Gomes · Sling Media Pvt Ltd

Priority 2011-08-29 • Filed 2017-01-27 • Granted 2020-03-10 • Published 2020-03-10

Systems and methods are described for providing a media stream transmitted from an encoding system to a remotely-located media player that requests segments of the media stream. The media stream is encoded into segments according to an encoding parameter. Data is gathered about current conditions ...

Audio splitting at codec applicable frame size

WO EP US CN JP KR AU BR CA IL MX SG · JP5728736B2 · ライアンオーウェン、カルバン・エコスター テクノロジーズエル、エル、シー、Ｅｃｈｏｓｔａｒ Ｔｅｃｈｎｏｌｏｇｉｅｓ Ｌ．Ｌ．Ｃ．

Priority 2009-12-21 • Filed 2010-12-21 • Granted 2015-06-03 • Published 2015-06-03

Receiving media content including audio and video by a computing system; Encoding the video into a plurality of video frames by the computing system according to a predetermined video encoding frame rate; Encoding the speech by the computing system into a plurality of uninterrupted speech frames ...

Playback stall avoidance in adaptive media streaming

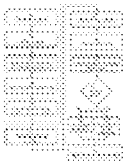
WO EP US CA · CA2888218C · Mark B. Hurst · Echostar Technologies Llc

Priority 2013-03-15 • Filed 2014-03-13 • Granted 2018-10-02 • Published 2018-10-02

Methods, systems and devices are described to avoid stalling during playback of an adaptive media stream delivered to a media player device over a network. The media device requests segments of the media stream that are received in a buffer. Buffer utilization is monitored over time to determine a ...

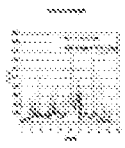
Determining a time budget for transcoding of video

US · US10531134B2 · Thomas George · Akamai Technologies, Inc.



Priority 2017-11-10 • Filed 2017-11-10 • Granted 2020-01-07 • Published 2020-01-07
This document describes systems, methods, and apparatus for determining a time budget for transcoding a video. By calculating and/or monitoring the time budget in accordance with the teachings hereof, a transcoder can assess the effect its transcode duration will have on a client buffer. As a ...

Content delivery



WO EP US • US20130185399A1 • Stephen Clifford Appleby • British Telecommunications Public Limited Company
Priority 2010-09-30 • Filed 2011-09-30 • Published 2013-07-18
A method for providing equitable media streaming between an HTTP server and a number of receivers via shared network. The streaming data is processed to split the data across a number of sub-streams. Each sub-stream contains non-contiguous data. A receiver requesting the streaming media ...

Frame-rate conversion in a distributed computing system

US • US9609049B2 • Kourosh Soroushian • Akamai Technologies, Inc.
Priority 2013-12-30 • Filed 2016-09-30 • Granted 2017-03-28 • Published 2017-03-28
Described herein are, among other things, distributed processing methods and systems for frame rate conversion. In an embodiment, a transcoding management machine manages a distributed transcoding process, creating a plurality of video segments and assigning the video segments across a set of ...

Apparatus, system, and method for multi-bitrate content streaming

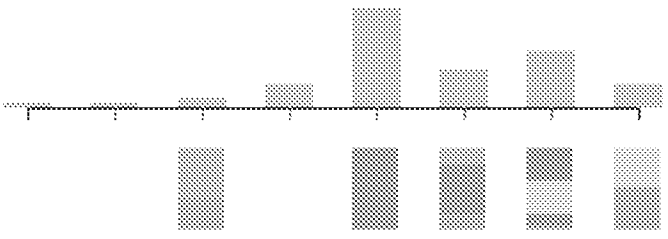
US • US9071668B2 • David F. Brueck • Echostar Technologies L.L.C.
Priority 2004-04-30 • Filed 2013-12-13 • Granted 2015-06-30 • Published 2015-06-30
An apparatus for multi-bitrate content streaming includes a receiving module configured to capture media content, a streamlet module configured to segment the media content and generate a plurality of streamlets, and an encoding module configured to generate a set of streamlets. The system ...

Adaptive multicast delivery of media streams

WO US • US9716918B2 • Robert Drew Major • Echostar Technologies L.L.C.
Priority 2012-12-28 • Filed 2013-12-30 • Granted 2017-07-25 • Published 2017-07-25
Various systems, methods and devices adaptively manage the multicast delivery of multiple media programs. Each of the media programs is encoded into multiple media streams, each stream having a different bitrate, frame rate, resolution or other encoding parameter. A computer receives feedback ...

Next › » About 335 results

Top 1000 results by filing date



Relative count of top 5 values

Assignees	Inventors	CPCs
DISH Technologies L.L.C.		14.2%
Echostar Technologies L.L.C.		12.5%
Sling Media Pvt Ltd		8.9%
Akamai Technologies, Inc.		5.3%
Echostar Technologies Llc		3.5%

Expand

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

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	16876579	Filing Date	2020-05-18	Docket Number (if applicable)	066.0141x1c9	Art Unit	2454
First Named Inventor	David F. Brueck			Examiner Name	Chirag R. Patel		

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 order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

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

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

☒ Enclosed

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

MISCELLANEOUS

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

☐ Other _____

FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

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)	2021-11-17
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 to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

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

Privacy Act Statement

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

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

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

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

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

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

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

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

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

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

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

DISH EXHIBIT 2002, Page 962
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

IDS CERTIFICATION STATEMENTS

I. THIS IDS IS BEING FILED UNDER 37 C.F.R. 1.97(b): (check one box)

☐ Within three months of the filing date of a national application other than a continued prosecution application under 1.53(d).

☐ Within three months of the date of entry of the national stage as set forth in 1.491 in an international application.

☐ Before the mailing date of a first Office Action on the merits. In the event that a first Office Action on the merits has been mailed, please consider this IDS under 37 C.F.R. 1.97(c) and see the statement under 1.97(e) or charge deposit account 50-2091 the fee specified by 37 C.F.R. 1.17(p) if such statement is not selected in Section IV.

☑ Before the mailing of a first Office Action after the filing of a request for continued examination under 1.114.

II. THIS IDS IS BEING FILED UNDER 37 C.F.R. 1.97(c):

☐ After the period specified in 37 C.F.R. 1.97(b) and before the mailing date of any of a final action under 1.113, a notice of allowance under 1.311 or an action that otherwise closes prosecution in the application, and accompanied by:

- ☐ a statement specified in 1.97(e) as subsequently provided in this IDS; or
- ☐ the fee set forth in 1.17(p).

III. THIS IDS IS BEING FILED UNDER 37 C.F.R. 1.97(d):

☐ After the period specified in 37 C.F.R. 1.97(c) and on or after the mailing date of any of a final action under 1.113, a notice of allowance under 1.311 or an action that otherwise closes prosecution in the application, but before or simultaneous with payment of the issue fee, and accompanied by a statement specified in 1.97(e) as subsequently provided in this IDS **and** the fee set forth in 1.17(p).

IV. Statement under 37 C.F.R. 1.97(e) (check only one box)

The undersigned hereby states that:

☐ Each item of information contained in the IDS 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 this IDS.

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

V. Statement under 37 C.F.R. §1.704(d):

☐ The undersigned hereby states that each item of information contained in the information disclosure statement: (i) was first cited in any communication from a patent office in a counterpart foreign or international application or from the Office, and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the information disclosure statement; or (ii) is a communication that was issued by a patent office in a counterpart foreign or international application or by the Office, and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of the information disclosure statement..

VI. CONCLUSION

It is respectfully submitted that the claims presently on file patently distinguish the present invention from each of the references cited in this IDS. The references cited in this IDS are being cited only in the interest of candor and without any admission that they constitute statutory prior art or contain matter which anticipates the invention or which would render the same obvious, either singly or in a combination, to a person of ordinary skill in the art. Furthermore the filing of this IDS should not be construed to be an admission that the information cited in this IDS is, or is considered to be, material to patentability as defined in 1.56(b). In addition, the filing of this IDS should not be construed as a representation that a search has been made.

If the Examiner has any questions concerning this IDS, the Examiner is requested to contact the undersigned at the telephone number associated with Customer No. 70560 . If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule, with a petition if necessary, and charge the appropriate fee to Deposit Account No. 50-2091.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	1	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Akiyama et al	
	2	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Arye et al.	
	3	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Carmel et al.	
	4	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Chou et al.	
	5	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Durrant et al.	
	6	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Gentric	
	7	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Kitamura	
	8	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Klemets et al.	
	9	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Oplayo et al.	
	10	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") QOAS	
	11	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") QuickTime Changes	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	12	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") QuickTime	
	13	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Ravi	
	14	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") RealOne Player	
	15	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Walker	
	16	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Wang	
	17	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") Wu	
	18	Claim Chart Against U.S. Patent No. 9,407,564 ("'564 patent") RealSystem G2	
	19	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Akiyama et al.	
	20	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Ayre	
	21	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Carmel et. al.	
	22	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Chou et. al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	23	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Durrant et. al.	
	24	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Gentric	
	25	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Kitamura	
	26	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Klemets	
	27	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Oplayo	
	28	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") QOAS	
	29	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") QuickTime Changes	
	30	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") QuickTime	
	31	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Ravi	
	32	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") RealOne Player	
	33	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Walker	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	34	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Wang
	35	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Wu
	36	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Dey
	37	Claim Chart Against U.S. Patent No. 10,469,554 ("'554 patent") Microsoft
	38	DISH - Respondent's Joint Disclosure of Supplemental Invalidity Contentions in Response to Individual Interrogatories.
	39	MIRROR - RESPONDENTS LULULEMON ATHLETICA INC. and CURIOUSER PRODUCTS INC. d/b/a MIRROR FIRST AMENDED RESPONSE TO COMPLAINT UNDER SECTION 337 OF THE TARIFF ACT OF 1930, AS AMENDED, STATEMENT OF PUBLIC INTEREST AND NOTICE OF INSTITUTION OF INVESTIGATION.
	40	PELOTON - RESPONDENT PELOTON INTERACTIVE, INC.'S FIRST AMENDED RESPONSE TO COMPLAINT AND TO NOTICE OF INVESTIGATION
	41	ICON - RESPONDENTS' JOINT DISCLOSURE OF INITIAL INVALIDITY CONTENTIONS IN RESPONSE TO INDIVIDUAL INTERROGATORIES
	42	RESPONDENTS' NOTICE OF PRIOR ART
	43	ICON and Free Motion Fitness, Inc. VERIFIED RESPONSE OF ICON HEALTH & FITNESS, INC., FREE MOTION FITNESS, INC., AND NORDICTRACK, INC. TO COMPLAINT OF DISH DBS CORPORATION, DISH TECHNOLOGIES L.L.C., AND SLING TV L.L.C. AND TO NOTICE OF INVESTIGATION

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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

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	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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)	2021-11-17
Name/Print	Brett A. Carlson	Registration Number	39,928

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.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
16/876,579	11/17/2021 12:11:47 PM ET	066.0141X1C9

Title of Invention

APPARATUS, SYSTEM, AND METHOD FOR MULTI-BITRATE CONTENT STREAMING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3720	FILED BY	Francene Stewart
PATENT CENTER #	60403474	AUTHORIZED BY	Brett Carlson
CUSTOMER #	70560	FILING DATE	05/18/2020
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	DAVID F. BRUECK

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 1269	E2021AGC13051478	Francene Stewart
PRE-AUTHORIZED ACCOUNT	**PRE-AUTHORIZED CATEGORY**	
502091	37 CFR 1.17 (Patent application and reexamination processing fees)	

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
1820	REQUEST FOR CONTINUED EXAMINATION (RCE)- 2ND AND SUBSEQUENT REQUEST (SEE 37 CFR 1.114)	2000.00	1	2000.00
			TOTAL AMOUNT:	$2,000.00

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

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506),

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/08a (02-18)
Approved for use through 11/30/2020. 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	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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	5414455	A	1995-05-09	HOOPER Donald F et al.	
	2	5867230	A	1999-02-02	WANG Feng Chi et al.	
	3	5941951	A	1999-08-24	DAY Michael Norman et al.	
	4	5996025	A	1999-11-30	DAY Michael Norman et al.	
	5	6292834	B1	2001-09-18	RAVI et al.	
	6	6389473	B1	2002-05-14	CARMEL et al.	
	7	6490627	B1	2002-12-03	KALRA et al.	
	8	6498897	B1	2002-12-24	NELSON et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	9	6637031	B1	2003-10-21	CHOU	
	10	7047307	B2	2006-05-16	LI	
	11	7386627	B1	2008-06-10	LANGO et al.	
	12	8711701	B2	2014-04-29	JU	
	13	8818127	B2	2014-08-26	HAYATA et al.	
	14	9407564	B2	2016-08-02	MAJOR et al.	
	15	10469554	B2	2019-11-05	BRUECK et al.	
	16	10469555	B2	2019-11-05	BRUECK et al.	
	17	10757156	B2	2020-08-25	MAJOR et al.	
	18	10951680	B2	2021-03-16	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

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16876579
Filing Date	2020-05-18
First Named Inventor	DAVID F. BRUECK
Art Unit	2454
Examiner Name	Chirag R. Patel
Attorney Docket Number	066.0141X1C9

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	20020002708	A1	2002-01-03	ARYE	
	2	20020044528	A1	2002-04-18	POGREBINSKY et al.	
	3	20020131496	A1	2002-09-19	VASUDEVAN et al.	
	4	20030061305	A1	2003-03-27	COPLEY et al.	
	5	20030067872	A1	2003-04-10	HARRELL et al.	
	6	20030067875	A1	2003-04-10	YOSHIDA et al.	
	7	20030072376	A1	2003-04-17	KRISHNAMACHARI et al.	
	8	20030152036	A1	2003-08-14	QUIGG Brown et al.	
	9	20030236906	A1	2003-12-25	KLEMETS et al.	
	10	20040202109	A1	2004-10-14	AKIYAMA et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	11	20040260827	A1	2004-12-23	WANG	
	12	20050177618	A1	2005-08-11	ZIMLER et al.	
	13	20080086570	A1	2008-04-10	DEY 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] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	1394973	EP	B1	2010-05-26	MATSUSHITA ELECTRIC IND CO LTD		
	2	03041413	WO	A1	2003-05-15	PA CONSULTING SERVICES LIMITED		
	3	2005000116	KR	A	2005-01-06	SAMSUNG ELECTRONICS CO LTD		
	4	0245372	WO	A3	2002-09-06	BRITISH TELECOMMUNICATION PUBLIC LTD CO		
	5	2006086717	WO	A1	2006-08-17	VIDIATOR ENTERPRISES INC.		
	6	2004057832	WO	A1	2004-07-08	KONIN-KLIJKE PHILIPS ELECTRONICS N.V.		

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

	7	2004021668	WO	A1	2004-03-11	KONIN-KLIJKE PHILIPS ELECTRONICS N.V.		

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		

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	16876579
	Filing Date	2020-05-18
	First Named Inventor	DAVID F. BRUECK
	Art Unit	2454
	Examiner Name	Chirag R. Patel
	Attorney Docket Number	066.0141X1C9

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)	2021-11-17
Name/Print	Brett A. Carlson	Registration Number	39,928

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.

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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
8 July 2004 (08.07.2004)

PCT

(10) International Publication Number
WO 2004/057832 A1

(51) International Patent Classification[7]: H04L 29/06, H04N 7/24

(21) International Application Number: PCT/IB2003/006004

(22) International Filing Date: 16 December 2003 (16.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/435,242 20 December 2002 (20.12.2002) US

(71) Applicant *(for all designated States except US)*: **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **VAN DER SCHAAR, Mihaela** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US). **LI, Qiong** [US/US]; P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).

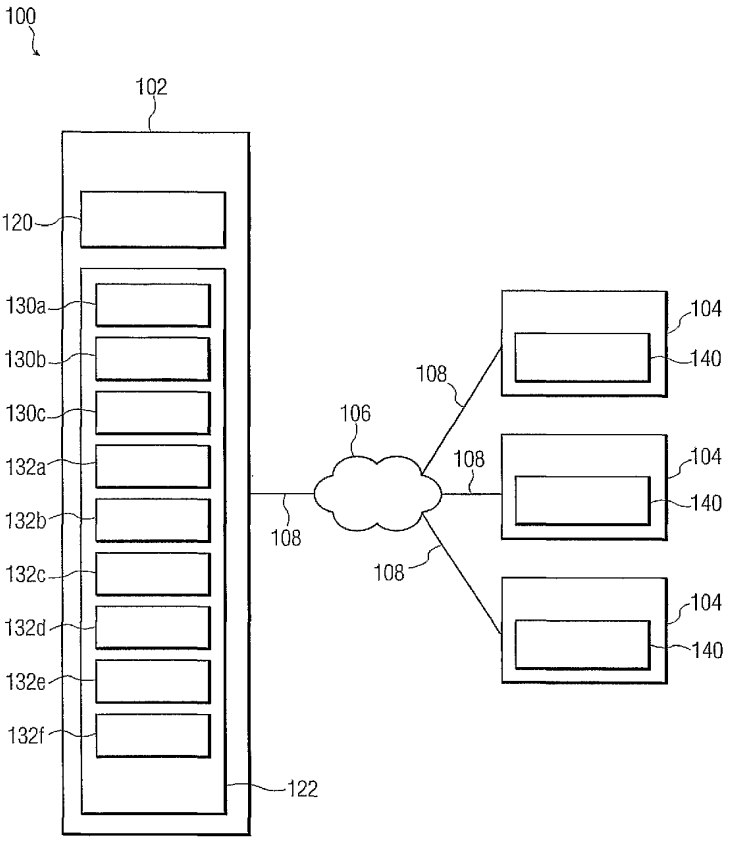
(74) Common Representative: **KONINKLIJKE PHILIPS ELECTRONICS N.V.**; c/o BELK, Michael, P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, 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, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),

[Continued on next page]

(54) Title: MULTI-TRACK HINTING FOR RECEIVER-DRIVEN STREAMING SYSTEM



(57) Abstract: A receiver-driven streaming method is provided. The method includes receiving an original coded video stream from a transmitter 102 at a receiver 104. An available bit rate is measured at the receiver 104. A request for a different coded video stream and a switching stream is sent from the receiver 104 to the transmitter 102 based on the available bit rate. The requested switching stream is received from the transmitter 102 at the receiver 104. The requested coded video stream is received from the transmitter 102 at the receiver 104.Switching streams 132a-132f are stored separately from coded video streams 130a-130c, and each switching stream 132a-132f and coded video stream 130a-130c is stored in a separate track from each other. In this way, switching streams 132a-132f may be generated offline. Also, the receiver 104 controls the streams provided by the transmitter 102 by requesting specific switching streams 132a-132f and coded video streams 130a-103c.

WO 2004/057832 A1

Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

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

Published:

— *with international search report*

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.

MULTI-TRACK HINTING FOR RECEIVER-DRIVEN STREAMING SYSTEM

The present invention relates generally to multi-track hinting and streaming systems and, more particularly, to a multi-track hinting for receiver-driven streaming system for non-scalable video coding using switching frames and method.

With the rapid development of broadband Internet technologies, video streaming is envisioned to become the dominant Internet application in the near future. Similarly, the falling cost of wireless local area network (WLAN) products has led to their increased use in consumer homes. Also, although currently most WLANs are predominantly used for data transfer, the higher bandwidth provided by new WLAN technologies, such as IEEE 802.11a and IEEE 802.11g, may ultimately lead to their increasing use for video transmission. Furthermore, future wireless video applications will have to work over an open, layered, Internet-style network with a wired backbone and wireless extensions. Therefore, common protocols will have to be used for transmission across both the wired and wireless portions of the network. These protocols will most likely be future extensions of the existing protocols that are based on the Internet Protocol (IP).

Consequently, due to the inherent resource sharing nature of the Internet and wireless networks, multimedia communications of the future will mainly use variable bandwidth channels. Hence, if streaming of video content is performed over this type of network, the instantaneous data rate must frequently be tailored to fit the available resources. This can be achieved in a very flexible way by the approach of scalable coding. Scalable video-coding schemes are able to provide a simple and flexible framework for transmission over heterogeneous networks.

However, in order to provide the required adaptation to bandwidth variations, device characteristics and user requirements, multiple non-scalable video coding with a different data rate needs to be transmitted using an appropriate streaming architecture. The MPEG-4 Systems Group has developed and standardized the streaming strategy for non-scalable coded video over IP networks. However, this strategy is unable to efficiently adapt to channel conditions, complexity constraints and user preferences. In addition, conventional systems such as these require the

DISH EXHIBIT 2002, Page 983
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

transmitter to be responsible for inserting the correct switching frames into the video stream to accomplish smooth switching.

In accordance with the present invention, a multi-track hinting for receiver-driven streaming system for non-scalable video coding using switching frames and method are provided that substantially eliminate or reduce disadvantages and problems associated with conventional systems and methods. In particular, each receiver may independently adapt its received video optimally to its own perceived network conditions.

According to one embodiment of the present invention, a receiver-driven streaming method is provided. The method includes receiving an original coded video stream from a transmitter at a receiver. An available bit rate is measured at the receiver. A request for a different coded video stream and a switching stream is sent from the receiver to the transmitter based on the available bit rate. The requested switching stream is received from the transmitter at the receiver. The requested coded video stream is received from the transmitter at the receiver.

According to another embodiment of the present invention, a receiver-driven streaming method is provided that includes transmitting an original coded video stream from a transmitter to a receiver. A request for a different coded video stream and a switching stream is received from the receiver at the transmitter. The requested switching stream is transmitted from the transmitter to the receiver. The requested coded video stream is transmitted from the transmitter to the receiver.

Technical advantages of one or more embodiments of the present invention include providing an improved streaming system. In a particular embodiment, coded video streams at different bit rates and switching streams are stored in separate tracks. In this way, a receiver-driven streaming system is provided that may respond more quickly to network changes than a transmitter-driven streaming system, thereby achieving better performance. This is due to the ability of each receiver to independently adapt its received video optimally to its own perceived network conditions.

Other technical advantages will be readily apparent to one skilled in the art from the following figures, description, and claims.

DISH EXHIBIT 2002, Page 984
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

Before undertaking the DETAILED DESCRIPTION, it may be advantageous to set forth definitions of certain words and phrases used throughout this patent document: the terms "include" and "comprise," as well as derivatives thereof, mean inclusion without limitation; the term "or," is inclusive, meaning and/or; the phrases "associated with" and "associated therewith," as well as derivatives thereof, may mean to include, be included within, interconnect with, contain, be contained within, connect to or with, couple to or with, be communicable with, cooperate with, interleave, juxtapose, be proximate to, be bound to or with, have, have a property of, or the like; and the term "controller" means any device, system or part thereof that controls at least one operation, such a device may be implemented in hardware, firmware or software, or some combination of at least two of the same. It should be noted that the functionality associated with any particular controller may be centralized or distributed, whether locally or remotely. In particular, a controller may comprise one or more data processors, and associated input/output devices and memory, that execute one or more application programs and/or an operating system program. Definitions for certain words and phrases are provided throughout this patent document, those of ordinary skill in the art should understand that in many, if not most instances, such definitions apply to prior, as well as future uses of such defined words and phrases.

For a more complete understanding of the present invention and its advantages, reference is now made to the following description taken in conjunction with the accompanying drawings, wherein like reference numerals represent like parts, in which:

FIGURE 1 is a block diagram illustrating a receiver-driven streaming system in accordance with one embodiment of the present invention;

FIGURES 2A-B are block diagrams illustrating a multi-track hinting file format in accordance with one embodiment of the present invention;

FIGURE 3 is a flow diagram illustrating a receiver-driven streaming method from the perspective of the transmitter of FIGURE 1 in accordance with one embodiment of the present invention; and

DISH EXHIBIT 2002, Page 985
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

FIGURE 4 is a flow diagram illustrating a receiver-driven streaming method from the perspective of one of the receivers of FIGURE 1 in accordance with one embodiment of the present invention.

FIGURES 1 through 4, discussed below, and the various embodiments used to describe the principles of the present invention in this patent document are by way of illustration only and should not be construed in any way to limit the scope of the invention. Those skilled in the art will understand that the principles of the present invention may be implemented in any suitably arranged streaming system.

FIGURE 1 is a block diagram illustrating a receiver-driven streaming system 100 in accordance with one embodiment of the present invention. The system 100 comprises a transmitter 102, at least one receiver 104 and a network 106 for providing communication between the transmitter 102 and the receivers 104. It will be understood that the system 100 may comprise any other suitable components of a streaming system, such as other suitable servers coupled to the network 106, without departing from the scope of the present invention.

The transmitter 102 comprises a processor 120 and a memory 122. The processor 120 is operable to code video streams at different bit rates, store the coded video streams in separate tracks in the memory 122, generate switching streams for the coded video streams, and store the switching streams in separate tracks in the memory 122. The transmitter 102 is also operable to generate and store a hinting track (not illustrated in FIGURE 1) for each coded video stream and switching stream. The processor 120 is also operable to transmit the coded video streams and the switching streams to the receivers 104 through the network 106.

The memory 122 may comprise random access memory (RAM), a combination of RAM and read only memory (ROM), or any other suitable form of memory. According to one embodiment, the memory 122 may comprise a non-volatile RAM, such as flash memory. The memory 122 is operable to store a plurality of coded video streams 130 and a plurality of switching streams 132.

For the illustrated embodiment, the memory 122 stores three coded video streams 130: one coded video stream 130a at a first bit rate (CVS-BR1), one coded video stream 130b at a second bit rate (CVS-BR2), and one coded video stream 130c at a third bit rate (CVS-BR3). In addition, the illustrated memory 122 stores six

DISH EXHIBIT 2002, Page 986
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

switching streams 132, one for each of the possible bit rate changes between the three bit rates for the three coded video streams 130. However, it will be understood that the memory 122 may store any suitable number of coded video streams 130 and switching streams 132 without departing from the scope of the present invention.

For example, even for an embodiment in which the memory 122 stores three coded video streams 130, the memory 122 may store only four switching streams 132a,c,d,f. For this embodiment, coded video streams 130 may only be changed to an adjacent coded video stream 130, instead of allowing the coded video stream 130a to be changed directly to the coded video stream 130c, for example. Thus, the coded video stream 130a would first be changed to the coded video stream 130b and then changed to the coded video stream 130c.

Each receiver 104 comprises a processor 140 that is operable to receive a coded video stream 130 from the transmitter 102 through the network 106, to measure the available bit rate for the receiver 104 from the network 106, and to request a switching stream 132 and a different coded video stream 130 from the transmitter 102 based on the available bit rate. Thus, each receiver 104 may independently optimize its video stream being provided by the transmitter 102 based on the network conditions for that receiver 104. As used herein, "each" means every one of at least a subset of the identified items.

In one embodiment, the network 106 comprises a packet data network, such as the Internet, or other suitable network. However, the network 106 may also comprise any interconnection found on any computer network such as a local area network (LAN), a wide area network (WAN), or any other communications and data exchange systems created by connecting two or more computers.

The transmitter 102 and the receivers 104 are operable to communicate with the network 106 over communication lines 108, which may be any type of communication link capable of supporting data transfer. In one embodiment, the communication lines 108 may comprise, alone or in combination, Integrated Services Digital Network (ISDN), Asymmetric Digital Subscriber Line (ADSL), T1 or T3 communication lines, hardwire lines, or telephone links. It will be understood that the communication lines 108 may comprise other suitable types of data communication

DISH EXHIBIT 2002, Page 987
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

links. The communication lines 108 may also connect to a plurality of intermediate servers between the network 106 and the transmitter 102 and the receivers 104.

At least a portion of the transmitter 102 and/or the receiver 104 may comprise logic encoded in media. The logic comprises functional instructions for carrying out program tasks. The media comprises computer disks or other computer-readable media, application-specific integrated circuits, field-programmable gate arrays, digital signal processors, other suitable specific or general purpose processors, transmission media or other suitable media in which logic may be encoded and utilized.

FIGURES 2A-B are block diagrams illustrating a multi-track hinting file format 142 in accordance with one embodiment of the present invention. For description purposes, FIGURE 2A illustrates the file format 142 with respect to the coded video streams 130, while FIGURE 2B illustrates the file format 142 with respect to the switching streams 132. However, it will be understood that the file format 142 comprises the combination of the two illustrations.

The illustrated embodiment of the file format 142 corresponds to the embodiment in which the transmitter 102 stores three coded video streams 130 and six switching streams 132. Thus, it will be understood that the file format 142 may be altered so as to accommodate different numbers of coded video streams 130 and/or switching streams 132.

In addition to the three coded video streams 130, the file format 142 of FIGURE 2A comprises three hinting tracks 160. As indicated by the arrows, each hinting track 160 corresponds to one of the coded video streams 130.

Similarly, in addition to the six switching streams 132, the file format 142 of FIGURE 2B comprises six hinting tracks 162. As indicated by the arrows, each hinting track 162 corresponds to one of the switching streams 132. Thus, the combined file format 142 provides a separate hinting track 160, 162 for each of these streams 130, 132.

FIGURE 3 is a flow diagram illustrating a receiver-driven streaming method from the perspective of the transmitter 102 in accordance with one embodiment of the present invention. The method begins at step 200 where the transmitter 102 codes a video stream for transmission to the receiver 104. At step 202, the transmitter 102

DISH EXHIBIT 2002, Page 988
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

stores the coded video stream 130 in the memory 122 and also stores the hinting track for the coded video stream 130.

At decisional step 204, a determination is made regarding whether or not all coded video streams 130 at all desired bit rates have been stored in the memory 122. If the video stream has not been coded and stored at all the desired bit rates, the method follows the No branch from decisional step 204 and returns to step 200 where the transmitter 102 codes the video stream at another bit rate and then to step 202 where the transmitter 102 stores the coded video stream 130 in a separate track from any other coded video stream 130 and also stores the hinting track for the coded video stream 130.

However, if the video stream has been coded and stored in separate tracks at all the desired bit rates, the method follows the Yes branch from decisional step 204 to step 206. At step 206, the transmitter 102 stores a switching stream 132 for switching between coded video streams 130 in the memory 122 and also stores the hinting track for the switching stream 132.

At decisional step 208, a determination is made regarding whether or not all desired switching streams 132 have been stored in the memory 122. If all the desired switching streams have not been stored, the method follows the No branch from decisional step 208 and returns to step 206 where the transmitter 102 stores another switching stream 132 for switching between additional coded video streams 130 in a separate track from any other switching stream 132 in the memory 122 and also stores the hinting track for the switching stream 132.

However, if all the desired switching streams have been stored in separate tracks, the method follows the Yes branch from decisional step 208 to step 210. At step 210, the transmitter 102 transmits an original coded video stream 130 to the receiver 104. In addition, the transmitter 102 transmits to the receiver 104 data to inform the receiver 104 of the different bit rates corresponding to the stored coded video streams 130.

At decisional step 212, a determination is made regarding whether or not a request for a different coded video stream 130 has been received from the receiver 104. In addition to the different coded video stream 130, the request comprises a request for the switching stream 132 that corresponds to the difference between the

DISH EXHIBIT 2002, Page 989
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

original coded video stream 130 and the requested coded video stream 130. If no such request is received, the method follows the No branch from decisional step 212 and comes to an end. However, if such a request is received, the method follows the Yes branch from decisional step 212 to step 214.

At step 216, the transmitter 102 transmits the requested switching stream 132 to the receiver 104. At step 218, the transmitter 102 transmits the requested coded video stream 130 to the receiver 104, at which point the method returns to decisional step 212 to determine whether or not an additional request for another coded video stream 130 has been received.

FIGURE 4 is a flow diagram illustrating a receiver-driven streaming method from the perspective of the receiver 104 in accordance with one embodiment of the present invention. The method begins at step 300 where the receiver 104 receives the original coded video stream 130 from the transmitter 102. In addition, the receiver 104 receives data that informs the receiver 104 of the different bit rates corresponding to the the coded video streams 130 stored in the transmitter 104. At step 302, the receiver 104 measures the available bit rate for the receiver 104 from the network 106.

At decisional step 304, a determination is made regarding whether or not the receiver 104 should request a switch in bit rates for the coded video stream 130 based on the available bit rate. If the receiver 104 decides not to request a switch in bit rates, the method follows the No branch from decisional step 304 and returns to step 302 where the available bit rate continues to be measured. However, if the receiver 104 decides to request a switch in bit rates, the method follows the Yes branch from decisional step 304 to step 306.

At step 306, the receiver 104 sends a request for a different coded video stream 130 to the transmitter 102, with the requested coded video stream 130 based on the available bit rate. In addition to the different coded video stream 130, the request comprises a request for the switching stream 132 that corresponds to the difference between the original coded video stream 130 and the requested coded video stream 130. At step 308, the receiver 104 receives the requested switching stream 132 from the transmitter 102. At step 310, the receiver 104 receives the requested coded

DISH EXHIBIT 2002, Page 990
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

video stream 130, after which the method returns to step 302 where the available bit rate continues to be measured.

Although the present invention has been described with several embodiments, various changes and modifications may be suggested to one skilled in the art. It is intended that the present invention encompass such changes and modifications as fall within the scope of the appended claims.

DISH EXHIBIT 2002, Page 991
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

CLAIMS:

1. A receiver-driven streaming method, comprising:

receiving an original coded video stream from a transmitter at a receiver;

measuring an available bit rate at the receiver;

sending a request for a different coded video stream and a switching stream based on the available bit rate from the receiver to the transmitter;

receiving the requested switching stream from the transmitter at the receiver; and

receiving the requested coded video stream from the transmitter at the receiver.

2. The method of Claim 1, the receiver and the transmitter coupled to each other through a network.

3. The method of Claim 1, the transmitter operable to store at least three coded video streams and at least four switching streams for each of a plurality of video streams.

4. The method of Claim 1, the transmitter operable to store at least three coded video streams and at least six switching streams for each of a plurality of video streams.

5. A receiver-driven streaming method, comprising:

transmitting an original coded video stream from a transmitter to a receiver;

receiving a request for a different coded video stream and a switching stream from the receiver at the transmitter;

transmitting the requested switching stream from the transmitter to the receiver; and

DISH EXHIBIT 2002, Page 992
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

transmitting the requested coded video stream from the transmitter to the receiver.

6. The method of Claim 5, further comprising:

coding a plurality of video streams at a plurality of bit rates at the transmitter; and

storing each of the coded video streams in a separate track at the transmitter.

7. The method of Claim 6, further comprising transmitting from the transmitter to the receiver data to inform the receiver of the plurality of bit rates corresponding to the stored coded video streams.

8. The method of Claim 5, further comprising storing each of a plurality of switching streams in a separate track at the transmitter.

9. The method of Claim 5, further comprising storing in separate tracks at the transmitter at least three coded video streams and at least four switching streams for each of a plurality of video streams.

10. The method of Claim 5, further comprising storing in separate tracks at the transmitter at least three coded video streams and at least six switching streams for each of a plurality of video streams.

11. A receiver-driven streaming system, comprising:

a computer-processable medium; and

logic stored on the computer-processable medium, the logic operable to receive an original coded video stream, to measure an available bit rate, to send a request for a different coded video stream and a switching stream based on the available bit rate, to receive the requested switching stream, and to receive the requested coded video stream.

DISH EXHIBIT 2002, Page 993
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

12. A receiver-driven streaming system, comprising:

a computer-processable medium; and

logic stored on the computer-processable medium, the logic operable to transmit an original coded video stream, to receive a request for a different coded video stream and a switching stream, to transmit the requested switching stream, and to transmit the requested coded video stream.

13. The system of Claim 12, the logic further operable to code a plurality of video streams at a plurality of bit rates and to store each of the coded video streams in a separate track and to transmit data to inform a receiver of the plurality of bit rates corresponding to the stored coded video streams.

14. The system of Claim 12, the logic further operable to store each of a plurality of switching streams in a separate track.

15. The system of Claim 12, the logic further operable to store in separate tracks at least three coded video streams and at least four switching streams for each of a plurality of video streams.

16. The system of Claim 12, the logic further operable to store in separate tracks at least three coded video streams and at least six switching streams for each of a plurality of video streams.

17. A receiver-driven video stream, comprising:

an original coded video stream;

a different coded video stream and a switching stream requested by a receiver measuring an available bit rate at the receiver and sending a request for the different coded video stream and the switching stream based on the available bit rate.

18. The receiver-driven video stream of Claim 17, wherein the original coded video stream, the different coded video stream and the switching stream are selected from at least three coded video streams and at least four switching streams.

DISH EXHIBIT 2002, Page 994
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

19. The receiver-driven video stream of Claim 17, wherein the original coded video stream, the different coded video stream and the switching stream are selected from at least three coded video streams and at least six switching streams.

20. The receiver-driven video stream of Claim 17, wherein streaming of the original coded video stream, the different coded video stream and the switching stream is based at least in part on one or more hinting tracks each corresponding to one of a plurality of coded video streams coded at different bit rates and one or more hinting tracks each corresponding to one of a plurality of switching streams for switching from a coded video stream at a first bit rate to a coded video stream at a second bit rate.

DISH EXHIBIT 2002, Page 995
Aylo Freesites Ltd. v. Dish Technologies L.L.C.
IPR2024-00047

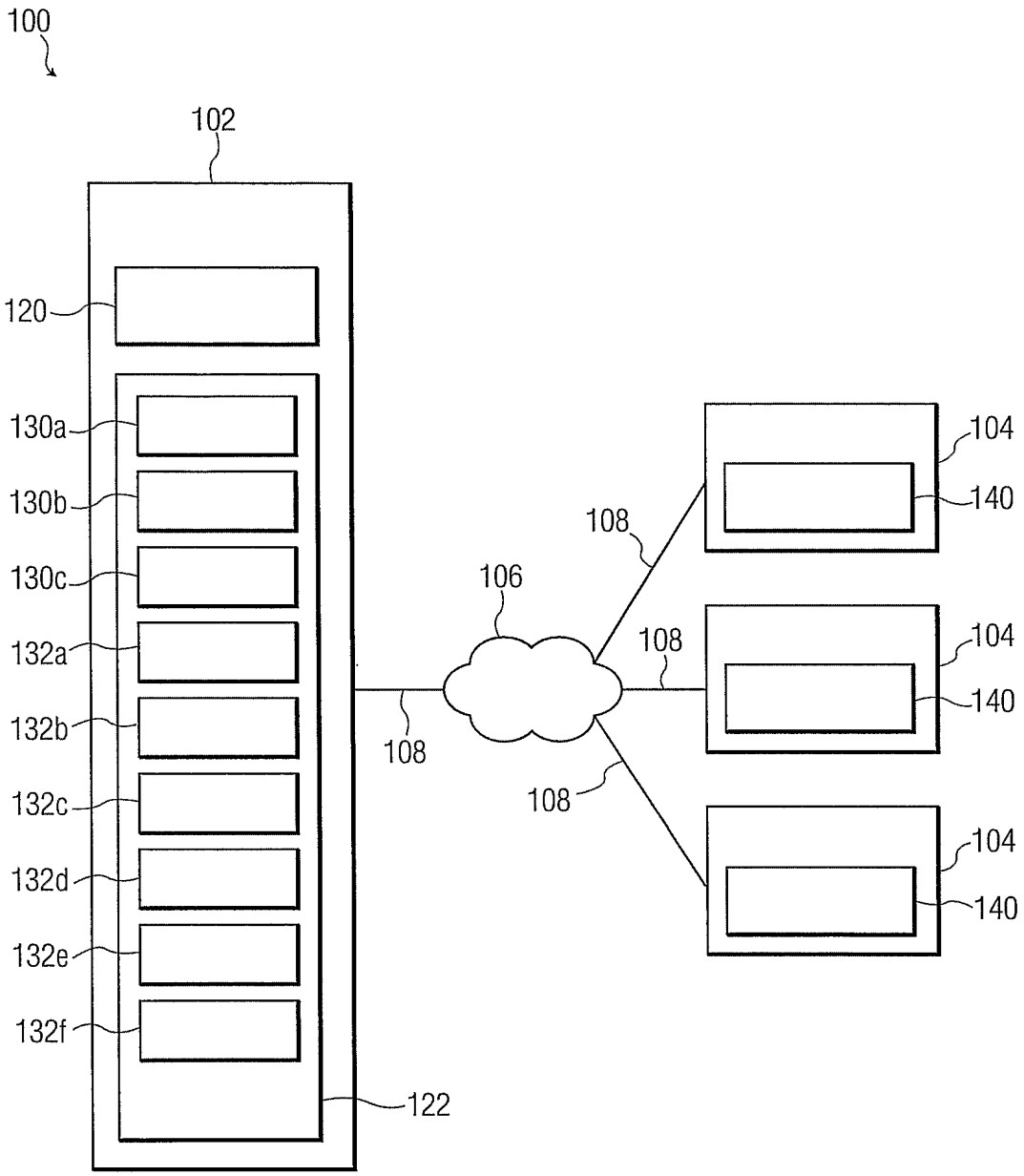

100
102
120
130a
130b
130c
132a
132b
132c
132d
132e
132f
122
106
108
108
108
104
140
104
140
104
140

FIG. 1

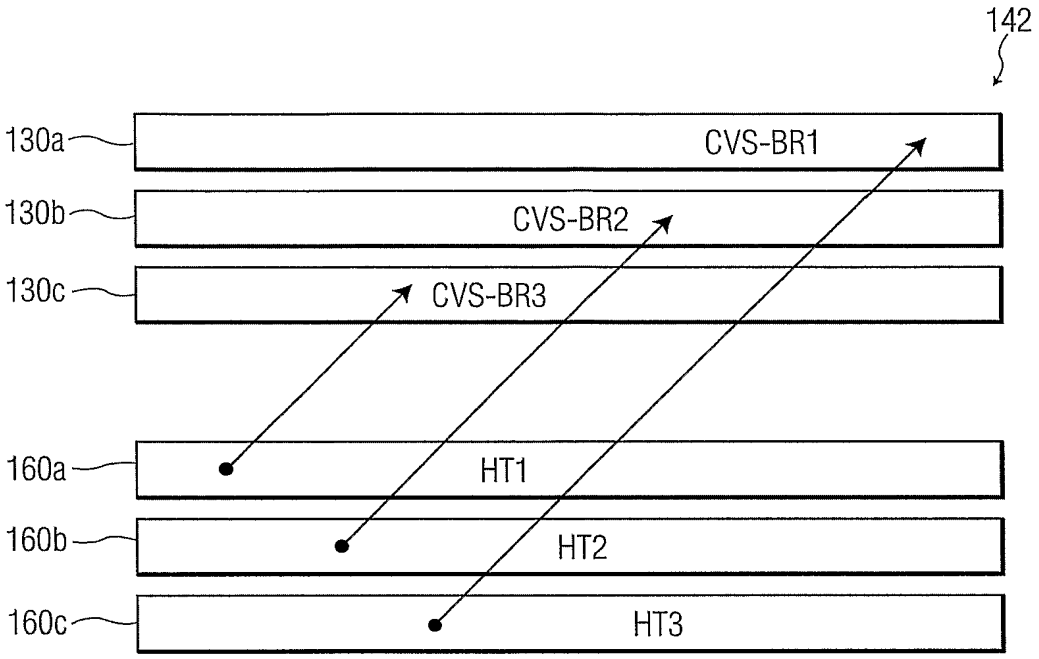

142
130a
CVS-BR1
130b
CVS-BR2
130c
CVS-BR3
160a
HT1
160b
HT2
160c
HT3

FIG. 2A

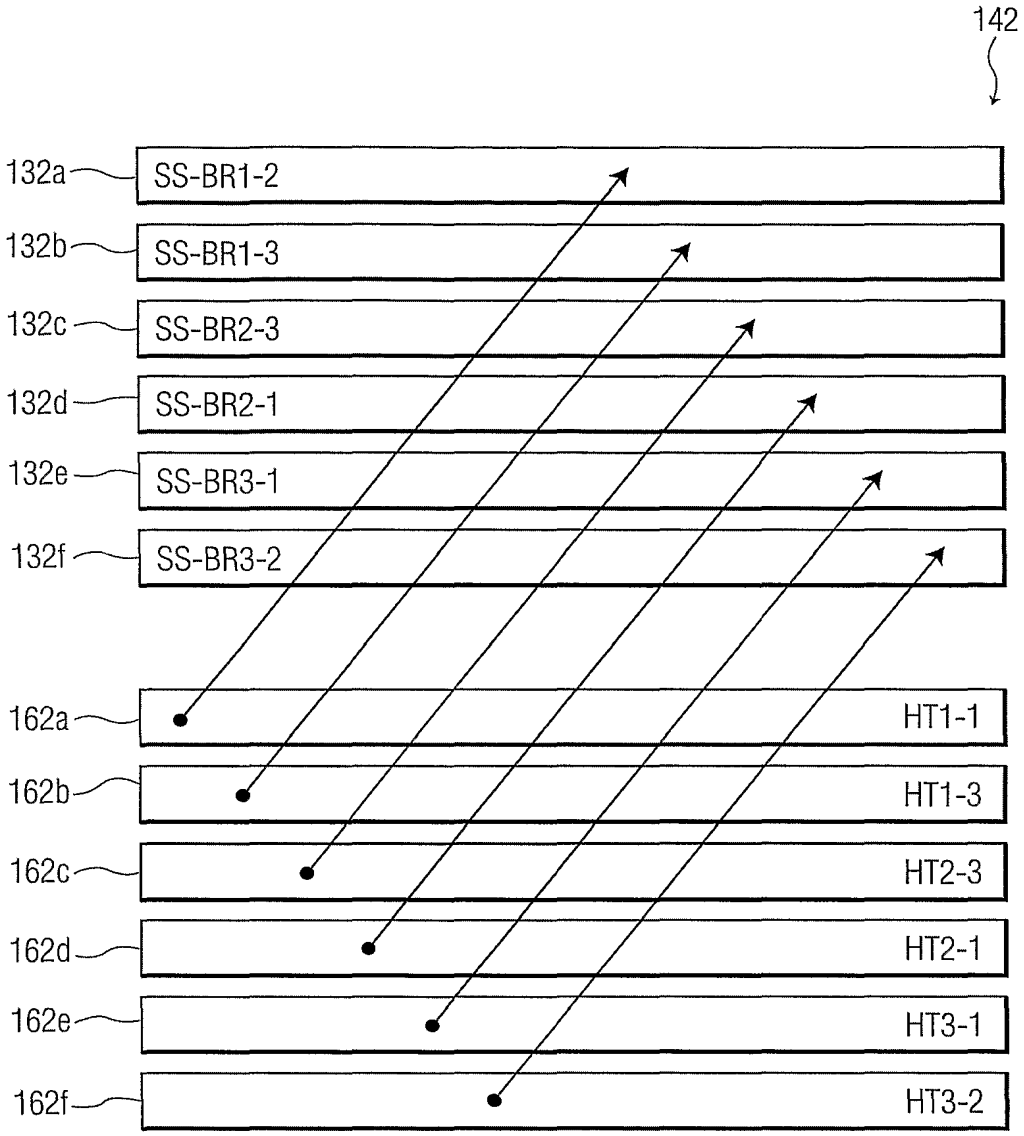

142
132a
SS-BR1-2
132b
SS-BR1-3
132c
SS-BR2-3
132d
SS-BR2-1
132e
SS-BR3-1
132f
SS-BR3-2
162a
HT1-1
162b
HT1-3
162c
HT2-3
162d
HT2-1
162e
HT3-1
162f
HT3-2

FIG. 2B

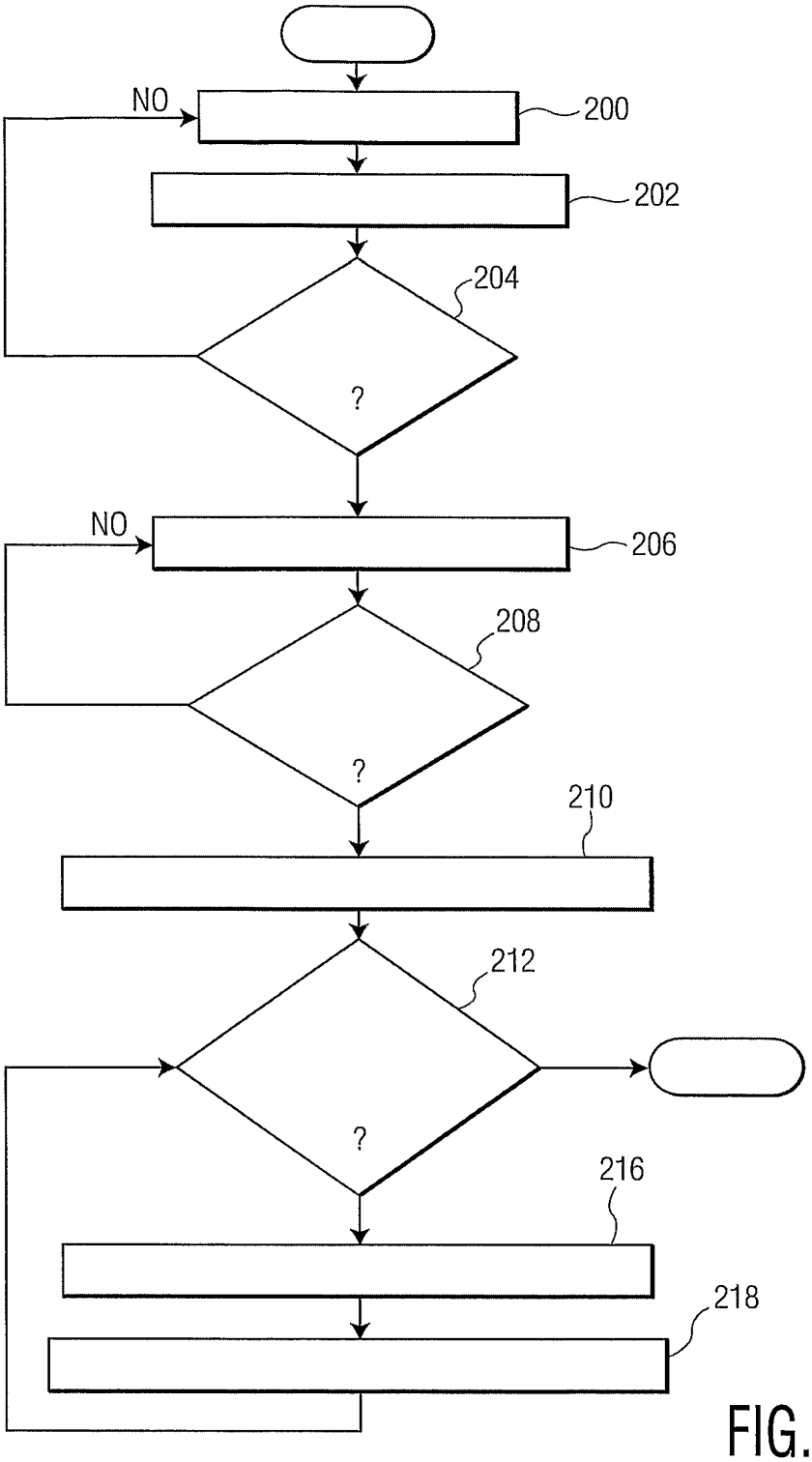


FIG. 3

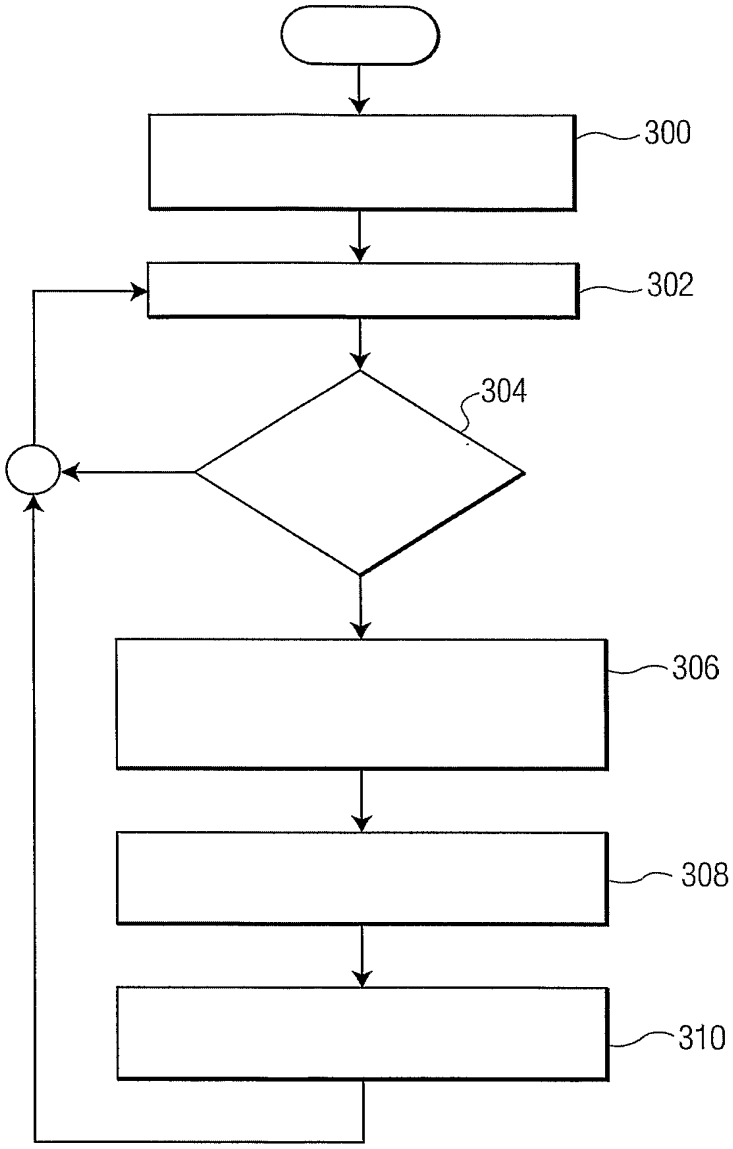


FIG. 4