Appeal Decision

Appeal No. 2020-6853

Appellant	HUAWEI TECHNOLOGIES CO.LTD.
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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2018-525659, entitled "METHOD FOR OBTAINING TARGET TRANSMISSION PATH AND NETWORK NODE" [International Publication No. WO2017/084487 published on May 26, 2017, National Publication of International Patent Application No. 2018-534873 published on November 22, 2018, number of claims (12)] has resulted in the following appeal decision.

Conclusion

The examiner's decision is revoked.

The Invention of the present application shall be granted a patent.

Reason

No. 1 History of the procedures

The present application was filed on October 31, 2016 (priority claim under the Paris Convention: November 18, 2015, received by the foreign receiving office, China) as an International Patent Application. The history of the procedures thereof is as follows.

June 13, 2018	: Submission of Written amendment
dated April 25, 2019	: Notice of reasons for refusal
August 13, 2019	: Submission of Written opinion and Written amendment
dated January 9, 2020	: Examiner's decision of refusal
May 20, 2020	: Appeal against the examiner's decision of refusal

No. 2 Outline of the examiner's decision

The outline of the examiner's decision (the examiner's decision of refusal dated January 9, 2020) is as follows.

The inventions according to Claims 1 to 12 could have been easily made by a person ordinarily skilled in the art of the field of the invention (hereinafter referred to as "the person skilled in the art") on the basis of the following Cited Documents 1 to 4. Thus, the Appellant should not be granted a patent for the inventions under the provisions of Article 29(2) of the Patent Act.

List of Cited Documents, etc.

1. Specification of U. S. Patent Application Publication No. 2013/0212268
2. Japanese Unexamined Patent Application Publication No. 2001-333092
3. Japanese Unexamined Patent Application Publication No. 2015-12580
4. Japanese Unexamined Patent Application Publication No. 2007-243511

No. 3 The Invention

The inventions according to Claims 1 to 12 (hereinafter referred to as "Invention 1" to "Invention 12", respectively) are inventions specified by the matters recited in Claims 1 to 12 of the scope of claims amended by the written amendment submitted on August 13, 2019. Inventions 1 and 7 are as follows.

"[Claim 1]

A method for obtaining a target transmission path, applied to a network domain, comprising:

obtaining, by a first network node in the network domain, topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain, the topology information comprising a physical link delay between two adjacent network nodes in the network nodes and a node residence time of each of the network nodes;

obtaining, by the first network node, a transmission delay of each path between the ingress node and the egress node according to the topology information, the transmission delay of each path comprising a sum of physical link delay between the two adjacent network nodes on each path and node residence times of the network nodes on each path; and

determining, by the first network node, the target transmission path between the ingress node and the egress node according to the transmission delay of each path,

wherein the topology information comprises first topology information,

obtaining, by the first network node in the network domain, topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain comprising:

obtaining, by the first network node, a first physical link delay in the first topology information, the first physical link delay comprising a link delay between the first network node and an adjacent first neighboring node; and

obtaining, by the first network node, a node residence time of the first network node in the first topology information,

obtaining, by the first network node, a node residence time that is of the first network node and that is in the first topology information comprising:

a step of obtaining, by the first network node, load of the first network node; and

a step of obtaining, by the first network node, the node residence time of the first network node according to the load and a mapping table, the mapping table comprising a correspondence between the load and the node residence time of the first network node."

"[Claim 7]

A first network node for obtaining a target transmission path, wherein the network node is a first network node in a network domain, and the first network node includes:

a first obtaining unit configured to obtain topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain, the topology information comprising a physical link delay between two adjacent network nodes in the plurality of network nodes and a node residence time of each of the plurality of network nodes;

a second obtaining unit configured to obtain a transmission delay of each path between the ingress node and the egress node according to the topology information, wherein the transmission delay of each path comprising a sum of the physical link delay between the two adjacent network nodes on each path and node residence times of the plurality of network nodes on each path; and

a determining unit configured to determine the target transmission path between the ingress node and the egress node according to the transmission delay of each path,

wherein the topology information comprises first topology information, and

the first obtaining unit is specifically further configured to

obtain a first physical link delay in the first topology information, the first physical link delay comprising a link delay between the first network node and an adjacent first neighboring node, and the first neighboring node and the first network node belong to the plurality of network nodes, and

obtain a node residence time of the first network node in the first topology information,

the first obtaining unit is specifically further configured to

obtain load of the first network node, and

obtain the node residence time of the first network node according to the load and a mapping table, the mapping table comprising a correspondence between the load and the node residence time that are of the first network node."

Inventions 2 to 6 are inventions obtained by restricting Invention 1, and Inventions 8 to 12 are inventions obtained by restricting Invention 7.

No. 4 Description in Cited Document and Cited Invention

1 Cited Document 1 (Specification of U.S. Patent Application Publication No. 2013/0212268) cited in the reasons for refusal stated in the examiner's decision includes the following matters with drawings. (The underlines were added by the body, the same applies hereinafter.)

"[0052] The example provides a route control method, which can be used for a packet transport network or an optical transmission network, a specific process thereof is as shown in FIG. 1, and the following steps are included.
[0053] In step 100, a path computing apparatus acquires a latency value of each node and a latency value of a link between each node and each adjacent node thereof.
[0054] It should be noted that, in the application of the present document, the latency values can contain real-time latency values and latency variation values.
[0055] In the example, each node can start a latency measurement function to measure the latency value of the link between the node itself and each adjacent node thereof (i.e. a link directly formed by the node itself and the adjacent node without going through other nodes), and report latency measurement results to a control plane, and the control plane releases the latency value of the link between each node and each adjacent node thereof to the path computing apparatus or a routing domain. Therefore, the path computing apparatus can possess the latency values of all links in the whole network."

"[0060] In the example, in consideration of the differences between signal processing technologies of all nodes, for example, statistical multiplexing (the packet network using statistical multiplexing) technology or time division multiplexing (the optical transport network using time division multiplexing) technology is used, and thus the latency value is not a fixed value with regard to the same node. Moreover, with regard to the same node, the latency value also can have a relationship with the amount of the node bearer services, for example, in the condition that a node is in full load, with regard to the statistical multiplexing services; since the services are always scheduled by means of buffering and the priority in hardware implementation, latency values in different periods of each service passing through the node may be different. Therefore, a statistic for an average latency of the node with respect to all the services can be implemented; that is, an average value of all latency values from ingress interfaces to egress interfaces on the node.

The average latency is configured by a management plane according to the capacity of equipment or is computed automatically after the node operates. That is, the control plane can know the average latency value of each node eventually, and then release an average latency value of a node on which the control plane is located to the routing domain or the path computing apparatus through the routing protocol.

[0061] In step 200, the path computing apparatus receives a route computing request, and according to each latency value acquired, computes an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request.

[0062] In the example, the latency requirement of the service corresponding to the route computing request can be carried in the route computing request. Information of the latency requirement can include a latency required by the client (the latency required by the client can be a latency value and also can be a latency range); or it can include a minimum latency value, an average latency value, a maximum latency value, and a selection policy of the latency requirement required by the client, wherein the selection policy of the latency requirement is to make a prior selection to satisfy the minimum latency value, make a prior selection to satisfy the maximum latency value, or make a prior selection to satisfy the average latency value; or the information of the latency requirement includes an acceptable maximum latency value and an acceptable maximum latency variation value required by the client, wherein the selection policy of the latency requirement is to:

satisfy only the acceptable maximum latency value; satisfy only the acceptable maximum latency variation value; satisfy the acceptable maximum latency variation value and the acceptable maximum latency value simultaneously; or need not satisfy the acceptable maximum latency variation value and the acceptable maximum latency value.

[0063] According to the above step 200, after computing the end-to-end path satisfying the latency requirement of the service, a source node on the path can initiate a connection establishment process, wherein, a latency value required by the Label Switching Path (LSP) (i.e. the latency requirement of the service corresponding to the route computing request) can be carried in traffic engineering parameters of the signaling. When the source node on the path sends a Path message to a sink node, the sink node can collect latencies of all nodes passed by the end-to-end service (i.e. the Path message) and latency values of links between all the adjacent nodes on the way passed by the end-to-end service and perform accumulation, and after reaching the sink node, a total latency in a direction from the source node to the sink node (also can be called a first total latency value) can be acquired through the accumulated value, the sink node can compare the first total latency value with the latency value carried in the traffic engineering parameters (i.e. the latency requirement of the service corresponding to the route computing request), if the first total latency value is greater than the latency value carried in the traffic engineering parameters, that is, if it does not satisfy the latency requirement of the service corresponding to the route computing request, the sink node returns a PathErr message to the upstream and indicates a connection establishment failure; and if the first total latency value is less than or equal to the latency value carried in the traffic engineering parameters, that is, if it satisfies the latency requirement of the service corresponding to the route computing request, the sink node returns a reservation (Resv) message to an upstream node."

2 According to the description of Cited Document 1 in 1, it is recognized that Cited Document 1 describes the following invention (hereinafter referred to as "Cited Invention").

"A route control method, which can be used for a packet transport network, wherein

a path computing apparatus acquires a latency value of each node and a latency value of a link between each node and each adjacent node thereof,

in the condition that a node is in full load, with regard to the statistical multiplexing services, since the services are always scheduled by means of buffering and the priority in hardware implementation, latency values in different periods of each service passing through the node may be different, and therefore the average latency is computed automatically after the node operates,

the path computing apparatus receives a route computing request, and according to each latency value acquired, computes an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request,

after computing the end-to-end path satisfying the latency requirement of the service, a source node on the path can initiate a connection establishment process,

when the source node on the path sends Path message to a sink node, the sink node can collect latencies of all nodes passed by the end-to-end service (i.e. the Path message) and latency values of links between all the adjacent nodes on the way passed by the end-to-end service and perform the accumulation, and after reaching the sink node, a total latency in a direction from the source node to the sink node can be acquired through the accumulated value, and the sink node can compare the first total latency value with the latency value carried in the traffic engineering parameters."

No. 5 Comparison / Judgment

1 Regarding Invention 1

(1) Comparison

A Invention 1 and the Cited Invention are compared below.

(A) The Cited Invention is "a route control method, which can be used for a packet transport network" and is configured so that "the path computing apparatus receives a route computing request, and according to each latency value acquired, computes an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request". It can be said that the "end-to-end path satisfying a latency requirement of a service corresponding to the route computing request" is "acquired" as a target "transmission path"; i.e., a "target transmission path", and corresponds to the "target transmission path" in Invention 1. The "route control method" in the Cited Invention corresponds to the "method for obtaining a target transmission path" in Invention 1 except for the different feature described later.

(B) In the "route control method, which can be used for a packet transport network" in the Cited Invention, "when the source node on the path sends Path message to a sink node, the sink node can collect latencies of all nodes passed by the end-to-end service (i.e. the Path message) and latency values of links between all the adjacent nodes on the way passed by the end-to-end service and perform the accumulation". Thus, it can be said that the "route control method" is "applied" to a domain of the "packet transport network"; i.e., a "network domain".

(C) In the Cited Invention, each "node" (including a "source node" and a "sink node") corresponds to the "network node" in Invention 1. The "source node" and the "sink node" correspond to the "ingress node" and the "egress node" in Invention 1, respectively. The "latency value of a link between each node and each adjacent node thereof" is a delay generated in a physical "link" between two "adjacent" "nodes", which is obtained for each of a pair of "adjacent" "nodes". The "latency value of a link" between two specific "adjacent" "nodes" corresponds to the "physical link delays between adjacent two network nodes in the network nodes" in Invention 1. The "latency value of each node", which is a delay generated in "each node", corresponds to the "node residence time of each of the network nodes" in Invention 1.

The "latency value of a link between each node and each adjacent node thereof" in the Cited Invention is considered to relate to connection "between adjacent nodes", or topology. Therefore, the "latency value of a link between each node and each adjacent node thereof" is considered to configure "topology information" together with the "latency value of each node" in the Cited Invention. Accordingly, the "topology information" includes the "latency value of a link" between the above specific two "adjacent" "nodes" and the "latency value of each node".

(D) The "path computing apparatus" is configured to "acquire a latency value of each node and a latency value of a link between each node and each adjacent node thereof" and "receive a route computing request, and according to each latency value acquired, compute an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request". It is obvious that the "end-to-end path" is a path from a "source node" to a "sink node" in the "network domain" in (B) and that "a latency value of each node and a latency value of a link between each node and each adjacent node thereof are acquired" for a plurality of "nodes" included by "each path" of a plurality of paths passing through different "nodes" or "links" between the "source node" and the "sink node".

According to (C), the Cited Invention includes a configuration corresponding to

"obtaining topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node that are in the network domain, the topology information comprising a physical link delay between two adjacent network nodes in the network nodes and a node residence time of each of the network nodes".

(E) Considering that the Cited Invention is configured so that "when the source node on the path sends Path message to a sink node, the sink node can collect latencies of all nodes passed by the end-to-end service (i.e. the Path message) and latency values of links between all the adjacent nodes on the way passed by the end-to-end service and perform the accumulation, and after reaching the sink node, a total latency in a direction from the source node to the sink node can be acquired through the accumulated value, the sink node can compare the first total latency value with the latency value carried in the traffic engineering parameters", it is obvious that, "when the path computing apparatus receives a route computing request, and according to each latency value acquired, computes an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request", the "total latency" is "acquired" for "each path" between" the "source node" and the "sink node" in (D) and "an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request is computed", accordingly.

The "total latency", which is considered to include a "sum" of "a latency value of a link" between two specific "adjacent" "nodes" ((C)) and "a latency value of each node", corresponds to the "transmission delay" in Invention 1.

As indicated in (C), the "topology information" includes the "latency value of a link" between two specific "adjacent" "nodes" and the "latency value of each node". Thus, it can be said that the "total latency" is "acquired" according to the "topology information".

According to (C), the Cited Invention includes a configuration corresponding to

"obtaining a transmission delay of each path between the ingress node and the egress node according to the topology information, the transmission delay of each path comprising a sum of physical link delays between the two adjacent network nodes on each path and node residence times of the network nodes on each path".

(F) The Cited Invention is configured so that "the path computing apparatus receives a route computing request, and according to each latency value acquired, computes an end-to-end path satisfying a latency requirement of a service corresponding to the route computing request, after computing the end-to-end path satisfying the latency requirement of the service, a source node on the path can initiate a connection establishment process". The matter, "after computing the end-to-end path satisfying the latency requirement of the service, a source node on the path can initiate a connection establishment process", is considered to mean "determining" a specific "end-to-end path" to "initiate a connection establishment process".

According to (A), (D), and (E), the Cited Invention includes a configuration corresponding to

"determining the target transmission path between the ingress node and the egress node according to the transmission delay of each path" in Invention 1.

(G) The "obtaining topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain, wherein

the topology information comprising a physical link delay between two adjacent network nodes in the network nodes and a node residence time of each of the network nodes"
of Invention 1 obviously includes obtaining "physical link delays" between a specific "network node" and a "network node" adjacent thereto, and a "node residence time"
of a specific "network node" that is of the specific "network node". The specific "network node" and the "network node" adjacent thereto may be arbitrarily referred to as "first network node" and "first neighboring node", respectively. The "physical link delays" may be arbitrarily referred to as "first physical link delay".

The "first physical link delay" and the "node resident time" are considered as a part of "topology information", and may be arbitrarily referred to as "first topology information".

As indicated in (D), the Cited Invention includes a configuration corresponding to

"obtaining topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain, wherein the topology information comprising a physical link delays between two adjacent network nodes in the network nodes and a node residence time of each of the network nodes" in Invention 1. Thus, the Cited Invention obviously includes a configuration corresponding to the following matters in Invention 1:

"the topology information comprises first topology information",

"obtaining topology information of a plurality of network nodes included by each path between an ingress node and an egress node in the network domain comprising:"

"obtaining a first physical link delay in the first topology information, wherein the first physical link delay" "comprising a link delay between the first network node and an adjacent first neighboring node; and"

"obtaining a node residence time of the first network node in the first topology information".

(H) The Cited Invention is configured as follows: "in the condition that a node is in full load, with regard to the statistical multiplexing services, since the services are always scheduled by means of buffering and the priority in hardware implementation, latency values in different periods of each service passing through the node may be different, and therefore the average latency is computed automatically after the node operates". The above matter is considered to indicate that the "latency value" may be varied by "period" or that the "average latency" is "computed" while taking into consideration the variation, while it cannot be said that the matter indicates "obtaining" the "latency value" from the "load" of the "node".

Therefore, it is not recognized that the above configuration of the Cited Invention discloses or suggests the following configuration of Invention 1:

"obtaining load of the first network node; and

obtaining the node residence time of the first network node according to the load and a mapping table, the mapping table comprising a correspondence between the load and the node residence time of the first network node".

B According to A, Invention 1 and the Cited Invention have the following corresponding feature and different features.

(Corresponding Feature)

"A method for obtaining a target transmission path, applied to a network domain, comprising:

obtaining topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain, the topology information comprising a physical link delay between two adjacent network nodes in the network nodes and a node residence time of each of the network nodes;

obtaining a transmission delay of each path between the ingress node and the egress node according to the topology information, the transmission delay of each path comprising a sum of physical link delay between the two adjacent network nodes on each path and node residence times of the network nodes on each path; and

determining the target transmission path between the ingress node and the egress node according to the transmission delay of each path,

wherein the topology information comprises first topology information,

obtaining topology information of a plurality of network nodes comprised by each path between an ingress node and an egress node in the network domain comprising:

obtaining a first physical link delay in the first topology information, the first physical link delay comprising a link delay between the first network node and an adjacent first neighboring node; and

obtaining a node residence time of the first network node and in the first topology information".

(Different Feature 1)

Invention 1 is configured so that "the first network node" "obtains topology information", "obtains a transmission delay of each path", "determines a target transmission path", "obtains a first physical link delay in the first topology information", and "obtains a node residence time of the first network node and in the first topology information". However, in the Cited Invention, the above operations are conducted by the "path computing apparatus".

(Different Feature 2)

Invention 1 is configured as follows:

"obtaining, by the first network node, a node residence time of the first network node and in the first topology information comprising:

obtaining, by the first network node, load of the first network node; and

obtaining, by the first network node, the node residence time of the first network node according to the load and a mapping table, the mapping table includes a correspondence between the load and the node residence time of the first network node". The Cited Invention does not specify a concrete method for "acquiring" a "latency value of each node".

(2) Judgment

In view of the case, Different Feature 2 is examined first.

None of Cited Documents 1 to 4 cited in the examiner's decision includes any description about obtaining a node residence time of a network node on the basis of a correspondence between load of the network node and the node residence time after obtaining the load of the network node. It is not recognized that the above matter was a matter of well-known art before the filing date of the present application.

The configuration in the Cited Invention, "in the condition that a node is in full load, with regard to the statistical multiplexing services, since the services are always scheduled by means of buffering and the priority in hardware implementation, latency values in different periods of each service passing through the node may be different, and therefore the average latency is computed automatically after the node operates", does not correspond to or suggest the configuration of the Invention relating to Different Feature 2, as indicated in (1) A (H).

Thus, it cannot be said that Invention 1 could be easily made by a person skilled in the art on the basis of the inventions described in Cited Documents 1 to 4, without making a judgment on another different feature.

2 Regarding Inventions 2 to 12

Invention 7 is an invention which corresponds to Invention 1 and is different in category expression from Invention 1, and includes the matters specifying the invention corresponding to Different Feature 2.

Inventions 2 to 6 are inventions obtained by restricting Invention 1, and Inventions 8 to 12 are inventions obtained by restricting Invention 7.

Accordingly, for the same reason as for Invention 1, it is also cannot be said that Inventions 2 to 12 could have been easily made by a person skilled in the art on the basis of the inventions described in Cited Documents 1 to 4.

No. 6 Closing

As above, Inventions 1 to 12 are not inventions which could have been easily made by a person skilled in the art on the basis of the inventions described in Cited Documents 1 to 4. Thus, the present application cannot be rejected due to the reasons in the examiner's decision.

In addition, beyond that, no reasons for refusal were found.

Therefore, the appeal decision shall be made as described in the conclusion.

May 11, 2021

Chief administrative judge: INABA, Kazuo
Administrative judge: TOMIZAWA, Tetsuo
Administrative judge: HAYASHI, Tsuyoshi