

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JUNIPER NETWORKS, INC.,
Petitioner,

v.

MONARCH NETWORKING SOLUTIONS LLC,
Patent Owner.

U.S. Patent No. 8,693,369

“Method of Routing a Data Packet in a Network and an Associated Device”

IPR2024-00175

PETITION FOR *INTER PARTES* REVIEW

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EX1002	Prosecution history of U.S. Patent No. 8,693,369 (“’369 Prosecution History”)
EX1003	Declaration of Dr. Samrat Bhattacharjee under 37 C.F.R. §1.68
EX1004	<i>Curriculum Vitae</i> of Dr. Bhattacharjee
EX1005	Declaration of Dr. Sylvia Hall-Ellis under 37 C.F.R. §1.68
EX1006	P. Richter et al., “A Primer on IPv4 Scarcity,” (Feb. 27, 2015), available at https://arxiv.org/pdf/1411.2649.pdf
EX1007	H. Yeom et al., “IP Multiplexing by Transparent Port-Address Translator,” 10th USENIX System Administration Conference (LISA X) (Sept. 29, 1996), available at https://www.usenix.org/conference/lisa-96/ip-multiplexing-transparent-port-address-translator
EX1008	RFC 3022 (Traditional NAT), dated January 2001, available at https://datatracker.ietf.org/doc/html/rfc3022
EX1009	U.S. Patent Application Publication No. 2002/0016826 to Johansson et al. (“Johansson”)
EX1010	A. Reitz, “The Dynamic Port Reservation Protocol,” Univ. Ill. at Urbana-Champaign (2001), available at http://redefine.dyndns.org/~andyr/documents_and_writings/thesis/docs/areitz_msthesis.pdf
EX1011	M. Shin et al., “Using a Single IPv4 Global Address in DSTM,” Internet Engineering Task Force (“IETF”) (Feb. 22, 2001), available at https://www.ietf.org/archive/id/draft-shin-dstm-single-ipv4-00.txt (“Shin”)
EX1012	U.S. Patent No. 7,356,045 to Satapati et al. (“Satapati”)
EX1013	U.S. Patent Application Publication No. 2003/0154306 to Perry (“Perry”)

EX1014	RFC 950 (Internet Standard Subnetting Procedure), dated August 1985, available at https://datatracker.ietf.org/doc/html/rfc950
EX1015	U.S. Patent No. 7,624,195 to Biswas et al. (“Biswas-195”)
EX1016	WO Publication No. 01/02965 A2 to Herbst et al. (“Herbst”)
EX1017	RFC 7597 (Mapping of Address and Port with Encapsulation), dated July 2015, available at https://datatracker.ietf.org/doc/html/rfc7597
EX1018	RFC 4632 (Classless Inter-domain Routing), dated August 2006, available at https://datatracker.ietf.org/doc/html/rfc4632
EX1019	U.S. Patent Application No. 10/873,547 to Tornetta et al. (“Tornetta”)
EX1020	U.S. Patent No. 7,873,038 to LaVigne et al. (“LaVigne”)
EX1021	U.S. Patent Application No. 11/699,765 to McAlister (“McAlister”)
EX1022	U.S. Patent No. 8,019,889 to Biswas et al. (“Biswas”)
EX1023	U.S. Patent No. 7,394,809 to Kumar et al. (“Kumar”)
EX1024	U.S. Patent No. 7,068,647 to Fangman et al. (“Fangman”)
EX1025	U.S. Patent No. 8,032,639 to King et al. (“King”)
EX1026	RFC 791, Internet Protocol Specification (September 1981), available at https://datatracker.ietf.org/doc/html/rfc791
EX1027	U.S. Patent No. 5,014,221 to Mogul (“Mogul”)
EX1028	U.S. Patent No. 5,163,131 to Row et al. (“Row”)
EX1029	July 20, 2006 Capture of RFC 791, Wayback Machine, available at https://web.archive.org/web/20060720182319/http://www.ietf.org/rfc/rfc791.txt
EX1030	Michael Witt, A Comment on Current Source Routing Techniques (1987), available at https://dl.acm.org/doi/pdf/10.1145/36727.36728

EX1031	Andrew Tanenbaum, Computer Networks (5th Ed. 2011)
EX1032	Monarch’s Opposition to Juniper’s Motion to Transfer, <i>Monarch Networking Solutions LLC v. Juniper Networks, Inc.</i> , No. 1:23-cv-670-TSE-LRV (E.D. Va. Oct. 3, 2023), ECF No. 52
EX1033	PTO Reexamination Operational Statistics, available at https://www.uspto.gov/learning-and-resources/statistics/reexamination-information
EX1034	Complaint, <i>Monarch Networking Solutions LLC v. Juniper Networks, Inc.</i> , No. 1:23-cv-670-TSE-LRV (E.D. Va. May 23, 2023), ECF No. 1
EX1035	Unified EPR (Control No. 90/015,315), filed on October 23, 2023

LIST OF CHALLENGED CLAIMS

Claim	Limitation
1[pre]	A method of routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, said method comprising, on reception of said packet, the following steps:
1[a]	determining a port mask assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;
1[b]	selecting at least one identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and
1[c]	routing the packet to the destination equipment based on said identifier.
2	The method according to claim 1 of routing an IP data packet, wherein said at least one identifier is a secondary destination address of the destination equipment.
3	The method according to claim 2 of routing an IP data packet, comprising, before the routing step, a step of transforming the packet by adding said secondary address to the packet, and routing the packet based on said secondary destination address.
4	The routing method according to claim 1, wherein the at least one identifier is a route identifier specific to said destination equipment and the packet is routed based on said specific route identifier.
5[pre]	A device for routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, wherein said device comprises, on reception of said packet:
5[a]	a processor that determines a port mask assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

Claim	Limitation
5[b]	the processor selects an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and
5[c]	a communication unit that routes the packet to the destination equipment based on said identifier.
6[pre]	Telecommunications network equipment adapted to receive an IP data packet comprising a primary destination address and a destination port number, comprising at least one routing device comprising:
6[a]	a processor that determines a port mask assigned to a destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;
6[b]	the processor selects an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and
6[c]	a communication unit that routes the packet to the destination equipment based on said identifier.
7[pre]	A method of configuring a piece of terminal equipment connected to a telecommunications network, comprising, on reception of a configuration request sent by said equipment, the following steps:
7[a]	assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;
7[b]	assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and
7[c]	sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.
8	The method according to claim 7 of configuring a piece of terminal equipment, comprising a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment, and the

Claim	Limitation
	configuration message further comprising said routing device identifier.
9	The configuration method according to claim 7, wherein said configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address.
10[pre]	A configuration server in a telecommunications network, wherein, on reception of a configuration request sent by a piece of terminal equipment, comprising:
10[a]	a processor that assigns a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment;
10[b]	the processor assigns to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and
10[c]	a communication unit that sends to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.
11[pre]	A method of configuring a piece of terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address, a port mask defining a range of port numbers that is dedicated thereto, and a routing identifier, said method comprises the following steps:
11[a]	storing said configuration data; and
11[b]	before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number.
12	The configuration method according to claim 11, wherein, once an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said

Claim	Limitation
	piece of terminal equipment has been received, said method further comprises a step of sending the configuration data to said routing device.
13	The configuration method according to claim 11, wherein, on reception of a data packet comprising a destination address, a port number, and a routing identifier, said method further comprises a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative.
14[pre]	A piece of client terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address shared with a plurality of pieces of terminal equipment, a port mask defining a range of port numbers that is dedicated to the piece of client terminal equipment, and a routing identifier, the piece of client terminal equipment comprising:
14[a]	a memory that stores said configuration data;
14[b]	before sending a data packet in the telecommunications network, a processor that selects a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number.
15	A non-transitory computer readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 1.
16	A non-transitory computer readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 7
17	A non-transitory computer-readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 11.

I. INTRODUCTION

Juniper Networks, Inc. (“Petitioner”) requests IPR of claims 1-17 (“Challenged Claims”) of U.S. Patent No. 8,693,369 (the “’369 patent”).

Long before the ’369 patent was filed, it was well-understood that IPv4 addresses would eventually be exhausted. One solution to this exhaustion problem was known as Port Address Translation (“PAT”).

PAT recognized that devices have approximately 65,000 port numbers, many of which go unused. Thus, PAT assigns a shared public IP address to multiple devices, as well as an unused port number to distinguish each host sharing the address. This allowed the same public IP address to be reused with multiple devices.

The ’369 patent describes a further variation of PAT, in which the PAT device assigns a *range* of port numbers. But this variation is not new or novel. It is disclosed by multiple prior art references in this petition, for USP Nos. 8,019,889 (“Biswas”), 7,068,647 (“Fangman”), and 8,032,639 (“King”) disclose the variation of PAT that is described in the ’369 patent. And a fourth reference, USP No. 7,394,809 (“Kumar”), teaches an implementation detail that the ’369 patent uses to define the assigned port ranges, called “port masks.”

II. MANDATORY NOTICES

A. Real Party-in-Interest (37 C.F.R. §42.8(b)(1))

Petitioner certifies that the real party-in-interest is Juniper Networks, Inc.

B. Related Matters (37 C.F.R. §42.8(b)(2))**1. Related District Court Proceedings**

Monarch Networking Solutions (“Monarch” or “Patent Owner”) filed a lawsuit in the Eastern District of Virginia alleging that Petitioner infringes the ’369 patent. *See Monarch Networking Solutions LLC v. Juniper Networks, Inc.*, Case No. 1:23-cv-00670-TSE-LRV (E.D. Va.). On October 4, 2023, the case was transferred to the Northern District of California. *Monarch Networking Solutions LLC v. Juniper Networks, Inc.*, Case No. 4:23-cv-05076-JST (N.D. Cal.), Dkt. 71.

Petitioner is currently unaware of any other lawsuits involving the ’369 patent.

2. Related Patent Office Proceedings

This is the first IPR petition challenging a claim of the ’369 patent.

On October 23, 2023, Unified Patents, LLC requested *ex parte* reexamination of the ’369 patent, and reexamination is proceeding under U.S. Patent Application No. 90/015,315. As of the date of this petition, the Patent Office has not ordered reexamination of the ’369 patent or issued any office action.

C. Lead and Back-up Counsel and Service Information

Petitioner provides the following counsel and service information. Pursuant to 37 C.F.R. §42.10(b), a Power of Attorney accompanies this Petition.

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III. REQUIREMENTS FOR IPR

A. Payment of Fees

The undersigned authorizes the Office to charge the fee required for this Petition for *inter partes* review to Deposit Account No. 50-5708.

B. Grounds for Standing

Petitioner hereby certifies that the '369 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR challenging the claims of the '369 patent. Petitioner further certifies that the prohibitions of 35 U.S.C. §§315 (a)-(b) are inapplicable.

C. Statement and Relief Requested

Petitioner requests review and cancelation of claims 1-17:

Prior Art References	
Biswas (EX1022), USP 8,019,889; filed May 31, 2002; published September 13, 2011; prior art under pre-AIA §102(e).	
Kumar (EX1023), USP 7,394,809; filed March 31, 2003; published July 1, 2008; prior art under pre-AIA 35 §102(e).	
Fangman (EX1024), USP 7,068,647; filed July 11, 2001; issued June 27, 2006; prior art under pre-AIA §102(b).	
King (EX1025), USP 8,032,639; filed May 23, 2006; issued October 4, 2011; prior art under pre-AIA §102(e).	
RFC 791 (EX1026); published September 1981; prior art under pre-AIA §102(b).	

Ground	Claims	Description
1	7-14, 16-17	Obvious in View of Biswas and Kumar
2	1-3, 5-6, 15	Obvious in View of Fangman and Kumar
3	1-3, 5-6, 15	Obvious in View of King and Kumar
4	4	Obvious in View of Fangman, Kumar, and RFC 791
5	4	Obvious in View of King, Kumar, and RFC 791

IV. TECHNOLOGY BACKGROUND

A. Exhaustion of IPv4 Addresses

There is a finite number of possible IPv4 addresses such that POSITAs understood they would soon be exhausted and began developing means for combating the exhaustion. EX1003, ¶¶27-29; EX1006, 1, 8-9.

B. Network Address Port Translation

One of the ideas for addressing the exhaustion of IPv4 addresses, disclosed in the 1990s, is called Port Address Translation (“PAT”). EX1007, 113. PAT recognizes that computers have 2^{16} (~65,000) ports. *Id.* PAT utilizes these unused ports to share one “global” IPv4 address among multiple computers, thereby slowing IPv4 address exhaustion. *Id.*; EX1003, ¶¶30-31.

Specifically, PAT implements an internal network that contains multiple internal clients (*e.g.*, PCs and phones). EX1007, 114. A proxy server sits on the edge of the internal network and routes communications between these internal clients and an outer network (*e.g.*, the public Internet) and intercepts all incoming and outgoing data packets. *Id.*; EX1003, ¶32.

An embodiment of this implementation is pictured below:

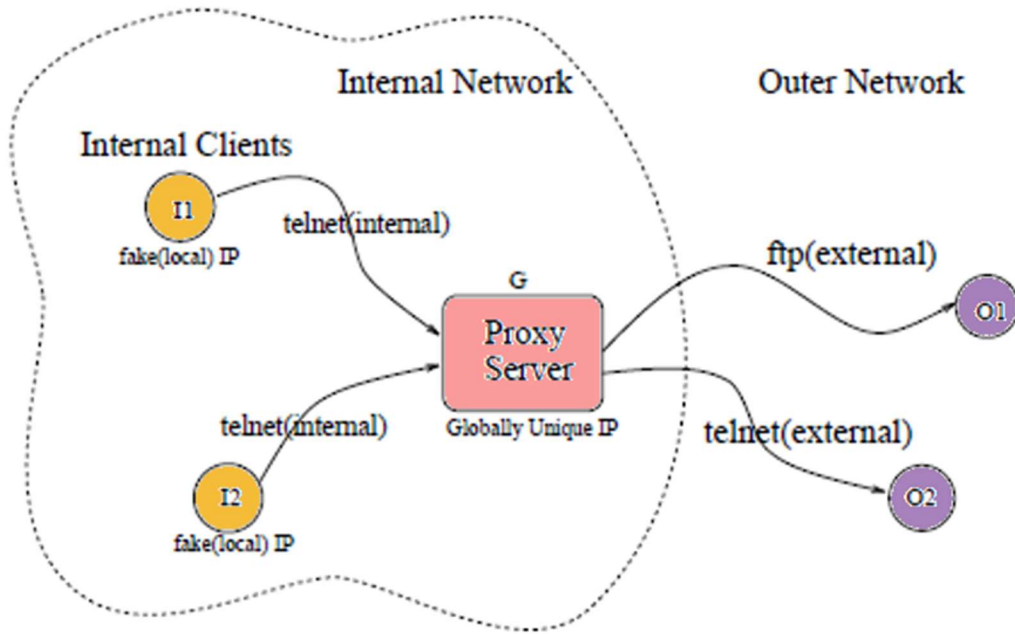


Figure 1: Connecting through a Proxy Server

EX1007, 114. The internal clients (orange) have a local IP address that is known within the internal network, not the Internet at large. *Id.* The proxy server (red), on the other hand, does have a public IPv4 address and shares this address with the internal clients. *Id.*, 114-15. When an internal client wants to send a data packet to a device on the outer network (purple), it sends the packet to the proxy server. *Id.*, 115-16. The proxy server modifies the incoming data packet, replacing (1) the internal client's local IP address with the proxy server's global IPv4 address and (2) the internal client's port number with one of the proxy server's port numbers. *Id.*, 115. The proxy server then stores this association before ultimately routing the data packet to the device on the outer network. *Id.* If the device on the outer network sends a data packet back to the internal client, the proxy server will know where to

send the incoming data packet based on the destination port number in the received packet. *Id.*; EX1003, ¶¶33-34 (providing example of PAT exchanging packets). Numerous prior art documents have discussed PAT and variations of PAT. EX1003, ¶35-40 (discussing EXS1007-1013).

C. Masks

Masks are an efficient way of defining a range of numbers and determining whether a number is within that range. EX1003, ¶¶41-43 (explaining how masks operate). Using masks to define a range of numbers and determine whether a received number is within that defined range has been known in the field of computer networking for decades. *Id.*, ¶44.

For example, masks have long been used to define a range of addresses. *Id.*, ¶44-45. RFC 950, for instance, which was published in August 1985, describe using “a bit mask (‘address mask’) to identify which bits of the local address field indicate the subnet number.” EX1014, 4. In other words, the mask in RFC 950 is used to determine whether a received data packet that contains an IP address falls within a range of addresses within the network. Similarly, RFC 4632, which was published in August 2006, describes masks that are used to represent a range of IP addresses. EX1018, 15-16; EX1003, ¶45.

The ’369 patent uses masks to define a port range. EX1001, 7:40-67; EX1003, ¶46. This too was well known in the prior art. For instance, Kumar (EX1023)

discloses a mask that is used to define a range of port numbers. *See infra* §VIII.A.2. Other references, like U.S. Patent No. 7,624,195 (“Biswas-195”), which was filed on May 8, 2003 and published on November 24, 2009, also disclose masks that can be used to define a port range. EX1015, 7:42-54 (“[i]f port ranges were used, one convenient mechanism that could be used to quickly route messages based on port range is by extending subnetting concepts [*i.e.*, subnet masks] to port ranges.”).

And many other examples of masks being used to define an exact value or range of values in a computer system are well known as well. EX1003, ¶¶47-51.

V. OVERVIEW OF THE '369 PATENT

A. Priority

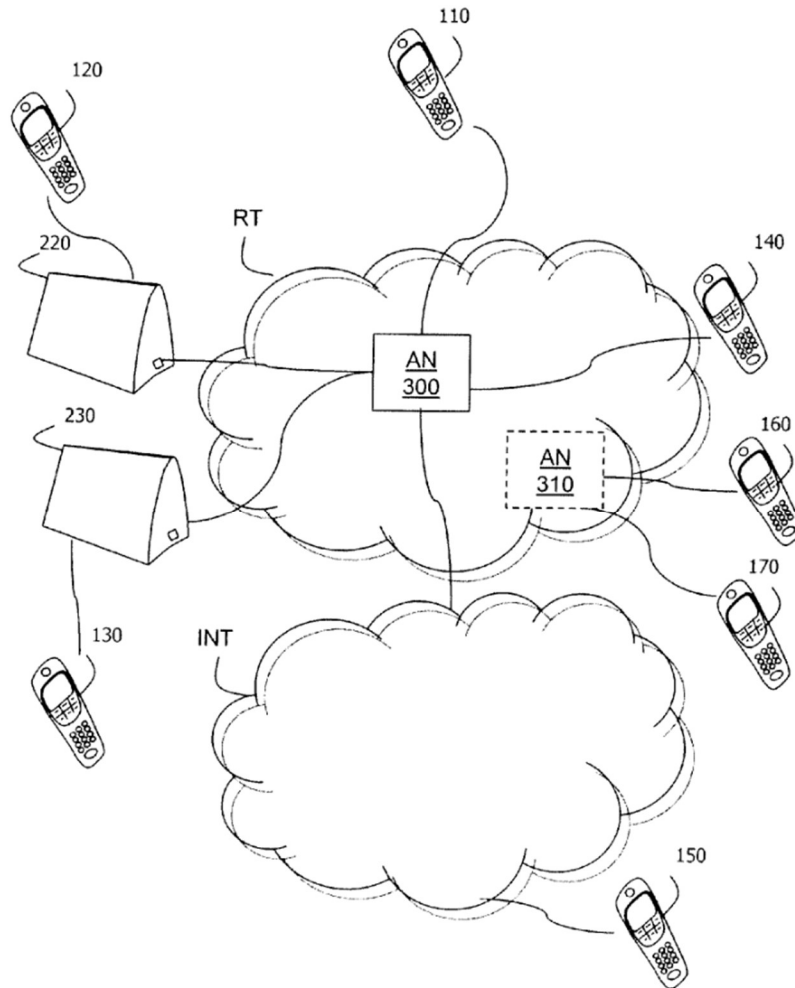
The '369 patent claims priority to a foreign application filed on March 31, 2008. EX1001. No priority date analysis is necessary because the relied-upon prior art pre-dates March 31, 2008.

B. Specification

The '369 patent explains that “the exhaustion of public IPv4 addresses is inevitable.” EX1001, 1:53-54. The patent claims that “[t]he inventors have found that pieces of terminal equipment do not make use simultaneously of all the 2^{16} (*i.e.* 65536) port number values available thereto.” *Id.*, 7:22-35. Thus, the “general principle of the invention relies on assigning the same primary address to a plurality of pieces of terminal equipment,” along with a “port mask defining a range of port numbers” that serves to distinguish pieces of equipment with the same primary

address. *Id.*, 7:12-17. By allowing pieces of terminal equipment to share an address, the patent purports to “economiz[e] the use of public IP addresses.” *Id.*, 2:45-50. EX1003, ¶¶53-54.

Figure 3 illustrates an embodiment of the alleged invention:



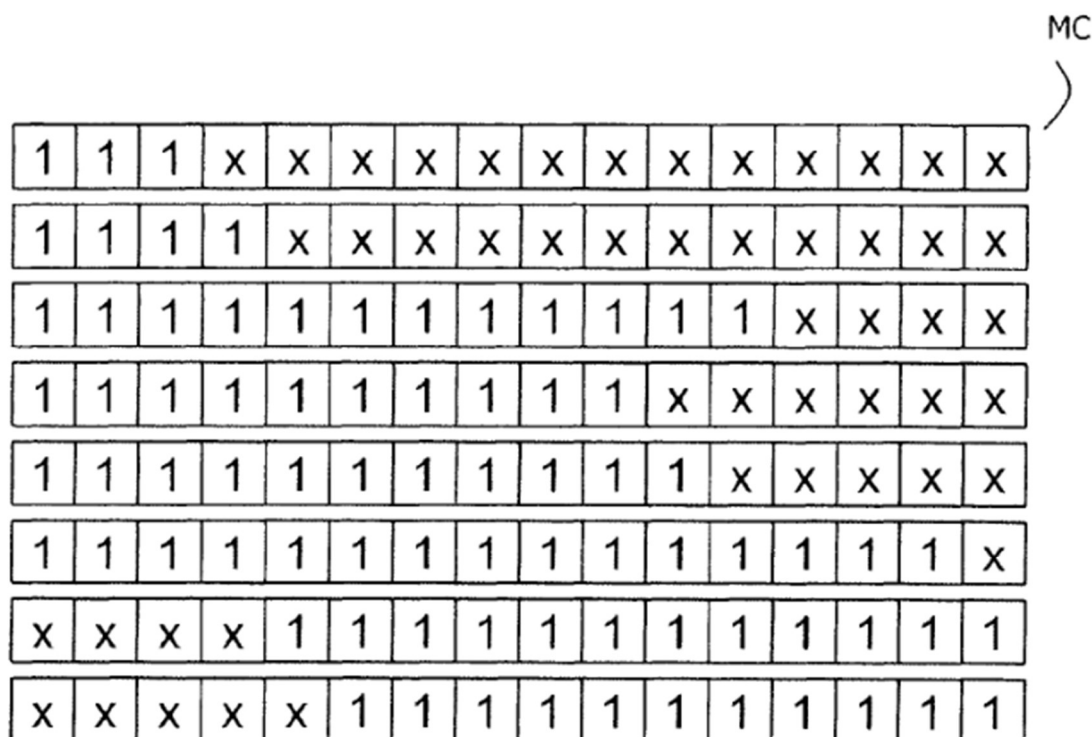
EX1001, FIG3.

1. Configuration

The '369 patent describes “a method of configuring terminal equipment connected to a telecommunications network.” *Id.*, 4:58-61. To start the

configuration process, the terminal equipment (*e.g.*, **130**) “sends a configuration request to the IP connectivity service ... in a known manner,” for example, a DHCP request. *Id.*, 9:36-53. The IP connectivity service assigns the terminal equipment a primary address (which, in one embodiment, is a public address) that is shared with multiple other terminal equipment. *Id.*, 9:54-63. The terminal equipment is further assigned a range of port numbers dedicated to the terminal equipment. *Id.* For example, a first terminal equipment might be assigned port numbers 0-255, while a second terminal equipment might be assigned port numbers 256-511, and so on. *Id.*, 7:36-67; EX1003, ¶56. These port ranges are defined by “port masks.” EX1001, 7:36-67.

For example, Figure 2A depicts embodiments of a “contiguous” port mask that represents a continues range of port numbers:

**FIG. 2A**

Id., FIG2A, 7:54-61. Figure 2B shows examples of “non-contiguous mask[s].” *Id.*, FIG2B, 7:62-66.

Finally, the terminal equipment in the network is assigned a “routing identifier” for communication internal to the network. *Id.*, 7:12-17, 9:9-17. For example, a private IPv4 address. *Id.*, 3:48-56. The IP connectivity service then sends the configuration data back to the terminal equipment in a configuration message, completing the configuration process. *Id.*, 9:54-63. EX1003, ¶¶55-59.

2. Routing

Once configured, the network can process packets according to the '369 patent's disclosures. For example, when the routing device **300** receives a data

packet, it determines whether the destination port number in the data packet belongs to an assigned port range (defined using a port mask) and, if so, uses the routing identifier (*e.g.*, private IP address) that is associated with that assigned port range to route the data packet to the corresponding destination terminal equipment. EX1001, 8:21-36; EX1003, ¶60.

* * *

As explained above (Section IV.B), assigning the same primary address (*e.g.*, a public IPv4 address) to a plurality of pieces of terminal equipment, along with a port number and routing identifier (*e.g.*, a private IP address) was a standard element of prior art PAT. EX1003, ¶61. Like the '369 patent, these prior art PAT technologies received a data packet, determined whether the destination port number in the data packet belonged to a port number assigned to a destination equipment, and, if so, used a private IP address of the destination equipment to route the packet. *Id.* While the '369 patent uses a range of port numbers, defined by a mask, rather than a single port number, that variation is not novel or non-obvious. *See infra* §VIII; EX1003, ¶61.

C. Prosecution History

The '369 patent was filed on September 28, 2010. EX1002, 188.

On August 31, 2012, the Examiner issued a non-final rejection that rejected claims 1-17 as obvious over the Baum and Patek prior art references. *Id.*, 139-55.

On November 28, 2012, the Applicant argued that Baum assigns an *IP or MAC address* to destination equipment, rather than *port numbers*. *Id.*, 133. The Applicant further argued that Patek did not disclose a port mask. *Id.*, 134.

On March 1, 2013, the Examiner issued a final rejection, rejecting claims 1-6 and 15 as anticipated by the Parker prior art reference, and claims 7-14 as obvious in further view of Baum. *Id.*, 105-16.

On April 30, 2013, the Applicant responded that (1) the VLAN field in Parker is not a “primary destination address”; (2) the “ingress port number” in Parker is a *physical* port, rather than a *software* construct; and (3) the “identifier of a virtual router” in Parker does not correspond to destination equipment. *Id.*, 91-95.

On May 20, 2013, the Examiner issued a non-final rejection that [1] rejected certain claims under §101 and §112 and [2] rejected claims 7-17 as obvious over Baum in view of the Davis prior art. *Id.*, 62-72. The Examiner further determined that claims 1, 5, and 6 were allowable. *Id.*, 73.

On August 20, 2013, the Applicant responded by amending certain claims (*id.*, 52-53) and disputing that Baum in view of Davis taught claims 7-17 because the ports in Davis corresponded to *physical* ports rather than software constructs (*id.*, 53-55). The Examiner then allowed the claims on November 21, 2013. *Id.*, 20-22.

Fangman (EX1024) was cited in an IDS (*id.*, 163) during prosecution, but was not substantively discussed or applied to any rejection. And none of the other references in this Petition were before the Examiner.

VI. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA would have had a B.S. degree in electrical engineering, computer engineering, computer science, or a related subject, and three years of work experience in computer networking, including experience with the IPv4 protocol, or a related field. EX1003, ¶¶62-64. Lack of professional experience can be remedied by additional education, and vice versa. *Id.*

VII. CLAIM CONSTRUCTION

In the district court action, the parties have not submitted claim construction proposals. Petitioner does not believe any terms require construction, particularly because the prior art relied upon in this petition maps directly onto embodiments disclosed in the '369 patent. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

VIII. GROUNDS

A. Ground 1: Claims 7-14, 16-17 Are Obvious in View of Biswas and Kumar

1. Biswas (EX1022)

Biswas is prior art under at least pre-AIA §102(e) because its May 31, 2002 filing date is earlier than the priority date of the '369 patent. *See* §V.A.

Biswas recognizes that “[w]ith the explosion of the Internet, the number of IP addresses is not enough to give each computer a unique IP address.” EX1022, 1:7-24. Accordingly, Biswas disclosed a form of PAT that assigns a shared global address to hosts in a private network, as well as a port range to distinguish each host. *Id.*, 2:23-33; EX1003, ¶68.

Biswas teaches the following network embodiment:

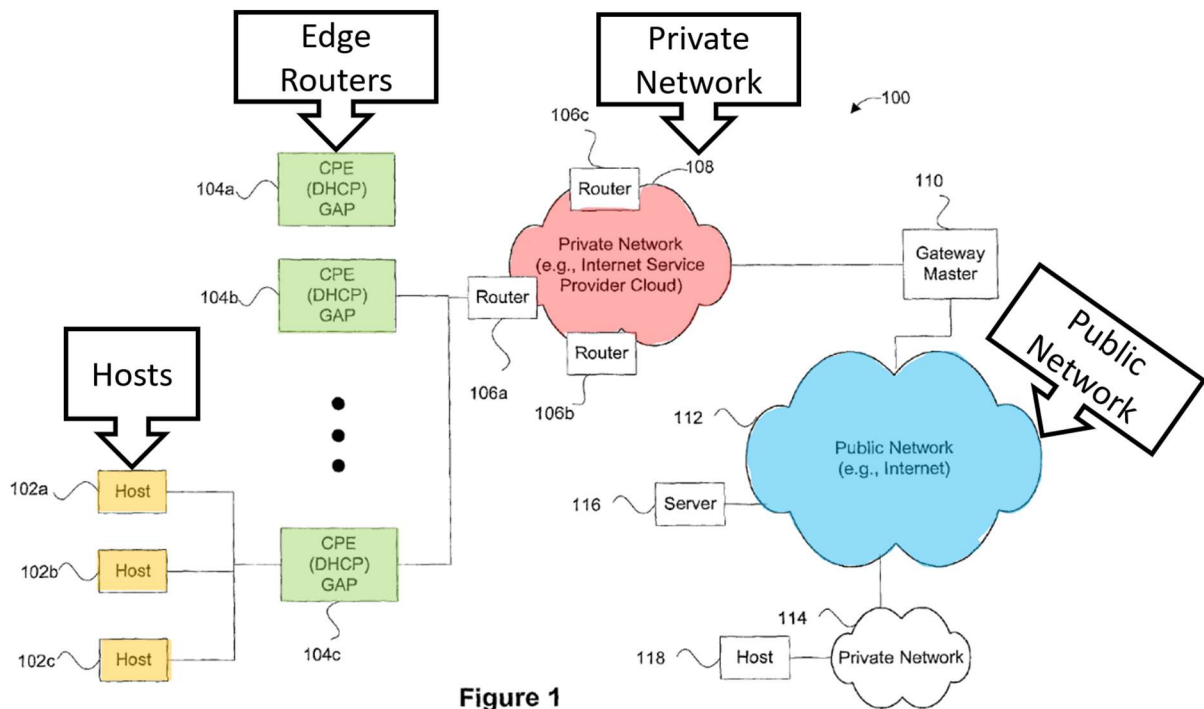


Figure 1

EX1022, FIG1. Network **108** (red) is a private network containing multiple intermediary routers **106** that are further connected to edge routers **104** (green) that service multiple hosts **102** (orange). *Id.*, 5:43-6:24. A gateway master **110** handles communication between the private network **108** and public network **112** (blue). *Id.*

The network configuration can be used by host **102** to contact other hosts through the public network, like host **118** or server **116**. *Id.* EX1003, ¶70.

Each host (*e.g.*, hosts **102a-c**) obtain a global address and global port range from their corresponding edge router (*e.g.*, **104c**) using a DHCP process. EX1022, 6:41-60, 7:49-12:19, Figs. 3A-8. In one embodiment, edge router **104c** has a global address of 172.1.1.1 and a global port range of 10000 to 15000. *Id.*, 6:61-7:7. “When host **102a** makes a request for a [global address] and [global port range], edge router **104c** may then assign the [global address] 172.1.1.1 and a portion of its available [global port range] to host **102a**.” *Id.* For instance, edge router **104c** might assign the port range 10000-10100 to host **102a**. *Id.* Edge router **104c** tracks the global port ranges that it assigns to the hosts so that incoming packets can be sent to the correct host. *Id.* EX1003, ¶71.

2. Kumar (EX1023)

Kumar is prior art under at least pre-AIA §102(e) because its March 31, 2003 filing date is earlier than the priority date of the '369 patent. *See* §V.A.

Kumar discloses a packet classifier that can apply various filters or rules to incoming data packets. EX1023, 7:14-38. If the rule applies, then the router can take a pre-defined action associated with that rule. *Id.* These rules may be represented by bit masks. *Id.*, 7:38-57. EX1003, ¶73.

One example of a mask described in Kumar is a mask that defines a range of port numbers. EX1023, 7:14-63. For instance, Figure 7B depicts a port mask **712e** (yellow) that determines whether a destination port number **702e** (red) falls between the range 0-1023:

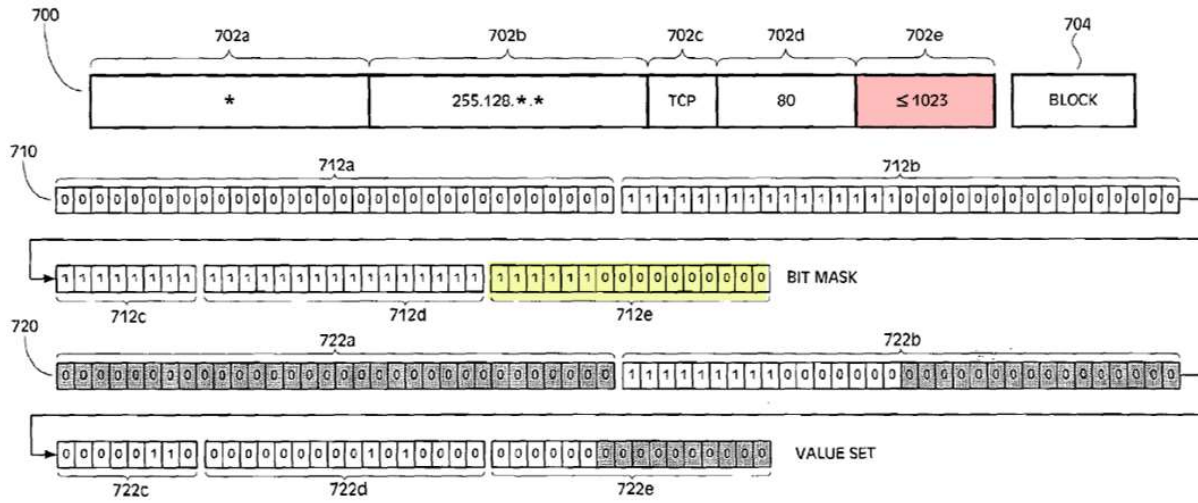


FIG. 7B

Id., FIG7B; *see also id.*, 8:20-9:19, FIG8. EX1003, ¶¶74-76.

3. The Biswas-Kumar Combination

In the Biswas-Kumar combination, Biswas's teachings disclose an edge router that implements a method for configuring a piece of terminal equipment connected to a telecommunications network, including by assigning a piece of terminal equipment a shared primary address, a range of port numbers dedicated to it, and a routing identifier. EX1003, ¶77. Although Biswas does not provide the implementation detail of using a port mask to define the range of port numbers assigned to the terminal equipment, Kumar's teachings supply this additional detail

by disclosing port masks that define a range of port numbers. *Id.* Thus, in the Biswas-Kumar combination, Biswas would continue to assign a range of port numbers to a piece of terminal equipment but would use port masks from Kumar to define the range. *Id.*

4. Motivations

An explanation of the multiple reasons to combine Biswas and Kumar are provided in the analysis below.

5. Claim 7

(a) 7[pre]

To the extent the preamble is limiting, Biswas discloses limitation 7[pre]: “a method of configuring a piece of terminal equipment [*e.g.*, **host 102a**] connected to a telecommunications network [*e.g.*, **Figure 1 network**], comprising, on reception of a configuration request [*e.g.*, **a DHCP request**] sent by said equipment, the following steps.” EX1003, ¶¶79-82.

Figure 1 illustrates a telecommunications network that includes hosts (orange) connected to an ISP Cloud (red) and the public Internet (blue) via CPE (green):

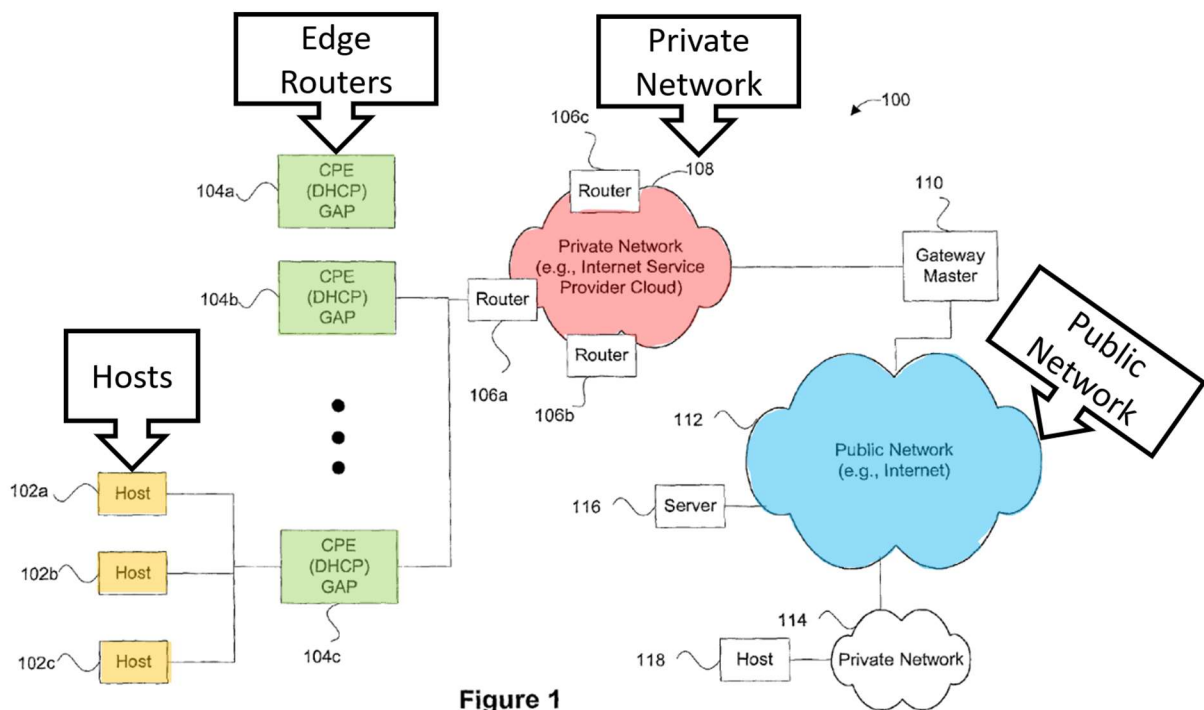


Figure 1

EX1022, FIG1.

Hosts **102** correspond to “a piece of terminal equipment.” EX1003, ¶81. Indeed, the ’369 patent states that “terminal equipment” can be “telephones or personal computers.” EX1001, 8:5-11. Similarly, Biswas discloses that host **102** may be “a personal computer.” EX1022, 12:54-58.

Biswas further discloses a method of configuring a piece of terminal equipment (*e.g.*, **host 102a**) that comprises “reception of a configuration request” (*e.g.*, **DHCP request**) sent by said equipment. EX1003, ¶82. For example, each host **102** “is operable to obtain from its corresponding edge router a global address (GA) and optionally a global port range (GPR).” EX1022, 2:23-33. Host **102** may use “any suitable mechanism” for requesting the GA and GPR, for example “a

DHCP (Dynamic Host Configuration Protocol) request.” *Id.*, 6:50-60, 2:47-3:57, 7:9-12:19. The ’369 patent discloses the “configuration request... may be, for example, a DHCP request.” EX1001, 9:42-54, 11:30-35.

(b) 7[a]

Biswas discloses limitation 7[a]: “assigning [*e.g.*, **via edge router 104**] to said piece of terminal equipment [*e.g.*, **host 102a**] a primary address [*e.g.*, **a global address**] shared with a plurality of pieces of terminal equipment [*e.g.*, **other hosts 102b-c**].” EX1003, ¶¶83-86.

Biswas discloses that after receiving a configuration request (*e.g.*, **a DHCP request**) from a piece of terminal equipment (*e.g.*, **hosts 102**), an edge router **104** responds with a DHCP reply that includes a local address, global address (GA), and global port range (GPR) for the terminal equipment. EX1022, FIG3A, 7:62-8:15, 6:50-60, 2:25-28.

Biswas further discloses how the piece of terminal equipment (*e.g.*, **host 102a**) is assigned a primary address (*e.g.*, **the global address**) that is shared with other hosts (*e.g.*, **hosts 102b-c**). Each edge router **104** “has a GA [global address] and GPR [global port range] that may be apportioned among its corresponding hosts.” *Id.*, 6:61-7:7. For instance, “edge router **104c** may have GA 172.1.1.1 and GPR 10000 through 15000” to assign to hosts **102a-c**. *Id.* “When host **102a** makes a request for a GA and GPR, edge router **104c** may then assign the GA 172.1.1.1

and a portion of its available GPR to host **102a**,” for example it may assign “GPR 10000 through 10100” to host **102a**. *Id.*; EX1003, ¶85. Thus, Biswas discloses that a shared global address is assigned to multiple hosts (**102a-c**) with each host also being assign a range of port numbers to “distinguish its GA from other hosts which use the same GA.” EX1022, 11:50-54, 1:42-45, 6:61-63.

The “global address” in Biswas corresponds to the “primary address” in the ’369 patent. EX1003, ¶86. Biswas’s global address is a public address that is used to communicate over the public network. *Id.*; EX1022, 6:41-49. The ’369 patent discloses the “primary address is advantageously a public address.” EX1001, 3:44-46.

(c) 7[b]

Biswas and Kumar render obvious limitation 7[b]: “assigning to said piece of terminal equipment [*e.g.*, **Biswas’s host 102a**] a port mask [*e.g.*, **Kumar’s port mask**] defining a range of numbers dedicated to it [*e.g.*, **Biswas’s global port range**] and a routing identifier [*e.g.*, **Biswas’s local address**].” EX1003, ¶¶87-101.

Biswas discloses assigning hosts (*e.g.*, **host 102a**) a routing identifier (*e.g.*, **a local address**). Biswas explains that hosts **102** “send[] a DHCP request for a local address to its corresponding edge router **104**,” which edge router then “respond[s] with a DHCP reply having the local address as well as the GA (and GPR) for the querying host.” EX1022, 6:50-60. The local address of Biswas corresponds to the

“routing identifier” in the ’369 patent. EX1003, ¶88. Indeed, the ’369 patent explains that a “routing identifier” may be a “secondary address” (EX1001, 3:47-50, 14:29-31), such as a “private address” (*id.*, 3:50-52, 9:9-11). Similarly, Biswas teaches that a host’s local address is “only used within that local group” (EX1022, 1:32-33), such that a POSITA would have understood it is a private address (EX1003, ¶88).

Biswas also discloses assigning each host (*e.g.*, **host 102a**) a range of port numbers dedicated to it. EX1022, 6:37-7:7, 7:49-61, Figs. 3A-3E; EX1003, ¶89.

Although Biswas does not provide the implementation detail of using a port mask to define the range of port numbers, assigning a port mask defining that range of port numbers would have been obvious in view of Kumar. EX1003, ¶90. Kumar discloses using port masks that are similar to those disclosed in the ’369 patent. *Id.*

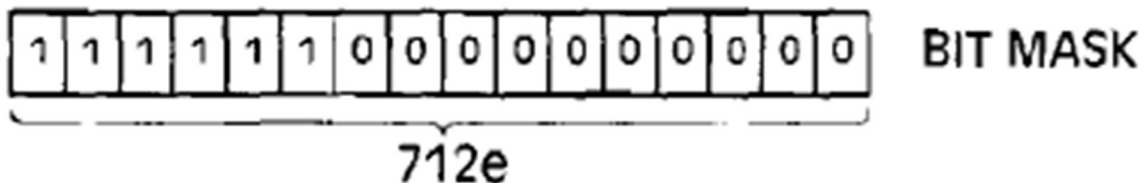
Indeed, the ’369 patent depicts examples of 16-bit port masks, in which the range of port numbers is defined by the bits marked with an “x”:

1	1	1	x	x	x	x	x	x	x	x	x	x	x	x	x
1	1	1	1	x	x	x	x	x	x	x	x	x	x	x	x
1	1	1	1	1	1	1	1	1	1	1	1	x	x	x	x
1	1	1	1	1	1	1	1	1	1	1	x	x	x	x	x
1	1	1	1	1	1	1	1	1	1	1	x	x	x	x	x
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	x
x	x	x	x	1	1	1	1	1	1	1	1	1	1	1	1
x	x	x	x	x	1	1	1	1	1	1	1	1	1	1	1

FIG. 2A

EX1001, Figs. 2A & 2B, 7:49-67.

Similarly, Kumar teaches that its port masks may define “a range” of port numbers (EX1023, 7:31-38) and discloses 16-bit port masks in which the range of port numbers is defined by the bits marked with a “0.” EX1023, FIG7B, 7:38-8:64; EX1003, ¶¶90-92. For instance, Kumar provides the exemplary port mask below in which the last ten bits of the mask are marked with a “0” (akin to the “x” in the ’369 patent mask) to specify a port range of 0-1023:



EX1023, FIG7B, 8:34-63; EX1003, ¶¶92-94. Kumar also explains that to the extent a port range cannot be represented by a single port mask, multiple masks can be used to encompass the desired range. EX1023, 8:34-63.

Thus, in the combined Biswas-Kumar system the edge router **104** would continue to assign to each host **102** a range of port numbers dedicated to it (as disclosed in Biswas), but would use a port mask to define the range of port numbers (as disclosed in Kumar). EX1003, ¶¶95.

A POSITA would have been motivated to combine the teachings of Biswas and Kumar. EX1003, ¶¶96-101.

As a threshold matter, Biswas and Kumar are analogous art because the references are in the same field of endeavor as each other and the '369 patent, *i.e.*, computer networking and routing data packets. EX1022, 1:7-10, EX1023, 1:7-24, 2:57-65; EX1001, 1:15-36; EX1003, ¶¶97.

Further, Biswas does not disclose the details of how edge router **104** determines whether a destination port number is within one of its stored port ranges. EX1022, 7:1-7. A POSITA would have been aware that masks could be used to determine whether a number lies within a range. EX1003, ¶¶98. Masks in general were well known in the prior art for decades. *Id.* And the use of masks to determine whether a number falls within a range was ubiquitous in computer networking. *Id.* For example, a POSITA would have been aware that networks routinely used masks

to determine whether the destination address in an incoming data packet fell within the range of addresses in the network. *Id.* A POSITA would have further been aware that masks were used in the prior art to classify incoming port numbers—and determine whether those incoming port numbers fall within a specified range—as well. *Id.* Thus, a POSITA would be motivated to look to references, like Kumar, that discuss classifying packets based on their port numbers, and a POSITA would have been particularly interested in references, like Kumar, that use the common and well-known technique of masking to make these classifications. *Id.* Indeed, a POSITA would have found combining Biswas and Kumar obvious because Kumar teaches that its disclosures “are generally applicable to any device, system, and/or circumstance where classification of packets or other communications is needed.” EX1023, 2:57-65.

Moreover, a POSITA would have been motivated to combine the teaching of these two references because, by the time of the alleged invention of the ’369 patent, it was well-known that bit masks, such as port masks, could be used to optimize performance. EX1003, ¶99. For example, a POSITA would have recognized that Kumar’s port masks are computationally efficient because they use only bitwise operations, like ANDs and ORs. *Id.*

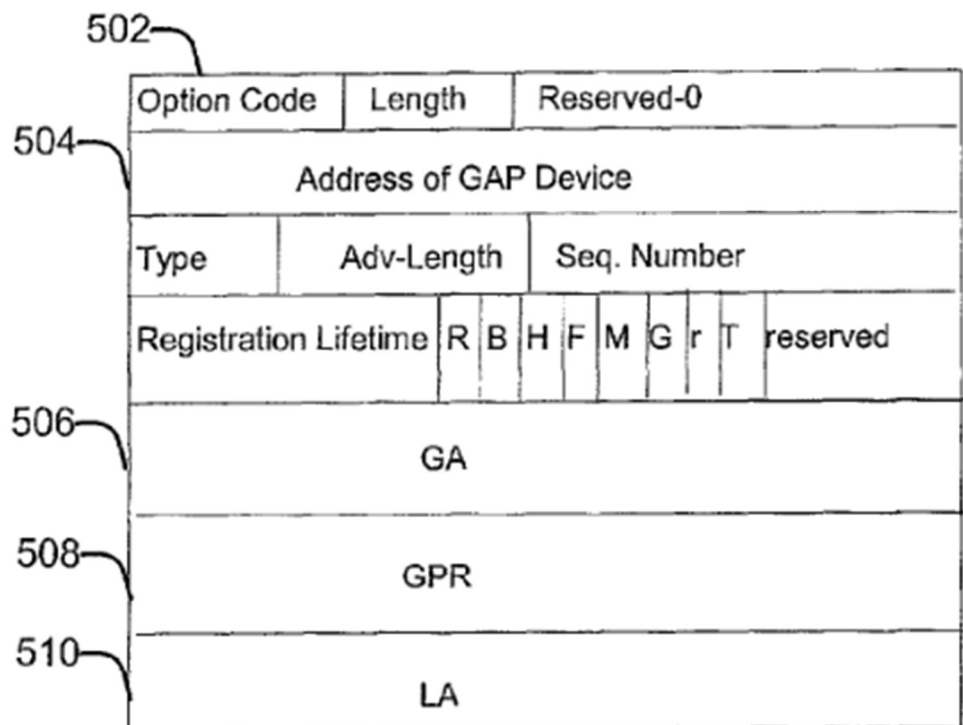
Additionally, the combination would have involved the application of a known technique (*i.e.*, the use of port masks) to a known device (*i.e.*, Biswas’s edge

router which is equipped to assign port ranges) to yield predictable results (*i.e.*, a network device that uses port masks to define a range of port numbers). EX1003, ¶100. And a POSITA would have had a reasonable expectation of success in combining Biswas and Kumar because the combination merely involves the straightforward application of Kumar’s port masks to define the range of port numbers already assigned by Biswas. *Id.*, ¶101. Indeed, this reasonable expectation of success is echoed by Kumar, which is “generally applicable to any device, system, and/or circumstance where classification of packets or other communications is needed.” EX1023, 2:57-65.

(d) 7[c]

Biswas and Kumar render obvious limitation 7[c]: “sending to said piece of terminal equipment [*e.g.*, **Biswas’s host 102**] a configuration message [*e.g.*, **Biswas’s DHCP reply**] comprising said primary address [*e.g.*, **Biswas’s global address**], said port mask [*e.g.*, **Kumar’s port mask**], and said routing identifier [*e.g.*, **Biswas’s local address**].” EX1003, ¶¶102-04.

Biswas discloses sending to the piece of terminal equipment (*e.g.*, **hosts 102**) a configuration message. For instance, Figure 5 illustrates an embodiment of “the reply to the host’s DHCP request” and the global address **506**, the global port range **508**, and the local address **510** for host **102** that is included in the reply:



EX1022, FIG5, 10:22-58.

As discussed in connection with limitations 7[a] and 7[b], the global address and the local address in the DHCP Reply correspond to the “primary address” and “routing identifier” in Biswas. EX1003, ¶103-04. As also discussed in connection with limitation 7[b], in view of Kumar it was obvious to implement Biswas’s global port range—which is a range of port numbers assigned to host **102**—using a port mask representing a range of ports. *Id.*, ¶104.

6. Claim 8

Biswas further disclose the additional limitation of claim 8: “assigning to said piece of terminal equipment [*e.g.*, **host 102**] an identifier of a routing device adapted

to route a data packet [*e.g.*, **gateway master 110**] comprising said primary address as the destination address to said piece of terminal equipment [*e.g.*, **the global address that is used by gateway master 110**], and the configuration message [*e.g.*, **the DHCP reply 500**] further comprising said routing device identifier.” EX1003, ¶¶105-07.

As discussed, Biswas describes assigning a global address that is shared between hosts **102**, and the DHCP reply in Biswas contains that global address. *See* §VIII.A.5. Biswas explains that “Gateway Master **110** translates local addresses of data received from a private network **108** into global addresses of data being output from the Gateway Master **110** to public network **112**, and vice versa. The Gateway Master **110** also translates global addresses of data received from public network **112** into local addresses of data being output from the Gateway Master **110** to private network **108**, and vice versa.” EX1022, 5:52-6:24. A POSITA would have known that gateway master **110** is a “routing device” and that the global address is an “identifier of a routing device” (*e.g.*, an identifier of gateway master **110**) because the disclosed network routes data packets containing that global address to gateway master **110**. EX1003, ¶¶106-07.

7. Claim 9

Biswas further discloses the additional limitation of claim 9: “wherein said configuration message [*e.g.*, **DHCP reply**] is further sent to a routing device [*e.g.*,

edge router 104 / CPE 206] that routes to said piece of terminal equipment [*e.g.*, **host 102**] a data packet containing said primary address [*e.g.*, **global address**] as the destination address.” EX1003, ¶¶108-09.

Biswas discloses embodiments that employ a DHCP server that is separate from the edge router. *Id.*, ¶¶109. For instance, Biswas teaches that “edge router **104** may be in the form of a customer premises equipment (CPE)” that is “operable as a DHCP relay.” EX1022, 7:9-10, 8:16-27. Figure 3B of Biswas illustrates this embodiment in which the edge router (labeled CPE **206**) acts as a DHCP relay for a separate DHCP server (labeled DHCP/GAP **208**):

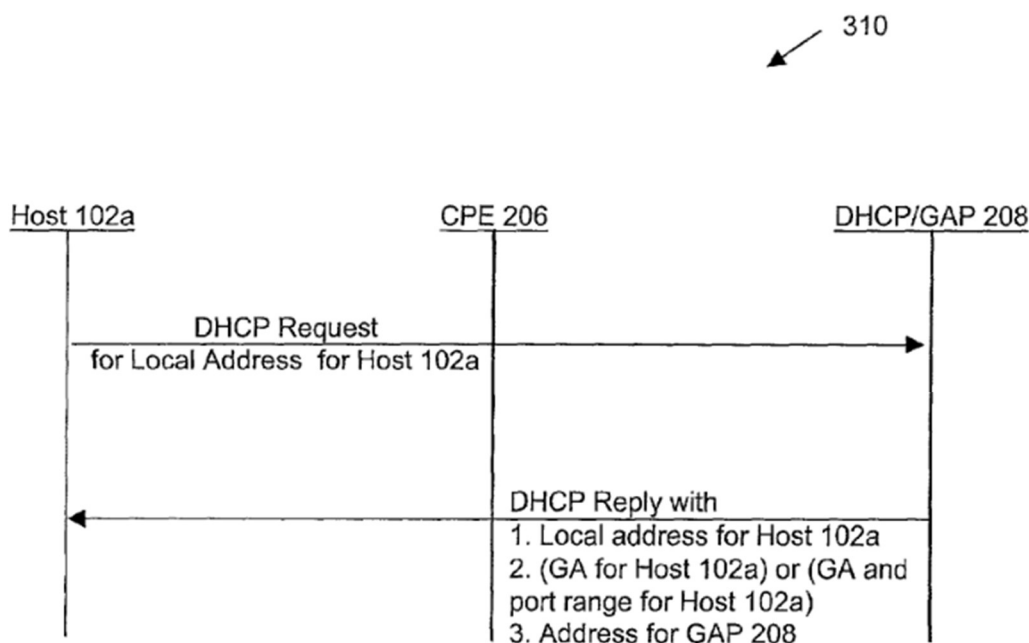


Figure 3B

Id., FIG3B. As discussed, the edge router routes data packets containing the primary address to the piece of terminal equipment. *See* §VIII.A.5.

8. Claim 10

(a) 10[pre]

To the extent the preamble is limiting, Biswas teaches limitation 10[pre]: “a configuration server in a telecommunications network [*e.g.*, **edge router 104**]” that performs the claimed steps. EX1003, ¶110; *see* §VIII.A.5.a.

(b) 10[a]

Biswas teaches the claimed steps, performed on an edge router. *See* §VIII.A.5.b. The edge router uses a processor to perform these steps. EX1003, ¶111.

(c) 10[b]

Biswas and Kumar render obvious the claimed steps, performed on an edge router. *See* §VIII.A.5.c. The edge router uses processors to perform these steps. EX1003, ¶112.

(d) 10[c]

Biswas and Kumar render obvious the claimed step, performed on an edge router. *See* §VIII.A.5.d. The edge router uses a communication unit to perform this step. EX1003, ¶113.

9. Claim 11

(a) 11[pre]

To the extent the preamble is limiting, Biswas and Kumar render obvious limitation 11[pre]: “a method of configuring a piece of terminal equipment

connected to a telecommunications network [*e.g.*, **Biswas’s host 102**], wherein, on reception of a configuration message [*e.g.*, **Biswas’s DHCP reply 500**] comprising configuration data comprising a primary address [*e.g.*, **Biswas’s global address**], a port mask [*e.g.*, **Kumar’s port mask**] defining a range of port numbers that is dedicated thereto [*e.g.*, **Biswas’s global port range**], and a routing identifier [*e.g.*, **Biswas’s local address**].” See §§VIII.A.5, VIII.A.8. EX1003, ¶114.

(b) 11[a]

Biswas discloses limitation 11[a]: “storing said configuration data [*e.g.*, **Biswas’s host stores the local address, global address, and global port ranges**].” EX1003, ¶115-17. Indeed, Biswas explains that its hosts “may each be implemented” on “a personal computer” and Biswas further discloses computers that have a memory block **61** for “caching and/or storing data.” EX1022, 12:40-13:17. “The memory or memories may also be configured to store.. *a local address, a global address, one or more global port ranges*, an address for a GAP device, etc.” *Id.*, 13:45-57 (emphasis added); *see also supra* §VIII.A.9.a.

(c) 11[b]

Biswas and Kumar render obvious limitation 11[b]: “before sending a data packet into the telecommunications network [*e.g.*, **the network described in Figure 1 of Biswas**], selecting a port number [*e.g.*, **a port number assigned to a host 102 in Biswas**] in the range of port numbers defined by the port mask [*e.g.*, **Kumar’s**

port masks], said data packet comprising as source address the primary address of said piece of terminal equipment [e.g., **the global address for host 102**] and as source port number the selected port number.” EX1003, ¶¶118-19

Biswas depicts host **102**’s process for sending data in Figure 8:

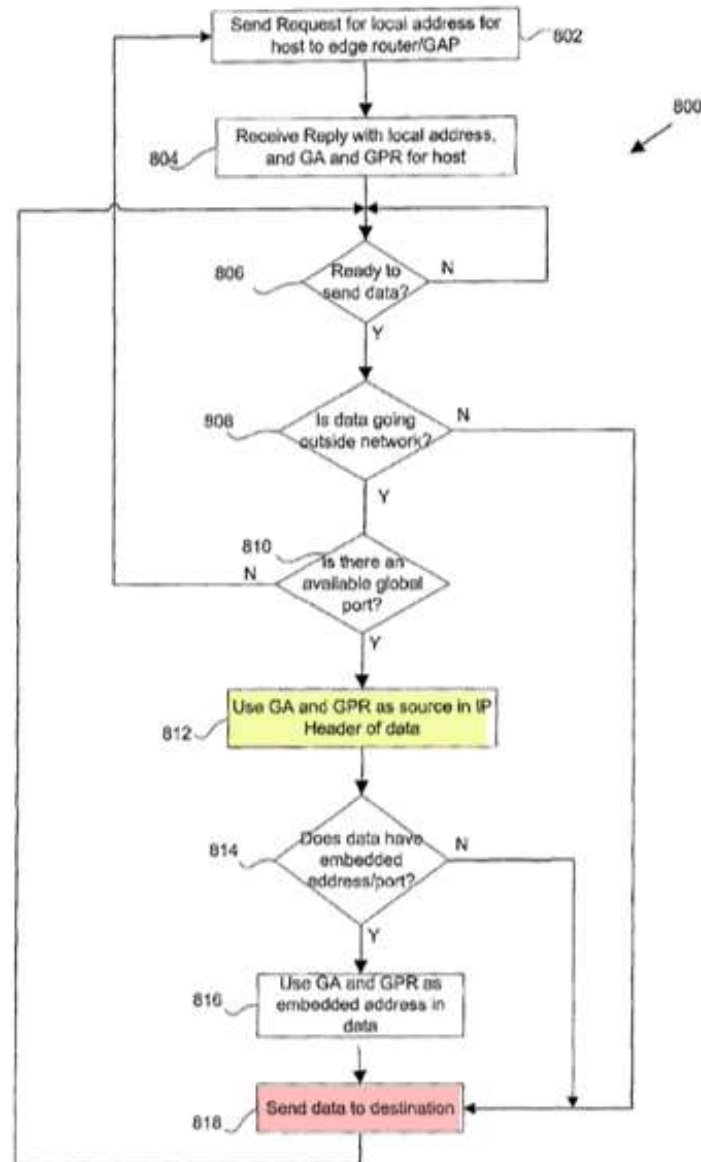


Figure 8

EX1022, FIG8. At step **812** (yellow), host **102** selects a global address and a port number in the global port range as the source address and source port number in the IP header of the data packet. *Id.*, FIG8, 11:25-12:28. As discussed, a POSITA would have found it obvious to combine Biswas with Kumar to represent the port range as a port mask. *See* §VIII.A.5.c. After using said global address and port number in the global port range as the source information of the data packet, host **102** sends the data packet to its destination at step 818 (red). EX1022, Fig 8, 11:25-12:28.

10. Claim 12

Biswas further discloses the additional limitation of claim 12: “once an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment has been received [*e.g.*, **Biswas’s global address**], said method further comprises a step of sending the configuration data [*e.g.*, **Biswas’s DHCP reply 500**] to said routing device [*e.g.*, **Biswas’s gateway master 110**].” EX1003, ¶¶120-23.

As discussed, Biswas discloses assigning a primary address (*e.g.*, **a global address**) to host **102**. *See* §VIII.A.5.b. This global address corresponds to the “identifier of a routing device” in claim 12, and is an identifier of gateway master **110**. EX1003, ¶121. As Biswas explains, gateway master **110** can “translate[] local address of data received from a private network **108** into global addresses of data being output from the Gateway Master **110** to public network **112**, and vice versa.”

EX1022, 6:12-24. A POSITA would have understood that this global address is an identifier of gateway master **110** because the gateway master intercepts incoming data packets that use the global address as a destination address. EX1003, ¶121.

Biswas further discloses that the gateway master **110** is “adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment.” In particular, Biswas teaches that incoming data packets that include the global address as the destination address can be routed to the corresponding host **102**. EX1022, 6:61-7:8.

A POSITA would understand Biswas to disclose “sending the configuration data to said routing device [**gateway master 110**].” EX1003, ¶122-23. In particular, gateway master **110** must be able to route incoming data packets that include the global address to the correct edge router **104** and host **102**. *Id.* Gateway master **110** therefore must receive and store configuration data so that it knows which global address and global port range is assigned to which host **102** and edge router **104**. *Id.*, ¶123. If gateway master **110** did not receive the configuration data, it would not know where to send incoming data packets. *Id.* Thus, a POSITA would have understood that the configuration message is sent to the routing device (*e.g.*, **gateway master 110**), and that this may occur once it is received by the terminal equipment (*e.g.*, **host 102**).

11. Claim 13

Biswas further discloses the additional limitation of claim 13: “on reception of a data packet [*e.g.*, **data packet received by edge router 104**] comprising a destination address [*e.g.*, **global address**], a port number [*e.g.*, **port number assigned to host 102**], and a routing identifier [*e.g.*, **host 102’s local address**], said method further comprises a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative.” EX1003, ¶¶124-31.

The ’369 patent explains that “terminal equipment” can be a gateway. EX1001, 8:5-10. Here, the terminal equipment corresponds to Biswas’s edge router **104**. Biswas explains that “[e]ach edge router **104** preferably tracks its GPR assignments so that data that is destined for any of its hosts may be sent to the correct host.” EX1022, 7:1-8. Kumar teaches rules or filters that are associated with actions. EX1023, 7:14-38. Kumar explains that the router can use these rules to accept or block incoming data packets. *Id.*; *see also, e.g., id.*, 8:1-19, 9:1-2.

A POSITA would have found it obvious to apply the teachings of Kumar to Biswas such that Biswas’s edge router **104** or gateway master **110** would be able to block or reject data packets that contain a port number that does not belong to an assigned range of port numbers. EX1003, ¶126. For instance, when edge router **104** receives an incoming data packet, it could use Kumar’s “rules” or “filters” to

evaluate whether the data packet contains a destination port number that is within an assigned port mask. *Id.* If a rule applies, the associated action would be to “accept” the data packet and continue routing it to host **102** that was assigned the relevant port mask. *Id.* Data packets that do not match any rule would be automatically rejected. *Id.*

A POSITA would have been motivated to combine the teachings of Biswas and Kumar. *Id.*, ¶¶127-31. Biswas does not explain what to do when an incoming data packet contains a destination port number that is not within an assigned port mask. *Id.*, ¶127. A POSITA would have been motivated to look for references that teach a method of handling data packets that do not comply with specific assignments, like Kumar’s filters. *Id.*, ¶127. Indeed, a POSITA would have found combining Biswas and Kumar obvious because Kumar teaches that its disclosures “are generally applicable to any device, system, and/or circumstance where classification of packets or other communications is needed.” EX1023, 2:57-65. Biswas itself explains that “it will be apparent that certain changes and modifications may be practiced within the scope of the appended claims. Therefore, the described embodiments should be taken as illustrative and not restrictive, and the invention should not be limited to the details given herein.” EX1022, 14:9-16. The combination would have been the application of a known technique (*i.e.*, Kumar’s filters) to a known device (*i.e.*, Biswas’s edge router **104** or gateway master **110**) to

yield a predictable result (*i.e.*, classifying and handling data packets). EX1003, ¶128.

To the extent claim 13 suggests that the host **102** must be the terminal equipment that rejects data packets outside of its port range (rather than the edge router **104**), Biswas discloses that as well. Biswas explains that the hosts **102** use only ports in their assigned global port range to communicate over the network. EX1022, 2:23-33, 2:46-65. For example, Biswas explains that hosts **102** must make additional DHCP requests (in which the DHCP device will assign an additional port range to host **102**) in order to use port numbers that are outside of their original port range. *Id.*, 3:6-14. A POSITA would have understood this disclosure to mean that host **102** in Biswas would not open connections on any ports or use any ports that are outside of its assigned port range. EX1003, ¶130. Thus, a POSITA would have known that host **102** would have rejected all incoming packets that contain a port number that is outside of the assigned port range. *Id.*

12. Claim 14

(a) 14[pre]

To the extent the preamble is limiting, Biswas and Kumar render obvious the elements of this limitation, which occur on Biswas's host **102**. *See* §VIII.A.9.a; EX1003, ¶132.

(b) 14[a]

Biswas and Kumar render obvious storing the configuration data in memory on host **102**. *See* §VIII.A.9.b; EX1003, ¶133.

(c) 14[b]

Biswas and Kumar render obvious the steps of this limitation. *See* §VIII.A.9.c. These steps are performed on the processor of host **102**. EX1003, ¶134.

13. Claim 16

Biswas also discloses the additional limitation of claim 16. *E.g.*, EX1022, 3:59-4:4, 13:58-14:16, 17:63-18-21; EX1003, ¶135.

14. Claim 17

Biswas discloses the additional limitation of claim 17. *E.g.*, EX1022, 3:59-4:4, 13:58-14:16, 17:63-18-21; EX1003, ¶136.

B. Ground 2: Claims 1-3, 5-6, and 15 Are Obvious in View of Fangman and Kumar

1. Fangman (EX1024)

Fangman is prior art under at least pre-AIA §102(b) because its issue date is more than a year earlier than the priority date of the '369 patent. *See* §V.A.

Fangman describes methods and systems for routing IP packets in networks supporting IP telephones and “Voice over Internet Protocol.” EX1024, Abstract, 1:1-2, 1:17-22. Like the '369 patent, Fangman explains that the “popular growth on the Internet” has led to the “depletion of remaining available addresses” and the need

for improved “NAT technology” that permits “a single public IP address to be used to support thousands of hosts using private (RFC 1918) addresses.” *Id.*, 1:40-56. Fangman thus discloses a process where each host is assigned a range of port numbers. *Id.*, 8:45-57, 8:4-9; *see also id.*, 14:12-14, 10:66-67, 11:14-15. EX1003, ¶140.

Figure 3B (below) depicts an embodiment of Fangman’s VoIP network:

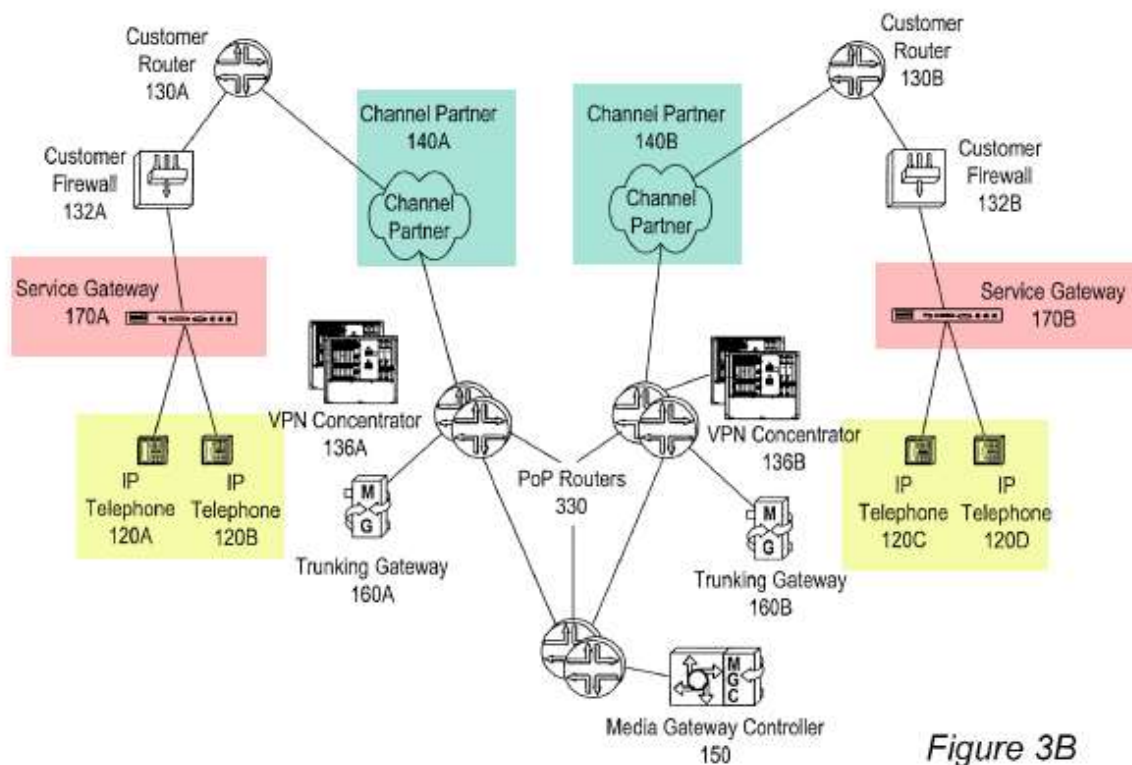


Figure 3B

EX1024, FIG3B. The IP telephones (yellow), also referred to as “internal hosts,” are connected to a service gateway at a customer premises (red). *Id.*, 12:2-4. The service gateway is in turn connected to “Internet Service Providers,” which are

referred to as “Channel Partners” (green), via “customer routers.” *Id.*, 7:12-21. EX1003, ¶141.

Each internal host has its own “private IP address” for use within the private network. EX1024, 12:1-10. To reach the public network, Fangman’s service gateways are equipped with its improved NAT functionality (called “NAPPT”). *Id.*, 8:6-9. Like conventional NAT processes each service gateway (*e.g.*, service gateway **170A**) has a “single, public IP address” for “all the internal hosts.” *Id.*, 8:21-31, 1:51-56. However, “[i]nstead of dynamically assigning ports to IP telephones,” the service gateway assigns each of the hosts that share this public address a semi-permanent “range of port numbers.” *Id.*, 8:21-32, 18:45-57. In this manner, the combination of a public IP address (shared by multiple hosts) and an assigned port range can “uniquely identify the IP telephone.” *Id.*, 18:37-46, 4:17-25. EX1003, ¶142.

To perform NAPPT, the service gateway also maintains a table that contains mappings between the public IP address and assigned port range for an internal host and the private IP address for that internal host. EX1024, 8:49-56. Thus, when service gateway **170A** “receives a data packet” that is “destined for the IP telephone” **120A**, the packet can then be routed to its destination using the private IP address of telephone **120A**. *Id.*, 18:31-47. EX1003, ¶143.

2. The Fangman-Kumar Combination

In the Fangman-Kumar combination, Fangman’s teachings disclose an edge router that implements a method for configuring a piece of terminal equipment connected to a telecommunications network, including by assigning a piece of terminal equipment a shared primary address, a range of port numbers dedicated to it, and a routing identifier. EX1003, ¶144. Although Fangman does not provide the implementation detail of using a port mask to define the range of port numbers assigned to the terminal equipment, Kumar’s teachings supply this additional detail by disclosing port masks that define a range of port numbers. *Id.* Thus, in the Fangman-Kumar combination, Fangman would continue to assign a range of port numbers to a piece of terminal equipment but would use port masks to define the range. *Id.*

3. Motivations

An explanation of the multiple reasons to combine Fangman and Kumar are provided in the analysis below.

4. Claim 1

(a) 1[pre]

To the extent the preamble is limiting, Fangman discloses limitation 1[pre]: “a method of routing an IP data packet [*e.g.*, **data packet received at service gateway 170**] in a telecommunications network [*e.g.*, **network of Figure 3B**] to a destination equipment [*e.g.*, **IP telephones 120**], said packet comprising a primary

destination address [e.g., **public destination IP address**] and a destination port number [e.g., **destination port number**].” EX1003, ¶¶146-51.

Fangman discloses a method of routing “IP packets” in a telecommunication network to IP telephones **120**. EX1024, Abstract, 13:55-58, 18:31-47; *see also id.*, 1:1-2 (“system and method for routing IP packets”). Figure 3B (reproduced below) depicts an embodiment of the network in which IP telephones (yellow) are connected to service gateways (red). The service gateways connect the IP telephones to “Internet Service Providers,” which are referred to as “Channel Partners” (green), via “customer router” **130**. *Id.*, 7:12-21, 7:47-54.

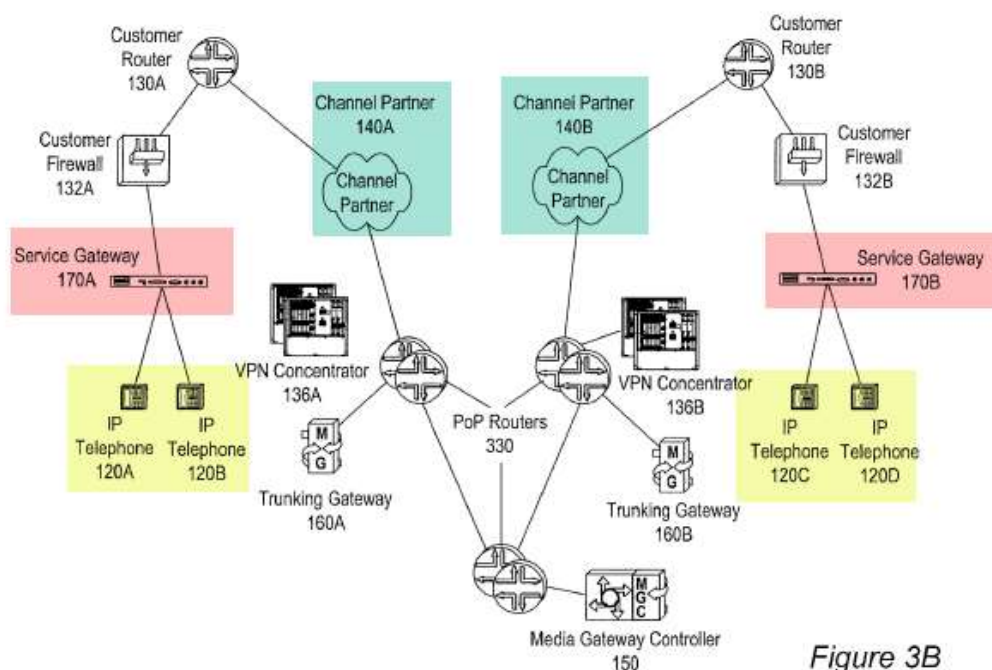


Figure 3B

Id., FIG3B.

Fangman's IP telephones **120** correspond to the "destination equipment" in the '369 patent. EX1003, ¶148; *see also* EX1001, 8:5-11 (destination equipment, also called "terminal equipment," can be "telephones or personal computers.").

Fangman also discloses that service gateways **170** route an "IP packet" to an IP telephone that comprises a "primary destination address" and a "destination port number." EX1024, 4:17-33, 18:30-47, Abstract. For instance, Fangman states that "service gateways may mediate IP communications between the IP telephone and an IP device, such as another IP telephone." *Id.*, 3:65-4:3. Fangman further teaches that this involves "SG 170 receiv[ing] a data packet from the IP device destined for the IP telephone **120**," and that "the data packet may include a public destination IP address [and] a destination port number ... where the destination port number is in the assigned range of port numbers for the IP telephone **120**." *Id.*, 3:65-4:3, 4:17-33, 18:30-47, Abstract; *see also* FIG10B (box 1064, showing that "SG 2" receives a packet having "Dest. IP" and "Dest. Port"). The "public destination IP address" in Fangman's data packet corresponds to the "primary destination address" in the '369 patent. EX1003, ¶150; EX1001, 3:44-46. And the destination port number corresponds to the destination port number of the '369 patent. EX1003, ¶149.

(b) 1[a]

Fangman in view of Kumar renders obvious limitation 1[a]: "determining a port mask [*e.g.*, **Kumar's port mask**] assigned to the destination equipment [*e.g.*,

Fangman’s IP telephones 120], the port mask defining a range of port numbers [e.g., **Fangman’s range of port numbers**] to which the destination port number belongs.” EX1003, ¶¶152-62.

Each of the IP telephones is assigned a range of port numbers by service gateway **170**. EX1024, 3:14-25, 8:45-49, 17:21-25.

When service gateway **170** receives an IP data packet destined for IP telephone **120**, the service gateway must perform “NAPPT on the data packet” to “change the public destination IP address to a private destination IP address” for the IP telephone. *Id.*, 4:17-33, 18:30-47. In particular, Fangman explains that to perform NAPPT on received data packets, the service gateway “maintain[s] a table” that “map[s]” the port range assigned to an IP telephone to its internal (or “private”) IP address. *Id.*, 8:45-58, 10:66-67, 11:14-15; EX1003, ¶153. Thus, a POSITA would have understood that the service gateway **170** consults its mapping table to determine “the assigned range of port numbers” to which the “destination port number” in the IP packet belongs, and then replaces the public IP address in the received packet with the private IP address for the IP telephone that is associated with that range of port numbers. EX1024, 18:31-47 (“Performing a NAPPT on the data packet may include using the public destination IP address and the destination port number to uniquely identify the IP telephone **120**”), 4:17-33; EX1003, ¶153.

For instance, in the case of a packet that is received at service gateway **170A** and destined for IP telephone **120A**, the service gateway determines that the destination port number in the IP packet “is in the assigned range of port numbers for the IP telephone” **120A** by consulting its mapping table, and then replaces the public IP address of the packet with the private IP address for IP telephone **120A**. EX1024, 18:31-47; *see also id.*, FIG10B (box 1064: “SG 2 performs NAPPT” involving changing “Dest. IP” from “Phone 2 Public changed to Phone 2 private”), 30:12-23.

Although Fangman does not provide the implementation detail that the service gateway uses a port mask to define the range of port numbers in the mapping table, a POSITA would have found it obvious to do so. EX1003, ¶155. Indeed, as already explained, Fangman’s service gateway maintains a table of port ranges that have been assigned to the IP telephones and determines the range of port numbers to which a destination port number in a received data packet belongs. Kumar discloses using a port mask to make this determination. *Id.* Kumar discloses port masks that are similar to those disclosed in the ’369 patent, and expressly teaches that its port masks may define “a range” of port numbers. EX1023, 7:31-38, FIG7B.

A POSITA would have been motivated to combine the teachings of Fangman and Kumar. EX1003, ¶¶156-62.

As a threshold matter, Fangman, Kumar, and the '369 patent are analogous art because they are in the same field of endeavor, *i.e.*, computer networking and routing data packets. EX1024, 1:1-2, 8:33-43; EX1023, 1:7-24, 2:57-65; EX1001, 1:15-36; EX1003, ¶157.

Further, Fangman does not disclose the details of how service gateway **170** determines whether a destination port number is within one of its stored port ranges. EX1024, 4:17-33, 8:45-58, 18:31-47. A POSITA would have been aware that masks could be used to determine whether a number lies within a range and that this implementation of masks was well-known in the prior art for decades. EX1003, ¶158. Masks in general were well known in the prior art for decades and a POSITA would have been motivated to combine these references to optimize performance. *Id.*

Further, a POSITA would have found combining Fangman and Kumar obvious because Kumar teaches that its disclosures “are generally applicable to any device, system, and/or circumstance where classification of packets or other communications is needed.” EX1023, 2:57-65. Fangman itself explains that “numerous variations and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated” and that “[i]t is intended that the following claims be interpreted to embrace all such variations and modifications.” EX1024, 32:28-34.

Additionally, the combination would have been of a known technique (*i.e.*, Kumar’s port mask rules) to a known device (*i.e.*, Fangman’s service gateway **170**) to yield predictable results (*i.e.*, a service gateway that can use port masks to determine whether a destination port number falls within an assigned port range). EX1003, ¶161. A POSITA would have had a reasonable expectation of success in combining Fangman and Kumar because the combination merely involves the straightforward application of Kumar’s port masks to the service gateway of Fangman to define a port range. *Id.*, ¶162.

(c) 1[b]

Fangman in view of Kumar renders obvious limitation 1[b]: “selecting at least one identifier [*e.g.*, **Fangman’s private IP address**] of the destination equipment [*e.g.*, **Fangman’s IP telephone 120**] of the packet from a plurality of equipment identifiers [*e.g.*, **Fangman’s private IP addresses for IP telephones 120A-D**] associated with said primary destination address [*e.g.*, **Fangman’s public IP address**] based on the port mask [*e.g.*, **Kumar’s port mask**].” EX1003, ¶¶163-67.

Fangman discloses a plurality of equipment identifiers (*e.g.*, **private IP addresses**) associated with said primary destination address (*e.g.*, **a public IP address**). Fangman explains that network address port translation is a technique that “allows a single public IP address to be used to support thousands of hosts using private (RC 1918) addresses.” EX1024, 1:54-56. Consistent with this, Fangman

discloses that service gateways (*e.g.*, service gateway **170A**) have a “single, public IP address” to provide network address persistent port translation support to multiple internal hosts (*e.g.*, IP telephones **120A** and **120B**), each of which is assigned a private IP address. *Id.*, 8:20-31, 12:7-13.

A POSITA would have understood that a “private IP address” in Fangman is an “equipment identifier.” EX1003, ¶165. Indeed, the ’369 patent also teaches that an example of an equipment “identifier” is a “secondary destination address” (EX1001, 3:47-50, 14:29-31), such as a “private address” (*id.*, 3:50-52, 9:9-11). And as already explained in connection with limitation 1[pre], a POSITA would have understood that Fangman’s public IP address is a “primary destination address.” EX1003, ¶165.

Fangman also teaches selecting at least one identifier from the plurality of equipment identifiers based on the port range. To perform NAPPT, service gateways **170** maintain a table that maps the “external” (*i.e.*, public) IP address and assigned port range for a host to a private IP address for the host. EX1024, 8:49-52 (“The SG **170** may maintain a table of semi-permanent mappings of the external IP address and ports to the internal hosts and ports.”). Thus, when a packet “destined for the IP telephone” (*e.g.*, IP telephone **120A**) is received, the service gateway **170** will (1) consult its mapping table to determine “the assigned range of port numbers” to which the “destination port number” in the IP packet belongs, and then (2) based on

the matching port range in the table, the service gateway will replace the public IP address in the received packet with the private IP address for the IP telephone to which the packet is to be routed. *Id.*, 18:39-47 (“Performing a NAPPT on the data packet may include using the public destination IP address and the destination port number to uniquely identify the IP telephone **120**, and changing the public destination IP address to a private destination IP address...”), 4:17-33, Abstract; *see also id.*, 8:52-56 (when performing NAPPT, service gateway “may validate” the port number in the IP packet “to ensure the correct internal host is using its assigned port range.”); EX1003, ¶166.

As discussed in connection with limitation 1[a], in the combined system of Fangman in view of Kumar, the service gateway would determine a port mask defining a range of port numbers to which the destination port number belongs, such that the service gateway would determine the private IP address for the IP telephone based on the port mask that defines the range of port numbers to which the destination port number belongs. EX1003, ¶167.

(d) 1[c]

Fangman discloses limitation 1[c]: “routing the packet [*e.g.*, **IP data packet received by the service gateway 170**] to the destination equipment [*e.g.*, **IP telephone 120**] based on said identifier [*e.g.*, **the private IP address of IP telephone 120**].” EX1003, ¶¶168-69.

As explained in connection with limitation 1[b], service gateway **170** “[p]erform[s] a NAPPT on the data packet” that “change[s] the public destination IP address to a private destination IP address” for the IP telephone **120**. EX1024, 18:31-42. Fangman further teaches that “[a]fter NAPPTing the data packet, the SG **170** may send the data packet to the IP telephone **120**” using the private destination IP address. *Id.*, 18:46-47, Abstract. For instance, Figure 10B of Fangman illustrates a service gateway routing the packet to “Phone 2” (yellow) after performing a NAPPT operation that changes the destination IP address of the packet from “Phone 2 Public... to Phone 2 private” (red):

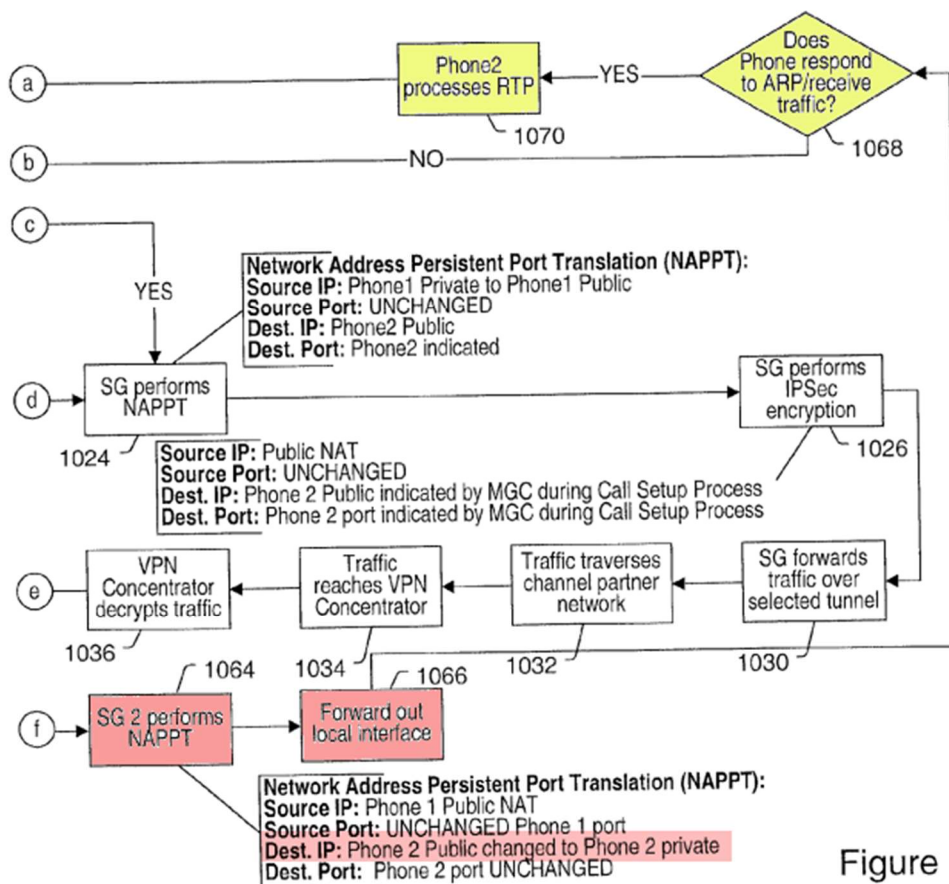


Figure 10B

Id., FIG10B, 30:12-41.

5. Claim 2

Fangman discloses the additional limitation of claim 2: “routing an IP data packet [*e.g.*, **IP data packet received by the service gateway 170**], wherein said at least one identifier is a secondary destination address [*e.g.*, **Fangman’s private IP address**] of the destination equipment [*e.g.*, **IP telephone 120**].” EX1003, ¶170. As the ’369 patent explains, a “secondary address” is merely the private IP address. EX1001, 3:50-51. Similarly, Fangman uses the private IP address of the IP telephone as the identifier. *See* §VIII.C.4.c.

6. Claim 3

Fangman discloses the additional limitation of claim 3: “routing an IP data packet [*e.g.*, **IP data packet received by the service gateway 170**], comprising, before the routing step, a step of transforming the packet by adding said secondary address to the packet [*e.g.*, **changing the public destination IP address to a private destination IP address**], and routing the packet based on said secondary destination address.” EX1003, ¶171. Fangman explains that the service gateway **170**, upon receiving an incoming data packet, “chang[es] the public destination IP address to a private destination IP address” before it “send[s] the data packet to the IP telephone **120**.” EX1024, 18:31-47.

7. Claim 5

(a) 5[pre]

Fangman discloses the claimed steps, performed on a **service gateway 170**.
See §VIII.C.4.a; EX1003, ¶172.

(b) 5[a]

Fangman and Kumar render obvious the claimed steps, performed on the **service gateway 170**. *See* §VIII.B.4.b; EX1003, ¶173. The service gateway uses a processor to perform this operation. EX1024, 32:15-20.

(c) 5[b]

Fangman and Kumar render obvious the claimed steps, performed on the **service gateway 170**. *See* §VIII.B.4.c; EX1003, ¶174. The service gateway uses a processor to perform this operation. EX1024, 32:15-20.

(d) 5[c]

Fangman discloses the claimed steps, performed on the **service gateway 170**.
See §VIII.B.4.d; EX1003, ¶175. The service gateway uses a communication unit to route the packet. EX1024, 30:23-24, FIG10B (box 1066, communication unit “forward[ing]” packet using “private” IP address).

8. Claim 6

(a) 6[pre]

Fangman discloses telecommunications network equipment, such as **service gateway 170**, that is adapted to receive and route an IP data packet comprising a

primary destination address and a destination port number. *See* §VIII.B.4.a; EX1003, ¶176.

(b) 6[a]

Fangman and Kumar render obvious this limitation. *See* §VIII.B.7.b; EX1003, ¶177.

(c) 6[b]

Fangman and Kumar render obvious this limitation. *See* §VIII.B.7.c; EX1003, ¶178.

(d) 6[c]

Fangman discloses this limitation. *See* §VIII.B.7.d; EX1003, ¶179.

9. Claim 15

Fangman discloses and a POSITA would have understood that service gateway includes a non-transitory computer readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 1. EX1024, 4:34-46, 31:62-32:20; EX1003, ¶180.

C. Ground 3: Claims 1-3, 5-6, and 15 Are Obvious in View of King and Kumar

1. King (EX1025)

King is prior art under at least pre-AIA §102(e) because its May 23, 2006 filing date is earlier than the priority date of the '369 patent. *See* §V.A.

King describes a network in which user devices **100**, **118**, and **120** belong to a “community of source devices” **122**. EX1025, 1:34-44, 2:49-51. These user devices send data packets over the Internet **104** to remote devices **102** and **116**. *Id.*, 1:45-59. Several intermediary devices assist in routing the data packet from the user devices to the remote devices, like CPE **108** and the aggregation device **110**. *Id.* EX1003, ¶184.

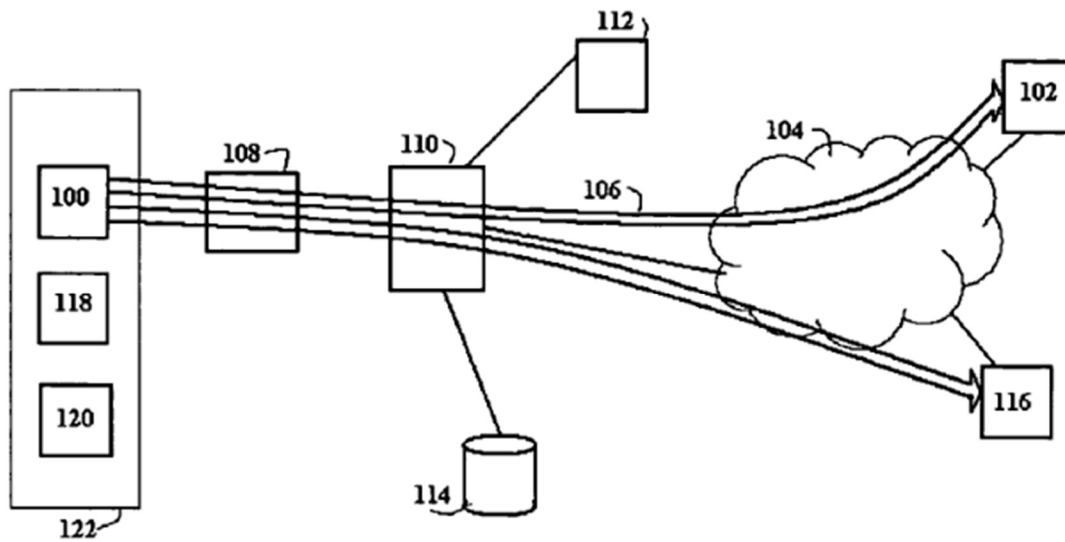


FIG. 1

EX1025, FIG1.

King improves on PAT by assigning ranges of port numbers to individual user devices. For example, Figure 7 shows that the range of port numbers 1024-1039 is assigned to user device **100**, while the range of port numbers 1040-1055 is assigned to user device **118**. *Id.*, 5:23-32. EX1003, ¶185.

SOURCE ADDRESS	TCP PORT	USER DEVICE
IPCPE	1024-1039	IP1'
IPCPE	1040-1055	1P2'

FIG. 7

EX1025, FIG7. Incoming packets (*i.e.*, packets that are sent from a remote device to a user device) “can then be classified” based on the assigned port range. *Id.*, 5:36-42. For example, when the aggregation device receives a data packet that contains (1) the CPE’s IP address and (2) port number 1024, the aggregation device can determine that port number 1024 belongs to the range of port numbers associated with user device **100**. *Id.*, 5:36-57. EX1003, ¶185.

2. The King-Kumar Combination

In the King-Kumar combination, King’s teachings disclose intermediary devices that assign user devices a shared primary address, a range of port numbers dedicated to it, and a routing identifier. EX1003, ¶186. Although King does not provide the implementation detail of using a port mask to define the range of port numbers assigned to the terminal equipment, Kumar’s teachings supply this additional detail by disclosing port masks that define a range of port numbers. *Id.* Thus, in the King-Kumar combination, King would continue to assign a range of

port numbers to a piece of terminal equipment but would use port masks to define the range. *Id.*

3. Motivation

An explanation of the multiple reasons to combine King and Kumar are provided in the analysis below.

4. Claim 1

(a) 1[pre]

To the extent the preamble is limiting, King teaches limitation 1[pre]: “a method of routing an IP data packet [*e.g.*, **returning traffic**] in a telecommunications network to a destination equipment [*e.g.*, **user device 100**], said packet comprising a primary destination address [*e.g.*, **the overloaded IP address**] and a destination port number [*e.g.*, **destination TCP port number**].” EX1003, ¶¶188-92.

King discloses a “method [that] is implemented using one or more computer programs running on a network element such as a **router device**.” EX1025, 7:29-35. Particularly, a customer premises equipment (“CPE”) device **108** and an “aggregation device **110**.” *Id.*, 1:34-49, 2:62-3:41, 5:36-56, FIG4. King teaches that “returning traffic” is sent from, for example, remote device **102** through aggregation device **110** and CPE **108** to user device **100**. *Id.*, 3:2-6, FIG5. A POSITA would have understood that a user device (*e.g.*, “user device **100**”) is “a destination

equipment” in the return path because it is the destination where the data sent from the remote device to the user device is to be routed. EX1003, ¶189.

King discloses that the “returning traffic” contains a “translated overloaded IP address and TCP port” in the destination address and TCP destination port fields, respectively. EX1025, 3:2-6, Figs. 2 & 5. For instance, a data packet sent by remote device **102** to user device **100** is received with the IP address (*i.e.*, IPCPE) and TCP port number (*i.e.*, 1024) that was inserted as part of the outbound translation process. *Id.*; EX1003, ¶190.

The “translated overloaded IP address” corresponds to the “primary address” of the ’369 patent. EX1003, ¶191. The ’369 patent discloses that an example of a “primary address” is a public IP address. EX1001, 3:44-46, 1:37-40. Similarly, the “overloaded IP address” of the CPE **108** “serv[es] multiple user devices.” EX1025, 2:55-61; EX1003, ¶191.

The “TCP port” corresponds to the “destination port number” of the ’369 patent. *Id.*, ¶192.

(b) 1[a]

King and Kumar render obvious limitation 1[a]: “determining a port mask [*e.g.*, **Kumar’s port mask**] assigned to the destination equipment [*e.g.*, **King’s user device 100**], the port mask defining a range of port numbers [*e.g.*, **King’s port range assigned to user device 100**] to which the destination port number [*e.g.*, **King’s**

destination TCP port number] belongs.” EX1003, ¶¶193-201. To start, Figure 7, King discloses assigning port ranges (blue column) to user devices (yellow column) and storing those assignments in a database:

SOURCE ADDRESS	TCP PORT	USER DEVICE
IPCPE	1024-1039	IP1'
IPCPE	1040-1055	IP2'

FIG. 7

EX1025, FIG7, 5:36-57. For example, “the CPE may assign TCP port numbers 1024 to 1039 to data sessions associated with the first user or source device **100** and TCP port numbers 1040 to 1055 to data sessions associated with the second user or source device **118**.” *Id.*, 5:28-32. This assignment is stored by both CPE **108** and aggregation device **110**. *Id.*, 4:23-24, 5:36-65. “As a result, ... translation is carried out to separate port ranges per host device.” *Id.*, 5:32-35.

King, in combination with Kumar, teaches “determining a port mask assigned to the destination equipment . . . to which the destination port number belongs.” EX1003, ¶194. King explains, on receipt of the data packet, that “incoming packets can then be classified ... based on source port range.” EX1025, 5:26-46. “In particular on receipt of a packet with (translated) source address IPCPE [*i.e.*, **the primary destination address**] and (translated) TCP port in the range 1024 to 1039

[i.e., the destination port number] the aggregation device derives corresponding source device information.” *Id.*, 5:42-46, 9:39-62 10:43-44. “Similarly if the port address is in the range 1040 to 1055 then the user device address is identified as IP2 or another mappable identifier/IP2.” *Id.*, 5:49-51. As discussed, Kumar teaches using a port mask to represent a port range. *See* §§VIII.A.2, VIII.A.5.c.

A POSITA would have found it obvious to apply the teachings of Kumar to King such that King’s aggregation device **110** would determine port masks defining a range of port numbers to which the destination port number belongs. Upon receipt of the incoming data packet, the aggregation device would need to determine which destination device the data packet is intended for. Accordingly, the aggregation device would use a port mask to identify the destination device based on the destination port number.

A POSITA would have been motivated to combine the teachings of King and Kumar. EX1003, ¶195-201. As a threshold matter, King and Kumar are analogous art because the references are in the same field of endeavor as each other and the ’369 patent, i.e., computer networking. EX1025, 1:23-44, 7:29-8:10; EX1023, 1:7-24, 2:57-65; EX1001, 1:15-36; EX1003, ¶197.

King does not disclose the details of how “incoming packets can then be classified ... based on source port range.” EX1025, 5:26-46. Thus, a POSITA would be motivated to look to references, like Kumar, that discuss packet

classification. Indeed, a POSITA would have found combining King and Kumar obvious because Kumar teaches that its disclosures “are generally applicable to any device, system, and/or circumstance where classification of packets or other communications is needed.” EX1023, 2:57-65. King itself explains that “[a]ny appropriate communication protocol and mechanism can be adopted to implement this invention.” EX1025, 9:38-42.

The combination would have improved computational efficiency and this use of masks was well-known in computer networking. EX1003, ¶198-99. Additionally, the combination would have been of a known technique (*i.e.*, Kumar’s port mask rules) to a known device (*i.e.*, King’s network configuration) to yield predictable results (*i.e.*, a network that can route incoming data packets according to destination port numbers). EX1003, ¶200. A POSITA would have a reasonable expectation of success in combining King and Kumar and there would have been no unexpected results. EX1003, ¶201.

(c) 1[b]

King and Kumar render obvious limitation 1[b]: “selecting at least one identifier of the destination equipment [*e.g.*, **King’s IP address of user device 100**] of the packet [*e.g.*, **King’s returning traffic**] from a plurality of equipment identifiers associated with said primary destination address based on the port mask [*e.g.*, **Kumar’s port mask**].” EX1003, ¶202-03.

King teaches the “at least one identifier of the destination equipment” of the ’369 patent. *Id.*, ¶203. The ’369 patent states that an example of an “identifier” is a “secondary destination address,” like the private address of the destination equipment. EX1001, 3:47-50, 14:29-31, 3:50-52, 9:9-11. Similarly, King derives user “device identifier information” from the port mask. EX1025, 5:43-46. King provides several examples of user “device identifier information,” including “the IP address of” the user device. *Id.*, 5:46-49. Figure 7 shows how this information is stored as well as “how [user] device identifier information can be derived from a received packet.” *Id.*, 5:36-43.

SOURCE ADDRESS	TCP PORT	USER DEVICE
IPCPE	1024-1039	IP1’
IPCPE	1040-1055	1P2’

FIG. 7

Id., FIG7. This process is described in further detail in King’s Figure 8.

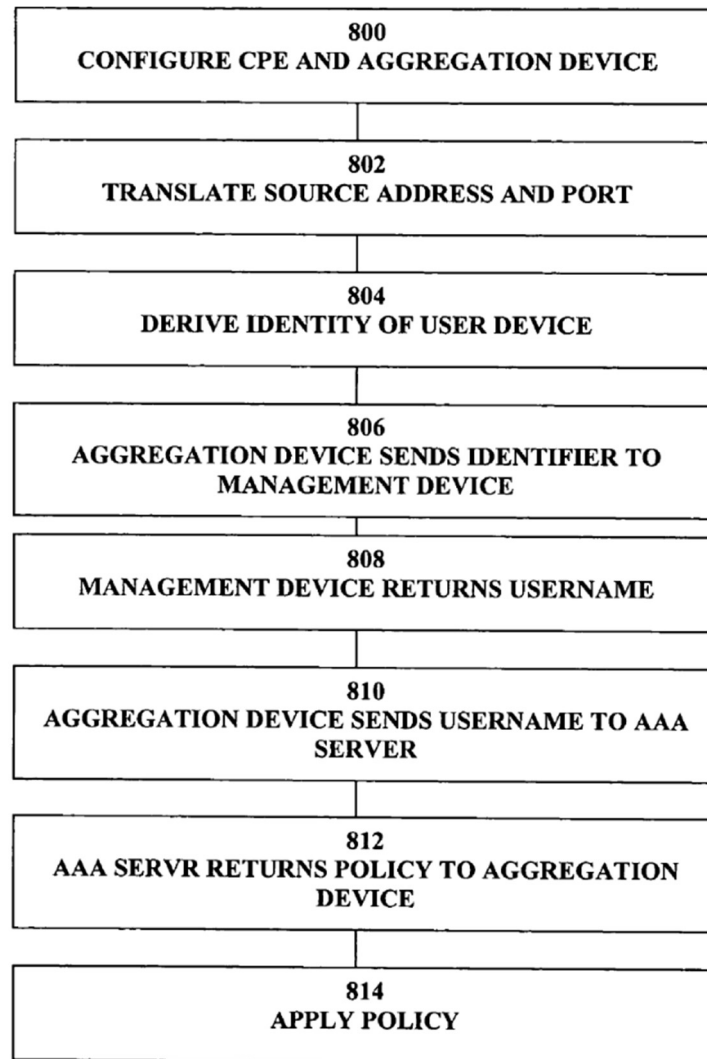


FIG. 8

Id., FIG8. In particular, “[a]t step **804** the aggregation device derives the data session [user] device information in the form of the original source or user device IP address or other identifier for example from the table at FIG7 based on the range in which the received TCP port number falls and, in the event that the CPE may use multiple outside source addresses, the received [user] device identifier in combination.” *Id.*, 6:5-11.

(d) 1[c]

King teaches limitation 1[c]: “routing the packet [*e.g.*, **returning traffic**] to the destination equipment [*e.g.*, **user device 100**] based on said identifier [*e.g.*, **IP address of user device 100**].” EX1003, ¶204. Figure 5 discloses the typical operations of a CPE that, as discussed above, “serves a plurality of user devices” and “acts as an ‘overloaded’ IP address serving multiple user devices.” EX1025, 2:49-61.

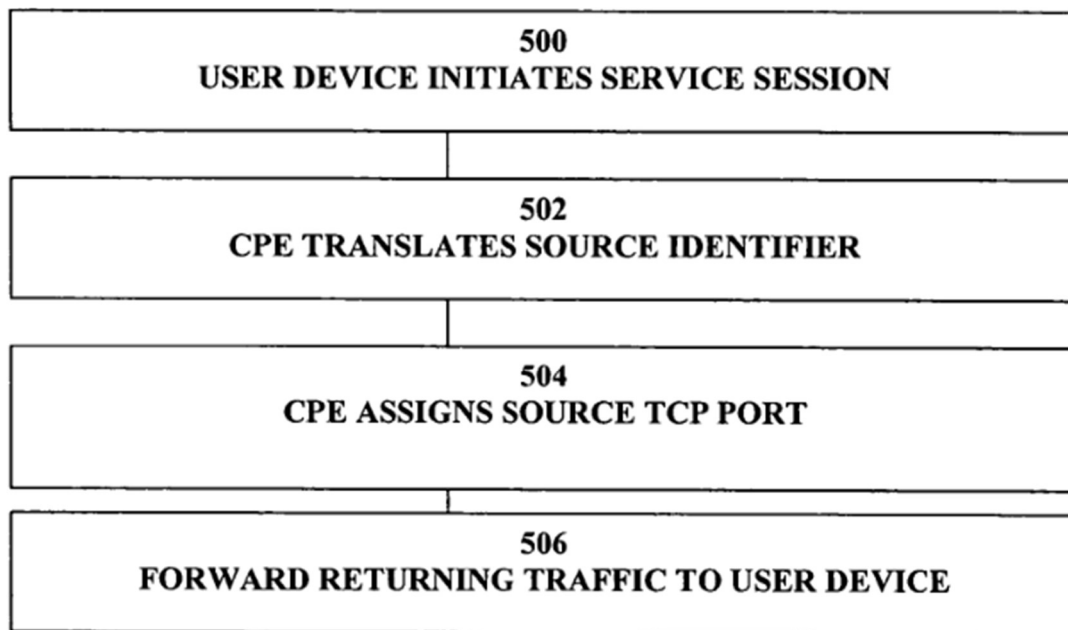


FIG. 5

Id., FIG5. At step **506**, the CPE “forwards returning traffic with the translated overloaded IP address and TCP port to the user device, reinstating the user device IP address as destination address and the user device assigned TCP port number.”

Id., 3:2-6. The “user device IP address” corresponds to the identifier. *Id.*, 5:46-57, 6:5-11; *see* §VIII.C.4.c.

5. Claim 2

King discloses the additional limitation of claim 2: “routing an IP data packet [*e.g.*, **returning traffic**], wherein said at least one identifier is a secondary destination address [*e.g.*, **IP address of user device 100**] of the destination equipment [*e.g.*, **user device 100**].” EX1003, ¶205. For instance, King uses the private IP address of the user device, which it refers to as “IP1” or “IP2,” as the secondary destination address. EX1025, 5:46-57, 6:5-11; *see* §VIII.C.4.c.

6. Claim 3

King discloses the additional limitation of claim 3: “routing an IP data packet [*e.g.*, **returning traffic**], comprising, before the routing step, a step of transforming the packet by adding said secondary address [*e.g.*, **IP address of user device 100**] to the packet [*e.g.*, **reinstating the user device IP address**], and routing the packet based on said secondary destination address.” EX1003, ¶206. For example, King describes, upon receiving an incoming data packet, “reinstating the user device IP address as destination address and the user device assigned TCP port number” before “forward[ing] returning traffic ... to the user device.” EX1025, 3:2-6. And as discussed above, King discloses routing the packet based on the secondary destination address. *See* §VIII.C.4.

7. Claim 5

(a) 5[pre]

King teaches devices—a CPE and an aggregation device—that performs the claimed steps. *See* §VIII.C.4.a; EX1003, ¶207.

(b) 5[a]

King teaches an aggregation device that uses a processor to perform the claimed steps. *See* §VIII.C.4.b; EX1003, ¶208.

(c) 5[b]

King teaches an aggregation device that uses a processor to perform the claimed steps. *See* §VIII.C.4.c; ; EX1003, ¶209.

(d) 5[c]

King teaches an aggregation device that uses a processor to perform the claimed steps. *See* §VIII.C.4.d; ; EX1003, ¶210.

8. Claim 6

(a) 6[pre]

King discloses telecommunications network equipment, such as CPE **108** and aggregation device **110**, that are adapted to receive and route an IP data packet comprising a primary destination address and a destination port number. *See* §VIII.C.4.a; EX1003, ¶211.

(b) 6[a]

King and Kumar render obvious this limitation. *See* §VIII.C.7.b; EX1003, ¶212.

(c) 6[b]

King and Kumar render obvious this limitation. *See* §VIII.C.7.c; EX1003, ¶213.

(d) 6[c]

King and Kumar render obvious this limitation. *See* §VIII.C.7.d; EX1003, ¶214.

9. Claim 15

King also describes non-transitory computer readable mediums that execute instructions using a processor. EX1025, 12:4-9, 12:30-38; ; EX1003, ¶215.

D. Ground 4: Claim 4 Is Obvious in View of Fangman, Kumar and RFC 791

1. RFC 791 (EX1026)

RFC 791, which is the “Internet Protocol” specification, was published in September 1981. EX1026. Petitioner’s expert, Dr. Bhattacharjee, confirmed that he personally accessed and reviewed EX1026 as early as 1994. EX1003, ¶¶216-220. In this regard, the IETF is similar to the IEEE, and the date on the face of the publication is sufficient evidence of its publication date and public accessibility. *See Ericsson, Inc. v. Intellectual Ventures I LLC*, IPR2014-00527, Paper 41, at 11-11

(PTAB May 18, 2015). In fact, patents that pre-date the '369 patent's priority date cite to EX1026. EX1003, ¶220 (citing EX1027, 3:50-61, EX1028, 6:5-23). Petitioner's expert, Dr. Hall-Ellis, also confirmed that EX1026 is a true and correct copy of RFC 791, which was publicly available and catalogued by April 6, 1984. EX1005, ¶¶44-51.

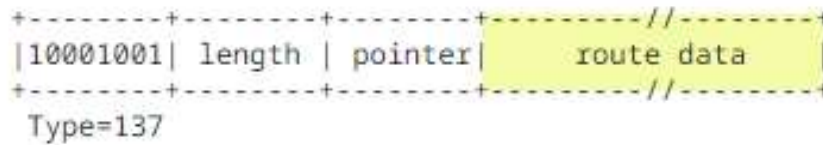
EX1029 is a true and correct copy of EX1026 captured by the Wayback Machine on July 20, 2006. EX1029. Thus, RFC 791 is prior art under at least pre-AIA §102(b). *See* MPEP §2128.

2. Claim 4

As discussed above, Fangman and Kumar render obvious Claim 1. *See* §VIII.B.4. The additional limitation of claim 4—"wherein the at least one identifier is a route identifier specific to said destination equipment and the packet is routed based on said specific route identifier"—is obvious in view of the general knowledge of a POSITA, or in further view of RFC 791.

Fangman discloses that its system is an "IP-based data networks." EX1024, 1:14-15, 1:19-24, 6:22-25. A POSITA at the time would have been well-aware of RFC 791, the "Internet Protocol" specification. EX1003, ¶222-23. This includes the "strict source routing" option disclosed in RFC 791, which specifies a "route data" field with the routers that an IP packet should traverse to the destination equipment (yellow):

Strict Source and Record Route



Id., 19-21; EX1003, ¶223; *see also* EX1031, 441-442.

It would have been obvious for Fangman’s service gateway 170 to implement the strict source routing option. EX1003, ¶¶223-24. In the combined system, the service gateway would select the route data to route the IP packet to a piece of destination equipment (e.g., host 102a) when performing NAPPT. EX1003, ¶223. The route data is “a route identifier specific to said destination equipment” because it specifies the exact path the packet should take to reach the destination equipment. *Id.*

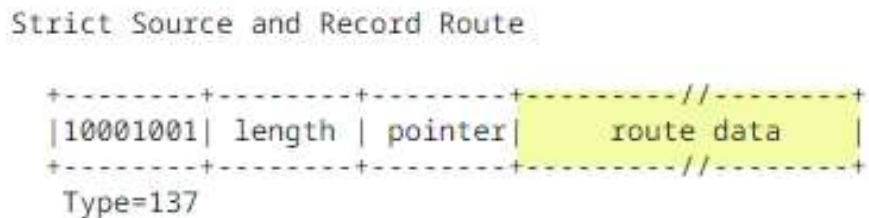
A POSITA would have been motivated to use strict source routing with the service gateway 170 of Fangman. EX1030, 1 (“many situations in which a source routing capability would be useful...”); EX1003, ¶224. Because strict source routing allows the service gateway 170 to specify the exact route to a host 102, the path can be optimized for reliability and bandwidth, for instance by routing packets around known bottlenecks or points of congestion. EX1030, 2 (one benefit is “restricting the route the a datagram may take” to avoid “some ‘trouble spot’”). A POSITA would have been particularly motivated to use source routing in Fangman

because selecting a path that optimizes reliability and bandwidth would improve the quality of Fangman’s VoIP calls. EX1003, ¶224.

E. Ground 5: Claim 4 Is Obvious in View of King, Kumar and RFC 791

1. Claim 4

King discloses an IP network with devices that operate in accordance with the “Internet Protocol.” EX1025, 1:21-33, claim 6. A POSITA would have thus understood King to disclose or render obvious that its network devices may operate in accordance with RFC 791, which is the “Internet Protocol” specification. EX1026 (RFC 791). RFC 791 discloses a “strict source routing” option (routing identifier) in a “route data” (yellow) field:



Id., 19-21; *see also* EX1031, 441-42. Thus, it was obvious to implement the strict source routing option such that the IP packet is routed to the terminal equipment based on the route data. EX1003, ¶225.

A POSITA would have been motivated to use strict source routing. EX1030, 1 (“There are probably many situations in which a source routing capability would be useful...”); EX1003, ¶226. For instance, a POSITA would have understood that

specifying the exact path to a piece of terminal equipment would allow the network to be optimized for reliability and bandwidth. EX1030, 2.

IX. DISCRETIONARY DENIAL IS NOT APPROPRIATE

A. Discretionary Denial Under the *Fintiv* Factors Is Not Appropriate

The Board should institute this proceeding because the relevant factors weigh against discretionary denial. Non-institution would be improper because these factors in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) strongly favor institution.

1. Factor 1: Whether the District Court Granted a Stay or a Stay May Be Granted If a Proceeding Is Instituted

The case is still in the early stages of litigation. Accordingly, the district court has not set any deadlines for claim construction or trial. Petitioner intends to file a motion to stay if the petition is instituted. A stay is proper in the Northern District of California because the litigation is in its early stages. *See Zomm, LLC v. Apple Inc.*, 391 F. Supp. 3d 946, 956 (N.D. Cal. 2019). This factor weighs against discretionary denial.

2. Factor 2: Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline for a Final Written Decision

The district court has scheduled the initial Case Management Conference for February 6, 2024, nearly three months from now. No scheduling order has yet to issue and no trial date has been set. Patent Owner stated in its opposition to Juniper's motion to transfer that "the average time to a jury trial in patent cases is 36.6 months

in the NDCA.” EX1032 at 28-29. Thus, a written decision on this petition will issue long before any trial. This factor weighs strongly against denial.

3. Factor 3: Investment in the Parallel Proceeding by the Court and the Parties

There has been no meaningful investment by either party in the district court proceeding. The district court has not entered a scheduling order. Fact discovery has not opened and no claim construction has occurred. Indeed, there have been no substantive motions raised in the parallel district court proceeding involving the '369 patent. The early stage of this litigation weighs against discretionary denial.

4. Factor 4: Overlap Between Issues Raised in the Petition and in the Parallel Proceeding

Although the invalidity contentions that will be served in the district court litigation are likely to include prior art cited in this petition, they are also likely to include additional references and might not advance the same grounds set forth in this petition. Instituting a proceeding will allow the Board to address the art, and the issues will be narrowed in the litigation due to the estoppel provisions of §315(e).

Additionally, Patent Owner asserts only claim 1 of the '369 patent in its complaint. EX1034, ¶ 100. This petition challenges additional claims, claims 2-17. Therefore, this factor weighs against discretionary denial. *3Shape A/S v. Align Tech., Inc.*, IPR2020-00223, Paper 12, at 34 (PTAB May 26, 2020); *see also Apple, Inc. v. Maxell, Ltd.*, IPR2020-00204, Paper 11, at 17 (PTAB June 19, 2020).

5. Factor 5: Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party

Petitioner is the defendant in the parallel district court proceeding. EX1034. This is true of most petitioners in IPR proceedings. While *Fintiv* indicates that a difference between the district court defendant and the IPR petitioner might weigh against discretionary denial, *Fintiv* does not suggest that this factor weighs in favor of discretionary denial if the district court defendant is the IPR petitioner. This factor is neutral.

6. Factor 6: Other Circumstances That Impact the Board's Exercise of Discretion, Including the Merits

As shown above, the merits of the petition are strong. Further, the prior art asserted in this petition was not considered during prosecution of the '369 patent. This is also the first petition challenging the claims of the '369 patent. Each of these additional factors weigh against discretionary denial.

B. Discretionary Denial Under 35 U.S.C. §325(d) Is Not Appropriate

The Board should not exercise its discretion under §325(d). *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, at 7 (PTAB Feb. 13, 2020). This analysis employs a two-prong framework: (1) whether the arguments presented in the previous action are the same or substantially the same as those previously presented to the Office; and (2) if so, whether the petitioner has demonstrated a material error by the Office in its prior consideration of those arguments. *Id.* Within these prongs, the Board considers

several non-exclusive factors from *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-015786, Paper 8 (PTAB Dec. 15, 2017).

1. Step One of Advanced Bionics

Petitioner's arguments and prior art are neither the same nor substantially the same art or arguments previously before the Office.

(a) Original Prosecution

During original prosecution, Biswas (EX1022), Kumar (EX1023), and King (EX1025) were not submitted to the PTO. There is therefore no basis for denying this petition "because, the same or substantially the same prior art or arguments previously were presented to the Office." 35 U.S.C. §325(d).

Patent Owner might argue that Fangman (EX1024) was cited in an IDS. But Fangman was not applied against the claims in an office action or otherwise discussed during prosecution. "The Board frequently holds that a reference that was neither applied against the claims nor discussed by the Examiner does not weigh in favor of exercising the Board's discretion under §325(d) to deny a petition." *Amazon.com, Inc. v. M2M Sols. LLC*, IPR2019-01205, Paper 14, 15 (PTAB. Jan. 27, 2020) (quotation omitted); *Adv. Energy Indus. Inc. v. Reno Tech. Inc.*, IPR2021-01397, Paper 7, 7 (PTAB Feb. 16, 2022); *Fasteners for Retail, Inc. v. RTC Indus., Inc.*, IPR2019-00994, Paper 9, 7-11 (PTAB Nov. 5, 2019). Moreover, as explained above, during prosecution the Examiner relied upon disclosures pertaining to

physical ports, whereas the claims require port numbers (a software construct). *See* §IX.C. Thus, Fangman is not cumulative of the disclosures relied upon during prosecution and the Examiner's failure to apply Fangman was material error, as described below. *See* §IX.B.2.

(b) Ex Part Reexamination

On October 23, 2023, Unified Patents, LLC requested *ex parte* reexamination ("EPR") of the '369 patent, and reexamination is proceeding under U.S. Patent Application No. 90/015,315. Unified Patents is not involved in this petition, and Petitioner is not involved in the Unified Patents EPR. The Board should not exercise its discretion under §325(d) to deny this petition.

First, §325(d) should not apply because the co-pending EPR is in its preliminary stages at the time of this IPR filing. *See, e.g., Mueller Sys. v. Rein Tech*, IPR2020-00099, Paper 9, 10-14 (PTAB May 12, 2020) (holding that §325(d) did not apply to prior art submitted in pending reexamination that had not yet resulted in an office action). Indeed, the EPR has not yet been granted, and an initial Office Action has not issued. The Patent Office's reexamination statistics further indicate that from 2021 through the first quarter of 2022 (the last month for which there is data), the average months from filing of an EPR to the first EPR Office Action on the Merits ("FAOM") varied between 4.85 and 7.46 months. EX1033. Thus, when the Board issues its institution decision for this petition, the Examiner will likely have

only recently issued (or not have issued) an initial Office Action. As a result, the Patent Office will not have fully considered the prior art or arguments submitted in the Unified EPR at the time the Board issues its institution decision on this IPR.

Second, §325(d) should not apply because this petition addresses all of the claims of the '369 patent, whereas the Unified EPR does not. In particular, this petition challenges claims 1-17, whereas the Unified EPR challenges only claims 1-3 and 5-17. EX1035, 1. Because the petition challenges claim 4 (and the Unified EPR does not), the petition necessarily includes arguments and prior art that are not the same or substantially the same as the Unified EPR. If this petition were denied on discretionary grounds, claim 4 of the '369 patent would not be the subject of any post-grant review before the Patent Office. On this basis alone, it would be inappropriate to apply §325(d).

Third, the EPR does *not* include any of the grounds that are presented in this petition. *See Nintendo Co. v. Polaris PowerLED Techs., LLC*, IPR2023-00778, Paper 9, 48-49 (PTAB Oct. 18, 2023) (“On the present record, we are not persuaded that a reexamination proceeding in its preliminary stages weighs in favor of exercising discretion to deny institution of *inter partes* review” because “the reexamination proceeding does not include any of the alleged grounds of obviousness presented in the Petition.”). Indeed, the Unified EPR presents invalidity grounds based on Fangman alone and U.S. Patent 7,624,195 alone. *See* EX1035.

Patent Owner may nevertheless argue that Fangman is relied upon in this petition and that U.S. Patent 7,624,195 shares overlapping inventors (*e.g.*, Biswas) with the Biswas reference relied upon in Ground 1 of this petition. However, Fangman reference is merely one primary reference used in an alternative ground, and the Biswas patent used in the EPR is not the same patent relied upon in this petition—indeed, the Biswas patent in this petition is not part of the same family as the Biswas patent in the EPR, has a different specification, and has a different set of inventors. Moreover, the Unified EPR does not include any arguments based on the King, Kumar and RFC 791 references in this petition.

It is also the case that the arguments in the petition are different and non-cumulative of those in the Unified EPR. As one example, for each of the independent claims the Unified EPR relies upon Biswas and Fangman’s disclosures of a “port range” as the claimed “port mask.” EX1035, 33, 36. In contrast, the present petition relies upon an obviousness combination with Kumar, which discloses a “mask” for defining a range of “port numbers.” *See* §VIII. The Kumar references thus provides different disclosures than those relied upon in the Unified EPR. As another example, the present petition relies upon RFC 791’s disclosure of “strict source routing” for claim 4. *See* §VIII.D-E. The Unified EPR does not rely upon “strict source routing” and does not even challenged claim 4. Thus, the Board should not deny institution based on §325(d).

2. Step Two of Advanced Bionics

Because Petitioner presents new arguments and combinations in this petition, it is unnecessary to analyze step two. However, even if the same or substantially the same art was previously presented to the Office somehow, the Examiner made material errors in evaluating the art.

(a) Original Prosecution

As discussed in Section V.C, during original prosecution the Examiner relied upon different references and arguments relating to, for instance, MAC addresses and *physical* ports. *See* §V.C. At the same time, the Examiner overlooked references like Biswas, Fangman, and King that provide clear teachings of improved PAT techniques that assign a range of port numbers (a software construct) to hosts so that they may share the same public IP address. The Examiner also overlooked references like Kumar that provide teachings regarding port masks, and references like RFC 791 that provide teachings regarding route identifiers that specify a route to a destination equipment. As shown in this petition, the teachings of Biswas, Fangman, King, Kumar, and RFC 791 render the Challenged Claims invalid.

(b) Ex Parte Reexamination

The Examiner has yet to order reexamination based on the Unified Patents EPR or issue any office action. To the extent the references or arguments in the EPR are deemed to be the same or substantially the same as those in this petition (they

are not), it would be material error for the Examiner to find the Challenged Claims patentable for the reasons discussed in this petition.

X. CONCLUSION

The Board should institute IPR and cancel claims 1-17.

Date: November 10, 2023

By: /s/ James Glass

Quinn Emanuel Urquhart & Sullivan, LLP

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), Petitioner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this Petition, that the number of words in this paper is 13,986. Pursuant to 37 C.F.R. §42.24(d), this word count excludes the table of contents, table of authorities, mandatory notices under §42.8, certificate of service, certificate of word count, appendix of exhibits, and any claim listing.

Date: November 10, 2023

Respectfully submitted,

By: /s/ James Glass

Attorney for Petitioner Juniper Networks, Inc.

CERTIFICATE OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. §§ 42.6(e) and 42.105 on the Patent Owner on a thumb drive by Federal Express of a copy of this Petition for Inter Partes review and supporting materials at the correspondence address of record for the '369 patent:

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