

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JUNIPER NETWORKS, INC.
Petitioner,

v.

MONARCH NETWORKING SOLUTIONS, LLC,
Patent Owner.

Case IPR2024-00175
Patent 8,693,369

DECLARATION OF DANIEL MINOLI

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I, Daniel Minoli, declare as follows:

I. INTRODUCTION

1. My name is Daniel Minoli. I am over eighteen years of age, of sound mind, and qualified to make the statements set forth in this Declaration. With the exception of the legal principles counsel has supplied to me, all the facts and statements contained herein are within my personal knowledge and are in all respects true and correct.

2. I have been asked by Monarch Networking Solutions, LLC (“Monarch” or “Patent Owner”) to submit this declaration in response to the Petition filed by Juniper Networks, Inc. (“Juniper” or “Petitioner”) and supporting declaration submitted by Dr. Samrat Bhattacharjee (“Bhattacharjee Declaration”) regarding U.S. Patent No. 8,693,369 (“the ’369 Patent”).

II. SUMMARY OF OPINIONS

3. The Petition and Dr. Bhattacharjee’s declaration do not demonstrate that there is a reasonable likelihood that any challenged claim of the ’369 Patent is invalid.

4. Dr. Bhattacharjee presents five grounds. Ground 1, which is primarily based on the Biswas reference, fails because neither Biswas nor Kumar teach the transmission of a “port mask” to a user device as claimed by the ’369 Patent. Further,

a POSITA would not combine Biswas with the teachings of Kumar because the two references are directed to different aspects of packet handling.

5. Ground 2, which is primarily based on Fangman, fails because Fangman does not teach that a packet is routed based on a port mask (or even a port range) as required by the independent claims of the '369 Patent. Grounds 2 and 4 also fail because a POSITA would not combine Fangman with the teachings of Kumar.

6. Ground 3, which is based primarily on the King reference. Ground 3 fails because King, like Fangman, does not teach that a packet's destination is determined based on a port mask. King also does not teach that a packet is routed with a destination identifier (identified in part by or via a port mask) as required by the claims of the '369 Patent. Grounds 2 and 5 also fail because a POSITA would not combine Fangman with the teachings of Kumar.

7. Grounds 4 and 5, which are exclusively directed to claim 4, fail because claim 4 depends from claim 1, which is not rendered obvious for the same reason as Grounds 2 and 3.

III. QUALIFICATIONS

8. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. My full *curriculum vita* is

attached as Exhibit EX2002 to this declaration. During the past 5 years, I have testified and/or submitted declarations in the following cases:

(1) *Nexus Connectivity Inc. v. Thankachan*, Case No. 656417/2022 (N.Y. S. Ct.);

(2) *Marble VOIP Partners LLC v. Zoom Video Communications Inc.*, Case No. 2:22-cv-02247-JAR-ADM (D. Kan.);

(3) *Fischbein v. IQVIA, Inc.*, Case No. 2:19-cv-05365-NIQA (E.D. Pa.);

(4) *Evertz Microsystems Ltd. v. LAWO North America Inc.*, Case No. No 19-302-MN (D. Del.);

(5) *GMG Products LLC v. Traeger Pellet Grills, LLC*, PGR2019-00036 (P.T.A.B.);

(6) *GMG Products LLC v. Traeger Pellet Grills, LLC*, PGR2019-00035 (P.T.A.B.);

(7) *GMG Products LLC v. Traeger Pellet Grills, LLC*, PGR2019-00034 (P.T.A.B.); and

(8) *GMG Products LLC v. Traeger Pellet Grills, LLC*, PGR2019-00024 (P.T.A.B.).

9. I received a Master of Science in Applied Mathematics in 1974 and a Master of Science in Computer Science in 1978 both from New York University Tandon School of Engineering. I have since worked and practiced in the field of telecommunications for several decades, with experience in the fields of data communications and networking, Internet Protocol version 4 (“IPv4”) and Internet Protocol version 6 (“IPv6”), telecommunications, cloud computing, Internet, wireless, and Internet of Things (“IoT”). I also have extensive research, technical,

and managerial expertise in these fields for both carrier networks and enterprise networks. I have written numerous peer-reviewed publications and textbooks in these fields. I am the inventor of an allowed U.S. patent application on integrated wireless technology. U.S. Pat. Application No. 17/589,374. A more complete list of my research and experience can be found on my CV. EX2002.

10. My work has been extensively cited: 262 published U.S. patents and 45 U.S. patent application reference my work. According to Google Scholar, over 7,773 academic researchers cite my work in their own peer-reviewed publications. In addition to my published books and articles, I have made technical presentations at over 90 technical conferences. I am also a reviewer for several publishers including Elsevier, Springer, IEEE, and Wiley. I have taught numerous telecommunications and networking courses at New York University, Stevens Institute of Technology, and Rutgers University over a period of 18 years. I have published numerous technical books on packet communications, IP, and networking.

11. I started working in the field of data networking and packet transmission in the late 1970s, and I continue working in these fields in both intranet and carrier network environments. I have extensive hands-on work in Local Area Networks (“LANs”), wireless LANs, IP, Multiprotocol Label Switching (“MPLS”), and related networking technologies over the years, including repeaters, bridges, access points, routers, firewalls, and traditional gateways. Specifically, I started

working with network layer protocols, including IPv4, in the mid-1970s, beginning with IP predecessors such as Network Control Protocol (“NCP”) and Network Layer Protocol (“NLP”). I continue to be very active in this field, including work on IPv6 starting in the mid-2000s, and on IPv4 address exhaustion mitigation mechanisms.

12. I also began working on voice over packet, which became Voice over IP (“VoIP”), in the late 1970s and published several IEEE papers on the topic and that time. I continue to track and work in that field.

13. In summary, I have extensive experience in and familiarity with the fields of networked IP systems and extensive experience and contributions towards the analysis, design, and implementation of such systems.

IV. COMPENSATION

14. I am being compensated for my time at my current standard rate of \$525 per hour for the services that I provide in connection with this IPR. That compensation is not contingent upon my performance, the outcome of this IPR, or any issues involved in or related to this IPR.

V. MATERIALS CONSIDERED

15. Among the materials I have reviewed in forming my opinions are the ’369 Patent, its prosecution history, and the patent application to which the ’369 Patent claims priority, as well as the patents, references, and other materials cited in this expert declaration.

16. I have also reviewed Juniper’s Petition for *Inter Partes* Review of the ’369 Patent and all of its exhibits (EX1001 to EX1035)—especially exhibit EX1003, the Declaration of Dr. Samrat Bhattacharjee submitted in support of that Petition.

VI. LEGAL UNDERSTANDINGS

17. I am not an attorney. For the purposes of this report, I have been informed about certain aspects of the law that are relevant to my analysis and opinions. In forming my opinions, I have not relied upon Monarch’s attorneys for any purpose other than the following legal principles.

A. Claim Construction

18. I understand that determining whether a patent claim is valid requires a two-step analysis. First, the claim must be construed. Second, the properly construed claim must be compared to the prior art.

19. With respect to the first step, I understand that claims are construed from the perspective of a person of ordinary skill in the art (“POSITA”) at the time of the invention. I understand that in the context of an *inter partes* review proceeding, absent a disclaimer or express definition, claim terms are given their plain and ordinary meaning to a POSITA in view of the specification and file history and the knowledge of a POSITA. Unless otherwise noted, I have applied what I consider to be the plain and ordinary meaning of all terms as understood by a POSITA at the time of the invention, which I understand to be approximately March

31, 2008 (the filing date of French Patent Application No. 08 52108, to which the '369 claims priority).

B. Validity

20. I understand that a patent claim is presumed to be valid. I understand that to overcome that presumption, the challenger must show that the claim is invalid by a preponderance of the evidence. I understand the preponderance of the evidence to require the greater weight of evidence in favor of the challenger.

21. I also understand that, in performing a proper unpatentability analysis, an expert must do more than simply provide quotes from the evidentiary record along with conclusory allegations of unpatentability. To the contrary, an expert's conclusions regarding unpatentability must be supported by actual analysis and reasoning set forth in the expert declaration, such that the theoretical and factual foundation for the expert's conclusions can be properly evaluated.

C. Anticipation

22. I understand that a claim is invalid if each and every element of the claim is disclosed in a single prior art reference with the elements arranged as specified in the claim, either expressly or inherently. I understand that invalidity based on the disclosure of a single prior art reference in this manner is called anticipation.

23. I understand that, although not expressly disclosed, subject matter may be inherently disclosed in a prior art reference where that subject matter is necessarily present in the subject matter disclosed and would be understood to be so by those of ordinary skill in the art. I understand that the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.

D. Obviousness

24. I understand that a patent claim may be found unpatentable as obvious only if the Petitioner establishes by a preponderance of the evidence that, as of the priority date, the subject matter of the claim, considered as a whole, would have been obvious to a person having ordinary skill in the field of the technology (the “art”) to which the claimed subject matter belongs.

25. I understand that a claim would have been obvious under 35 U.S.C. § 103 if one or more prior art references disclose, expressly or inherently, every claim limitation in such a way so as to render the claim, as a whole, obvious to a person of ordinary skill in the art at the time the purported invention was made. The relevant standard for obviousness is as follows:

A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention

pertains. Patentability shall not be negated by the manner in which the invention was made.

35 U.S.C. § 103.

26. In determining whether or not a patented invention would have been obvious, the following factors should be considered: (a) the scope and content of the prior art; (b) the differences between the prior art and the claims at issue; (c) the level of ordinary skill in the art; and (d) whatever “secondary considerations” may be present.

27. I understand that certain “secondary considerations” may be relevant in determining whether or not an invention would have been obvious, and that these secondary considerations may include commercial success of a product using the invention, if that commercial success is due to the invention; long-felt but unsolved need for the invention; evidence of copying of the claimed invention by others; industry acceptance; initial skepticism of the invention; failure of others to solve the problem; praise of the invention by others; the taking of licenses under the patents by others; and simultaneous invention by others (which may be an indication that the claimed invention was the result of ordinary skill in the art).

28. I understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. While multiple prior art references or elements may, in some circumstances, be combined to render a patent claim obvious, I understand that I

should consider whether there is an apparent reason to combine the prior art references or elements in the way the patent claims. To determine whether such an apparent reason exists to combine the prior art references or elements in the way a patent claims, it will often be necessary to look to the interrelated teaching of multiple patents, to the effects of demands known to the design community or present in the marketplace, and to the background knowledge possessed by a person having ordinary skill in the art.

29. I also understand that when the prior art teaches away from combining prior art references or certain known elements, discovery of a successful means of combining them is more likely to be non-obvious. A prior art reference may be said to teach away from a patent when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the patent or would be led in a direction divergent from the path that was taken by the patent.

30. I also understand that it is not permissible to use hindsight in assessing whether a claimed invention is obvious. Rather, I understand that, to assess obviousness, one must place oneself in the shoes of a person having ordinary skill in the relevant field of technology at the time the inventions were made who is trying to address the issues or solve the problems faced by the inventor and ignore the knowledge you currently now have of the inventions.

31. I also understand that there are numerous ways in which to articulate the legal standard for obviousness, including: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve similar devices (methods, or products) in the same way; (d) applying a known technique to a known device, method, or product ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions with a reasonable expectation of success; (f) known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and (g) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

E. Person of Skill in the Art

32. I understand that the meaning of claim terms and a patent's validity are to be determined from the vantage point of one of ordinary skill in the art at the time of the invention. In determining who would be one of such ordinary skill, I understand it is appropriate to consider criteria such as: (a) the type of problems encountered in the art; (b) prior art solutions to those problems; (c) the rapidity with

which innovations are made; (d) the sophistication of the technology; and (e) the education level of active workers in the field.

VII. OVERVIEW OF THE '369 PATENT

A. Background

33. Packet-based networks route packets based on the destination address field in the header of a packet. Many of these networks rely on a protocol known as the Internet Protocol (“IP”), originally defined by RFC 791 (later updated by RFC 1349, RFC 2474, RFC 6864).¹ *See generally* EX1026. Many modern telecommunication networks (including the Internet) rely on the addressing scheme defined by IP version 4 (“IPv4”). *See* EX1026 at 7, 11, 17. The IPv4 address system uses addresses that are typically represented as a 32-bit field identifying devices connected to an IP network. *Id.* The IPv4 binary address can also be represented in other forms, such as decimally, e.g., 192.1.1.1 (which is equivalent to the binary number 11000000 00000001 00000001 00000001). IP service providers can create

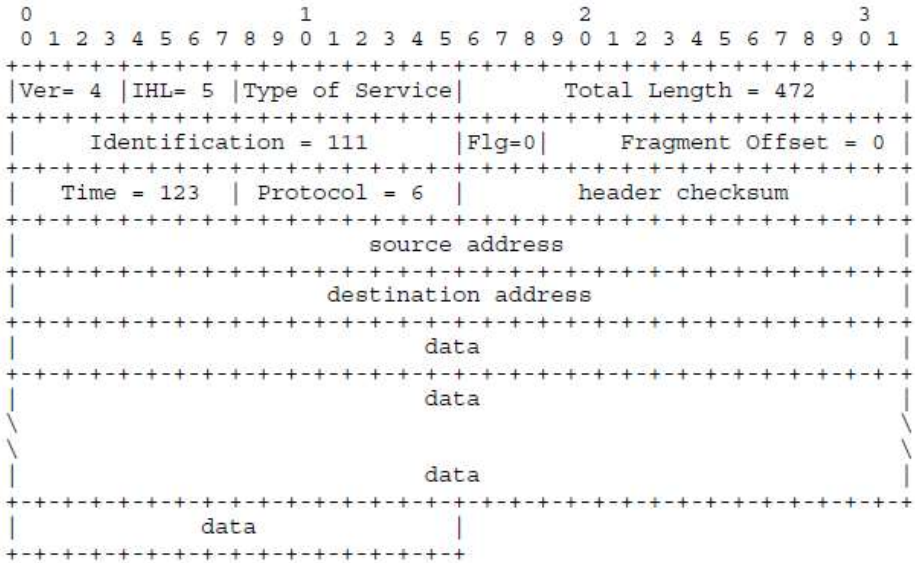
¹ A Request for Comments (“RFC”) is a publication by researchers and advocates in standards-setting bodies for the Internet, principally the Internet Engineering Task Force (IETF). An RFC is a proposal or memo describing approaches or innovations for the Internet. The IETF eventually adopts some, but not all of the RFCs as Internet Standards.

networks of devices that use these IPv4 addresses to route data packets between the end-user devices connected to the network (referred to in the '369 Patent as “terminal equipment”). EX1001 at 1:22-37. Public IP addresses and administered and granted to end-user organizations by the Internet Assigned Numbers Authority (IANA).

34. The IP protocol is a connectionless protocol, meaning that no sessions are defined, maintained, or managed by IP, in contrast to other packet protocols that support end-to-end channels or sessions. Because IP does not support sessions, a higher layer protocol such as Transmission Control Protocol (“TCP”) is needed to support end-to-end sessions.² *See generally* EX2003 (defining TCP).

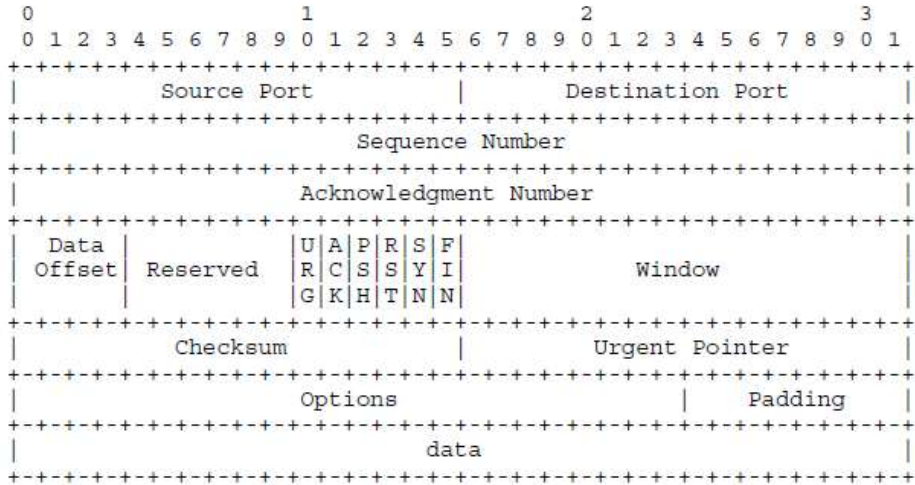
35. TCP data is encapsulated in the payload portion of an IP packet, rather than included in the IP header. The first portion of the TCP data is a header that includes two “port” fields, comprising a logical source port and a logical destination port. EX2003 at 15, Fig. 3. These ports are typically represented as 16-bit fields and include a source port and a destination port *Id.* Since the port fields immediately follow the IP header in a packet, the TCP ports can often be used as an extension of the IP addressing field as illustrated below:

² In the Open Systems Interconnection model (“OSI model”), IP is a layer 3 protocol, and TCP is a layer 4 protocol.



Example Internet Datagram

Figure 6. (RFC 791)



TCP Header Format

Note that one tick mark represents one bit position.

Figure 3. (RFC 793)

EX1026, Fig. 6, EX2003 Fig. 3. In this instance, the entire TCP protocol data unit fits in the IPv4 packet data field.

36. A companion layer 4 protocol to TCP is User Datagram Protocol (“UDP”). *See generally* EX2004 (defining UDP). UDP is a connectionless protocol, meaning it does not have end-to-end sessions. It is used extensively in real-time streaming services such as VoIP and IPTV. Like TCP, UDP also uses two port fields, that can also be represented by 16-bit values, though the two protocols differ in other ways. *Id.* at 1.

37. In order to identify entities in a public network, IP addresses assigned to said entities have to be unique, just like physical addresses. IPv4 allows about 4.3 billion unique addresses (administered by IANA). But by the time of the ’369 Patent, it was apparent that the number of available public IPv4 addresses could be exhausted due to the proliferation of networked devices, which would impede access to public networks. EX1001 at 1:53-54. Some kind of intervention is necessary to avoid, or at least delay, exhaustion of IPv4 addresses as the number of connected devices invariably increases over time. *Id.* at 1:53-54.

38. One solution to the problem of IPv4 address exhaustion is Internet Protocol version 6 (“IPv6”). *Id.* at 1:55-59. IPv6 uses addresses that are typically represented by a 128-bit value, or an equivalent representation. EX2011 at 4-5. The IPv6 address scheme dramatically increases the number of available public addresses (theoretically to approximately 3.40×10^{38} addresses). However, IPv6 is not designed to be backward compatible with IPv4; thus, integrating IPv6 networks

with existing IPv4 networks requires additional configuration and machinery beyond that dictated by the protocol standards. *See, e.g.*, EX2005 at 1 (detailing “Transition Mechanisms for IPv6 Hosts and Routers” that are “designed to allow IPv6 nodes to maintain complete compatibility with IPv4”). As a result, at the time of the invention of the ’369 Patent, not all organizations and operators had been able to transition from IPv4 to IPv6 due to “financial or strategic reasons.” EX1001 at 1:59-60.

39. At the same time, these organizations and operators were aware of the imminent risk of IPv4 address exhaustion. *Id.* at 1:60-65. Solutions were developed to limit the number of public IPv4 addresses needed to provide connectivity to the universe of terminals and devices. *See id.* at 1:66-2:1. One of these solutions is Network Address Translation (“NAT”), and specifically, dual NAT or Operator NAT. *Id.* NAT typically operates to map a private IP address to a public one. *See, e.g.*, EX2006 at 3-4. But, this solution has several drawbacks. EX1001 at 2:19-20. For example, the Operator NAT solution increases the complexity of routing and, with certain applications, can result in frequent re-registration requests. *Id.* at 2:20-23. It can also lead to degraded IP connectivity. *Id.* at 2:37-41. Another method to limit the use of public IPv4 addresses known at the time of the invention of ’369 Patent is Port Address Translation (“PAT”) which manages the port address space. *See, e.g.*, EX2007 at 7, 11. There were also techniques that combine the functions of NAT and PAT. *Id.*

B. The '369 Patent

40. The inventor of the '369 Patent sought to address the above shortcomings of the existing techniques used to provide connectivity to the public Internet while conserving public IPv4 addresses. EX1001 at 2:45-55.

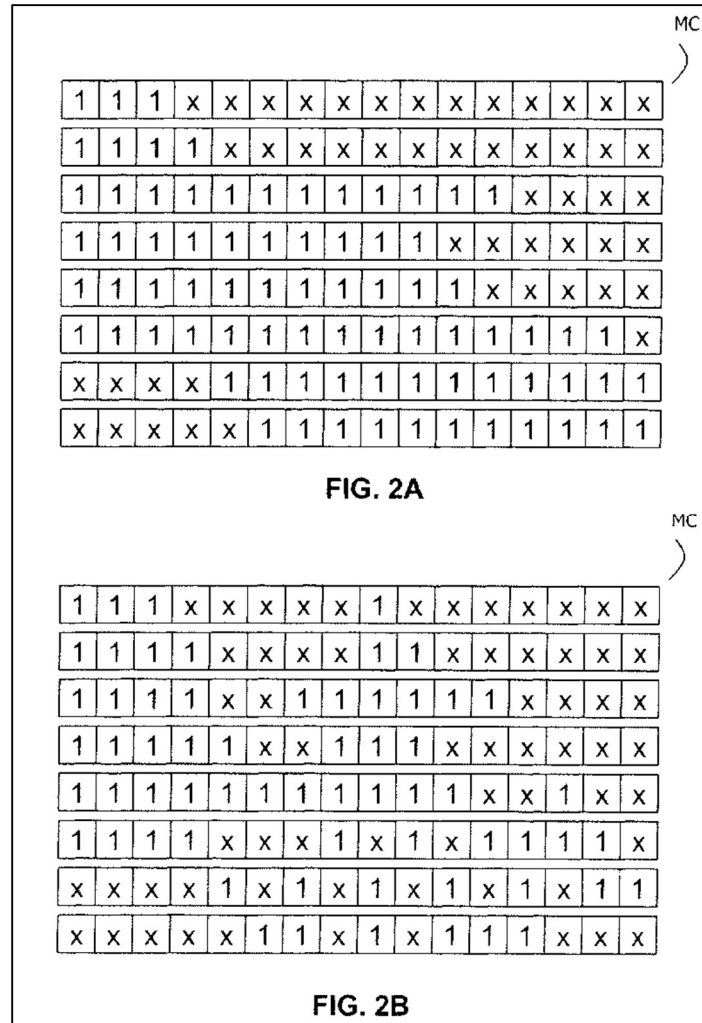
41. The '369 Patent is titled “Method of routing a data packet in a network and an associated device.” *Id.* at cover. According to the '369 Patent, it was invented by Mohamed Boucadair while working on techniques to counter the exhaustion of public IP address at Orange, a French telecommunications company. *Id.* at cover, 1:53-54. The '369 Patent claims priority to March 31, 2008. *Id.* at cover. It was issued on April 8, 2014. *Id.* I note that Dr. Bhattacharjee does not dispute that the priority date of the '369 Patent is March 31, 2008. EX1003 ¶ 52.

42. The '369 Patent generally relates to IPv4 telecommunications networks, and more specifically to IPv4 routing methods that conserve IPv4 addresses. *Id.* at 1:41-50, 2:19-41 3:18-29. In particular, the '369 patent describes techniques for assigning a public IP address to multiple terminal devices without having to use the Operator NAT solution. *Id.* at 3:11-23.

43. IP packets can carry a variety of protocols in their payloads (i.e., in the data fields), but as I explained above, IP-based communication typically entails the transmission of TCP or UDP data units. As I explained above, the TCP/UDP headers include source and destination ports. The invention '369 Patent takes advantage of

these port numbers in a novel manner. One novel aspect of the invention of the '369 Patent is the assignment and conveyance of a port mask to a terminal device by an edge router that defines a range of port numbers assigned to the terminal device. *Id.* at 3:11-29, 7:29-32.

44. As the '369 Patent explains, port masks are a sequence of bits that represent a range of port numbers. EX1001 at 7:49-67. Examples of these port masks are illustrated in Figs. 2A and 2B:



EX1001 Figs 2A, 2B

45. By assigning and transmitting a port mask to a terminal device, the terminal device can construct outgoing packets with an assigned public IP address and a locally-selected available port that falls within the range of its port mask(s). *Id.* at 4:65-66, 7:33-35. Thus, a routing device implementing the invention of the '369 Patent can support the transmission of packets from terminal devices sharing a common public IP address and avoid the drawbacks of operator NAT. *See id.* at 2:17-23, 3:18-23. Another benefit of using port masks is it eliminates the need for the edge router or CPE to track and compare each port in use by each terminal device, and therefore, it removes the need to perform the traditional NAT function. Instead, the edge router only needs to know which port mask is assigned to which terminal device, and the edge router can route packets to the desired terminal device when a packet's destination port "matches" with a port mask for the terminal device (i.e., it falls within the mask's range). EX1001 at 8:57-68. This simplicity reduces the overhead at the edge router required to route packets.

46. The '369 Patent has seven independent claims that recite similar subject matter. Claims 1, 5, and 6 recite methods and apparatuses for routing an IP data packet, while claims 7, 10, 11, and 14 recite methods and apparatuses to configure a terminal device in a telecommunications network. EX1001 at 14:14-16:43 In claims 1, 5, and 6, when receiving a packet, a port mask is determined that corresponds to a range of port numbers assigned to the terminal device. *Id.* at 14:15-15:2. Based on

that determination, the packet is routed to the terminal device based on an identifier associated with the device. *Id.* In claims 7 and 10, a configuration message is sent to a terminal device that includes an assigned primary address, a port mask that establishes a range of port numbers that the terminal device may use. *Id.* at 15:3-15:38. Claims 11 and 14 add that before a packet is transmitted, a port number is selected from the range defined by the port mask and includes certain parameters. *Id.* at 15:39-16:35.

47. Throughout this report, I have used the same annotations as Dr. Bhattacharjee. EX1003 at 10-13.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

48. I understand Dr. Bhattacharjee has opined that a POSITA “would have had a Bachelor of Science 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. This level of skill is approximate, and lack of professional experience can be remedied by additional education, and vice versa.” EX1003 ¶ 64. For the purposes of this declaration, I do not dispute Dr. Bhattacharjee’s description of a POSITA. I meet Dr. Bhattacharjee’s criteria, and I have applied that description in my analysis. I reserve the right to propose my own definition of a person of ordinary skill in the art (“POSITA”) in the future if necessary.

IX. PETITIONER'S REFERENCES

49. Dr. Bhattacharjee offers opinions regarding five references: (1) Biswas; (2) Kumar; (3) Fangman; (4) King; and (5) RFC 791. *See* EX1003 at ¶¶67-76 (Biswas and Kumar), 139-143 (Fangman), 183-185 (King), and 216-221 (RFC 791). I discuss each of them below.

A. Biswas [EX1022]

50. Biswas is U.S. Patent No. 8,019,889, titled “Method and apparatus for making end-host network address translation (NAT) global address and port ranges aware.” EX1022 at cover. It generally describes methods for handling packets with embedded or translated IP addresses. *Id.* at 2:23-33.

51. Biswas acknowledges the issues created by IPv4 address exhaustion, and notes that existing solutions, namely NAT, have several drawbacks. *Id.* at 1:14-2:19. Biswas describes a number of methods that attempt to improve these methods. *Id.* at 2:23-33. To solve these problems, Biswas describes an edge router that can, on request, assign a “Global Address,” and, optionally, a “Global Port Range” to a host device of a private network. *Id.* The global address and, optionally, a port from the global port range can be used by the host device as either an embedded or translated address and port for a packet that is transmitted to another device on a public IP network. *Id.*

52. Biswas describes several methods that may be used by the host device to obtain the Global Address and Global Port Range from an edge router. For example, Biswas describes issuing a Dynamic Host Configuration Protocol (“DHCP”) request to obtain this information. *Id.* at 6:50-60. This request could be sent to the edge router or to a customer premises equipment (“CPE”) or to an Authentication, Authorization, And Accounting (“AAA”) server. *Id.* at 7:9-17, 9:21-31.

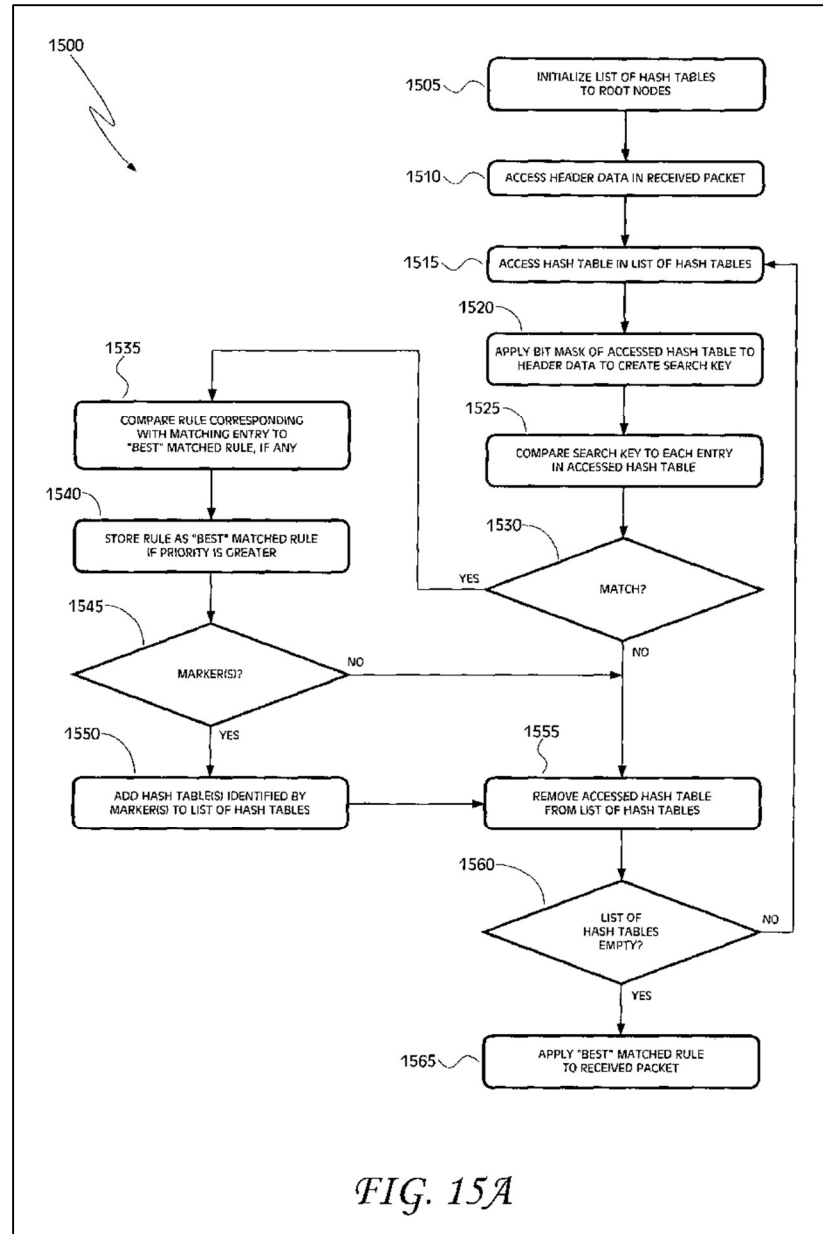
53. As Dr. Bhattacharjee recognizes, Biswas does not describe port masks, their use, or distribution, unlike the ’369 Patent. EX1003 at ¶ 90. Furthermore, unlike the ’369 Patent, Biswas also does not describe how an edge router or CPE determines whether a port number falls within a range of stored port numbers, which Dr. Bhattacharjee also acknowledges. *Id.* ¶ 98.

B. Kumar [EX1023]

54. Kumar is U.S. Patent No. 7,394,809, titled “Method and apparatus for packet classification using a forest of hash tables data structure.” EX1023 at cover. Kumar generally relates to methods for classifying packets in a “packet classifier” for the purpose of managing rules for arriving packets. *Id.* at 1:20-24, 2:57-66. More specifically, Kumar describes methods of creating a “forest of hash tables data structure” using bit masks corresponding to rules and using those rules to classify packets into various categories. *Id.* at Abstract. In one embodiment, Kumar describes

a packet classifier 500 that includes a rules database 510, a hash table data structure 520, and a search agent 530. *Id.* at 6:36-40. The search agent (i.e., a software or firmware module) is able to search the hash table data structure and identify a “best” match. *Id.* at 6:38-40. The hash table data structure 520 (also called a “forest of hash tables”) includes a number of hash tables 900. *Id.* at 6:52-55.

55. Kumar describes methods for storing and associating rules within its database so that a “best” match may be identified once a packet arrives at the firewall. *Id.* at 7:4-14. This process is illustrated by Fig. 15A:



56. Kumar varies significantly from the '369 Patent. For example, the term port mask is not used, and UDP/TCP ports are discussed only generally. *See, e.g.*, EX1023 at 3:27, 3:39, 6:18-6:30, 8:1-14, 8:64- 9:15. Kumar also does not compare a received port number to a port mask. Instead, Kumar describes creating a “search key” by applying a bit mask of a hash table to the header data of a packet. *Id.* at 19:2-

10. The search key is then compared to each entry of each relevant hash table to identify a “best” match. *Id.* at 19:11-27. Nothing in this process suggests to a POSITA that a port mask should be provided directly to a terminal device.

57. Moreover, Kumar does not teach address administration or public IP address conservation. Instead, Kumar focuses on “classifying packets.” *See id.* at 1:35-65 (“To implement the above-described routing methodologies (e.g., firewalls, QoS routing, bandwidth reservation) that provide more discriminating routing of network traffic, as well as to perform other policy-based packet forwarding techniques, it is necessary to classify packets.”).

C. Fangman [EX1024]

58. Fangman is U.S. Patent No. 7,068,647, titled “System and method for routing IP packets.” EX1024 at cover. It describes systems and methods for routing voice packets between IP Telephones over a telecommunications network, an environment also known as IP telephony or Voice over IP (“VoIP”). *Id.* at Abstract, 1:14-15. In particular, Fangman describes a network address persistent port translation (“NAPPT”) technique for translating addresses to or from a public IP address to a private IP address. *Id.* at Abstract, 4:9-17.

59. Fangman focuses specifically on IP telephony and its complexities. *Id.* at 1:14-22; 8:21-31; 12:24-30; 12:49-60; 17:67-18:9. As Fangman explains, the limit on available IP addresses required various NAT techniques to conserve public IP

addresses, the most common of which was Network Address Port Translation (“NAPT”). *Id.* at 1:47-54. However, NAT presented several problems for VoIP. *Id.* at 1:55-64, 2:5-11.

60. Fangman also notes that traditional methods of VoIP created issues with firewalls, particularly with packets using UDP (which is prevalent in VoIP). *Id.* at 2:12-27.

61. To address these problems, Fangman describes several alternative techniques for setting up and managing IP Telephony connections. *Id.* at 3:3-10. While Fangman describes several of these techniques in detail, the common technique used in Fangman’s embodiments is Network Address Persistent Port Translation (“NAPPT”), which allows IP packets to be sent between a local network and a public wide area network without changing the source port number. *See, e.g., id.* at 4:28-33.

62. When using NAPPT on a data packet, the private source address is translated to a public source address, but the source port is unchanged. *Id.* at 18:24-30. The public address and the “persistent” port can then be used to identify the device corresponding to a packet sent back to the private network. *Id.* at 18:28-39.

63. Unlike the ’369 Patent, Fangman does not teach routing a packet based on the port mask or port range assigned to a terminal device. Instead, Fangman

suggests using the port number provided by the terminal device in the relevant communication session. *See id.*

D. King [EX1025]

64. King is U.S. Patent No. 8,032,639, titled “Apparatus and method for providing data session source device information.” EX1025 at cover. It describes a system and methods for providing session source device information within a community (i.e., a group) of devices. *Id.* at 4:34-35, 4:52-57. In particular, King describes mechanisms to impose policies as dictated by an Authentication, Authorization and Accounting (“AAA”) administrator or server on packet flows. Specifically, King focuses on a device that can aggregate source host sessions (a “service aggregation device”) to manage connections between a “community” and a wide area network such as the internet. *Id.* at 1:45-59, 5:8-19.

65. King first explains that, in order to access a network, such as the Internet, a user device typically obtains access through customer premises equipment (“CPE”). *Id.* at 1:22-25. The CPE device then communicates with a gateway to the wider network, such as an aggregation device. *Id.* at 1:25-28. The aggregation device will seek to obtain and apply a “policy” to the communications between the user device and the wider network. *Id.* at 1:28-30. This policy can, for example, be used to ensure the device is authorized, that a link with an appropriate

bandwidth is selected, or that an appropriate billing method is applied. *Id.* at 1:30-33.

66. Initialization of this communication involves the user device initiating “an explicit service session with the aggregation device,” such as by logging on to the Internet *Id.* at 2:14-16. In order to complete the connection, the aggregation device needs to identify the user so that the correct policy can be obtained from a management device (such as a AAA device) applied. *Id.* at 2:16-48. However, the aggregation device receives limited information about the user, so this process can present challenges. *Id.* at 3:42-44, 3:53-4:2.

67. King explains the prior approaches to the steps of identifying and retrieving the policy info. *See id.* at 2:25-39, 2:49-3:54. However, King identifies several drawbacks with these prior methods, particularly when port address translation (“PAT”) is used. *Id.* at 3:42-44, 3:53-4:2.

68. To avoid these drawbacks, King describes a system wherein the services aggregation device is able to derive source device information from a packet with translated source and port information. *See id.* at 5:8-22, 5:36-46. In King’s system, the CPE assigns TCP (or UDP) port numbers to data sessions associated with each user device. *Id.* at 5:28-32. The port numbers assigned to each device are stored in a database which is accessible by both the CPE and the aggregation device. *Id.* at 5:36-42. Using this database, the aggregation device can identify the source

device of an outgoing packet it receives. *Id.* at 5:36-51. The aggregation device can then send the correct user information to the AAA server and obtain the correct policy. *Id.* at 5:51-56.

69. King differs from the invention of the '369 Patent in several ways. For example, this process in King does not describe the transmission of a packet based on the derived identity of the destination device. Instead, the source identifier information is sent to an AAA device in order to obtain a policy. That policy is then applied to the transmission of the packet, with the source address and source port number unchanged by the aggregation device. Moreover, King does not describe applying its approach to a *destination* address or port number on an incoming packet. King also does not describe port masks in any way.

E. RFC 791 [EX1026]

70. RFC791 is entitled “DARPA Internet Program Protocol Specification.” EX1026 at 1, 3. It specifies that Standard Internet Protocol developed for the Department of Defense. *Id.* at 5 (Preface). In particular, it illustrates a model of the Internet transmission path and provides the general specification for IP, such as the header format and the associated parameters. *Id.* at 17 (“3.1 Internet Header Format”). It attempts to utilize origination-provided full paths to reach a destination. EX1026 at 25.

X. GROUND 1

**A. Biswas In View Of Kumar Does Not Disclose Or Render Obvious
The Use Of A Port Mask To Define Or Assign A Range Of
Numbers (7[b], 7[c], 10[b], 10[c], 11[pre], 11[b], 14[pre], 14[b])**

71. Independent claims 7, 10, 11, and 14 all include elements that claim that a port mask is used to define a port range and that the port mask is transmitted to a terminal device. Independent claim 7 recites “assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it.” EX1001 at 15:10-12 (element 7[b]). Claim 10 recites essentially the same thing in the context of a configuration server. *Id.* at 15:33-35 (element 10[b]). Independent claims 7 and 10 are related and both include elements related to sending the port mask to a piece of terminal equipment:

sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier

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.

Id. at 15:13-15, 15:36-38 (elements 7[c] and 10[c]).

72. Similarly, independent claims 11 and 14 both recite receiving a configuration message comprising “a port mask defining a range of port numbers that is dedicated to [the piece of client terminal equipment]” in their preambles. *Id.* at 15:39-44, 16:20-27. Claims 11 and 14 add that, before a packet is sent “a port

number in the range of port numbers defined by the port mask” is selected. *Id.* at 16:1-6, 16:29-34 (elements 11[b] and 14[b]).

73. Dr. Bhattacharjee’s analysis for these claim limitations appears at paragraphs 87-104 of his declaration relative to claim 7. EX1003 ¶¶ 87-104. His analysis for these elements in claim 10 largely refers back to these paragraphs. *Id.* ¶¶ 112-113. Likewise, Dr. Bhattacharjee’s analysis of claims elements 11[pre] and 14[pre] primarily refers back to his discussion of claims 7 and 10. *Id.* ¶¶ 114, 132. His analysis of element 11[b] is at paragraphs 118-119 and also refers back to his discussion of element 7[b]. *Id.* ¶¶ 118-119. The discussion of element 14[b] refers back to the discussion of element 11[pre] (and 10[a] with respect to the inclusion of a processor). *Id.* ¶ 134.

74. As I noted above, Dr. Bhattacharjee acknowledges that Biswas does not disclose the use of port masks. *Id.* ¶ 90. I agree with this conclusion. Instead, Dr. Bhattacharjee argues that a POSITA would look to Kumar and combine it with Biswas to render these elements obvious. I note that Dr. Bhattacharjee makes a similar argument with respect to Grounds 2, 3, 4, and 5.

75. As an initial matter, Dr. Bhattacharjee has not provided a sufficient analysis of why a POSITA would be motivated to combine Biswas with Kumar. Dr. Bhattacharjee’s analysis ignores the significant differences between these references. For example, Biswas discusses an edge router that can assign a “Global

Address,” and, optionally, a “Global Port Range” to a host device of a private network. EX1022 at 2:23-33. The assigned global address and global port range can be transmitted to a host device in a dynamic host configuration protocol (“DHCP”) reply or similar transmission. *Id.* at 2:56-59. The global address and a port from the global port range can then be used by the host device as either an embedded or translated source address and port for a packet that is transmitted to another device on a public IP network. *Id.* at 2:23-33.

76. As Dr. Bhattacharjee acknowledges, Kumar, on the other hand, describes methods to organize and use databases of rules for policy-based packet classification. EX1003 ¶ 73, EX1023 at 2:66-3:14. These rules are placed in complicated “forests of hash tables” used to create “search keys” that must then be used to identify a “best match.” EX1023 at Abstract, 9:36-46, 19:11-27. As I noted above, Kumar does not discuss IP address management and conservation using the packet classification process.

77. These two patents are directed to separate aspects of networking, namely, assigning addresses and ports to a host device via a DHCP message in Biswas, and categorizing packets based on header information in Kumar. Nothing Dr. Bhattacharjee points to in Biswas addresses extracting or categorizing data from a packet header, such that a POSITA would be motivated to look to Kumar. Dr. Bhattacharjee also has not identified anything in Kumar that suggests transmitting

parts of its categorization system to a terminal device in a DHCP request. Indeed, nothing in Kumar addresses routing, IP address management, or IP address conservation, and nothing in Kumar suggests this method would have been used to send port ranges to a terminal device.

78. A POSITA seeking to implement the routing method of Biswas would never look to Kumar. Dr. Bhattacharjee contends that both Biswas and Kumar are in the same field of art. EX1003 ¶ 97. I disagree. As I noted above, Kumar's disclosure addresses policies in a "packet classifier" such as a firewall. Firewall packet handling deals with traffic flow management, not IP address mapping or distributing address and port assignments to terminal devices. At the time of the invention of the '369 Patent (circa 2008), this was, and remains, a significant distinction. For example, Kumar never provides any teaching on how routing is supported by its classification system. Furthermore, there is no discussion of the type of topology management routing protocols that need to be supported by Kumar's system to facilitate packet routing, such as routing information protocol ("RIP"), open shortest path first ("OSPF"), or Border Gateway protocol ("BGP"). And, by focusing on firewalls, Kumar does not consider the additional complexities or processes involved with routing a packet. Instead, Kumar merely discusses routing generally and at an introductory high level. *See, e.g.*, EX1023 at 3:1-8, 3:15-18. A POSITA would not look to Kumar when seeking to improve the system of Biswas

for the purpose of IP address conservation or sending a port mask to a terminal device.

79. Dr. Bhattacharjee's analysis also does not consider whether the combination of Biswas with Kumar would provide any benefits to Biswas. As I explained above, Kumar does not describe simply using a port mask. Instead, Kumar uses a complex hierarchical data structure comprised of a "forest of hash tables," with first and second rules, where "first rule is a 'descendant' of a second rule if the second rule—i.e., the 'ancestor' of the first rule." *Id.* at Abstract, 10:27-47, 18:65-19:10. Kumar explains that a received IP packet header (rather than a port range) is first converted to a "search key" using an "AND" operation with the bit mask of a hash table. EX1023 at 19:2-10. This search key is then compared to each entry in the hash table. *Id.* at 19:11-18, Fig. 15A. This process continues with each hash table until a match is found. *Id.* at 19:36-40, Fig. 15A. As a result, the combination of Kumar with Biswas would add significant processing demands to Biswas' methods for assigning embedded and translated addresses and ports. Due to this, a POSITA would not think to implement the Kumar system in Biswas.

80. Additionally, both Kumar and Biswas are silent with respect to transmitting a port mask to a terminal device. As I have explained, Kumar only teaches the internal use of masks to manage its packet classification and handling rules. *See, e.g.*, EX1023 at 8:1-14; 8:64-9:15 (example of rules as described by

Kumar). Biswas does not address port masks at all. Nothing in either reference suggests that a port mask would ever be transmitted to a terminal device. Indeed, Dr. Bhattacharjee ignores the substantive technical changes that would be required in both systems to suggest that port masks could be sent to a terminal device. *See* EX1003 ¶¶102-103. For example, nothing in Biswas or Kumar explains how a terminal device would use a port mask to determine what port to use for a subsequent transmission.

81. Thus Dr. Bhattacharjee has not shown that a POSITA would combine Biswas and Kumar to render obvious “assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it” and the related claim elements. Moreover, neither Biswas nor Kumar disclose sending a configuration message to a terminal device that includes a port mask.

XI. GROUND 2

A. **Fangman Does Not Disclose “determining a port mask assigned to the destination equipment...” and “selecting at least one identifier...based on the port mask” (1[a], 1[b], 5[a], 5[b], 6[a], 6[b])**

82. Independent claim 1 recites “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.” EX1001 at 14:20-22 (element 1[a]). Element 1[b] of claim 1 adds that “selecting at least one identifier of the destination equipment of the packet . . . based on the port mask[.]” *Id.* at 14:23-26. Claims 5 and 6 includes

similar limitations from the perspective of “a device for routing an IP data packet . . .” and “telecommunications network equipment . . .” *Id.* at 14:46-53, 14:60-67.

83. Dr. Bhattacharjee’s analysis for these claim limitations appears at paragraphs 152-167 with respect to claim 1, 173-174 for claim 5, and 177-178 for claim 6. EX1003 ¶¶ 152-167, 173-174, 177-178. Dr. Bhattacharjee’s analysis for claims 5 and 6 primarily refer back to his analysis for claim 1. *Id.* ¶¶ 172-179.

84. Much of Dr. Bhattacharjee’s analysis focuses on Fangman’s description of the routing functions at a service gateway. *See, e.g.*, EX1003 ¶¶ 153-154. Fangman explains that the service gateway may assign a range of ports to an IP Telephone (the terminal device in the local network connected to the service gateway). EX1024 at 16:64-17:3, 17:21-25. However, these descriptions of a port range are in the context of the initial setup of a connection. *See, e.g., id.* at 16:64-17:3, 17:21-25 (discussing port allocation in the context of a DHCP process). Indeed, the majority of Fangman’s discussion is focused on this set up process.

85. Fangman briefly discusses the handling of received packets. *Id.* at 18:31-44. This embodiment describes Fangman’s teachings related to packet handling:

Conversely, when the SG **170** receives a data packet from the IP device destined for the IP telephone **120**, the data packet may include a public destination IP address, a destination port number; and source information associated with the IP device, where the destination port

number is in the assigned range of port numbers for the IP telephone **120**. In one embodiment, the public destination IP address and the destination port number may be used to uniquely identify the IP telephone **120**. 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 while leaving the destination port number unchanged. Note that in this embodiment, the private IP address may be an IP address of the IP telephone **120**. After NAPPTing the data packet, the SG **170** may send the data packet to the IP telephone **120**.

Id. at 18:31-47. This disclosure first describes the contents of a packet received at service gateway 170, i.e., that it may include “[1] a public destination IP address, [2] a destination port number; and [3] source information associated with the IP device, where the destination port number is in the assigned range of port numbers for the IP telephone **120**.” *Id.* at 18:31-36. Fangman then explains how a packet with these contents may be handled: “In one embodiment, the public destination IP address and the destination port number may be used to uniquely identify the IP telephone **120**.” *Id.* at 18:37-39. Focusing on the destination port number, Fangman teaches that the packet includes a port number within the range assigned to the destination IP telephone, and that the port number may be used to identify the destination IP telephone. But this does not teach using the port range (or a port mask) to identify a destination IP telephone as required by the claims of the ’369 Patent.

86. Fangman also describes a process called Network Address Persistent Port Translation (“NAPPT”) used by a service gateway. EX1024 at 8:44-58; *supra*

§ IX.C. As the name suggests, NAPPT translates an IP address from a private one to a public one but uses a persistent port number that is unchanged between the private and public networks. EX1024 at 8:53-57; *supra* § IX.C. This technique is combined with more traditional address translation. EX1024 at 8:51-53; *supra* § IX.C. As with traditional NAT, the NAPPT process requires the edge device to “maintain a table of semi-permanent mappings of the external IP address and ports to the internal hosts and ports.” EX1024 at 8:49-51; *supra* § IX.C.

87. By tracking these mappings in its NAPPT table, a service gateway can determine that a packet with the public address and the persistent port number belongs to a particular IP telephone. *See* EX1024 at 18:39-47. However, this process suggests that, in NAPPT, the destination port number (previously identified in an outgoing transmission) is used to identify the destination of a packet. *Id.* at 8:49-51. This does not teach to a POSITA “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” claimed by the ’369 Patent.

88. Dr. Bhattacharjee agrees that Fangman would consult its NAPPT table to determine a destination for a received packet. EX1003 ¶153. However, Dr. Bhattacharjee then jumps to the conclusion that this process would lead the service gateway to “determine the assigned port range that includes the destination port

number.” *Id.* Dr. Bhattacharjee’s conclusion is based on an apparent misreading of Fangman.

89. First, Dr. Bhattacharjee states that “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.* (citing EX1024 at 8:45-58, 10:66-67, 11:14-15.) Based on this, Dr. Bhattacharjee concludes that a POSITA would understand that Fangman’s “service gateway 170 consults its mapping table to determine ‘the assigned range of port number’ to which the ‘destination port number’ in the IP packet belongs” *Id.* This is not accurate. Instead, the cited section explains that the service gateway 170 “may allocate a range of port number for each IP telephone 120 as it acquires its lease during a DHCP process” EX1024 at 8:45-48. In the next sentence, Fangman suggests that this table is separate from the NAPPT process, which “maintain[s] a table of semi-permanent mapping of the external IP address and ports to the internal hosts and ports.” *Id.* at 8:49-51. Next Fangman explains that the port information may be validated “to ensure the correct internal host is using its assigned port range.” *Id.* at 8:55-56. But importantly, this validation occurs on packets sent by IP telephone **120** and validates the *source* port number. *Id.* at 8:51-56. This does not suggest this validation process would be applied to the *destination* port number. *See, e.g.,* EX1024, Fig. 6C (illustrating that NAPPT does not change the source port

in step 638). Thus, a POSITA would not understand this disclosure to teach “determining a port mask assigned to the *destination equipment*, the port mask defining a range of port number to which the *destination port number* belongs.” EX1001 at 14:20-22.

90. The other two lines Dr. Bhattacharjee cites from columns 10 and 11 of Fangman are similarly taken out of context. EX1003 ¶ 153. These sections describe capabilities in the service gateway that are used in the initialization and DHCP process, not to route incoming packets to their destination. EX1024 at 10:20-11:67.

91. For the reasons explained above, nothing in Fangman teaches using a destination port range (or mask) to determine a destination for a packet as required by claims 1, 5, and 6. Fangman’s discussion of port ranges is only in the context of assigning source ports for outgoing transmissions. Dr. Bhattacharjee never acknowledges the difference in Fangman’s treatment of source and destination ports. Nor does Dr. Bhattacharjee explain why a POSITA would be motivated to modify Fangman’s handling of destination ports to apply Fangman’s teachings related to source port. As I explained above, when handling a return packet, Fangman teaches consulting the port number stored in its NAPPT table to identify a destination device. Nothing in Fangman suggests that a port range (or mask) is used in the NAPPT process to identify a destination device for a packet. In fact, Fangman confirms that it uses only a port number for this purpose. EX1024 at 18:39-42 (“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” (emphasis added)).

B. Fangman In View Of Kumar Does Not Render Obvious The Use of Port Masks

92. As I noted above, claim element 1[a] recites “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.” EX1001 at 14:20-22. Element 1[b] adds that “selecting at least one identifier of the destination equipment of the packet . . . based on the port mask[.]”. *Id.* at 14:23-26. Claims 5 and 6 includes similar limitations from the perspective of a “a device for routing an IP data packet . . .” and “telecommunications network equipment” *Id.* at 14:46-53, 14:60-67. Dr. Bhattacharjee’s analysis for these claim limitations appears at paragraphs 152-167 with respect to claim 1, 173-174 for claim 5, and 177-178 for claim 6. EX1003 ¶¶ 152-167, 173-174, 177-178. Dr. Bhattacharjee’s analysis for claims 5 and 6 primarily refer back to his analysis for claim 1. *Id.* ¶¶ 172-179.

93. Dr. Bhattacharjee acknowledges that Fangman does not describe using port masks. EX 1003 ¶ 155. However, Dr. Bhattacharjee concludes the Fangman would be modified to use Kumar’s port masks to compare a port number in a packet to a port range. *Id.* ¶¶ 155-162, 167.

94. Nothing in Fangman suggests this modification, at least because Fangman never teaches routing a packet based on a port range. *Supra* § XI.A. Dr. Bhattacharjee does not argue that Kumar's port masks could be used in place of a single port number, and nothing in Fangman or Kumar would lead a POSITA to make such a combination.

95. Moreover, Petitioner has not shown a POSITA seeking to implement the routing method of Fangman would look to Kumar. Unlike Fangman, which as explained above, describes techniques for establishing IP telephone connections, Kumar addresses policies in a packet classifier, such as in a router or firewall. As I explained above, firewall packet handling deals with traffic flow management, not IP telephony or connection setup and management. Kumar does not address the additional complexities or processes involved with IP telephony, which involves both a media packet stream and a separate signaling packet stream (both of which need address management). Accordingly, a POSITA would not look to Kumar when seeking to improve the system of Fangman for the purpose of IP address conservation.

96. Dr. Bhattacharjee's analysis also fails to explain how the system of Kumar would provide any benefit to the IP telephony system of Fangman. Kumar describes a complex hierarchical data structure comprised of a "forest of hash tables," with first and second rules, where "first rule is a 'descendant' of a second

rule if the second rule—i.e., the ‘ancestor’ of the first rule.” EX1023 at Abstract, 10:27-47. The header of an IP packet, rather than just a port number or range is converted to a “search key” using an “AND” operation with the bit mask of a hash table. EX1023 at 19:2-10. This search key is then compared to every entry in the hash table. *Id.* at 19:11-18. This process continues with each hash table until a match is found. *Id.* at 19:36-40. As a result, Kumar adds significant processing demands that would place additional burden on Fangman’s NAPPT system. A POSITA would not think to implement the Kumar system in Fangman. Fangman’s system and environment is already complex, and Kumar would make the combined system much more complex.

XII. GROUND 3

A. King Does Not Disclose “Determining A Port Mask Assigned To The Destination Equipment...” And “Selecting At Least One Identifier...Based On The Port Mask” (1[A], 1[B], 5[A], 5[B], 6[A], 6[B])

97. Claim element 1[a] recites “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.” EX1001 at 14:20-22. Claim element 1[b] adds that “selecting at least one identifier of the destination equipment of the packet . . . based on the port mask[.]” *Id.* at 14:23-26. Claims 5 and 6 includes similar limitations from the perspective of a “a device for routing an IP data packet . . .” and “telecommunications network equipment . . .” *Id.* at 14:46-53, 14:60-67.

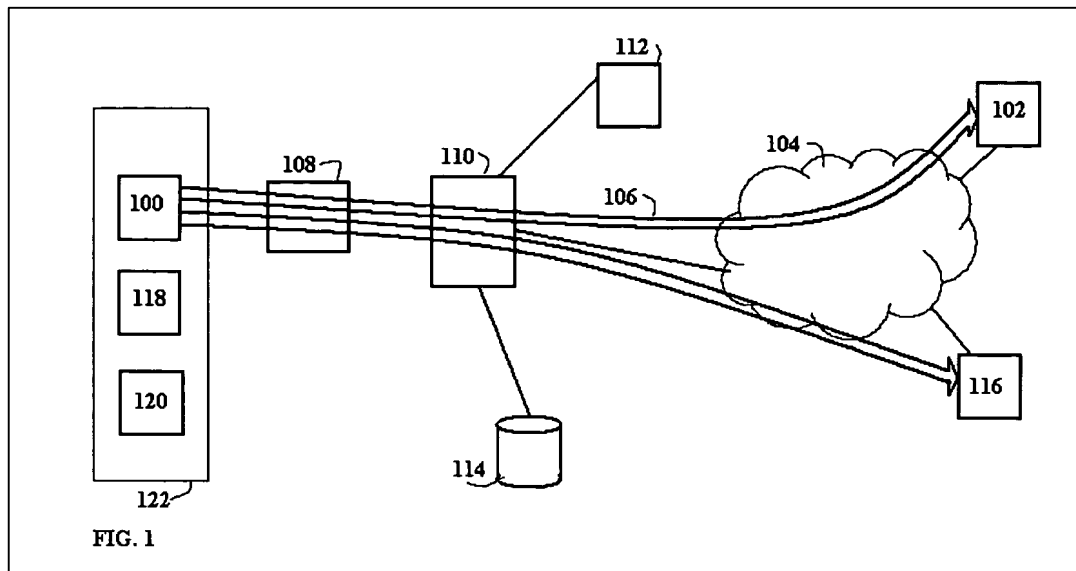
98. Dr. Bhattacharjee’s analysis for these claim limitations appears at paragraphs 193-203 with respect to claim 1, 208-209 for claim 5, and 212-213 for claim 6. EX1003 ¶¶ 193-203, 208-209, 212-213. Dr. Bhattacharjee’s analysis for claims 5 and 6 primarily refers back to his analysis for claim 1. *Id.* ¶¶ 207-214.

99. Dr. Bhattacharjee appears to misunderstand King’s disclosure and methods. Contrary to Dr. Bhattacharjee’s assertions, King never uses the device identifier information to route a packet to destination equipment. *See infra* XII.B. This creates two errors in his analysis of King. First, Dr. Bhattacharjee conflates *source* port processing with *destination* port processing. And second, Dr. Bhattacharjee proposed to combine King’s method of obtaining a policy with its description of a prior art method of routing packets without explaining why a POSITA would be motivated to do so.

100. As I explained above, King describes a system that allows an aggregation device to obtain user policy information from a management device, such as an authorization, authentication and accounting (“AAA”) server. *Supra* § IX.D. This is achieved by assigning source port ranges to user devices on a local network and sharing that information with both the customer premises equipment (“CPE”) that translates the packet’s address information, and the aggregation device, that assigns the policy. *Id.* By knowing the source port range assigned to each device, the aggregation device can identify the user device and use that identification to

obtain policy information from an Authentication, Authorization and Accounting (“AAA”) entity or server. *Id.*

101. This system is illustrated in Figure 1:



EX1025, Fig. 1. As Figure 1 shows, a packet in King flows from a first user device **100** to a CPE device **108**, then an aggregation device **110**, and onward to remote devices **102** and/or **116**. *Id.* at 1:34-59. When the packet is received at the aggregation device **110** (on its way to destination device **102**, for example), the aggregation device must know what policy to apply to the packet, such as parental control policy. *Id.* at 1:28-33. Since aggregation device **110** includes a table with *source* port ranges assigned by CPE device **108**, it can use the *source* port to identify the *source* device and obtain a policy for that device from AAA server **114**. *Id.* at 5:63-65, Figs. 6, 7. The packet can then be transmitted using that policy. *Id.* at 5:51-57.

102. At no point in this process is the **destination** port (i.e., a “port [] assigned to the destination equipment”) used as required by the ’369 claims . Indeed, nothing Dr. Bhattacharjee points to in King suggests that this method used to identify a policy would be implemented in reverse, i.e., to identify a policy for a packet transmitted from destination device **102** to user device **100** by using the destination port.

103. Even the language from King that Dr. Bhattacharjee included in his declaration is clear that King uses ports identifying **source** equipment, rather than destination identifying ports:

“[T]he 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.**”

“[I]ncoming packets can then be classified ... **based on source port range.**”

“In particular on receipt of a packet with (translated) **source** address IPCPE and (translated) TCP port in the range **1024 to 1039** the aggregation device derives corresponding **source device information.**”

EX1025, 5:28-32, 5:37-38, 5:42-46; *see also* EX1003 ¶¶ 185, 193-194 (citing EX1025 at 5:23-57). Dr. Bhattacharjee never articulates a reason why these teachings based on the source port would be applied to a destination port.

104. Because Dr. Bhattacharjee’s analysis is fundamentally flawed, he has not shown that King discloses “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” or “selecting at least one identifier of the **destination** equipment of the packet . . . based on the port mask[.]”

B. King Does Not Disclose “Routing The Packet To The Destination Equipment Based On Said Identifier” (1[C], 5[C], 6[C])

105. Claim element 1[c] recites “routing the packet to the destination equipment based on said identifier.” EX1001 at 14:27-28. Claims 5 and 6 includes similar limitations from the perspective of a “a device for routing an IP data packet . . .” and “telecommunications network equipment . . .” *Id.* at 14:54-55, 15:1-2.

106. Dr. Bhattacharjee’s analysis for these claim limitations appears at paragraph 204 with respect to claim 1, 210 for claim 5, and 214 for claim 6. EX1003 ¶ 204, 210, 214. Dr. Bhattacharjee’s analysis for claims 5 and 6 primarily refers back to his analysis for claim 1. EX1003 ¶ 207-214.

107. Contrary to Dr. Bhattacharjee’s assertions, King never describes that the device identifier information (identified based on the port mask) would be used to route a packet to the destination equipment. Dr. Bhattacharjee’s analysis glosses over this issue and only dedicates a single paragraph to explain how the packet is routed “to the destination equipment based on [the] identifier.” EX1003 ¶ 204. This analysis focuses entirely on King’s description of a prior art system that does not implement the techniques of King. *Compare id.* (citing EX1025 at 2:49-61, 3:2-6,

Fig. 5) *with* (EX1025 at 1:34-36, 1:60-61, 2:25-28). Dr. Bhattacharjee points to one step in that prior art process that explains that return traffic (which is not otherwise discussed in King) can be translated and sent to a local device. EX1003 ¶ 204. I reproduced King's entire description of this process below:

In particular at step **500** the user device initiates a service session with its IP address as source identifier and a native data session identifier such as a TCP source port as data session identifier. At step **502** the CPE translates the source address to its own overloaded IP address. At step **504** the CPE additionally translates the TCP source port to its own TCP port in a Port Address Translation (PAT) step as described in more detail below. Then, as 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.

EX1025 at 2:62-3:6. Nothing in this process suggests the use of port ranges or the identifier that is identified in claims earlier elements of claims 1, 5, and 6. Indeed, King teaches away from using this method and explains that it is the prior PAT technique that King explains created problems with identifying source devices. *Id.* at 3:42-52. Moreover, Dr. Bhattacharjee provided no explanation for why a POSITA would combine this technique with the policy identification method of King, or even how the source identifier used to obtain policy information from a AAA device would be used to route a packet to its destination.

108. In short, nothing in King suggests “routing the packet to the *destination* equipment based on said identifier [of the *destination* equipment].”

C. **King In View Of Kumar Does Not Render Obvious The Use of Port Masks**

109. As I noted above, Independent claim element 1[a] recites “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.” EX1001 at 14:20-22. Element 1[b] adds that “selecting at least one identifier of the destination equipment of the packet . . . based on the port mask[.]” *Id.* at 14:23-26. Claims 5 and 6 includes similar limitations from the perspective of a “a device for routing an IP data packet . . .” and “telecommunications network equipment . . .” *Id.* at 14:46-53, 14:60-67. Dr. Bhattacharjee’s analysis for these claim limitations appears at paragraphs 193-203 with respect to claim 1, 208-209 for claim 5, and 212-214 for claim 6. EX1003 ¶¶ 193-203, 208-209, 212-213. Dr. Bhattacharjee’s analysis for claims 5 and 6 primarily refer back to his analysis for claim 1. *Id.* ¶¶ 207-214.

110. Dr. Bhattacharjee contends that “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 for port number to which the destination port number belongs.” EX1003 ¶ 195. As I explained above, nothing in King suggests that a port range for the destination port would be used in any way in King. *Supra* § XII.A.

111. Dr. Bhattacharjee’s argument that a POSITA would combine King with Kumar relies on selective quotes that do not address the complexity of implementing

Kumar's search methods in King's policy management system. For example, Dr. Bhattacharjee has not shown a POSITA seeking to implement the routing method of King would look to Kumar. Unlike King, which concerns obtaining a policy from a AAA server, Kumar addresses applying policies in a packet classifier, such as in a firewall. As noted above, firewall packet handling deals with traffic flow management, not IP policy acquisition or routing. Thus, Kumar does not address obtaining policy information from an outside source. Accordingly, a POSITA would not look to Kumar when seeking to improve the system of King for the purpose of obtaining policy information.

112. Dr. Bhattacharjee has also failed to consider the additional complexity Kumar's teachings would impose on King. As noted above, Kumar uses a complex search system where packet headers are converted into search keys. *See, e.g.,* EX1023 at 18:65-19:10. This system would add consider processing demands to King steps that a POSITA would realize increases the complexity over the King's method of obtaining a policy from a AAA server. Thus, a POSITA would not implement the Kumar's system in King.

113. Petitioner's analysis also fails to explain how King and Kumar would be combined and how a POSITA would have a reasonable expectation of success. For example, Dr. Bhattacharjee does not explain how the complex system of a forest

of hash tables of Kumar would be implemented in King's translation table or policy management system.

114. In short, Dr. Bhattacharjee has not shown that a POSITA would modify King with Kumar.

XIII. GROUNDS 4 AND 5

A. Claim 4 Is Not Obvious For The Same Reasons As Claim 1

115. For Grounds 4 and 5, Dr. Bhattacharjee argues that Claim 4 is obvious in view of either Fangman and Kumar or King and Kumar in further view of RFC 791. Dr. Bhattacharjee's analysis of the elements of claim 1 depends entirely on his analysis in Grounds 2 and 3. EX1003 ¶¶ 222, 225. He then relies on RFC 791 for certain elements specific to claim 4. *Id.* ¶¶ 222-226. As I explained above, claim 1 is not obvious, and that reasoning applies to Grounds 4 and 5 as well. *Supra* §§ XI, XII. Accordingly, Dr. Bhattacharjee has not shown that claim 4 is obvious in either his Ground 4 or Ground 5.

XIV. CONCLUSION

116. For at least the reasons set forth herein, it is my opinion that Petitioner has failed to establish a reasonable likelihood that any of the claims of the '369 Patent are unpatentable over the cited prior art.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed on February 26, 2024, in Red Bank, New Jersey.

Respectfully Submitted,

A handwritten signature in blue ink that reads "Daniel Minoli". The signature is written in a cursive style with a horizontal line underneath it.

Daniel Minoli