Google LLC

v.

Sandpiper CDN, LLC

IPR2025-00806
U.S. Patent No. 8,645,517



Patent Owner's Demonstratives

August 6, 2026

Sandpiper EX2019
Google v. Sandpiper
IPR2025-00806

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Roadmap

- Overview of the ’517 Patent
- Hasan is not analogous art
- Beaumont-Hasan does not teach the claimed policy
- Beaumont-Hasan does not teach the claimed GUI that uses a decision tree representing rules
- Ben-Shaul does not teach location-based DNS policies
- Neither Ben-Shaul nor Ben-Shaul-Hasan teaches the claimed GUI that uses a decision tree representing rules

Independent Claim 1 of the ’517 Patent

1. A method, operable in a framework in which an adaptive traffic control name server network implements policy-based traffic direction, the name server network comprising at least one domain name server comprising hardware in combination with software and constructed and adapted to provide adaptive policy-based domain name service, the method comprising:

(A) providing a graphical user interface (GUI);

(B) using said GUI to obtain at least one policy for direction of network traffic, wherein the GUI supports the setting of said at least one policy using a decision tree representing rules; and

(C) providing said at least one policy to the name server network, wherein the decision tree comprises one or more resource nodes, and one or more branch nodes, wherein the one or more resource nodes specify one or more answers to be provided in response to a Domain Name Service (DNS) request, and wherein the one or more branch nodes specify one or more decision criteria to be applied, and wherein the GUI supports the specification of:

(i) one or more answers for the one or more resource nodes, and

(ii) one or more decision criteria for the one or more branch nodes, wherein the one or more criteria are selected from criteria related to: world zones, countries, states, time zones, and blocks of Internet Protocol (IP) addresses, and wherein the one or more resource nodes are selected from: IP addresses, canonical name (CNAME) records, mail exchange (MX) records, name server (NS) records, and load sharing server sets; and wherein the answers are selected from: IP addresses and CNAMEs.

EX1001, ’517 patent, claim 1.

Independent Claim 9 of the ’517 Patent

9. An administrative agent, operable in a framework in which an adaptive traffic control name server network implements policy-based traffic direction, the name server network comprising at least one domain name server comprising hardware in combination with software and constructed and adapted to provide adaptive policy-based domain name service, said administrative agent comprising hardware in combination with software and constructed and adapted to:

(a) provide a graphical user interface (GUI);

(b) use said GUI to obtain at least one policy for direction of network traffic, wherein the GUI supports the setting of said at least one policy using a decision tree representing rules; and

(c) provide said at least one policy to the name server network, wherein the decision tree comprises one or more resource nodes, and one or more branch nodes, wherein the one or more resource nodes specify one or more answers to be provided in response to a Domain Name Service (DNS) request, and wherein the one or more branch nodes specify one or more decision criteria to be applied, and wherein the GUI supports the specification of:

(i) one or more answers for the one or more resource nodes, and

(ii) one or more decision criteria for the one or more branch nodes,

wherein the one or more criteria are selected from criteria related to: world zones, countries, states, time zones, and blocks of Internet Protocol (IP) addresses, and

wherein the one or more resource nodes are selected from: IP addresses, canonical name (CNAME) records, mail exchange (MX) records, name server (NS) records, and load sharing server sets; and

wherein the answers are selected from: IP addresses and CNAMEs.

EX1001, ’517 patent, claim 9.

Independent Claim 17 of the ’517 Patent

17. A system comprising:

(A) an adaptive traffic control name server network comprising at least one domain name server comprising hardware in combination with software and constructed and adapted to provide adaptive policy-based domain name service, and

(B) an administrative agent comprising hardware in combination with software and constructed and adapted to:

(a) provide a graphical user interface (GUI);

(b) use said GUI to obtain at least one policy for direction of network traffic, wherein the GUI supports the setting of said at least one policy using a decision tree representing rules; and

(c) provide said at least one policy to the name server network,

wherein the decision tree comprises one or more resource nodes, and one or more branch nodes,

wherein the one or more resource nodes specify one or more answers to be provided in response to a Domain Name Service (DNS) request, and

wherein the one or more branch nodes specify one or more decision criteria to be applied, and

wherein the GUI supports the specification of:

(i) one or more answers for the one or more resource nodes, and

(ii) one or more decision criteria for the one or more branch nodes,

wherein the one or more criteria are selected from criteria related to: world zones, countries, states, time zones, and blocks of Internet Protocol (IP) addresses, and

wherein the one or more resource nodes are selected from: IP addresses, canonical name (CNAME) records, mail exchange (MX) records, name server (NS) records, and load sharing server sets; and

wherein the answers are selected from: IP addresses and CNAMEs.

EX1001, ’517 patent, claim 17.

The ’517 Patent Discloses DNS-Based Policies

This invention solves these and other problems by providing a means to distribute network (e.g., Internet) traffic according to a configurable set of rules. The rules can be configured to take into account key factors such as:

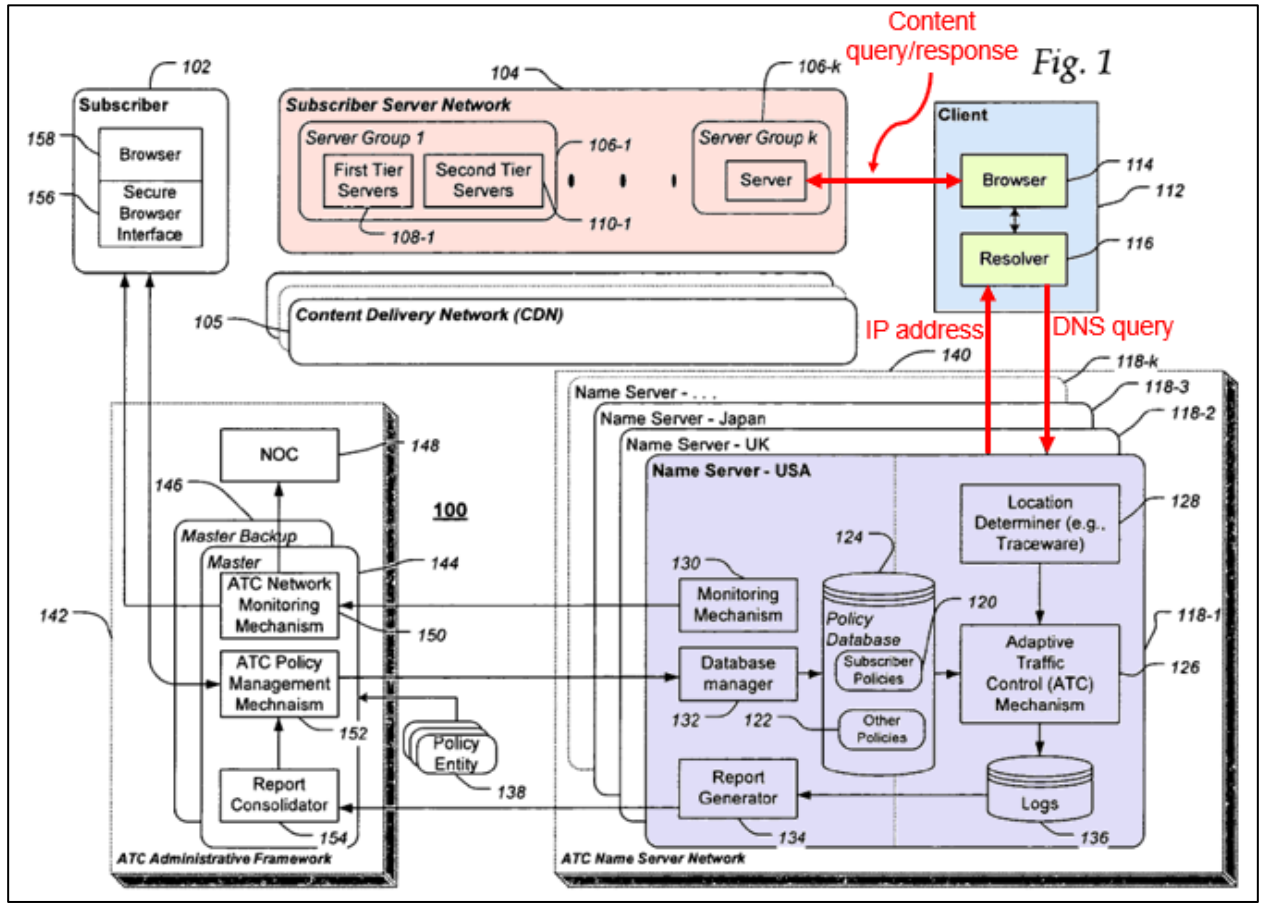
server availability.

specific requirements of content providers who deploy the invention, e.g., distribution based upon geography, position in IP address space, load share, etc.

state of the network (Internet) at any given moment, including measures of network latency.

The distribution of service requests (from a client **112**) within the subscriber server network **104** may be controlled through a set of ATC policies (**120**, **122**) stored in the policy database **124**. Various authorities may influence the ATC policies and may create policies in the policy database **124**. For example, the subscriber may set up policies to direct traffic with respect to considerations such as the geographical locations and the capacities of the underlying servers in the subscriber’s network **104**. Other policy entities **138**, includ-

EX1001, ’517 patent, 1:58-67; 6:28-36.



EX1001, ’517 patent, Fig. 1.

The ’517 Patent’s Policies are Hierarchically Constructed

The ATC policies **200** may be hierarchically constructed to form a decision tree. FIG. **3** depicts an exemplary subscriber policy hierarchy or a decision tree built based on various types of subscriber policies, according to an embodiment of the present invention. In FIG. **3**, the continental based distribution policies **220** are used to first direct a selection process limited to a particular continent. For example, if the requesting client **112** is located in Asia, the continental based distribution policies **220** may direct the further selection within servers that are located in Asia. Similarly, if the client **112** is located in either North America or Europe, the further selection process may be directed to the appropriate servers located in the corresponding continent.

FIG. **10**(*b*) shows an exemplary decision tree embedded in a set of geographical policies that guide how the traffic should be directed to a set of servers. In the decision tree depicted in FIG. **10**(*b*), the selection is first directed to different resources at the top level according to a split between the United States and rest of the world. A resource may correspond to either a single server (or CDN) or a group of servers (or CDNs). A request initiated from non-U.S. geographical regions is directed to a resource named “London”. Within the United States, time zone based policies are further applied. A request

EX1001, ’517 patent, 8:55-9:8, 25:8-25.

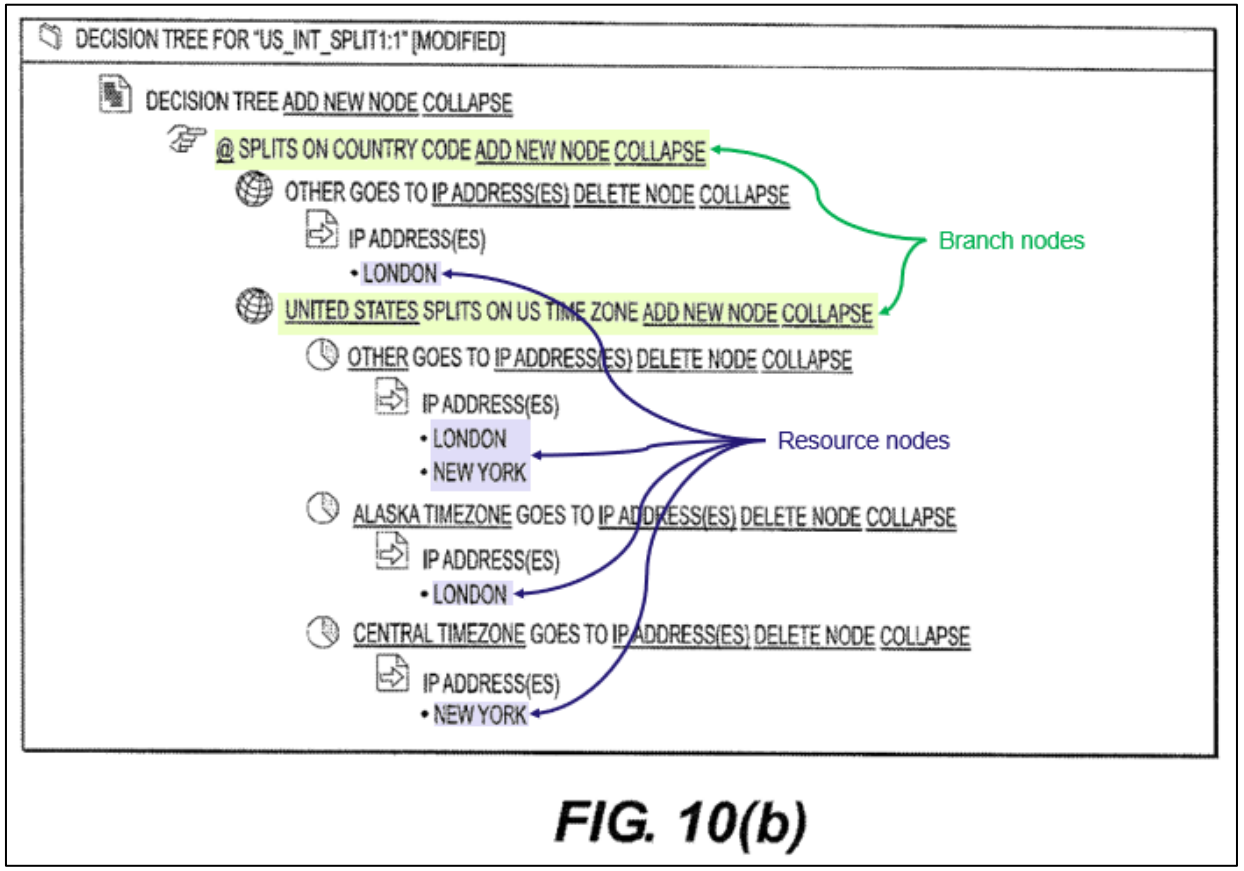


FIG. 10(b)

EX1001, ’517 patent, Fig. 10(b).

Hasan is not analogous art to the ’517 Patent

Field of Endeavor

The Field of Endeavor is determined by reference to the embodiments, function, and structure of the claimed invention.

In re Alberto Lee BIGIO.

No. 03–1358.

United States Court of Appeals, Federal Circuit.

DECIDED: Aug. 24, 2004.

This test for analogous art requires the PTO to determine the appropriate field of endeavor by reference to explanations of the invention's subject matter in the patent application, including the embodiments, function, and structure of the claimed invention. *See Wood*, 599 F.2d at

In re Bigio, 381 F.3d 1320, 1325 (Fed. Cir. 2004)

Paper 24, POR, 9-14; Paper 28, Sur-Reply, 1-5.

Hasan is not from the Same Field of Endeavor

The ’517 Patent’s field of endeavor is DNS services for directing network traffic

What is claimed is:

1. A method, operable in a framework in which an adaptive traffic control name server network implements policy-based traffic direction, the name server network comprising at least one domain name server comprising hardware in combination with software and constructed and adapted to provide adaptive policy-based domain name service, the method comprising:

This invention solves these and other problems by providing a means to distribute network (e.g., Internet) traffic according to a configurable set of rules. The rules can be configured to take into account key factors such as:

server availability.

specific requirements of content providers who deploy the invention, e.g., distribution based upon geography, position in IP address space, load share, etc.

state of the network (Internet) at any given moment, including measures of network latency.

EX1001, ’517 patent, claim 1, 1:58-67.

Hasan’s field of endeavor is management of network services in a data center

(57) **ABSTRACT**

A virtual management system for a network facility, such as a data center, or any facility having a plurality of components which can be organized as objects for presentation in a virtualized environment, is disclosed. The system includes a management topology presenting devices, facilities, subscribers, log servers, and services as objects to an administrative interface; and a configuration manager implementing changes to objects in the topology responsive to configuration input from an administrator via the administrative interface. In an exemplary embodiment, the user interface is

In one embodiment, this is implemented using each content services application. The content services application for the VPN, for example, will search through rules to allow appropriate settings for protocols, such as IPSec and IKE, to pass through a firewall implementation, and change appropriate DNS settings, both of which are implemented by other systems to implement a VPN. Similarly, the VPN application may make changes to NAT settings implemented by the NAT service application

EX1006, Hasan, Abstract; 17:57-65.

Paper 24, POR, 9-14; Paper 28, Sur-Reply, 1-5.

Petitioner's Proposed Field is Overly Broad

Petitioner's proposed field of endeavor does not reflect the "embodiments, function, and structure of the claimed invention."

The '517 patent's inventors characterized its technical field as "network traffic management." EX-1001, 1:36-37. The Office agreed, assigning U.S. and International classifications 709/223 for "Computer Network Managing" and G06F 15/173 for "Using an interconnection network," respectively. *Id.*, cover.

Hasan shares this same field of endeavor. *See Hasan*, cover (entitled "Network Management System"), 1:5-10 (asserting technical field as "management of network services in a data center"). Indeed, the Office classified *Hasan* with *identical* primary classifications as the '517 patent:

U.S. Patent No. 8,645,517
(The '517 Patent)

(51) **Int. Cl.**
G06F 15/173 (2006.01)
(52) **U.S. Cl.** 709/223; 709/202; 709/250

U.S. Patent No. 7,082,464
(Hasan)

(51) **Int. Cl.**
G06F 15/173 (2006.01)
G06F 15/16 (2006.01)
(52) **U.S. Cl.**
USPC 709/223; 709/238; 709/219

Paper 26, Pet. Reply, 2.

- The Federal Circuit has repeatedly rejected such generic fields of endeavor.
  - *See In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992);
  - *Wang Laboratories, Inc. v. Toshiba Corp.*, 993 F.2d 858, 864 (Fed. Cir. 1993)
- Classification evidence is "inherently weak" and is "of limited value" in demonstrating analogousness. *In re Mlot-Fijalkowski*, 676 F.2d 666, 669 n.5 (C.C.P.A. 1982)

Paper 24, POR, 9-14; Paper 28, Sur-Reply, 1-5.

Hasan is not Reasonably Pertinent to the Problem

The ’517 Patent addresses challenges in distributing network content to end users

As the volume of Internet traffic grows, providers of web content and applications increasingly need to deliver content from multiple servers at widely-separated locations in order to sustain a good end-user experience under high traffic loads. This need generates several difficult challenges, including, among others:

how to guarantee the fault-tolerance of such a multiple-server system in the face of failure of one or more individual servers;

how to control the way in which requests from end-users are distributed to each server according to important content provider policy constraints imposed for economic, contractual or other reasons; and

how to guarantee high performance as experienced by end-users as network conditions change.

EX1001, ’517 patent, 1:43-57.

Hasan addresses the “difficulty in administering a data center”

ing, or the like. As a result, the management of all subscribers within the data center becomes very complex and expensive with many different management interfaces for all of the subscribers and subscriber devices. Administering the equipment in each cage is generally accomplished via an administrative access interface coupled to each single function device.

The difficulty in administering a data center as shown in FIG. **1** is that changes to each subscriber’s individual configuration must be made at the cage, or at minimum, via appliance specific configuration mechanisms. Normally, subscribers themselves have no control over the service appliances and the data center administrators manage these appliances. As will be readily apparent, the more subscribers one has in the data center, the more resources must be committed to administration. This can become exceedingly

EX1006, Hasan, 2:52-67.

Paper 24, POR, 14-16; Paper 28, Sur-Reply, 5-6.

Hasan is not Reasonably Pertinent to the Problem

Petitioner

network traffic is irrelevant. A POSITA would have reasonably found *Hasan*'s GUI pertinent for managing policies. Lin, ¶59. And regardless, *Hasan* specifically encompasses management of "routing, firewall, … load balancing, [and] Web caching" tasks, all of which relate to network traffic and content delivery. *Hasan*, 2:42-52.

Paper 26, Pet. Reply, 5.

Hasan

ment can come from many different vendors. The cages may include network appliances dedicated to one or more of the following tasks: routing, firewall, network address translation (NAT), SSL acceleration, virtual private networking, public key infrastructure (PKI), load balancing, Web caching, or the like. As a result, the management of all subscribers within the data center becomes very complex and expensive with many different management interfaces for all of the subscribers and subscriber devices. Administering the equipment in each cage is generally accomplished via an administrative access interface coupled to each single function device.

EX1006, Hasan, 2:47-58.

Paper 24, POR, 14-16; Paper 28, Sur-Reply, 5-6.

Ground 1: Beaumont-Hasan does not teach the claimed policy for direction of network traffic

The claimed "policy" is a "rule" for directing network traffic

This invention solves these and other problems by providing a means to distribute network (e.g., Internet) traffic according to a configurable set of rules. The rules can be configured to take into account key factors such as:

server availability.

specific requirements of content providers who deploy the invention, e.g., distribution based upon geography, position in IP address space, load share, etc.

state of the network (Internet) at any given moment, including measures of network latency.

The distribution of service requests (from a client **112**) within the subscriber server network **104** may be controlled through a set of ATC policies (**120**, **122**) stored in the policy database **124**. Various authorities may influence the ATC policies and may create policies in the policy database **124**. For example, the subscriber may set up policies to direct traffic with respect to considerations such as the geographical locations and the capacities of the underlying servers in the subscriber's network **104**. Other policy entities **138**, includ-

EX1001, '517 patent, 1:58-67; 6:28-36.

As noted, a policy may be created by generating a decision tree representing the ATC rules that the user (content provider/subscriber) wants to apply. At the leaves of this tree (referred to as resource nodes) a user specifies the answers (IP addresses or CNAMEs) that the user wants ATC to provide in response to a DNS request. At the branches of this tree (referred to as branch nodes) the user specifies the various decision criteria that the user wants to apply. Those skilled in the

EX1001, '517 patent, 9:1-8.

Paper 24, POR, 17-19.

Both parties agree that the claimed "policy" is a rule

Patent Owner

The independent claims each recite various features involving a "policy." *See, e.g.,* claim 1 (reciting "policy-based traffic direction", "policy-based domain name service", and "at least one policy"). The '517 patent is clear that a "policy" refers to a course, rule, or principle of action. *See* EX1001, 1:43-2:7 ("This

Paper 24, POR, 17.

Petitioner

Patent Owner agrees that a policy is a "rule … to direct traffic of the underlying servers." Resp., 18. And Patent Owner concedes that *Beaumont* discloses

Paper 26, Pet. Reply, 6.

Institution decision

We agree with Patent Owner that its understanding of a policy as a rule is consistent with the disclosure in the '517 patent that "a policy may be created by generating a decision tree representing the ATC rules." *See* Ex. 1001, 9:1–3. We do not agree with Patent Owner, however, that

Paper 14, Institution Decision, 19.

Paper 24, POR, 17-19.

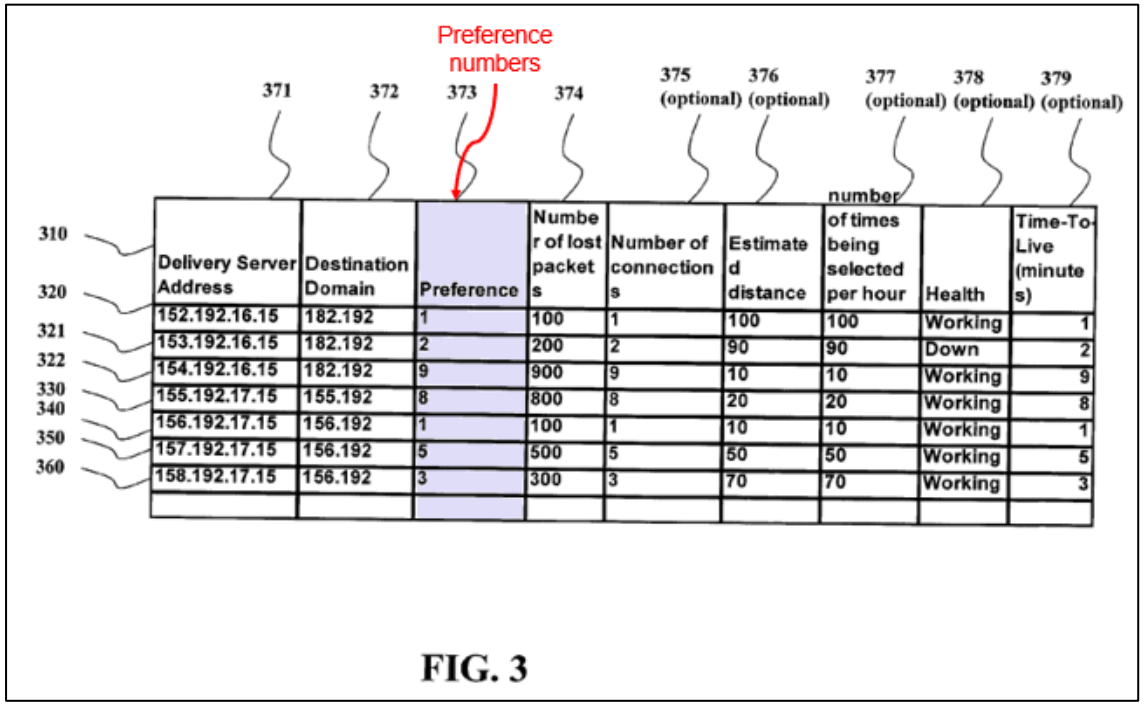
The Petition fails to identify the claimed policy

The Petition mapped Beaumont's "preference table" to the claimed policy.

[0023]. *Beaumont*'s method operates in a "data network" (framework) including a **content provider DNS server** that directs requests (traffic) according to a configurable preference table (policies):

Beaumont discloses providing policies to the content provider DNS servers to be stored as a table, but does not explicitly state the format of the provided file. *Beaumont*, [0032]. *Hasan*, however, discloses that "[p]olicy information is stored in XML format." *Hasan*, 4:60-64, 13:44-50.

Paper 1, Petition, 15, 26.



EX1007, Beaumont, Fig. 3 (annotated).

Paper 24, POR, 19-21; Paper 28, Sur-Reply, 6-9.

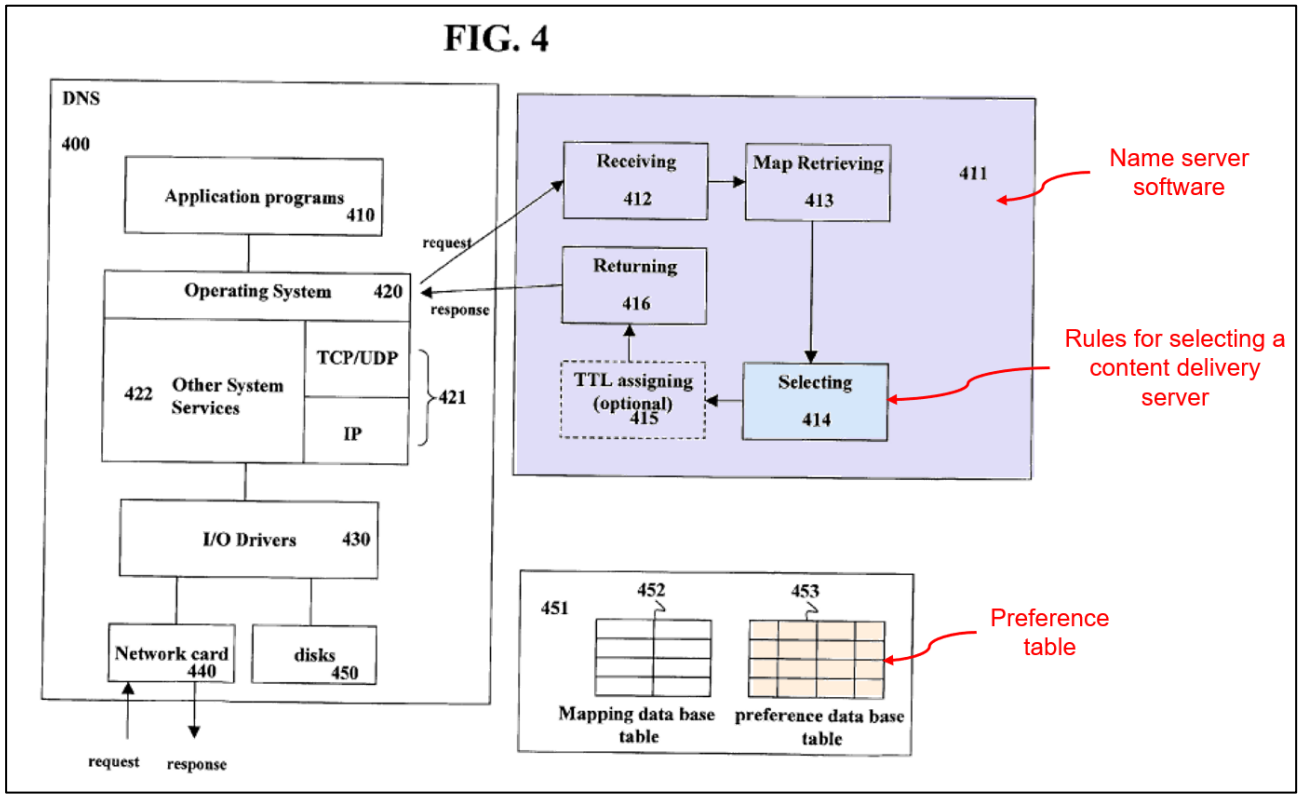
The Petition fails to identify the claimed policy

Beaumont's "preference table" does not store "rules" for directing traffic.

[0031] Although as illustrated above, the rule for selecting the best content delivery server in accordance with the principles of the invention is the shortest estimated distance to the client, other rules such as selecting one based on user preferences can be used as well. For example, a preference number can be assigned to each content delivery server and a destination domain, and the content delivery server with the highest retrieved preference number is selected. **FIG. 3**

module **413**, selecting module **414** retrieves from preference database **453** a preference number associated with each retrieved mapped address and the requester identifier. Preference database **453** illustratively also resides in disk **451** and comprises a table such as shown in **FIG. 3**. Each entry of the preference table comprises an address such as the delivery server address in **FIG. 3**, a requester identifier such as the destination domain in **FIG. 3**, a preference number, and optionally a TTL value. Selecting module **414** selects an address based on the retrieved preference numbers, preferably, one with the highest preference number. Finally,

EX1007, Beaumont, ¶¶ 31-32.



EX1007, Beaumont, Fig. 4 (annotated).

Paper 24, POR, 19-21; Paper 28, Sur-Reply, 6-9.

Petitioner's Reply's New Theories Should be Disregarded

Petitioner's Reply argues that Beaumont's "rules for selecting the best content delivery server" are the claimed policy.

That is not Petitioner's argument. The Petition relies on the underlying rules in *Beaumont*, which are evidenced by the preference table, and which even Patent

As the Petition explains, and as noted above, *Beaumont* enables users to manually enter preference values, which define a rule for how DNS requests should be resolved. Pet., 16; *supra,* §III.A.1. The rule imposed by the preference ordering is a policy as claimed. Pet., 16, 19-21; Lin, ¶¶74, 80, 82, 85 *supra,* §III.A.1. The

see also id., 25-26. But by changing the preference numbers in *Beaumont*, the user changes the rule—servers are selected differently because of the user's input. Thus,

Paper 26, Pet. Reply, 7, 8, 10.

[0031] Although as illustrated above, the rule for selecting the best content delivery server in accordance with the principles of the invention is the shortest estimated distance to the client, other rules such as selecting one based on user preferences can be used as well. For example, a preference number can be assigned to each content delivery server and a destination domain, and the content delivery server with the highest retrieved preference number is selected. **FIG. 3**

EX1007, Beaumont, ¶ 31.

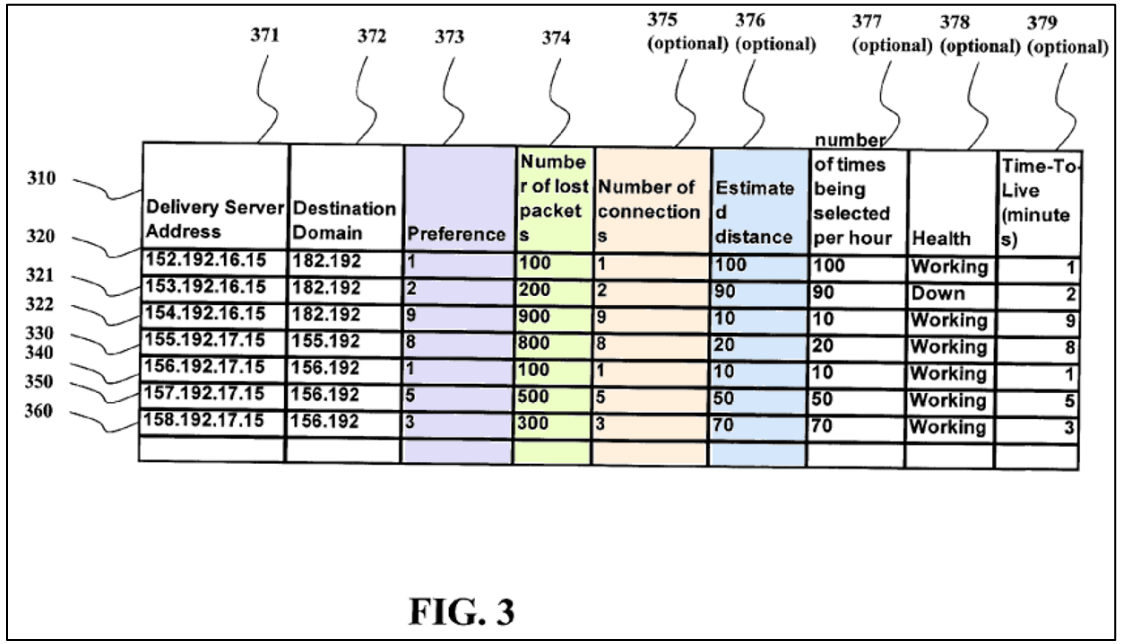
Paper 28, Sur-Reply, 9-12.

Petitioner's Reply's New Theories Fail on the Merits

Changing the preference value does not change the rule—it changes the result.

module **413**, selecting module **414** retrieves from preference database **453** a preference number associated with each retrieved mapped address and the requester identifier. Preference database **453** illustratively also resides in disk **451** and comprises a table such as shown in **FIG. 3**. Each entry of the preference table comprises an address such as the delivery server address in **FIG. 3**, a requester identifier such as the destination domain in **FIG. 3**, a preference number, and optionally a TTL value. Selecting module **414** selects an address based on the retrieved preference numbers, preferably, one with the highest preference number. Finally,

EX1007, Beaumont, ¶ 32.



	371	372	373	374	375 (optional)	376 (optional)	377 (optional)	378 (optional)	379 (optional)
310	Delivery Server Address	Destination Domain	Preference	Number of lost packets	Number of connections	Estimated distance	number of times being selected per hour	Health	Time-To-Live (minutes)
320	152.192.16.15	182.192	1	100	1	100	100	Working	1
321	153.192.16.15	182.192	2	200	2	90	90	Down	2
322	154.192.16.15	182.192	9	900	9	10	10	Working	9
330	155.192.17.15	155.192	8	800	8	20	20	Working	8
340	156.192.17.15	156.192	1	100	1	10	10	Working	1
350	157.192.17.15	156.192	5	500	5	50	50	Working	5
360	158.192.17.15	156.192	3	300	3	70	70	Working	3

FIG. 3

EX1007, Beaumont, Fig. 3.

Paper 28, Sur-Reply, 9-12.

Petitioner's Reply's New Theories Fail on the Merits

Petitioner's comparison to the '517 patent specification fails.

within an existing framework to impose policy. Indeed, *Beaumont*'s disclosure aligns with how policies are defined in the '517 patent. For example, Fig. 9(a) of the '517 patent shows a user interface "through which a subscriber may define load share and shed fraction policies."

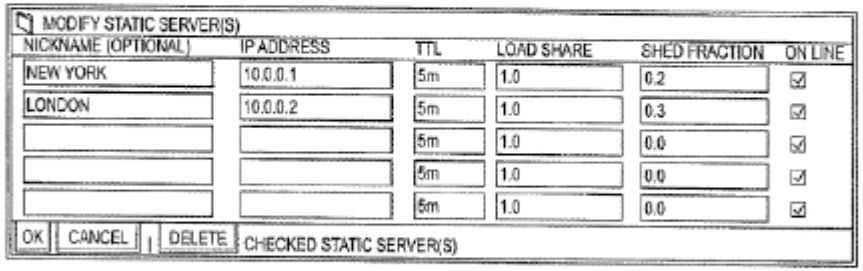


FIG. 9(a)

EX-1001, 2:60-62, Fig. 9(a). To configure these policies, the user enters integers (or decimals) much like in *Beaumont*. *Id.*, 24:8-18 ("[A] subscriber … can easily specify

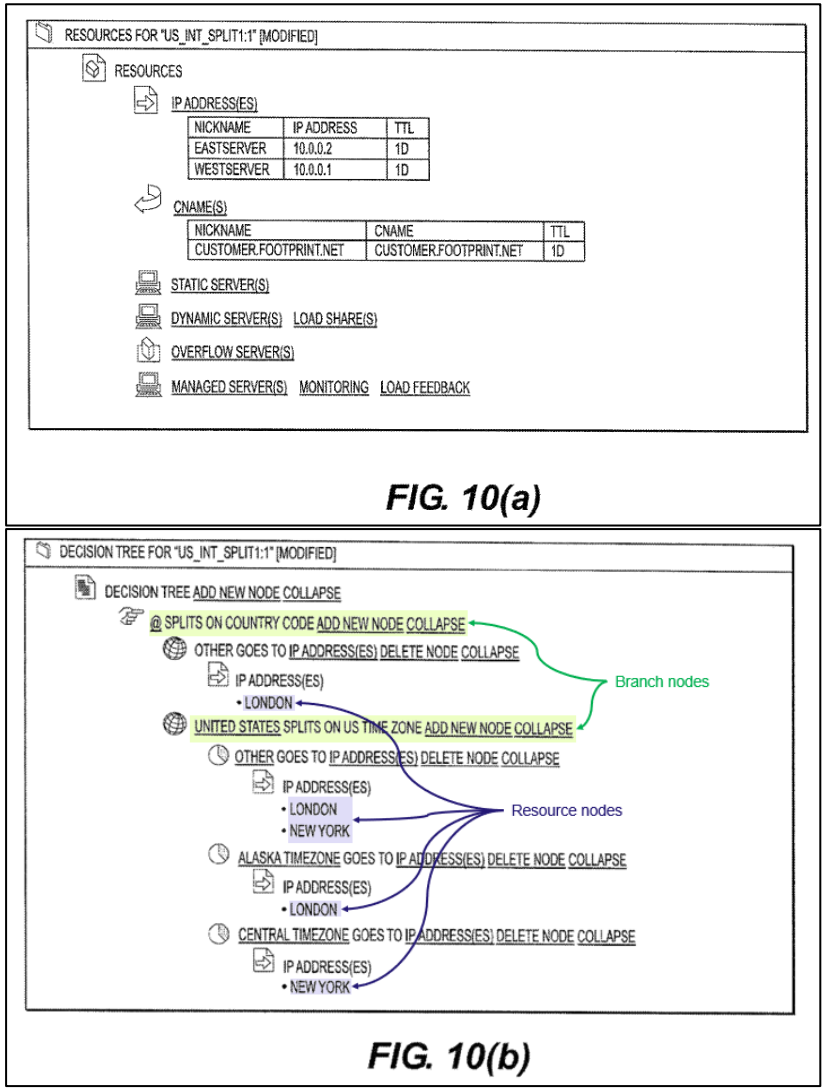
Paper 26, Pet. Reply, 9.

Paper 28, Sur-Reply, 9-12.

Petitioner's Reply's New Theories Fail on the Merits

FIGS. **10**(*a*)-**10**(*b*) show example subscriber policies, defined based on a set of resource servers, that govern the selection of the servers according to different criteria such as geographical location of an incoming request and the time zone of each of the locations. In FIG. **10**(*a*), three different resource servers are defined, including an "eastserver" with IP address 10.0.0.2, a "westserver" with IP address 10.0.0.1, and a service network with CName "customer.footprint.net". Here, the service network may include more than one server. FIG. **10**(*b*) shows an exemplary decision tree embedded in a set of geographical policies that guide how the traffic should be directed to a set of servers. In the decision tree depicted in

EX1001, '517 patent, 24:66-25:10.



EX1001, '517 patent, Figs. 10(a)-(b).

Paper 28, Sur-Reply, 9-12.

Petitioner's New Theories Fail on the Merits

The combined GUI is not used to obtain or support the setting of a policy for direction of network traffic

information" for servers within a network. *Hasan*, 7:12-21; 6:59-63. A POSITA would have been motivated to incorporate *Hasan*'s GUI into *Beaumont*'s network to enable similar user preference configuration, as suggested by *Beaumont*. Lin, ¶75; [0031]. For example, selecting a server would launch a menu for assigning the preferences shown in Fig. 3 of *Beaumont*. Lin, ¶77; *Beaumont*, Figs. 2, 3,

Paper 1, Petition, 17, 18.

the Petition, the *Beaumont-Hasan* GUI would allow users to input preferences and group servers within a decision-tree structure, altering the logical flow of server selection (the claimed policies) at multiple levels. *See, e.g.*, Pet., 21. This is

Paper 26, Pet. Reply, 12.

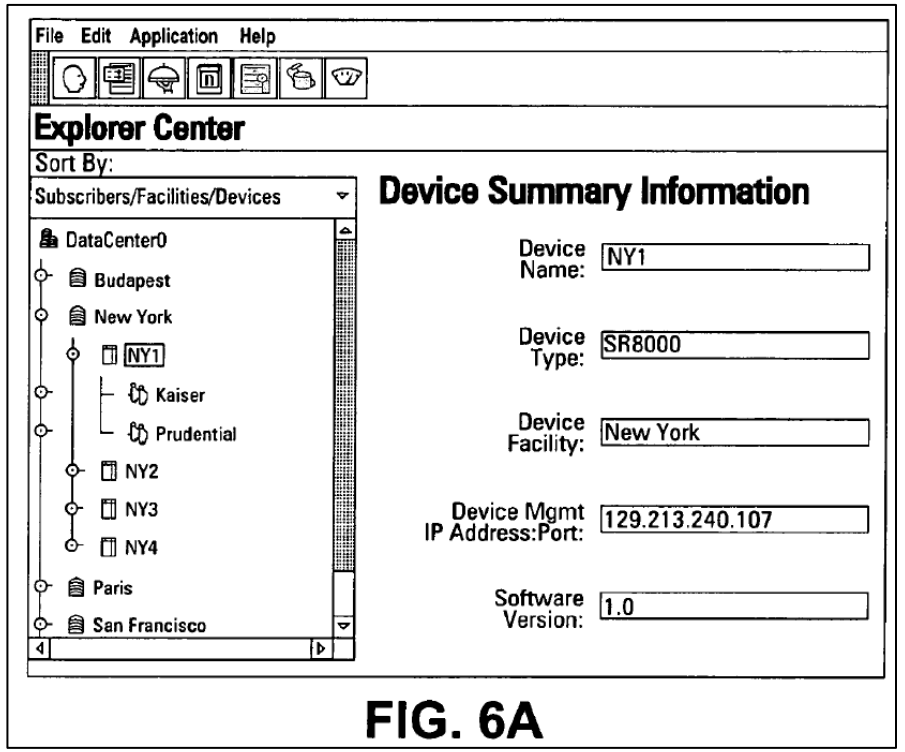


FIG. 6A

EX1006, Hasan, Fig. 6A.

Paper 24, POR, 22-26; Paper 28, Sur-Reply, 9-12.

Ground 1: Beaumont-Hasan does not teach providing said at least one policy to the name server network

Beaumont-Hasan does not teach providing said at least one policy to the name server network

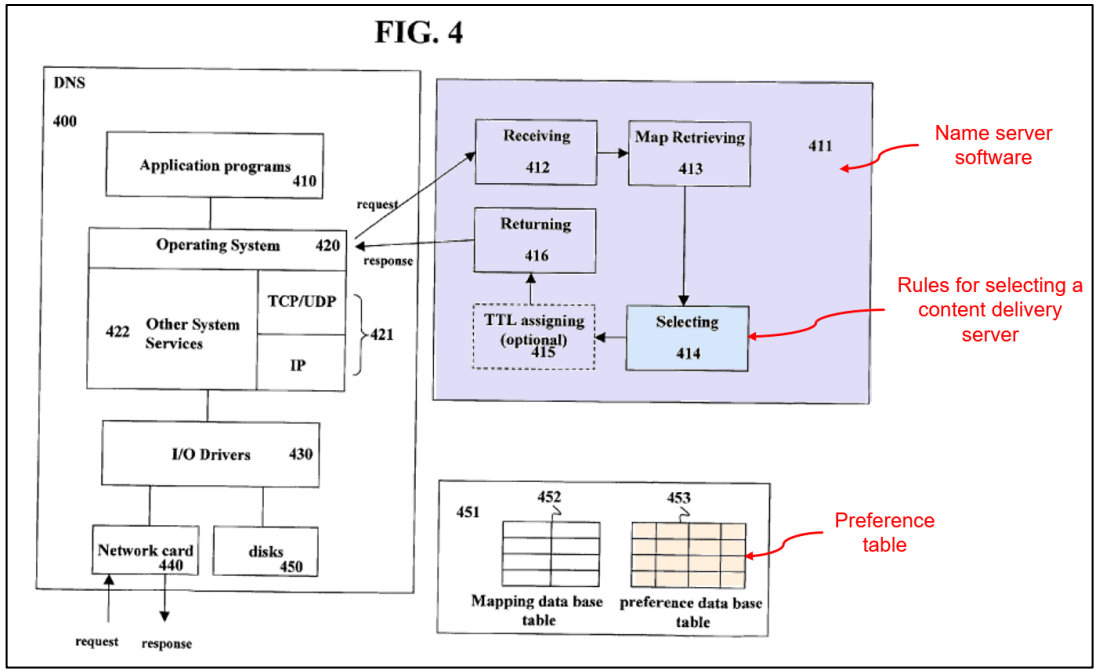
Petitioner's combination provides preference numbers, not policies, to the name server network.

Beaumont's custom preferences are stored at the DNS servers. *Beaumont*, [0032]. Incorporating *Hasan*'s GUI would not affect the storage of the preference table. Lin, ¶78. Thus, once set using the combined GUI, the preferences and/or rules would be stored in the network's content provider DNS servers and thus would be "provided … to the name server network." *Id.*

Paper 1, Petition, 18.

That is not Petitioner's argument. The Petition relies on the underlying rules in *Beaumont*, which are evidenced by the preference table, and which even Patent

Paper 26, Pet. Reply, 7.



EX1007, Beaumont, Fig. 4 (annotated).

Paper 24, POR, 26-27; Paper 28, Sur-Reply, 12-13.

Ground 1: Beaumont-Hasan does not teach the claimed GUI that uses a decision tree representing rules

Petitioner admits that neither Beaumont nor Hasan individually teaches the claimed GUI using a decision tree

Petitioner maps the "combined GUI" to the decision tree

[0029]-[0031]. The combined GUI would "support[] the setting of said at least one policy using a decision tree representing rules" because it is presented in a "familiar tree structure" and would allow users to set server preferences and rules. Lin, ¶77.

Paper 1, Petition, 18.

Dr. Lin did not analyze whether Hasan teaches the decision tree alone

10 My question is, do you believe that Hasan
11 on its own teaches a GUI that supports the setting
12 of at least one policy using a decision tree
13 representing rules?

...

19 today. I have not done any analysis whether Hasan
20 alone meets this claim limitation.

EX2018, Lin Deposition, 94:10-95:20.

Beaumont merely *suggests* a GUI for entering preferences

Beaumont's DNS server uses a preference table to resolve DNS requests. *Beaumont*, Abstract, [0006], [0023], [0031], [0032], [0034], [0035]. The table includes custom preferences "entered manually" by users. *Id.*, [0031]. A POSITA would have understood that *Beaumont* at least suggests providing a user interface for manually entering/defining preferences. Lin, ¶74.

Paper 1, Petition, 16-17.

Paper 24, POR, 28-31.

Petitioner's combined GUI does not support the setting of policies using a decision tree representing rules

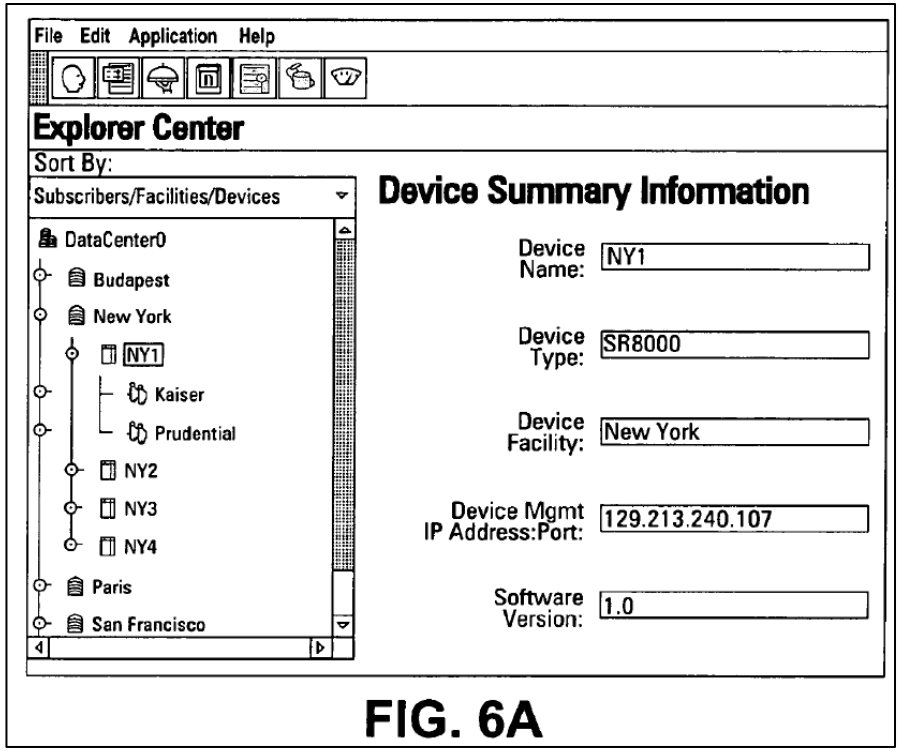
The combined GUI merely enables users to group servers and input preferences

The *Beaumont-Hasan* GUI would enable an administrator to set policies for a selected content delivery server. *Hasan*, 8:30-36, 10:25-34, 10:53-67; *Beaumont*, [0031]. For example, selecting a server would launch a menu for assigning the preferences shown in Fig. 3 of *Beaumont*. Lin, ¶77; *Beaumont*, Figs. 2, 3, [0029]-[0031]. The combined GUI would "support[] the setting of said at least one policy using a decision tree representing rules" because it is presented in a "familiar tree structure" and would allow users to set server preferences and rules. Lin, ¶77.

Paper 1, Petition, 18.

Petition and the combined functionality of *Beaumont* and *Hasan*. As explained in the Petition, the *Beaumont-Hasan* GUI would allow users to input preferences and group servers within a decision-tree structure, altering the logical flow of server selection (the claimed policies) at multiple levels. *See, e.g.*, Pet., 21. This is

Paper 26, Pet. Reply, 12.



EX1006, Hasan, Fig. 6A.

Paper 24, POR, 31-33; Paper 28, Sur-Reply, 13-15.

The claimed decision tree represents a policy hierarchy

The ATC policies **200** may be hierarchically constructed to form a decision tree. FIG. **3** depicts an exemplary subscriber policy hierarchy or a decision tree built based on various types of subscriber policies, according to an embodiment of the present invention. In FIG. **3**, the continental based distribu-

As noted, a policy may be created by generating a decision tree representing the ATC rules that the user (content provider/subscriber) wants to apply. At the leaves of this tree (referred to as resource nodes) a user specifies the answers (IP addresses or CNAMEs) that the user wants ATC to provide in response to a DNS request. At the branches of this tree (referred to as branch nodes) the user specifies the various decision criteria that the user wants to apply. Those skilled in the

EX1001, '517 patent, 8:55-59, 9:1-8.

Paper 24, POR, 5-7, 29.

The claimed decision tree represents a policy hierarchy

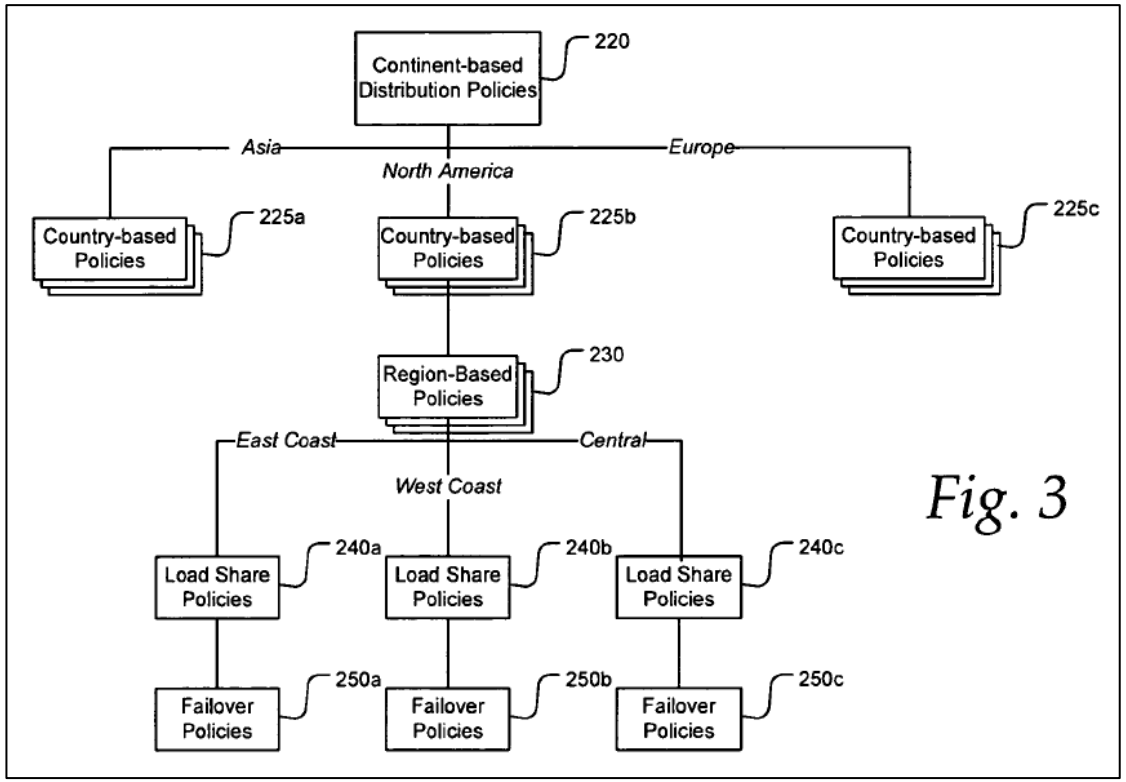


Fig. 3

EX1001, '517 patent, Fig. 3.

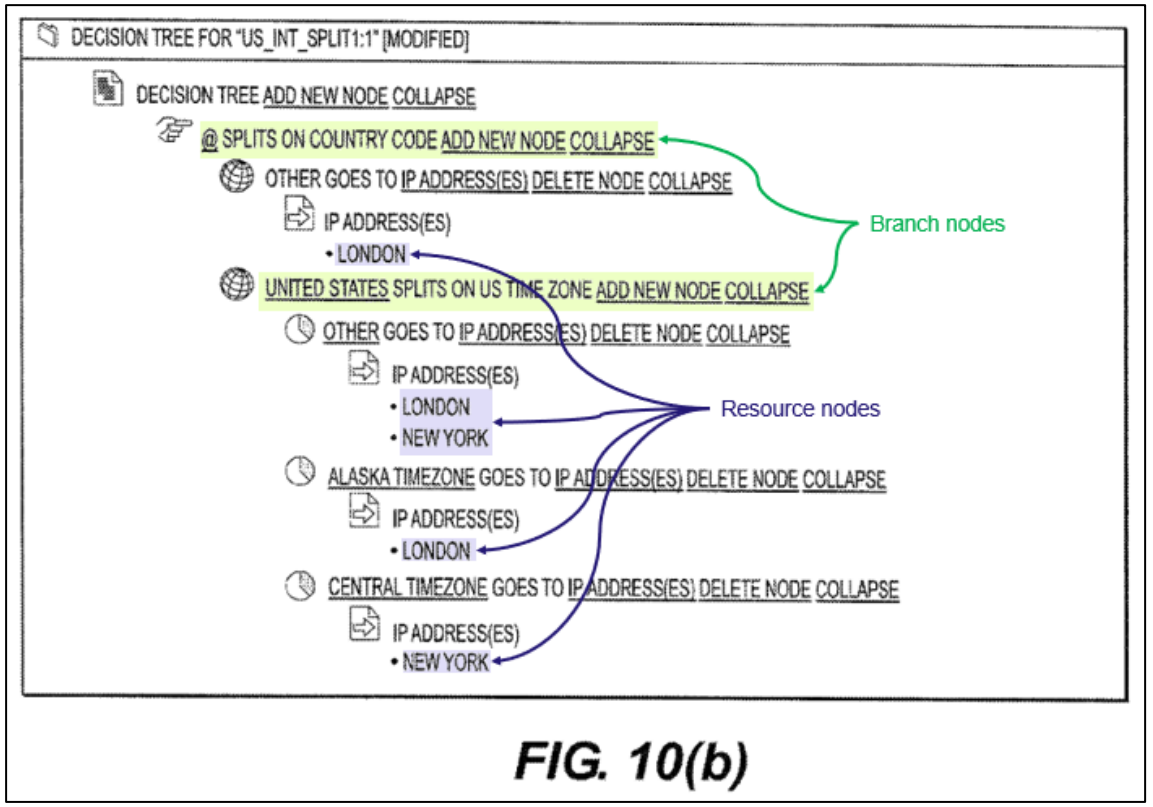


FIG. 10(b)

EX1001, '517 patent, Fig. 10(b).

Petitioner's combined GUI does not support the setting of policies using a decision tree representing rules

Petitioner argues Beaumont's "hierarchical policies" are performed by identifying servers from the mapping table and selecting one of those servers from the preference table.

"familiar tree structure." Pet., 18. *Beaumont* describes hierarchical policies for controlling network traffic. *Id.*, 18-20. For example, *Beaumont* teaches (1) identifying servers mapped to the client domain and then (2) selecting a particular one of those servers based on, e.g., geography, and/or other selection rules, including preference values. *See id.*, 10, 19-21. *Beaumont* expressly suggests

Paper 26, Pet. Reply, 11.

requester is used as the requester identifier. Map retrieving module **413** receives the input name from receiving module **412** and maps the input name against mapping database **452** to retrieve all addresses mapped to the input name. Mapping database resides in disk **451** which is part of disks **450**. After receiving the requester identifier from receiving module **412** and all the retrieved mapped addresses from map retrieving module **413**, selecting module **414** retrieves from preference database **453** a preference number associated with each retrieved mapped address and the requester identifier. Pref-

...

and optionally a TTL value. Selecting module **414** selects an address based on the retrieved preference numbers, preferably, one with the highest preference number. Finally,

EX1007, Beaumont, ¶ 32.

Paper 24, POR, 30-31; Paper 28, Sur-Reply, 13-15.

Petitioner's combined GUI does not support the setting of policies using a decision tree representing rules

The combined GUI does not represent Beaumont's alleged hierarchical policies.

Although Beaumont teaches rules for directing traffic to servers, Beaumont's rules are located in its DNS server, not in its preference table that Petitioner solely relies upon for the contents of the decision tree.

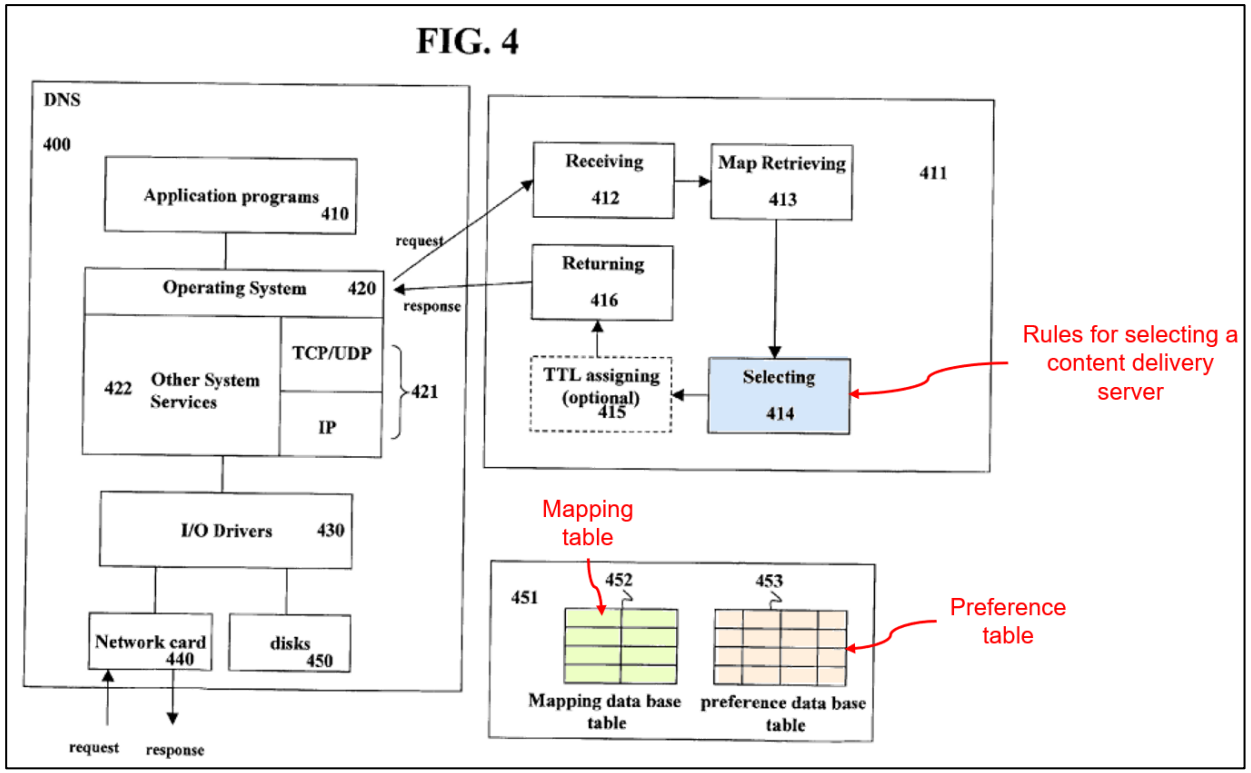
Paper 14, Institution Decision, 36.

[0031]. For example, selecting a server would launch a menu for assigning the preferences shown in Fig. 3 of *Beaumont*. Lin, ¶77; *Beaumont*, Figs. 2, 3,

Paper 1, Petition, 18.

the Petition, the *Beaumont-Hasan* GUI would allow users to input preferences and group servers within a decision-tree structure, altering the logical flow of server selection (the claimed policies) at multiple levels. *See, e.g.*, Pet., 21. This is

Paper 26, Pet. Reply, 12.



EX1007, Beaumont, Fig. 4 (annotated).

Paper 24, POR, 30-31; Paper 28, Sur-Reply, 13-15.

Ground 1: Beaumont-Hasan does not teach a decision tree with branch nodes specifying decision criteria

The combined GUI does not specify decision criteria

Beaumont-Hasan's decision criteria is fixed in server software and is not specified by a GUI.

being the facilities, subscribers, devices and log servers." *Hasan*, 8:19-29. When used in *Beaumont*'s network, **higher-level branches** ("branch nodes") in the GUI represent decision criteria (e.g., server health (e.g., working or down), destination domains (e.g., 182.192)), and **subbranches** ("resource nodes") represent individual

Paper 1, Petition, 19.

Accordingly, this is another variant of the same argument that "rules are not stored in the preference table." *Id.* That *Beaumont*—like the '517 patent—illustrates rules as a table does not change that *Beaumont* discloses decision criteria. *Supra*, §III.A.1.

Paper 26, Pet. Reply, 14.

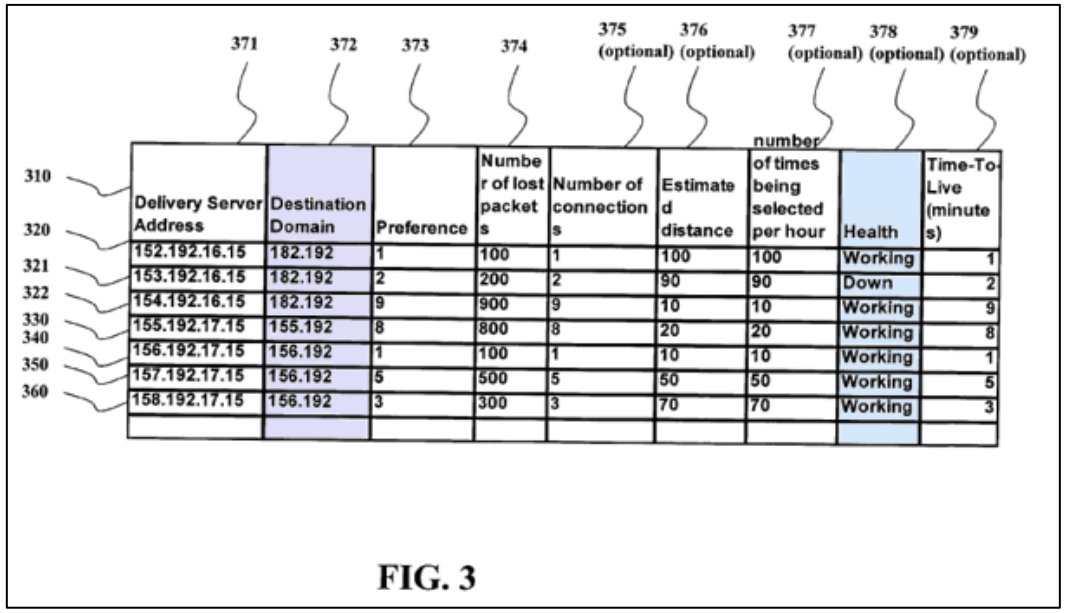


FIG. 3

Paper 24, POR, 33-38; Paper 28, Sur-Reply, 15-18.

The combined GUI does not support specification of decision criteria

The claims recite that the GUI supports the specification of the decision criteria

to be applied, and wherein the GUI supports the specification of:

(i) one or more answers for the one or more resource nodes, and

(ii) one or more decision criteria for the one or more branch nodes, wherein the one or more criteria are selected from criteria related to: world zones, countries, states, time zones, and blocks of Internet Protocol (IP) addresses, and wherein the one or more resource nodes are selected from: IP addresses, canonical name (CNAME) records, mail exchange (MX) records, name server (NS) records, and load sharing server sets; and wherein the answers are selected from: IP addresses and CNAMEs.

EX1001, '517 Patent, Claim 1.

The Petition maps Beaumont's "destination domains" and "server health" to the claimed decision criteria.

being the facilities, subscribers, devices and log servers." *Hasan*, 8:19-29. When used in *Beaumont*'s network, higher-level branches ("branch nodes") in the GUI represent decision criteria (e.g., server health (e.g., working or down), destination domains (e.g., 182.192)), and subbranches ("resource nodes") represent individual

domain, 182.192." *Id.*, [0028]. In the tree structure of the combined GUI, these content delivery servers would be grouped under the same destination domain and the destination domain would thus act as a decision criterion. Lin, ¶82.

Paper 1, Petition, 19, 20.

Paper 24, POR, 33-38; Paper 28, Sur-Reply, 15-18.

The combined GUI does not support specification of decision criteria

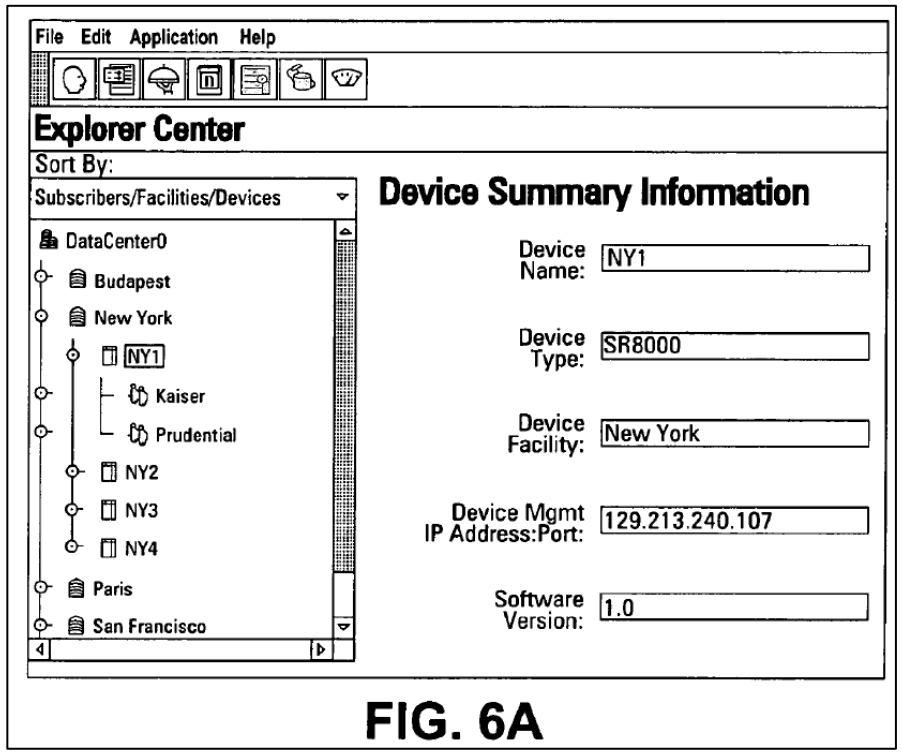
The combined GUI enables manual entry of preference numbers only, not destination domains or server health.

[0031]. For example, selecting a server would launch a menu for assigning the preferences shown in Fig. 3 of *Beaumont*. Lin, ¶77; *Beaumont*, Figs. 2, 3,

Paper 1, Petition, 18.

the Petition, the *Beaumont-Hasan* GUI would allow users to input preferences and group servers within a decision-tree structure, altering the logical flow of server selection (the claimed policies) at multiple levels. *See, e.g.*, Pet., 21. This is

Paper 26, Pet. Reply, 12.



EX1006, Hasan, Fig. 6A.

Paper 24, POR, 33-38; Paper 28, Sur-Reply, 15-18.

Petitioner's Reply's New Theory Fails

Petitioner's Reply argues for the first time that Beaumont's preference values are decision criteria.

argument (Resp., 35, n.2), the Petition indeed contemplates the preference values as decision criteria, explaining that *Beaumont*'s system "selects a server from within [a] set to handle the request based on a distance or other preferences." Pet., 19.

Paper 26, Pet. Reply, 15.

This theory fails because the preference values are not specified by branch nodes and do not satisfy the selection criteria

Name Service (DNS) request, and wherein the one or more branch nodes specify one or more decision criteria to be applied, and wherein the GUI supports the specification of:

(i) one or more answers for the one or more resource nodes, and

(ii) one or more decision criteria for the one or more branch nodes, wherein the one or more criteria are selected from criteria related to: world zones, countries, states, time zones, and blocks of Internet Protocol (IP) addresses, and wherein the one or more

EX1001, '517 Patent, Claim 1.

Paper 28, Sur-Reply, 15-18.

Petitioner's Reply's New Theory Fails

Petitioner does not argue that Beaumont-Hasan teaches "branch nodes [that] specify" the preference values.

being the facilities, subscribers, devices and log servers." *Hasan*, 8:19-29. When used in *Beaumont*'s network, higher-level branches ("branch nodes") in the GUI represent decision criteria (e.g., server health (e.g., working or down), destination domains (e.g., 182.192)), and subbranches ("resource nodes") represent individual delivery (content) servers that fulfill the decision criteria and are thus "answers" provided in response to a DNS request. *See, e.g.*, *Beaumont*, Fig. 2; Lin, ¶79.

Paper 1, Petition, 19.

The preference values are not "selected from criteria related to: world zones, countries, states, time zones, and blocks of Internet Protocol (IP) addresses."

preferences can be used as well. For example, a preference number can be assigned to each content delivery server and a destination domain, and the content delivery server with the highest retrieved preference number is selected. **FIG. 3** shows an illustrative example of incorporating preference numbers in a column, column **373**, of the illustrative preference database table. A preference number as illustrated is entered manually. However, other methods can be used as

EX1007, Beaumont, ¶ 31.

Paper 28, Sur-Reply, 15-18.

Petitioner maps the preference values to three distinct claim elements

Policy

As the Petition explains, and as noted above, *Beaumont* enables users to manually enter preference values, which define a rule for how DNS requests should be resolved. Pet., 16; *supra,* §III.A.1. The rule imposed by the preference ordering is a policy as claimed. Pet., 16, 19-21; Lin, ¶¶74, 80, 82, 85 *supra,* §III.A.1. The

Paper 26, Pet. Reply, 10.

Decision Criteria

[a server] based on user preferences"). Contrary to Patent Owner's footnote argument (Resp., 35, n.2), the Petition indeed contemplates the preference values as decision criteria, explaining that *Beaumont*'s system "selects a server from within [a] set to handle the request based on a distance or other preferences." Pet., 19.

Paper 26, Pet. Reply, 15.

Answer

8:61-64, 9:1-9; 17:11-13, 17:41-55. Because these preferences define which server address is returned (*Beaumont*, [0023], [0025]), and the GUI supports the specification of the preferences, the GUI supports specification of one or more answers for the one or more resource nodes. Lin, ¶85.

Paper 1, Petition, 20-21.

Paper 28, Sur-Reply, 18-19.

Ground 1: A POSA would not have been motivated to combine Beaumont and Hasan

A POSA would not have been motivated to combine Beaumont and Hasan

- A POSA would not have combined Beaumont and Hasan to implement a GUI that " GUI supports the setting of said at least one policy using a decision tree representing rules"

- Neither Beaumont nor Hasan teaches enabling users to specify policies (rules) for server selection
  - Beaumont's underlying rules are fixed in "name server software" and are independent from Beaumont's "preference table"
  - Hasan teaches that "DNS settings" are "implemented by other systems."

- Neither Beaumont nor Hasan enables users to instruct content delivery servers to be responsible for destination domains

Paper 24, POR, 39-43.

Grounds 3A-3B: Petitioner fundamentally misrepresents Ben-Shaul

Petitioner fundamentally misrepresents Ben-Shaul

Ben-Shaul's EdgeDNS does not apply location-based policies to resolve DNS requests.

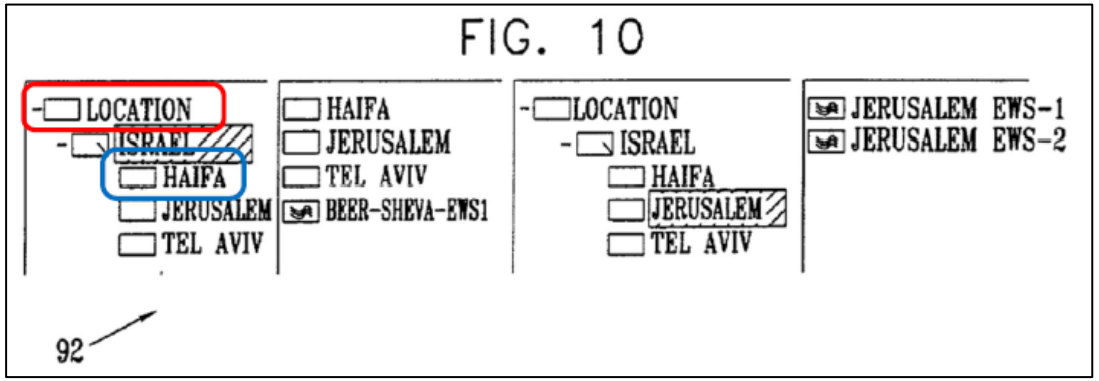
None of Petitioner's asserted GUIs teaches a decision tree specifying decision criteria to be applied or answers to be provided in response to a DNS request.

[0042], [0044]). *Ben-Shaul* further confirms that the EdgeDNS server applies location-based policies when directing requests, explaining that it "suppl[ies] different responses to a given request or query, depending on the *location of the query*, and the status of the edge server in the zone from which the request was made." *Id.*, [0360] (emphasis added); *see also id.*, [0039], [0309].[4]

Paper 26, Pet. Reply, 22.

The groups defined by the internal nodes "specify one or more decision criteria to be applied," because they "represent logical aggregations of nodes" based on a particular decision criteria, e.g., location. *Id.*, [0310]-[0311]; Lin, ¶174. A DNS request is thus directed to an edge server based on that server's association with the group. *Ben-Shaul*, [0044].

Paper 1, Petition, 53.



In the example above, the IP address for the server "Haifa" ("one or more answers") may be returned based on its location in Israel ("one or more decision criteria"). *Id.*, Fig. 10; Lin, ¶175.

Paper 1, Petition, 54.

Paper 24, POR, 53-58; Paper 28, Sur-Reply, 19-24.

Petitioner's misrepresentations doom all three of Petitioner's asserted GUIs

Petitioner relies on (1) Ben-Shaul's front edge tool; (2) Ben-Shaul's "single GUI"; and (3) the "Ben-Shaul-Hasan GUI"

[0038]-[0039], [0182], [0189], [0196]-[0197]). Lin, ¶165. The *Ben-Shaul* single GUI would thus allow defining "meaningful grouping[s] of edge servers" specifying which "policies [are] applicable to a set of related edge servers" and thus would "support[] the setting of said at least one policy using a decision tree representing rules" for the same reasons the front edge tool does. *Ben-Shaul*, [0309]. And the

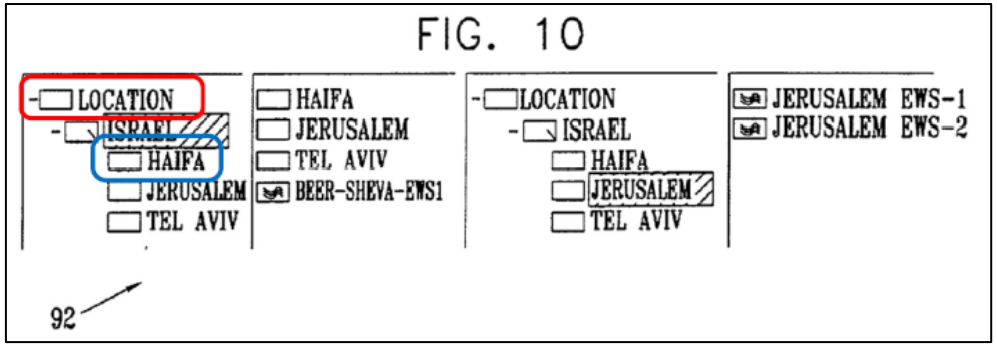
Paper 1, Petition, 50.

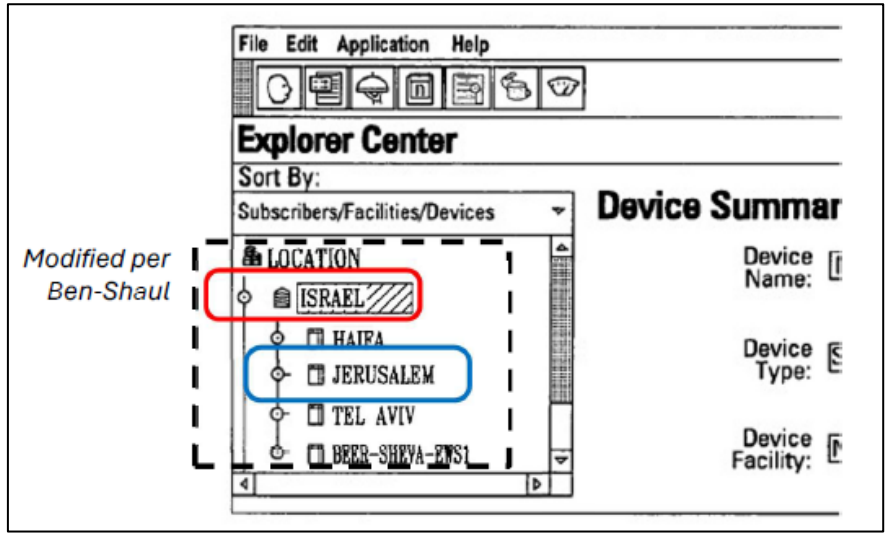
EX-1001, Fig. 10(b). The *Ben-Shaul* single GUI allows users to specify DNS directives under the same structure. Pet., 47-57. And the combined *Ben-Shaul-Hasan* GUI includes a similar hierarchical layout. *Id.*

Paper 26, Pet. Reply, 19.

etc." *Ben-Shaul*, [0039], [0044]. This functionality would remain intact when incorporating *Hasan*'s GUI. Lin, ¶179.

Paper 1, Petition, 55.





Paper 1, Petition, 53, 54.

Paper 24, POR, 53-58; Paper 28, Sur-Reply, 19-24.

Petitioner fails to identify a single policy used to resolve DNS requests

Ben-Shaul's DNS directives are not applied in resolving DNS requests

Petitioner

Ben-Shaul's DNS requests are resolved based on policies (*id.*, [0040], [0041], [0048], [0177]) defined through one or more directives (e.g., DNS directives) stored on a policy control server (*id.*, [0072], [0176], [0177]). Lin, ¶62.

Paper 1, Petition, 40.

editing the edge server directives." *Ben-Shaul*, [0349]. But *Ben-Shaul*'s EdgeDNS policies are also implemented through DNS directives, which are also editable using the front edge tool. *Id.*, [0176]. Indeed, these DNS directives originate from the same policy control servers as edge server directives. *Id.*, [0176], [0136], [0182]. Moreover, the front edge tool allows users to define groups of edge servers and thus specify which directives apply to which servers. Pet., 53.

Paper 26, Pet. Reply, 20.

Ben-Shaul

notation **(2, 3)**. The configuration of the EdgeDNS **38** and its coordination with the client regional DNS server **22**, the root DNS server **24**, and the authoritative DNS server **26** is controlled by DNS directives that originate from one or more policy control servers.

EX1005, Ben-Shaul, ¶176.

in the root DNS server system. The configuration of the EdgeDNS **40** and its coordination with the client regional DNS server **22** is controlled by DNS directives that originate from one or more policy control servers **42**. In addition each

EX1005, Ben-Shaul, ¶ 177.

Paper 24, POR, 53-57; Paper 28, Sur-Reply, 19-22.

Petitioner fails to identify a single policy used to resolve DNS requests

Ben-Shaul's CDML DNS redirection policies are not applied in resolving DNS requests

Petitioner

For example, *Ben-Shaul* explains that the EdgeDNS servers redirect end-user requests to particular content servers based on "DNS and HTTP redirections policies" implemented in CDML. *Ben-Shaul*, [0038]-[0039]. These policies are thus for "direction of network traffic" (*id.*), and are set through a graphical CDML editor (GUI) (*Ben-Shaul*, [0182], [0189]). Lin, ¶164. *Ben-Shaul* explains that the policies

Paper 1, Petition, 48-49.

GUI. *See* Pet., 49-50. And *Ben-Shaul* expressly teaches that CDML is used for "specification of the DNS and HTTP redirections policies" (i.e., direction of network traffic by the EdgeDNS servers). *See id.*, 48-49; *Ben-Shaul*, [0039]. These same functionalities would remain in the combined GUI. Pet., 55.

Paper 26, Pet. Reply, 20.

Ben-Shaul

[0039] In some preferred embodiments CDML may be partitioned into at least some of the following distinct specifications. These specifications include, first, the

...

such deliveries are specified. Fourth, there is a specification of the DNS and HTTP redirections policies. Fifth, the load balancing policy to be carried by the edge server is specified.

EX1005, Ben-Shaul, ¶ 39.

Paper 24, POR, 53-57; Paper 28, Sur-Reply, 19-22.

Petitioner fails to identify a single policy used to resolve DNS requests

Dr. Shenoy confirms that the CDML DNS redirection policies are not applied in resolving DNS requests

165. But the CDML editor is not used to specify policies for responding to DNS requests either. CDML stands for "content delivery markup language." EX1005, ¶37. It is an XML-based language used to author content delivery policies in Ben-Shaul's system. But these content delivery policies are not executed by the EdgeDNS, nor do they include policies for resolving DNS requests. CDML policies are delivered to and executed by edge servers. EX1005, ¶¶182, 188. As I explained above, Ben-Shaul provides example CDML directives in Listings 1-12. *See* EX1005, ¶¶193-208.

EX2017, Shenoy Dec., ¶ 173.

174. Petitioner and Dr. Lin assert that CDML policies include DNS redirection policies. Pet., 48-49 (citing Ben-Shaul, ¶39); EX1003, ¶164. But these policies are not executed by the EdgeDNS, nor are they for resolving DNS requests. At the outset, Ben-Shaul does not describe such redirection policies other than to mention their existence. *See* EX1005, ¶39. Regardless, as I have explained above, the EdgeDNS does not execute CDML policies. Indeed, the EdgeDNS implements Berkeley Internet Name Daemon (BIND) software for responding to DNS requests, not CDML. *See* EX1005, ¶¶9-14, 170, 379-382. As I have explained, the EdgeDNS is a "conventional DNS Name Server" adapted to implement cache replacement. It does not execute CDML policies. Indeed, Ben-Shaul does not teach that it does.

EX2017, Shenoy Dec., ¶ 174.

Paper 24, POR, 53-57; Paper 28, Sur-Reply, 19-22.

Petitioner incorrectly argues that the EdgeDNS "differentiates based on regions and groups."

The functionality cited by Petitioner is performed by the edge server. It is not DNS functionality.

Ben-Shaul explains its "EdgeDNS is responsible to return the IP address of … the edge server," (*id.*, [0041]), and that it differentiates based on regions and groups (*id.*, [0042], [0044]). *Ben-Shaul* further confirms that the EdgeDNS server applies location-based policies when directing requests, explaining that it "suppl[ies]

Paper 26, Pet. Reply, 22.

[0042] The differentiated content and application delivery model supports several types of edge-level differentiation, alone, or in combination, each of which can be mapped to various edge-level services:

[0044] 2. Regional and group differentiation. This characteristic allows one to differentiate delivery based on the location or the organization membership of the edge server. Thus, the same resource may have different priorities in different edge servers, permitting optimized use of resources. Or, the same URL may be translated to different physical resources, depending on the region or organization in which the request is made. Or, a certain resource may be visible, in whole or in part, to only some organizations, but not to others.

EX1005, Ben-Shaul, ¶¶ 42, 44.

Paper 24, POR, 55-57; Paper 28, Sur-Reply, 23.

Dr. Shenoy confirms that Ben-Shaul's "regional and group differentiation" is performed by the edge server.

180. Petitioner and Dr. Lin also cite Ben-Shaul paragraph 44 to support their assertion that edge servers are selected based on their "association with the group" specified in the hierarchical map. Pet., 53; *see also* EX1003, ¶174. But this paragraph describes *edge server* functionality for providing "differentiate[d]" content to users in different regions or groups. It does not describe techniques for resolving DNS requests. For instance, this paragraph explains that edge servers may give different priorities to different resources, or that edge servers may make certain resources visible to end-users or organizations in different regions. *See* EX1005, ¶44, *see also* ¶197 (discussing "content-based differentiation" performed by the edge server). These are not EdgeDNS functions, and they do not describe techniques for resolving DNS requests. As I have explained, the edge servers do

EX2017, Shenoy Dec., ¶ 180.

181. Indeed, this regional and group differentiation refers to the "delivery" of content to users, which is an edge server function. The EdgeDNS does not deliver content to users, it only directs users to the servers that can deliver the content. *See* EX1005, ¶¶41, 170. The EdgeDNS further does not know what content is stored at the edge server or what content is requested by the user. Again, its purpose is to resolve a request for a particular domain, not for particular content. In this differentiation technique, edge servers give different priorities to different resources. Again, this is not EdgeDNS functionality because the EdgeDNS is not concerned with *resources* stored at the edge server, it is only concerned with domains.

EX2017, Shenoy Dec., ¶ 181.

Paper 24, POR, 55-57; Paper 28, Sur-Reply, 23.

Ben-Shaul's location-dependent responses are a function of its dynamic cache replacement

Ben-Shaul does not apply location-based policies implemented using the claimed decision tree.

[0042], [0044]). *Ben-Shaul* further confirms that the EdgeDNS server applies location-based policies when directing requests, explaining that it "suppl[ies] different responses to a given request or query, depending on the *location of the query*, and the status of the edge server in the zone from which the request was made." *Id.*, [0360] (emphasis added); *see also id.*, [0039], [0309].[4]

Paper 26, Pet. Reply, 22.

[0360] The three special services provided by the DNS name server **134** are: (1) dynamic cache replacement, as allowing external hosts to dynamically replace entries in the local DNS cache is not standard in the DNS protocols; (2)

...

in the conventional DNS model. According to preferred embodiments of the invention, the DNS system is required to supply different responses to a given request or query, depending on the location of the query, and the status of the edge server in the zone from which the request was made. This capability is realized in the preferred embodiments by effecting a change in the DNS system, such that local dynamic changes can be made in the database on behalf of the edge server. While there are current DNS servers that differentiate among client queries, and issue different replies accordingly, these systems are not distributed, have scalability problems and require a complex mechanism to exist. In the invention local DNS servers are modified to allow dynamic cache replacement by edge servers.

EX1005, Ben-Shaul, ¶ 360.

Paper 24, POR, 48-52, 54-57; Paper 28, Sur-Reply, 23-24.

Grounds 3A-3B: Ben-Shaul's Dynamic Cache Replacement

The EdgeDNS resolves DNS requests through dynamic cache replacement

The EdgeDNS implements dynamic cache replacement

[0360] The three special services provided by the DNS name server **134** are: (1) dynamic cache replacement, as allowing external hosts to dynamically replace entries in the local DNS cache is not standard in the DNS protocols; (2)

...

In the invention local DNS servers are modified to allow dynamic cache replacement by edge servers.

EX1005, Ben-Shaul, ¶ 360.

Dr. Lin admits that dynamic cache replacement does not involve the implementation of policies

content. EX-2018, 229:5-9. Dr. Lin likewise did not testify that *Ben-Shaul*'s EdgeDNS does not use policies. Resp., 54. Rather, he merely declined to characterize the specific cache replacement functionality discussed by Patent Owner as a policy. EX-2018, 214:18-215:4 (stating "on first glance, this section appears to be about cache replacements," not "the implementation of policy"). Nor did Dr. Lin

Paper 26, Pet. Reply, 22-23.

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1  review.  But on -- on first glance, this section
2  appears to be about cache replacements, clearly
3  not entries.  And it's not talking about policy or
4  even the implementation of policy.
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EX2018, Lin Deposition, 215:1-4.

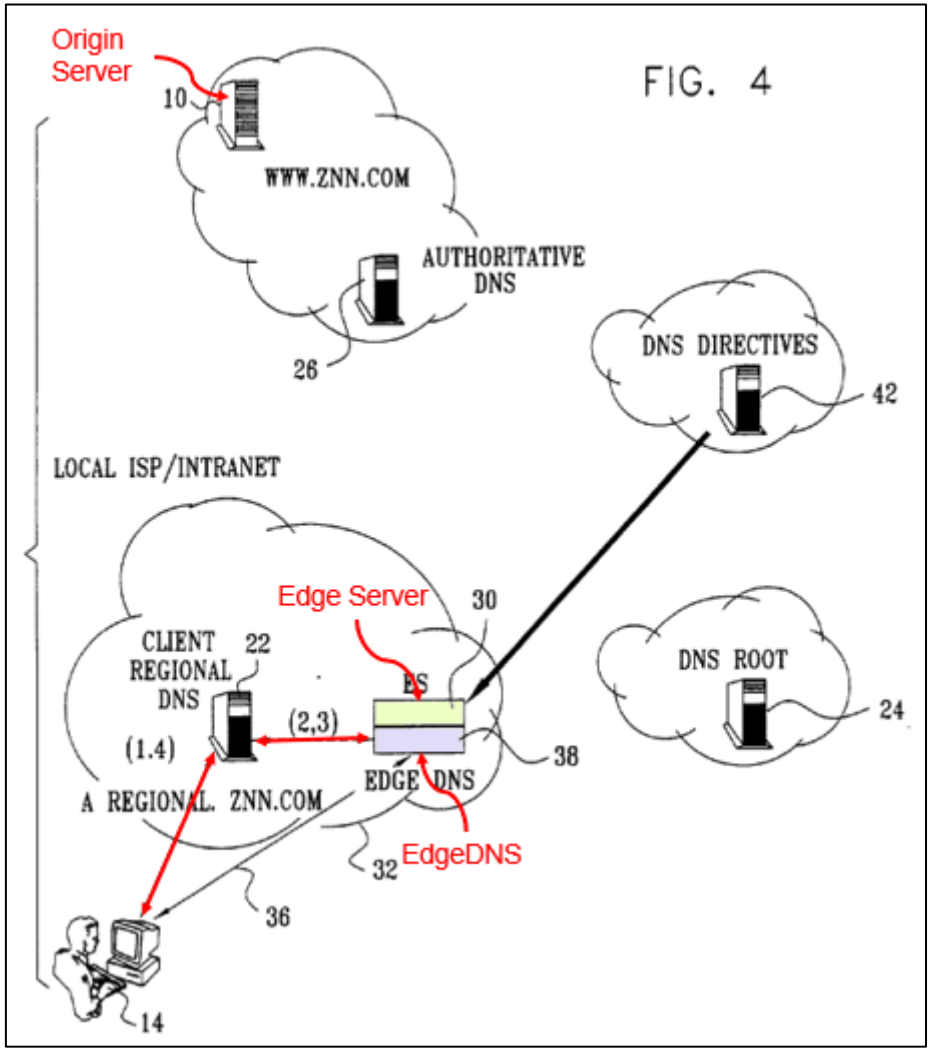
Paper 24, POR, 48-52, 54; Paper 28, Sur-Reply, 23-24.

The EdgeDNS resolves DNS requests through dynamic cache replacement

Dynamic Cache Replacement replaces the origin server IP address with the edge server IP address in EdgeDNS cache

[0176] 1. This alternative is termed DNS cache registration and is explained with reference to **FIG. 4**. Concurrent with an HTTP request **36** by the client **14** which reaches the regional edge server **30**, the client regional DNS server **22** forwards a request to the EdgeDNS **38** which has extended capabilities in comparison to a standard DNS server. In this local DNS insertion alternative, the client regional DNS server **22** conducts a periodic write of a regional domain name (a.regional.znn.com) DNS resolution with a binding to a local edge server IP address, together with a specified time-to-live (TTL) which is longer than the write period. The writing is done into the resolution cache of the EdgeDNS **38**. If such a periodic write ceases, the cache entry

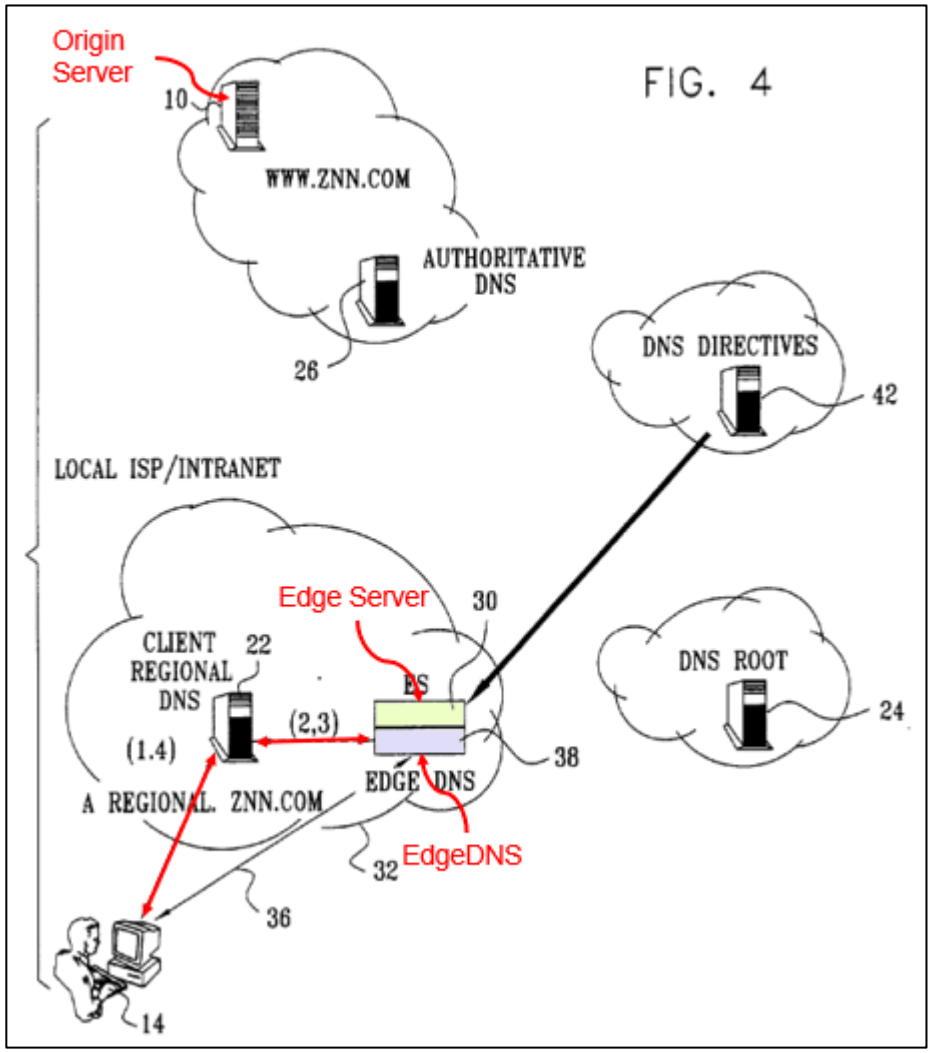
EX1005, Ben-Shaul, ¶ 176.



EX1005, Ben-Shaul, Fig. 4 (annotated).

Paper 24, POR, 48-52; Paper 28, Sur-Reply, 23-24.

The EdgeDNS resolves DNS requests through dynamic cache replacement



EX1005, Ben-Shaul, Fig. 4 (annotated).

1. DNS request from client 14 is directed to client regional DNS server 22.
2. Regional DNS server 22 forwards the request to the EdgeDNS 38.
3. The EdgeDNS performs a cache lookup and returns the edge server IP address to the regional DNS server 22.
4. The regional DNS server 22 returns the requested IP address to the client 14.

EX1005, *See* Ben-Shaul, ¶ 176.

Paper 24, POR, 48-52; Paper 28, Sur-Reply, 23-24.

The EdgeDNS resolves DNS requests through dynamic cache replacement

Listing 14

```
get cache entries relevant to the query type and domain
for each cached entry do
    if in bypass mode
      if entry type is CLCR
          ignore it
      else
          add entry
    if not in bypass mode
      if entry type is CLCR
          add entry and ignore all other types
      else if no CLCR entries found
          add entry
finally, if no entries found
    issue a normal DNS query to an external server
    after response arrives, send it back to the requester
    (while modifying the TTL value to max-ttl allowed)
```

EdgeDNS accesses cache entries for requested domain

If cache entry is a canonical local cache replacement (CLCR) entry, the EdgeDNS adds it to the response and ignores all other types. If no CLCR entry is found, the EdgeDNS adds all non CLCR entries to the response

If no relevant cache entries found, the EdgeDNS issues a normal DNS query

EX1005, Ben-Shaul, ¶ 362.

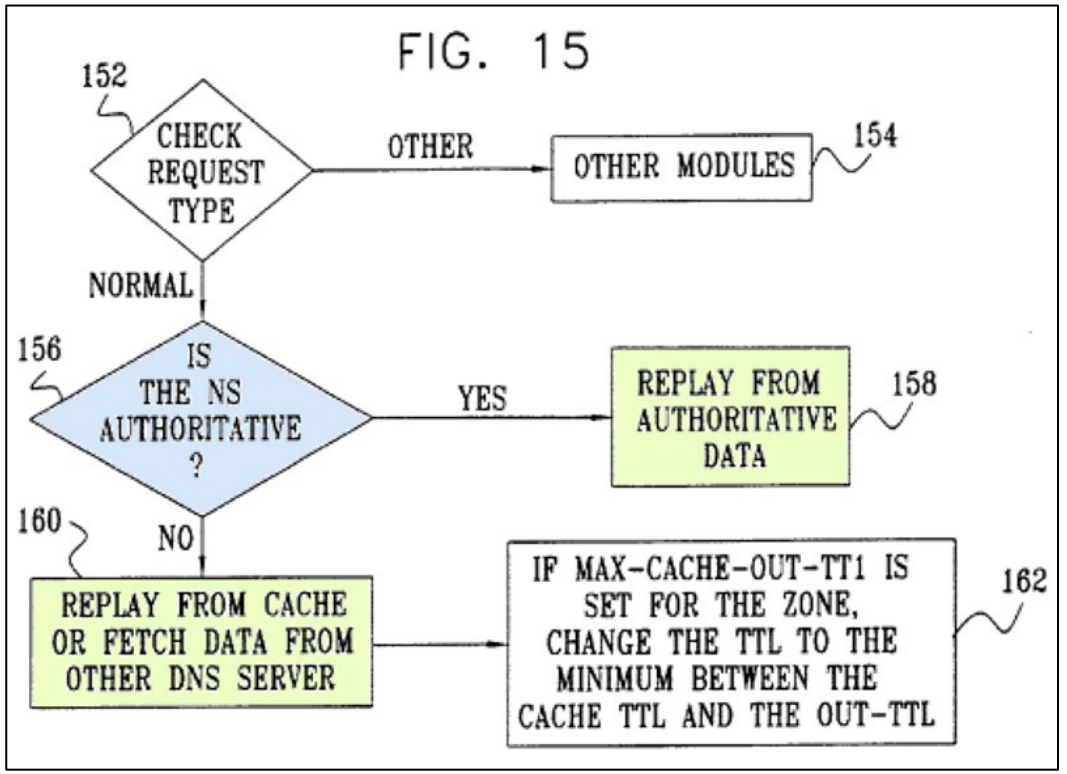
Paper 24, POR, 48-52; Paper 28, Sur-Reply, 23-24.

The EdgeDNS resolves DNS requests through dynamic cache replacement

[0398] Referring now to **FIG. 15**, at decision step **152** it is determined whether a normal DNS query is being received by the edge name server **148**. If not, then the query or message is referred to other modules at step **154**. If a normal DNS query has been received, then at decision step **156** it is determined whether the name server is authoritative. If the result of the determination is affirmative, then the database of authoritative data is consulted, and a reply is made accordingly at step **158**.

[0399] If the result of decision step **156** is negative, then at step **160** the required information is fetched from the local cache of the edge name server **148**. In the event of a cache miss, the data is obtained from another DNS server. At step **162**, if the value max-cache-out-ttl has been set for purposes

EX1005, Ben-Shaul, ¶¶ 398-399.



EX1005, Ben-Shaul, Fig. 15.

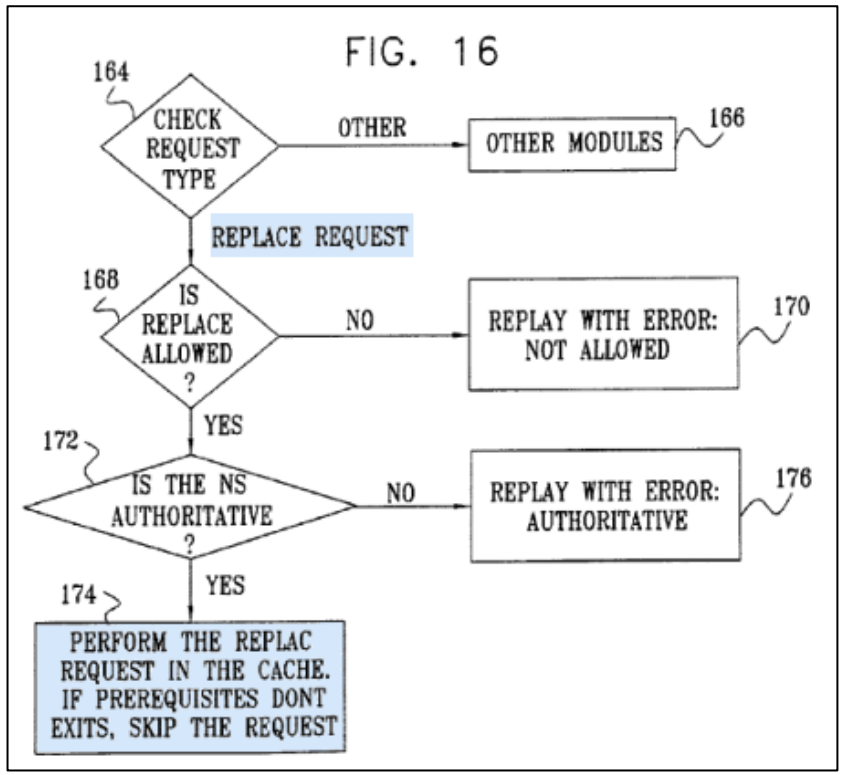
Paper 24, POR, 48-52; Paper 28, Sur-Reply, 23-24.

Ben-Shaul's dynamic cache replacement operation

[0379] The design of the edge name server **148** is based on BIND version 8 with an add-on for local cache replacement. Local cache replacement involves the usage of a new DNS message opcode, called "REPLACE". Since the REPLACE messages are not part of the standard DNS protocol and are not standard DNS messages, the REPLACE messages use an undefined opcode, and can be sent on a special and non-standard UDP/TCP port as implemented by the user.

[0414] Referring again to **FIGS. 14 and 16,** at decision step **164** it is determined whether a normal DNS query is being received by the edge name server **148**. If not, then the query or message is referred to other modules at step **166**. If a REPLACE DNS query has been received, then at decision step **168** it is determined whether the request is allowed. If not, then at step **170** an error message is generated and the procedure terminates. If the request is allowed, control proceeds to decision step **172**, it is determined if the name server is authoritative. If the result of the determination is affirmative, then, if the necessary conditions in the cache are met, cache replacement is effected at step **174**. If at decision

EX1005, Ben-Shaul, ¶¶ 379, 414.



Listing 13

```
For each rr in the REPLACE message
parse rr from the message
if allowed do
    If "add" operation - add or replace the CLCR entry
    if "remove" operation - remove the CLCR entry
```

EX1005, Ben-Shaul, ¶ 361, Fig. 16.

Paper 24, POR, 48-52; Paper 28, Sur-Reply, 23-24.

Grounds 3A-3B: Neither Ben-Shaul nor Ben-Shaul-Hasan teaches the claimed decision tree

Neither Ben-Shaul nor Ben-Shaul-Hasan teaches the claimed decision tree representing rules

Petitioner's asserted GUIs merely enable administrators to apply directives to edge servers. The GUIs do not represent rules or a policy hierarchy.

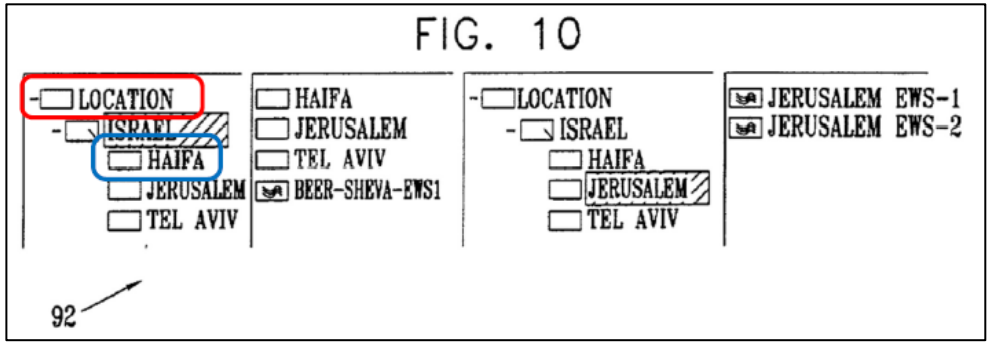
[0312]. A POSITA would have understood that the hierarchical map is a "decision" tree representing rules because directives apply based on inclusion of edge servers within the groups. Lin, ¶163.

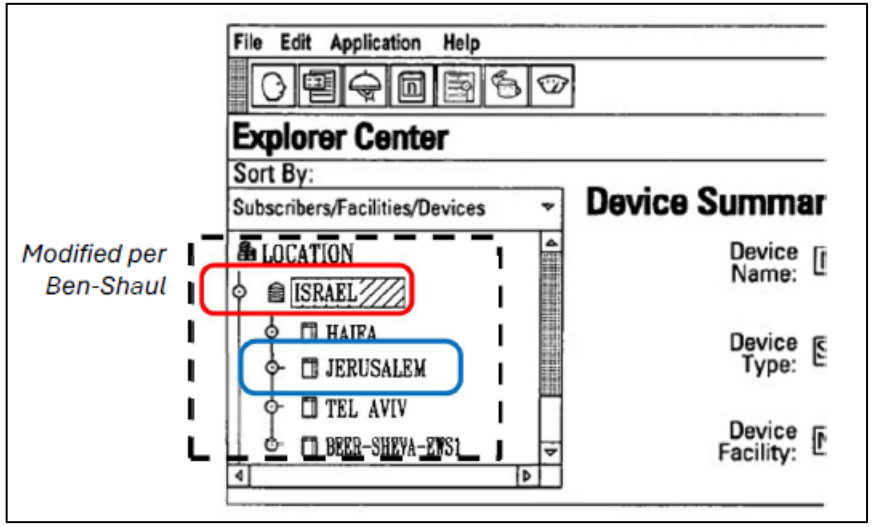
Paper 1, Petition, 48.

[0313] The front edge tool **86** provides an edge server graphical representation. This allows the client **14** and other users to view the list of edge servers either as a sorted list, or as a hierarchical map of edge servers. The hierarchical view allows the user to select and manipulate the hierarchies in an easy and intuitive manner. An example is shown as the view **92** in **FIG. 10**.

edge tool **86**. Administrators of the system **80** can construct hierarchies of edge servers, which are later used by profile editors in order to apply a particular service directive to a collection of edge servers. In particular, the front edge tool **86** supports defining service profiles for any internal node in

EX1005, Ben-Shaul, ¶¶ 309, 313.





Paper 1, Petition, 53, 54.

Paper 24, POR, 62-64; Paper 28, Sur-Reply, 24-27.

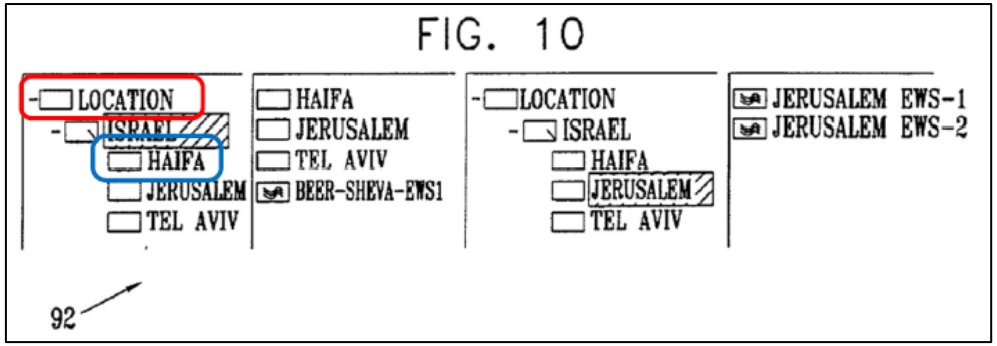
Neither Ben-Shaul nor Ben-Shaul-Hasan teaches the claimed decision tree representing rules

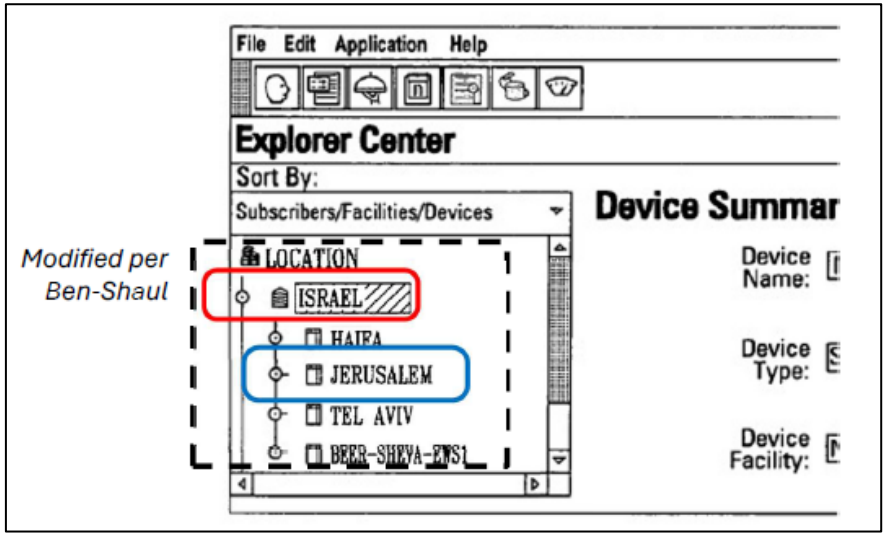
region, organization, or common interest. The edge server grouping, or edge server maps, are defined using the front edge tool **86**. Administrators of the system **80** can construct hierarchies of edge servers, which are later used by profile editors in order to apply a particular service directive to a collection of edge servers. In particular, the front edge tool **86** supports defining service profiles for any internal node in the hierarchy, resulting in the application of the service directive to all edge servers in the node's subtree.

EX1005, Ben-Shaul, ¶ 309.

Service directive	An instantiated request for service from one or more edge server's. It consists of the type of service and the actual service attributes. A service directive is created using the front edge tool.
Service profile	A service profile defines what services an edge server should provide and under what conditions each service is enabled.

EX1005, Ben-Shaul, ¶ 170 (Table 2).





Paper 1, Petition, 53, 54.

Paper 24, POR, 45-52, 53-58; Paper 28, Sur-Reply, 19-24.

Neither Ben-Shaul nor Ben-Shaul-Hasan teaches a decision tree that specifies the claimed decision criteria or answers to be provided in response to a DNS request.

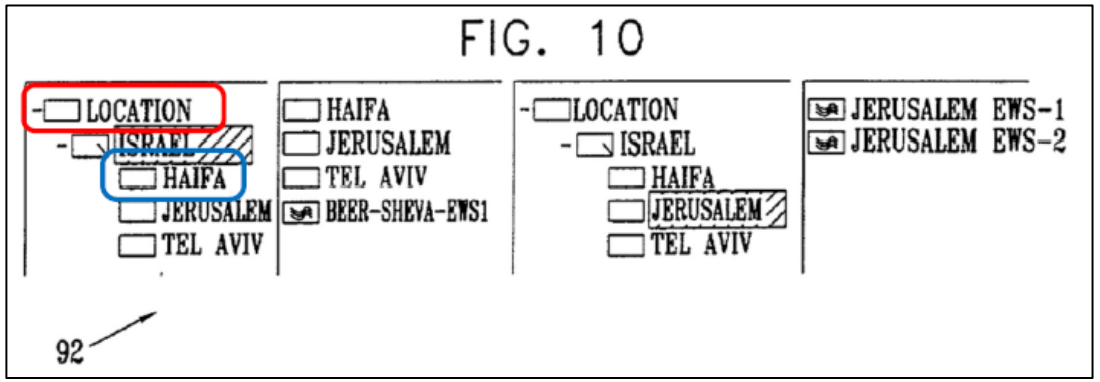
Petitioner's asserted GUIs are not used to create policies applied in response to DNS requests.

Therefore, none of Petitioner's asserted GUIs teaches a decision tree specifying decision criteria to be applied or answers to be provided in response to a DNS request.

The groups defined by the internal nodes "specify one or more decision criteria to be applied," because they "represent logical aggregations of nodes" based on a particular decision criteria, e.g., location. *Id.*, [0310]-[0311]; Lin, ¶174. A DNS request is thus directed to an edge server based on that server's association with the group. *Ben-Shaul*, [0044].

The edge server "leaves" "specify one or more answers to be provided in response to a Domain Name Service (DNS) request" because an IP address for a selected server is provided as an answer to a DNS request. *Id.*, [0041].

Paper 1, Petition, 53.



In the example above, the IP address for the server "Haifa" ("one or more answers") may be returned based on its location in Israel ("one or more decision criteria"). *Id.*, Fig. 10; Lin, ¶175.

Paper 1, Petition, 53-54.

Paper 24, POR, 53-64; Paper 28, Sur-Reply, 24-27.

Neither Ben-Shaul nor Ben-Shaul-Hasan teaches providing the claimed policy to the name server network

The Petition points only to Ben-Shaul's DNS directives for this element.

The policies defined in *Ben-Shaul* may be stored "in the origin web server 46 under a special CDML directory, or in a policy control server 42." *Ben-Shaul*, [0188]. Each EdgeDNS server receives the policy directives from policy control server 42 and is therefore provided "at least one policy." *Id.*, [0177].

Paper 1, Petition, 52.

Ben-Shaul

notation **(2, 3)**. The configuration of the EdgeDNS **38** and its coordination with the client regional DNS server **22**, the root DNS server **24**, and the authoritative DNS server **26** is controlled by DNS directives that originate from one or more policy control servers.

EX1005, Ben-Shaul, ¶176.

in the root DNS server system. The configuration of the EdgeDNS **40** and its coordination with the client regional DNS server **22** is controlled by DNS directives that originate from one or more policy control servers **42**. In addition each

EX1005, Ben-Shaul, ¶ 177.

Paper 24, POR, 65; Paper 28, Sur-Reply, 13-15.