

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 IPR2024-00485
U.S. Patent No. 8,451,844

**PATENT OWNER'S RESPONSE
TO PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,451,844**

Mail Stop "PATENT BOARD"
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Patent Owner's Exhibit List

Exhibit	Description
EX2001	RFC 2893 – “Transition Mechanisms for IPv6 Hosts and Routers” (Aug. 2000), available at https://datatracker.ietf.org/doc/rfc2893/
EX2002	RFC 1918 – “Address Allocation for Private Internets” (Feb. 1996), available at https://datatracker.ietf.org/doc/rfc1918/
EX2003	Excerpts from Newton’s Telecom Dictionary (11th ed., 1996)
EX2004	Excerpts from IBM Dictionary of Computing (1993)
EX2005	Printout of https://www.ietf.org/staging/
EX2006	Printout of https://www.ietf.org/staging/draft-xli-ivi-00-7430-cancelled.txt
EX2007	Screenshot of Internet Archive history for https://www.ietf.org/ (2008 year selected), available at https://web.archive.org/web/20080801000000*/www.ietf.org
EX2008	Screenshot of Internet Archive history for https://www.ietf.org/staging/ , available at https://web.archive.org/web/20240000000000*/https://www.ietf.org/staging/
EX2009	2008 IEEE Global Telecommunications Conference Proceedings Title Page, available at https://ieeexplore.ieee.org/xpl/conhome/4697774/proceeding
EX2010	Screenshot of Internet Archive history for www3.ietf.org/proceedings/staging , available at https://web.archive.org/web/20080515000000*/www3.ietf.org/proceedings/staging
EX2011	June 13, 2008 Capture of http://www3.ietf.org/proceedings/ , available at https://web.archive.org/web/20080613195553/www3.ietf.org/proceedings/
EX2012	October 4, 2008 Capture of http://www3.ietf.org/proceedings/ , available at https://web.archive.org/web/20081004152450/www3.ietf.org/proceedings/
EX2013	<i>Curriculum Vitae</i> of Dr. William Mangione-Smith
EX2014	Deposition notice of Alexa Morris
EX2015	Declaration of Dr. William Mangione-Smith in Support of Patent Owner’s Response
EX2016	Deposition Transcript of Alexa Morris, dated October 22, 2024
EX2017	Deposition Transcript of Ron Bonica, dated October 24, 2024

Table of Contents

I. Introduction.....	1
II. Background.....	2
A. State of the Art.....	6
B. The '844 Patent Invention.....	7
C. Petitioner's References	11
1. Li (EX1037).....	11
2. Li-2 (EX1038).....	14
3. Wu (EX1039).....	16
III. Person of Skill in the Art	19
IV. Claim Construction	20
A. "domain"	20
V. Argument	21
A. All Grounds: Li does not disclose the claimed IPv4 and IPv6 domains	22
1. Li teaches that Petitioner's purported IPv6 domain and IPv4 domain are not separate domains	24
(a) Li's Figure 7 depicts an intra-domain environment	24
(b) Li's Figures 8, 10, and 11 depict inter-domain environments.....	27
2. Petitioner's purported IPv6 domain and IPv4 domain are under common control.....	29
B. Ground 1: Li and Li-2	31
1. Petitioner has failed to show that Li-2 is prior art	31
2. A POSITA would not have been motivated to combine Li and Li-2 as proposed.....	39
(a) Li and Li-2 address different communication problems	39
(b) Li-2 is not an extension of Li.....	41
(c) Petitioner's motivations to combine rely on references that are not prior art	42
(d) The prior art identifies NAT tables as a well-known solution for IPv4 address exhaustion.....	44

C. Ground 2: Li.....	46
1. Recognizing that Li-2 is not prior art, Petitioner raises a second ground based on Li alone in view of knowledge in the art. <i>See</i> Pet. at 62. Petitioner admits Li fails to teach port number limitations	46
2. Petitioner fails to show simultaneous invention	46
D. Ground 3: Li and Wu	51
1. Li and Wu are directed to unrelated communication problems.....	51
2. Combining Li with Wu would eliminate the benefits of Li	53
3. Wu does not teach a destination address constructed with a destination port number.....	56
VI. Conclusion	59

Table of Authorities

Cases

<i>Endo Pharm., Inc. v. Actavis LLC</i> , 922 F.3d 1365 (Fed. Cir. 2019)	49, 50
<i>Immunex Corp. v. Sandoz Inc.</i> , 964 F.3d 1049 (Fed. Cir. 2020)	49
<i>Intex Recreation Corp. v. Team Worldwide Corp.</i> , IPR2018-00859, Paper 128, 2019 Pat. App. LEXIS 13585 (PTAB Oct. 21, 2019).....	50
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005)	49
<i>Regents of the Univ. of Cal. v. Broad Inst., Inc.</i> , 903 F.3d 1286 (Fed. Cir. 2018)	46
<i>Samsung Elecs. Co. v. Infobridge Pte. Ltd.</i> , 929 F.3d 1363 (Fed. Cir. 2019)	34
<i>SRI Int’l, Inc. v. Internet Sec. Sys., Inc.</i> , 511 F.3d 1186 (Fed. Cir. 2008)	32
<i>Voter Verified, Inc. v. Premier Election Solutions, Inc.</i> , 698 F.3d 1374 (Fed. Cir. 2012)	31, 38, 39

Regulations

37 C.F.R. § 102(a).....	1, 31
37 C.F.R. § 102(b)	39

I. Introduction

Patent Owner Monarch Networking Solutions LLC (“Monarch” or “Patent Owner”) respectfully requests that the Board affirm the validity of U.S. Patent No. 8,451,844 (“the ’844 Patent”) because petitioner Juniper Networks, Inc. (“Juniper” or “Petitioner”) has not carried its burden to establish invalidity on any of the grounds presented on claims 1-10 of the ’844 Patent.

Petitioner relies on one embodiment of Li to teach the claimed IPv4 domain and IPv6 domain for each independent claim of the ’844 Patent. The Li embodiment, however, teaches an intra-domain configuration and address mapping strategy that allows a single provider to migrate to an IPv6 backbone while still supporting IPv4 networks used by the IP provider’s customers. It does not teach routing communications between separate domains—one of which is an IPv4 domain—across an IPv6 domain, as required by every independent claim.

Furthermore, Petitioner’s first ground, which relies on Li and Li-2, fails to show that Li-2 is prior art under § 102(a). And Petitioner has repeatedly mischaracterized Li-2 and referred to non-prior art materials in an attempt to improperly expand Li-2’s teachings. First, Petitioner incorrectly asserts that Li-2 is an “extension” of Li; however, Li and Li-2 address different communications problems, and Li-2 never references or mentions the Li paper. Petitioner expands this mischaracterization of Li-2 on page 2 of the Petition (and elsewhere) by including images from references that are admittedly not prior art to explain and expand Li-2’s teachings.

For its second and third grounds, Petitioner relies on purported simultaneous invention to provide a missing limitation and motivation to combine. However, Petitioner fails to show that the references it relies on for simultaneous invention actually teach the challenged claims, instead focusing only on a single limitation—destination port number. But the claims are directed to more than just a destination port number within an IPv6 address. And the Wu reference relied on in the third ground relates to tunneling IPv6 packets over an IPv4 network, which is the inverse of the solution proposed by Li. A POSITA would not have been motivated to combine these references, which are directed to unrelated and incompatible solutions for IP network communications.

II. Background

The '844 Patent provides solutions for routing data packets across domains using different versions of Internet Protocol (“IP”) telecommunication networks. EX2015 ¶32-34; EX1001 at Abstract, 1:15-21. IP networks provide communication links between terminals connected to a network, allowing data to be exchanged between the terminals. EX2015 ¶32; EX1001 at 1:25-39. IP networks direct the data to the proper terminal using devices known as routers that route packets of data to their destinations on the basis of a destination address contained in each packet. EX2015 ¶32; EX1001 at 1:32-39, 6:59-7:10. The conventional version of this IP address system (referred to as “IPv4”) provided a limited number of publicly available IPv4 addresses. EX2015 ¶32; EX1001 at 1:61-62. Due to the limited number of available addresses, operators of home or business domains would frequently operate a “private domain,” in which terminals within the private domain

received private addresses with access to the public networks (such as the Internet) limited to exchanges occurring through a home gateway or application layer gateway. EX2015 ¶32-33; EX1001 at 1:43-56. The private terminals needing access to the public network share a limited number of public addresses assigned to the home or business network through techniques such as network address translation (“NAT”). EX2015 ¶32; EX1001 at 1:51-60.

To further reduce the number of IPv4 public addresses needed, “a solution known as Double NAT or Operator NAT has been proposed and implemented. It entails activating a NAT function within the telecommunications network of the operator so that the home gateways use a private address (instead of a public address) in their outgoing NAT tables.” *Id.* at 2:11-22. Both home gateway NAT and Operator NAT introduce significant drawbacks, including (1) requiring the interconnection equipment to track and maintain the state of connections in order to properly route packets; (2) introducing additional modifications of data packets for each level of NAT introduced (consuming additional time and processing resources); and (3) degradations in the levels and types of services available due to the limited availability of port forwarding and the resulting need to keep IP sessions active. *See id.* at 2:23-55; 3:40-52; 13:29-46.

A new Internet Protocol (referred to as “IPv6”) provides a significantly larger number of public IP addresses. EX2015 ¶33; EX1001 at 1:61-2:1. However, IPv6 is not designed to be backward compatible with IPv4; thus, integrating IPv6 networks with existing IPv4 networks requires configuration beyond that dictated by the

protocol standards. *See, e.g.*, EX2001 at 1¹ (detailing “Transition Mechanisms for IPv6 Hosts and Routers” that are “designed to allow IPv6 nodes to maintain complete compatibility with IPv4”). Many organizations and operators have not been able to transition from IPv4 to IPv6 due to “financial, strategic, and technical reasons.” EX1001 at 2:7-10; EX2015 ¶¶33-35. “It is therefore necessary to provide for a changeover to IPv6 in the medium term. Such a changeover will necessarily lead to a period of transition during which IPv6 domains will have to interconnect with IPv4 domains.” *Id.* at 2:46-55.

A home gateway² provides interconnection between a private domain and a public network operated by service providers. *See id.* at 1:40-56. “The home gateway generally assigns private IP addresses to the terminals of its home network.” *Id.* at 1:43-44. The addresses may be IPv4 addresses, which typically are formatted with a length of 32 bits, and frequently represented as four integers (each representing an octet of bits) separated by periods. *Id.* at 6:21-22. Private IP addresses may be allocated from a reserved private address space including the following blocks:

¹ Throughout this response, exhibit page citations for non-patent documents refer to the bates-stamped page provided for the exhibit. For exhibits that are patents, the traditional column and line number citation format is used.

² The term “home gateway” is used generically throughout this document to refer to various gateways and routers that are used to interface a private network with a public network, including customer premise equipment (CPE) gateways and border relays (BR).

10.0.0.0	-	10.255.255.255	(10/8 prefix)
172.16.0.0	-	172.31.255.255	(172.16/12 prefix)
192.168.0.0	-	192.168.255.255	(192.168/16 prefix)

EX2002 at 4. Addresses may be considered private in instances where the address is shared and thus the address is not globally routable. *Id.* at 2-4.

The same private addresses in such address spaces can be concurrently used or shared by multiple private networks. *Id.* (“The address space can thus be used by many enterprises. Addresses within this private address space will only be unique within the enterprise . . .”). Thus, subnetworks within the same private network (such as an internal network maintained by a business) typically share a single private address space, while independent private networks will have their own private address space for each network maintained by one or more servers for that network. *Id.*

Because private addresses are not unique across the broader public network (such as the Internet), terminals assigned these private addresses generally have limited ability to communicate with other terminals outside of the private network. *See id.* at 2-4 (“In order to use private address space, an enterprise needs to determine which hosts do not need to have network layer connectivity outside the enterprise in the foreseeable future and thus could be classified as private.”). A gateway can offer some public network accessibility to terminals with a private address by maintaining a table that maps a public address and port to a private address and port (often referred to as “NAT” or “NAPT”). EX1001 at 1:51-60, 2:11-45, 3:40-52, 6:13-20, 13:43-56. However, interoperability through traditional NAT is limited by the number of available public addresses and/or ports, and it requires the gateway to

monitor and maintain tables with state information about the current connections between terminals in the private domain and other terminals outside the private domain. *Id.* Thus, traditional methods of providing interoperability incurred significant overhead due to the requirement of tracking connection states in a network address and port translation (NAPT) table. These problems were further exacerbated by solutions such as Operator NAT, which required additional state tracking and modification of transmitted data packets within the telecommunication network of the operator. *Id.* at 2:11-45. Thus, for Operator NAT, state tracking is required at both a home gateway and at a border relay device. Thus, a telecommunications operator must include NAT state tables at both the home gateway and at a border relay device within the telecommunication network, which significantly increases the cost and complexity of the telecommunication network. Due to these complexities, telecommunication operators and service providers were reluctant to implement core networks that implement IPv6 addressing schemes. EX1001 at 2:7-45.

A. State of the Art

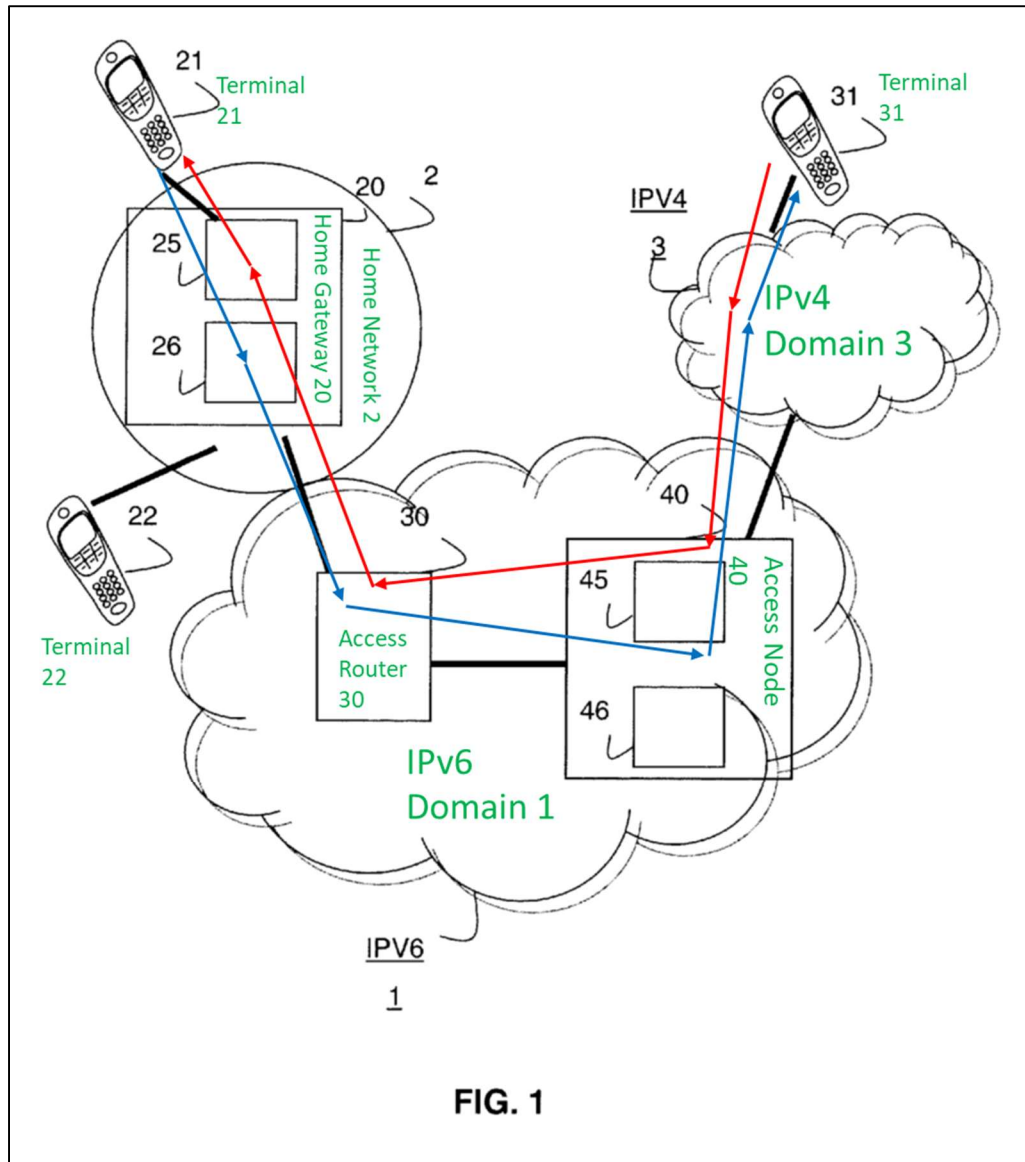
Because there is no single standardized strategy for transitioning from IPv4 to IPv6, there is also no single standardized solution for providing interconnection from one device or network type to another. EX2015 ¶35. For example, one organization may need to update its infrastructure backbone to IPv6 without breaking connectivity for existing IPv4 terminals, while another organization may need to provide a terminal with the ability to traverse an intermediate IPv4 network to exchange packets with an IPv6 terminal in a third network, while yet another

organization may need to provide connectivity between an IPv6 host and IPv4 hosts. *Id.*; compare EX1037 at 1-3, with EX1038 at 4, with EX1039 at 10-11. Because of these and other factors, it is well-known that different interconnection solutions are frequently incompatible and individual pieces of an interconnection solution cannot just be mixed and matched. EX2015 ¶35. Instead, the solution must be specifically tailored to the problems of a given transition strategy. *Id.*

Prior to the '844 Patent, the methods of providing interconnection between terminals in a separate IPv4 domain with a public IPv6 domain were often costly and complex, requiring the use of NAT state tables to convert between IPv4 and IPv6 addresses for every packet transmission occurring between these different domains. EX1001 at 1:51-60, 2:11-45, 3:40-52, 6:13-20, 13:43-56. The invention developed by France Telecom and disclosed in the '844 Patent sought to minimize the reliance on these state tables by introducing techniques that supported stateless encapsulation and/or translation of an IPv4 data packet into an IPv6 data packet. *See id.* at 3:40-46, 3:59-65, 13:43-56.

B. The '844 Patent Invention

The '844 Patent issued on May 28, 2013 and it claims priority to a French application filed by France Telecom on June 30, 2008.



The '844 Patent invention discloses techniques for routing data packets to and from IPv4 terminals in separate domains via an intermediate IPv6 domain without the need to resort to NAT-based state tracking. EX1001 at 3:35-52.³

³ The '844 patent does indicate that “an internal network address translation (NAT) device is often included in this kind of home gateway if it serves a plurality of user terminals 21, 22 in its home network.” EX1001 at 11:42-48. The home

The above diagram, an annotated version of Figure 1 of the '844 Patent, is an example of interconnected networks that benefit from the '844 invention. Domain 3 is an IPv4 domain connected to Domain 1, which is an IPv6 domain. EX1001 at 7:4-10. Domain 1 is further connected to Home Network 2, which is an IPv4 Domain providing network access to Terminals 21 and 22. *Id.* Because IPv4 addresses cannot be routed in an IPv6 domain, packets from a terminal in Domain 3 normally cannot be sent to a destination in Home Network 2, because to do so would require traversing IPv6 Domain 1.

The '844 invention provides the ability for terminals in an IPv4 domain (such as Terminal 31) to communicate with terminals in other IPv4 domains, even when reaching the destination terminal requires traversing an IPv6 domain. EX2015 ¶41. For example, the invention enables Terminal 31 in IPv4 Domain 3 to exchange data packets with Terminal 21 in Home Network 2, using the paths indicated by the red and blue arrows in the above figure. EX1001 at 9:62-11:41. Because Terminal 31 resides in an IPv4 Domain, it would normally be unable to communicate with Terminal 21 across IPv6 Domain 1, because IPv4 packets are not routable within an IPv6 domain. To communicate with Terminal 21, Terminal 31 creates an IPv4 packet with a header containing the destination IPv4 address and port of Terminal 21. *Id.* at 10:4-9. That packet is routed to Access Node 40, which is a dual stack

gateway may thus include an internal NAT to translate between public and private addresses.

IPv4/IPv6 router capable of routing traffic between Domain 1 and Domain 3. *Id.* at 9:47-56.

The invention teaches that an IPv6 routable packet can be created from an IPv4 packet using a novel stateless approach which includes constructing an IPv6 destination address using a predetermined operator prefix, destination IPv4 address from the incoming IPv4 data packet, and destination port from the IPv4 data packet. EX1001 at 2:59-3:18. This approach is stateless in that portions of the constructed IPv6 destination address can be retrieved from information in the incoming IPv4 data packet (IPv4 destination address and port information) and from network information that has been provided by other routers within the IPv6 domain (the operator or IPv6 prefix). The router in the IPv6 domain receiving the IPv4 data packet is able to construct the IPv6 destination address “on-the-fly” from the received IPv4 data packet without requiring entries in state tables. Access Node 40 will select the IPv6 prefix corresponding to the interconnection device which has previously advertised that it is responsible for routing packets to the destination address (in this case, a prefix associated with Access Router 30). *Id.* at 8:39-44, 10:14-22. The access node 40 will then construct an IPv6 packet from information derived from the received IPv4 packet and the generated IPv6 packet will be routed through the IPv6 domain to Access Router 30, which can then forward the packet to Home Gateway 20. *Id.* at 11:9-15 The home gateway can determine whether it is a standard IPv6 packet or an IPv6 packet which has been generated from an IPv4 packet. *Id.* at 11:20-24. If it is a packet generated from an IPv4 packet, the home gateway can generate an IPv4 packet from the IPv6 packet and route the IPv4 packet

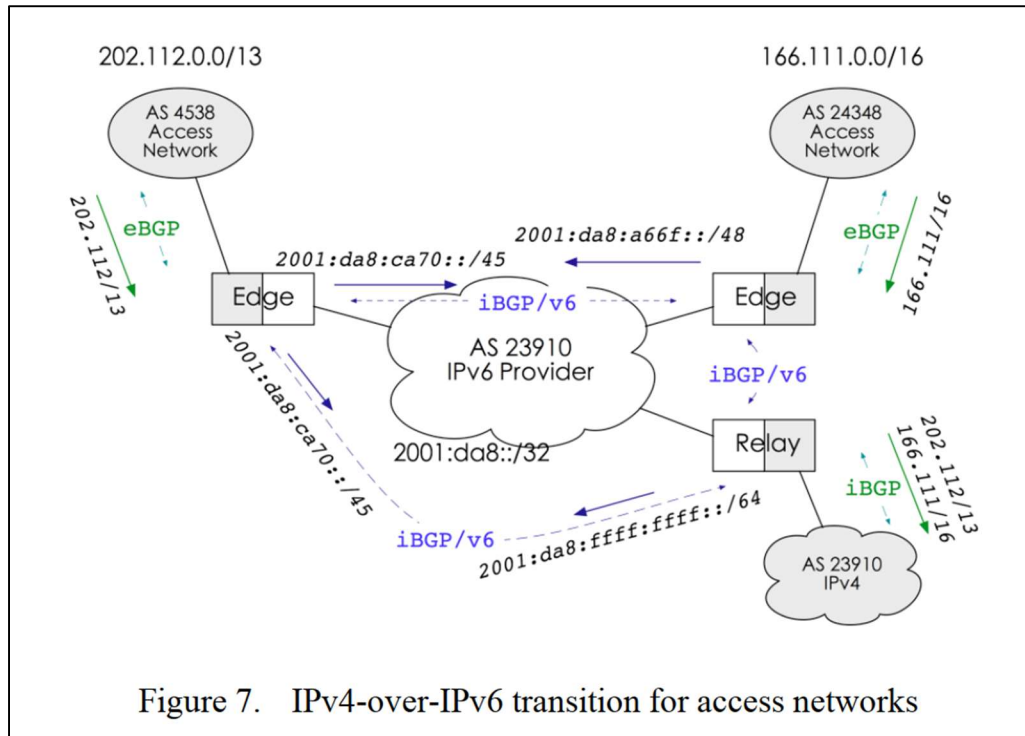
to a terminal within the home gateway network, such as Terminal 21. *Id.* at 11:25-41. This ability to uniquely route the data packet from an IPv4 source terminal through an intermediate IPv6 domain to the intended IPv4 destination terminal occurs despite the existence of other home gateways that may also use an address shared by home gateway 20. *See id.* at Figure 2 (shared@IPv4 address); 8:1-13 (“sharing the public address shared@IPv4 between home gateways ...”).

C. Petitioner’s References

Petitioner asserts three grounds of invalidity, arguing: (1) Claims 1-10 would have been obvious in view of Li (EX1037) and Li-2 (EX1038); (2) Claims 1-10 would have been obvious in view of Li; and (3) Claims 1-10 would have been obvious in view of Li and Wu (EX1039). Pet. at 6.

1. Li (EX1037)

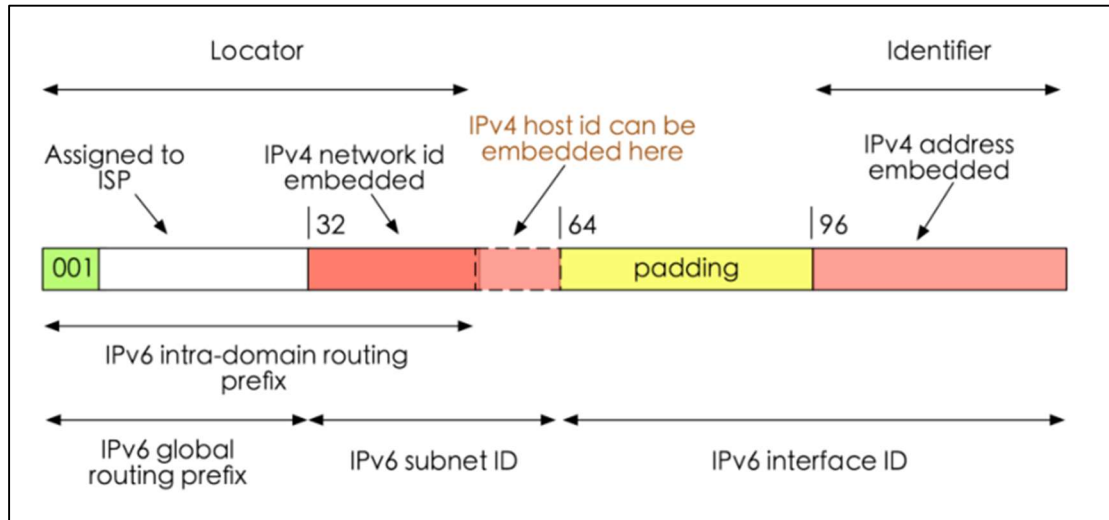
Li is an IEEE paper titled “Forwarding IPv4 Traffics in Pure IPv6 Backbone with Stateless Address Mapping,” detailing a mapping scheme that permits IPv4 hosts to communicate with other IPv4 hosts across an intermediate IPv6-only network. EX1037 at 1. Li teaches an approach to “forwarding IPv4 traffics in IPv6-only backbone....” *Id.* An exemplary IPv6 backbone is illustrated in Li’s Figure 7, reproduced below:



Id. at 7. AS 23910 is a service provider’s IPv6-only backbone; AS 4538 and AS 24348 each represent customer networks that are either dual-stack or IPv4 only. *Id.* at 6. AS 23910 IPv4, in the bottom-right corner of the figure, represents other IPv4 networks “out of the scope that the provider serves.” *Id.* at 7. This would include, for instance, the IPv4 Internet. *See id.* at 3 (Figure 1 showing IPv4 Internet in this same network architecture).

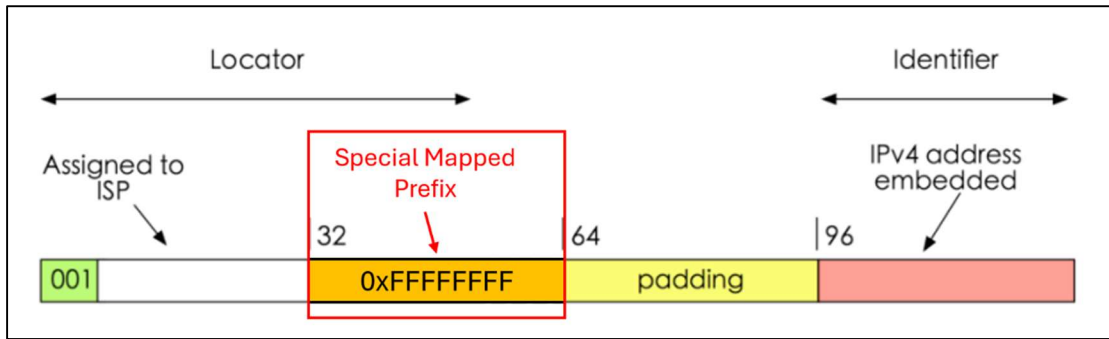
Li teaches two different ways to map an IPv4 address to an IPv6 address for transport through an IPv6-only network. EX2015 ¶52. The first type of mapping is reserved for IPv4 addresses within the control of the administrator of the IPv6 backbone. *Id.* IPv4 addresses within the control of the IPv6-backbone provider are mapped to IPv6 addresses by appending together the following components: (1) IPv6 prefix; (2) IPv4 network id and optionally IPv4 host id; (3) padding; and (4)

and IPv4 address. EX1037 at 3. This mapping is illustrated in Li's Figure 2, shown below:



Id. Li proposes this mapping only for handling IPv4 packets traversing the IPv6 backbone to IPv4 addresses that are held by the autonomous system (AS) that controls the IPv6 backbone. *See id.* (“It is important to emphasize that only the IPv4 addresses held by the AS can be mapped, or the mapping would run out the most space of an IPv6/32 block.”).

IPv4 communications traversing the IPv6 backbone that are directed to IPv4 addresses *not* held by the domain provider (*e.g.*, addresses belonging to other domain providers) use a different mapping scheme. EX2015 ¶54. In this mapping scheme, IPv4 addresses that are not administered by the IPv6 backbone provider are mapped to IPv6 addresses by appending together the following components: (1) IPv6 prefix; (2) “0xFFFFFFFF”; (3) padding; and (4) and IPv4 address. EX2015 ¶52.. This mapping is illustrated below:



Annotated Version of Li’s Figure 2 (adding special mapped prefix and removing bitstring descriptive annotations). Petitioner’s allegations only relate to the first mapping detailed above for intra-domain communications.

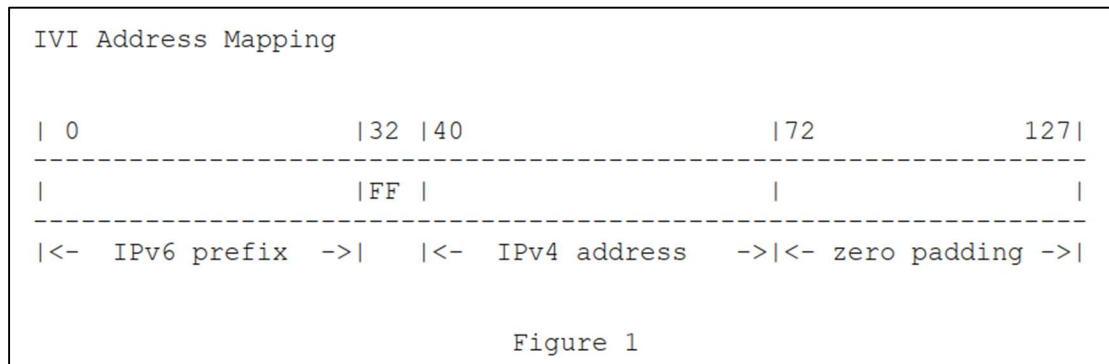
2. Li-2 (EX1038)

Li-2 is an Internet Draft submission titled “Bi-directional Address Borrowing (IVI)” detailing an IPv4-IPv6 transition scheme (referred to as IVI) in which “special IPv6 address blocks are defined, which can communicate with the global IPv6 networks directly and with the global IPv4 networks via stateless (or almost stateless) gateways.” EX1038 at 1, 2. In particular, Li-2 is focused on the requirement that “IPv6 hosts need to communicate with the global IPv4 networks” *Id.* at 4.

IVI’s implementation by an ISP requires: “(1) The ISP borrows a subset of ISP’s global routable IPv4 address, maps it into IPv6 and physically uses it for ISP’s pure IPv6 hosts; [and] (2) The ISP borrows a subset of ISP’s global routable IPv6 address, maps it into IPv4 and virtually uses it for global IPv4 hosts.” *Id.* at 6. The first subset of addresses (a set of global routable IPv4 addresses referred to as “IVI4(i)”) are assigned to a set of pure IPv6 hosts within the ISP’s network. *Id.* at 5. Thus, each such IPv6 host (“IVI Host”) has a global routable IPv4 address assigned

to it for use in communicating with IPv4 hosts. The second subset of addresses (a set of global routable IPv6 addresses referred to as “IVIG46(i)”) are virtually assigned to every possible global IPv4 address. Thus, within the ISP’s network, each possible global IPv4 address has a well-known corresponding IPv6 address.

The IVIG46(i) addresses are created using the following address mapping:



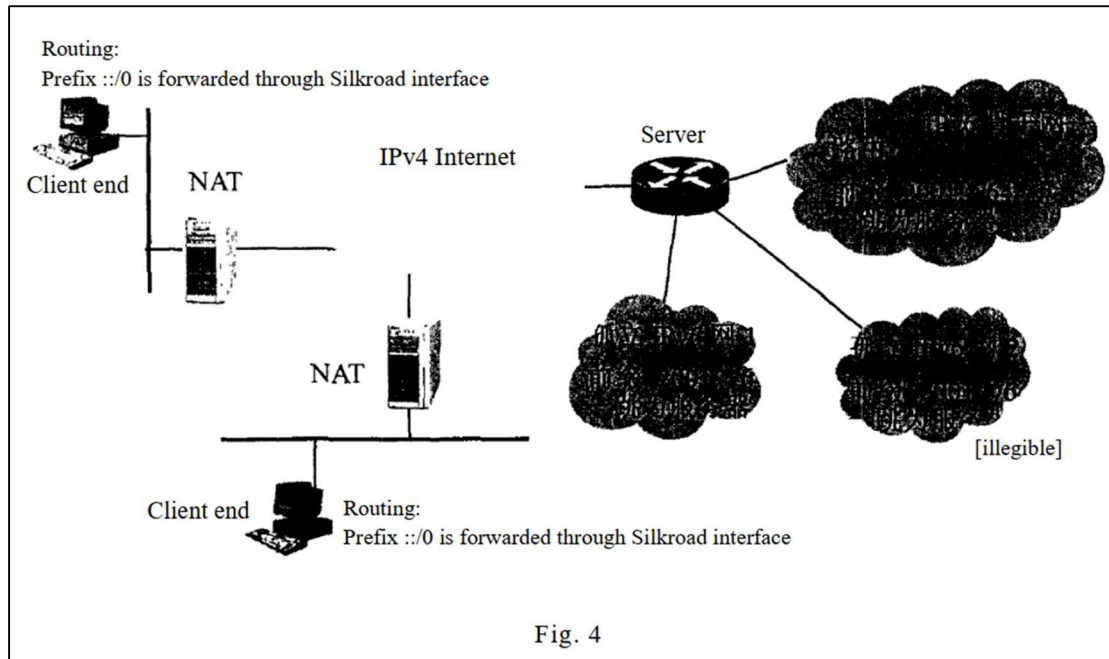
Id. at 6. Each IVIG46(i) address includes a 32-bit prefix followed by eight 1-bits (or “FF” in hexadecimal) to denote that it is an IVI address. *Id.* After the prefix and IVI identifier is the IPv4 address to which this IVI address corresponds followed by 56 0-bits for the remainder of the address bitstring. *Id.*

As detailed above, a borrowed IPv4 address (*i.e.*, within the set IVI4(i)) is assigned to each IVI Host. Each such IVI4(i) address has a corresponding address within IVIG46(i), and this IPv6 address (built using the mapping rule above) is physically assigned to an IVI Host for IPv6 communications. The set of IVIG46(i) addresses that correspond to the IVI4(i) addresses are referred to as IVI6(i) addresses. *Id.* at 5; *see id.* at 6 (“IVI4(i) is a mirror image of IVI6(i).”). “IVI6(i) is the special IPv6 address block which can communicate with both address families.” *Id.* at 6.

By default, there is a one-to-one mapping between each address in I4(i) and I6(i). *See id.* at 6 (“Because this mapping is 1-to-1 defined by the I4 mapping rule, it is stateless and it has feature of end-to-end address transparency.”). However, recognizing that “public-IPv4 address is a scarce resource,” Li-2 identifies port multiplexing “[t]o [further] increase the utilization ratio of the public IPv4 address.” *Id.* at 14. Li-2 explains that “[t]he mapping scheme is to use the least significant bits in the I6(i) to define the multiple mapping and combine the transport-layer port number to uniquely perform the mapping from I4(i) to I6(i).” *Id.* Li does not, however, propose or teach concatenating a port number. EX2015 ¶59. Instead, it teaches the use of zero bits for stateless mapping, one bit for two-state mapping, and four bits for 16-state mapping. *Id.* Beyond Li-2’s indication that these multiplexing bits must appear in the least significant bits of the IPv6 address, Li-2 is silent regarding the implementation or operation of port multiplexing. *Id.*

3. Wu (EX1039)

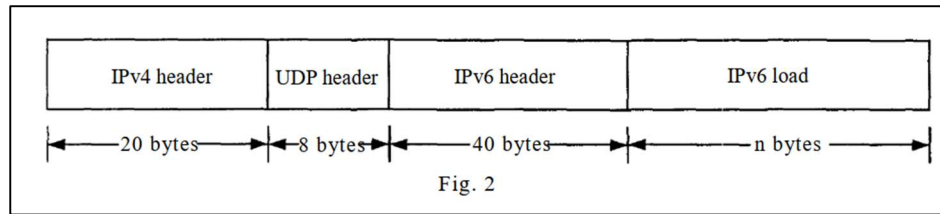
Wu is a Chinese Patent Application Publication titled “An automatic tunnel method capable of traversing network address translation.” EX1039 at 2. Wu’s solution is focused on “solv[ing] the communication problem between . . . two IPv6 nodes separated by the IPv4 network” in a manner that permits “NAT in the body of the tunnel.” *Id.* at 10. Wu refers to this solution as “Silkroad,” and the solution involves Silkroad clients that are able to communicate via a Silkroad tunnel with assistance from a Silkroad server. *See id.* at 10-11. Wu’s architecture is illustrated below:



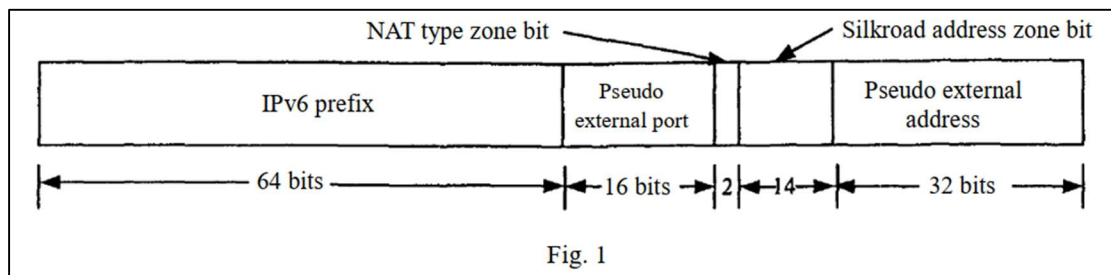
EX1039 at 17.

Within Wu’s Figure 4, the two endpoints of the Silkroad tunnel are the “Client end” devices, which are “IPv6/IPv4 dual-stack node[s] in the NAT field” EX1039 at 11. The “Server” corresponds to a Silkroad server outside of the NAT field. “[I]t assigns IPv6 address and the IPv6/IPv4 dual-stack node with the routing function for the client end” and “can have the route leading to the IPv6 backbone network, also the route leading to the isolated IPv6 network.” *Id.* As shown in the figure, the client ends are behind a NAT function (*i.e.*, in the NAT field) that is connected to the IPv4 Internet; thus, any tunnel constructed with that client as an endpoint will also have “NAT in the body of [the] tunnel.” *Id.* at 10. The server is connected to the IPv4 Internet as well as IPv6 networks (illustrated as black clouds).

Wu’s client ends communicate using the packet structure illustrated in Figure 2:



EX1039 at 17. This packet structure illustrates an IPv6-tunnel over IPv4; the IPv6 packets for transmission are included as IPv4 packet payload. The embedded IPv6 packets include at least one Silkroad address in the IPv6 header. The Silkroad address represents the IPv6 address assigned by the Silkroad server to the Silkroad client end. *See* EX1039 at 11. The format of a Silkroad address is illustrated in Figure 1:



EX1039 at 17. The address includes an IPv6 prefix, a pseudo external port of the NAT function, a NAT type designation, a Silkroad address designation, and a pseudo external address of the NAT function. *See id.* at 11-12. The IPv6 prefix is “[t]he aggregate global unicast address prefix or the ‘site-local’ address prefix formally assigned by IANA” *Id.* at 11. The “Pseudo external port” is defined as “[t]he external port (NAT-mapped port) and 0xFFFF and/or the subsequent 16-bit numerical value.” *Id.* at 11. The NAT type zone bit is 2-bits “used to represent the type of NAT where the client end is located” *Id.* The Silkroad address zone bit is defined as “14 bits . . . set as 0, representing that this address is a Silkroad

address.” *Id.* The “Pseudo external address” is defined as “the address mapped by NAT and 0xFFFFFFFF and/or the subsequent 32-bit numerical value” *Id.* at 11-12. The Silkroad address—“an aggregate global unicast IPv6 address”—is used by the client ends to define the head node and end node of an IPv4 tunnel for transporting IPv6 packets. *See id.* at 10-11.

The goal of enabling communication between two nodes that are already modified to support IPv6 (as Wu purports to teach) is very different than the goal of providing IPv4 and IPv6 interconnection to hosts in a transparent manner such that hosts do not need to be modified. EX2015 ¶63. The terminal behind the NAT in Wu must have already been transitioned to a dual-stack node (supporting both IPv4 and IPv6) and must determine for itself whether to encapsulate and address a packet to the “SilkRoad” server or transmit it directly to the destination. *Id.*; EX1039 at 11-12. The terminal in Wu must also periodically send packets to the server in order to maintain its mapping in the NAT translation table. EX1039 at 11. This approach of offloading destination determination and connection management to the terminal (rather than handling it transparently at the router or other infrastructure) is an important design distinction that would tend to teach away from applying Wu’s teachings to an implementation more focused on operation that is transparent from the perspective of the terminal device. EX2015 ¶63.

III. Person of Skill in the Art

For purposes of this Preliminary Response, Patent Owner does not contest Petitioner’s recitation of the level of skill in the art, because even under Petitioner’s proposed level of skill Petitioner has failed to demonstrate that the challenged claims

are invalid. Patent Owner reserves the right to propose its own definition of a person of ordinary skill in the art (“POSITA”) in the future if necessary.

IV. Claim Construction

Petitioner proposes that the previous constructions provided by the district court in the *Cisco* litigation be adopted for this proceeding. Pet. at 10-14. Patent owner does not presently contest those constructions for the purpose of this proceeding. Petitioner additionally argues that “domain” should be construed as “[a] telecommunications network administered by an operator.” *See* Pet. at 31. For the reasons set forth below, Patent Owner proposes a different construction of “domain” that better captures the scope of the term.

A. “domain”

The proper construction for “domain” is “a network or subnetwork and its address space that are under common control.” EX2015 ¶46. This is apparent from both the intrinsic evidence and the extrinsic evidence, which establish that “domain” includes the concept of common control. *Id.*

The ’844 Patent’s specification states that “[a] telecommunications network administered by an operator is also referred to as a domain.” EX1001 at 1:30-31. Thus, the ’844 Patent supports defining domain to include the concept of control. One cannot speak of a domain without considering the particular entity that operates or controls it. *Id.* ¶47. Consistent with the specification passage cited above, a network administered by a different operator would be a different domain. *Id.* In this regard, the specification highlights the difference between a private domain (a network that is controlled or administered by a homeowner or business entity), and

a domain operated by a service provider. *Id.*; EX1001 at 1:32-50; 4:41-43 (“The neighboring IPv4 domain may be a public network managed by an operator or a private network, either a home network or a business network.”). This concept is important, because a network operator controlling a domain can take precautions, such as restricting where in the network address translation occurs, and ensuring private addresses are not re-used within that domain. EX2015 ¶48. In networks that are operated and controlled by different entities, such precautions are not possible: entities (such as a service provider) may implement their own layer of address translation, and the same private IPv4 addresses can be reused in different domains. *Id.*; EX1001 at 2:11-22 (discussing Operator NAT).

Extrinsic evidence supports this definition. EX2015 ¶49. *Newton’s Telecom Dictionary* is in accord, defining “domain” as “[t]he part of a computer network in which the data processing resources *are under common control.*” EX2003 at 3 (emphases added). The *IBM Dictionary of Computing* is in accord and defines “domain” as “[t]hat part of a computer network in which the data processing resources are under common control.” EX2004 at 4.

V. Argument

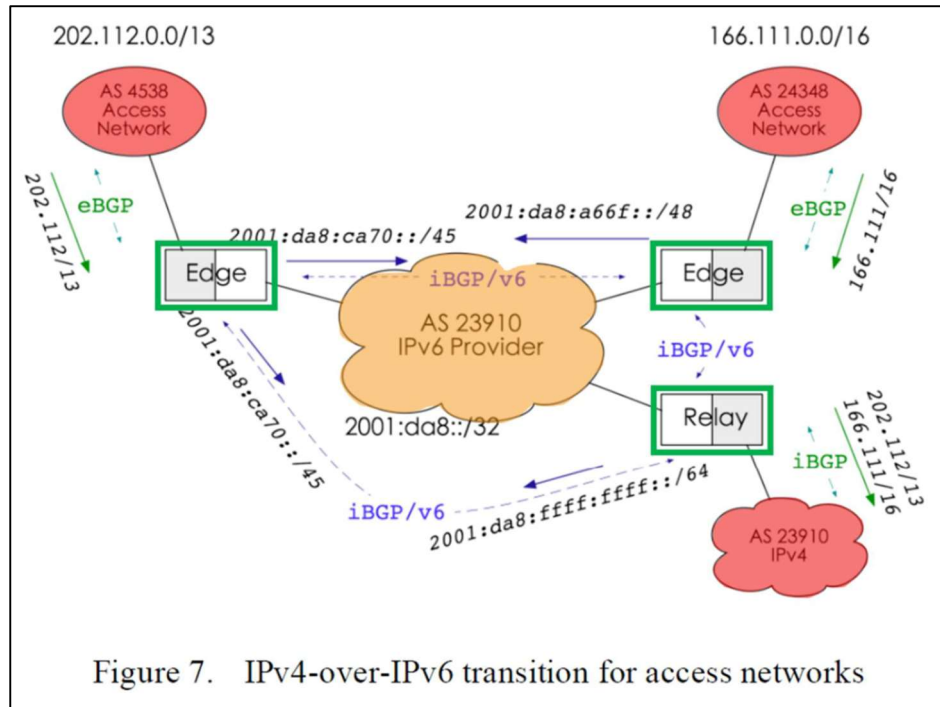
The Petition should be denied for multiple independent reasons. First, as to all challenged independent claims, Petitioner fails to show that Li discloses the claimed IPv6 domain and IPv4 domain under the constructions advanced by the parties. And Li is the only reference upon which Petitioner relies for teaching the claimed domains. Furthermore, Petitioner has failed to show that Li-2 (a purported IETF draft submission) is prior art, relying on the declaration of its own employee to assert

public availability positions well beyond what the IETF declarant was willing to say. Additionally, Petitioner does not even attempt to show that its purported simultaneous invention references actually correspond to the limitations of the challenged claims, instead focusing only on forming an IPv6 address that includes a port number. Finally, in ground 3 Petitioner proposes combining Li and Wu, which teach unrelated and incompatible solutions. Li teaches permitting IPv4 hosts to communicate across an IPv6-only network, while Wu teaches the inverse—permitting IPv6 hosts to communicate across an IPv4-only network.

A. All Grounds: Li does not disclose the claimed IPv4 and IPv6 domains

Each of the independent claims of the '844 Patent require either “receiving a data packet from an *IPv4 domain* in an *IPv6 domain*” ('844 claims 1 and 5 (emphasis added)) or “sending a data packet from an *IPv6 domain* to a destination address of an *IPv4 domain*” ('844 claims 3 and 10 (emphasis added)). EX2015 ¶64. This sending/receiving of packets between the domain types is possible because the '844 Patent enables the transparent (to the hosts) interconnection of an IPv4 domain and an IPv6 domain. *Id.*

Petitioner relies exclusively on Li's Figure 7 to support its allegations regarding Li for the independent claims in all three grounds. Pet. at 28-29 (claim 1); *id.* at 39 (claim 2 referring back to claim 1 analysis); *id.* at 39-40 (claim 3); *id.* at 44 (claim 4 referring back to claim 3 analysis); *id.* at 44 (claim 5 referring back to claim 1 analysis); *id.* at 47-48 (claim 6); *id.* at 61 (claim 10 referring back to claim 3 analysis). Petitioner identifies IPv4 domains in red and IPv6 domains in orange in Li's Figure 7, shown below:



Pet. at 29. For claims 1 and 5, Petitioner identifies the top left AS 4538 Access Network as the IPv4 domain from which an IPv4 packet originates. For claims 3 and 10, Petitioner identifies the top right AS 24348 Access Network as the IPv4 domain to which an IPv4 packet is destined. *See* Pet. at 17 (illustrating the packet flow relied on by Petitioner).

Under the proper construction of “domain” (*see supra* Section IV.A), Petitioner fails to demonstrate that Li discloses separate IPv4 and IPv6 domains, as required by the claim language. EX2015 ¶¶67-76. First, Li teaches that the networks identified by Petitioner as purported separate domains are instead all part of a single provider domain. *Id.* ¶¶67. Second, Petitioner’s identified domains all share common control and a common address space. *Id.* Because of this common control, even under Petitioner’s proposed construction, Petitioner’s identified domains share a

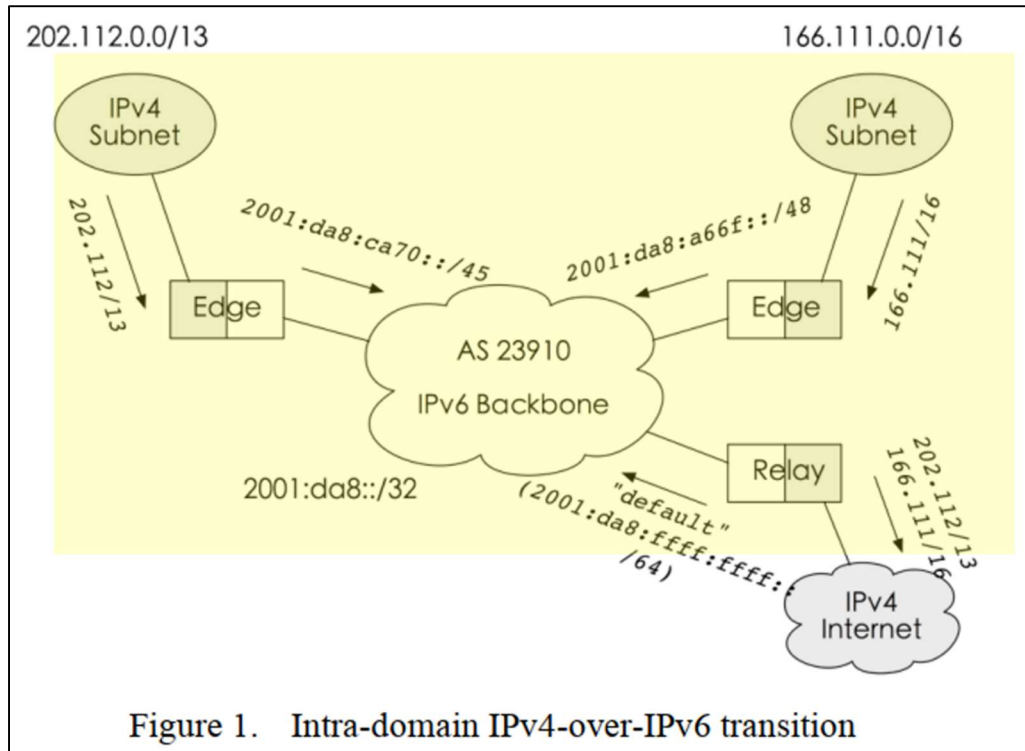
common administrator—the network provider—and thus form a single provider domain. *Id.*

1. Li teaches that Petitioner’s purported IPv6 domain and IPv4 domain are not separate domains

As detailed below, Petitioner has relied on Li’s intra-domain configuration and address mapping to purportedly teach a separate IPv6 domain and a separate IPv4 domain as required by all independent claims. EX2015 ¶¶68-72.

(a) Li’s Figure 7 depicts an intra-domain environment

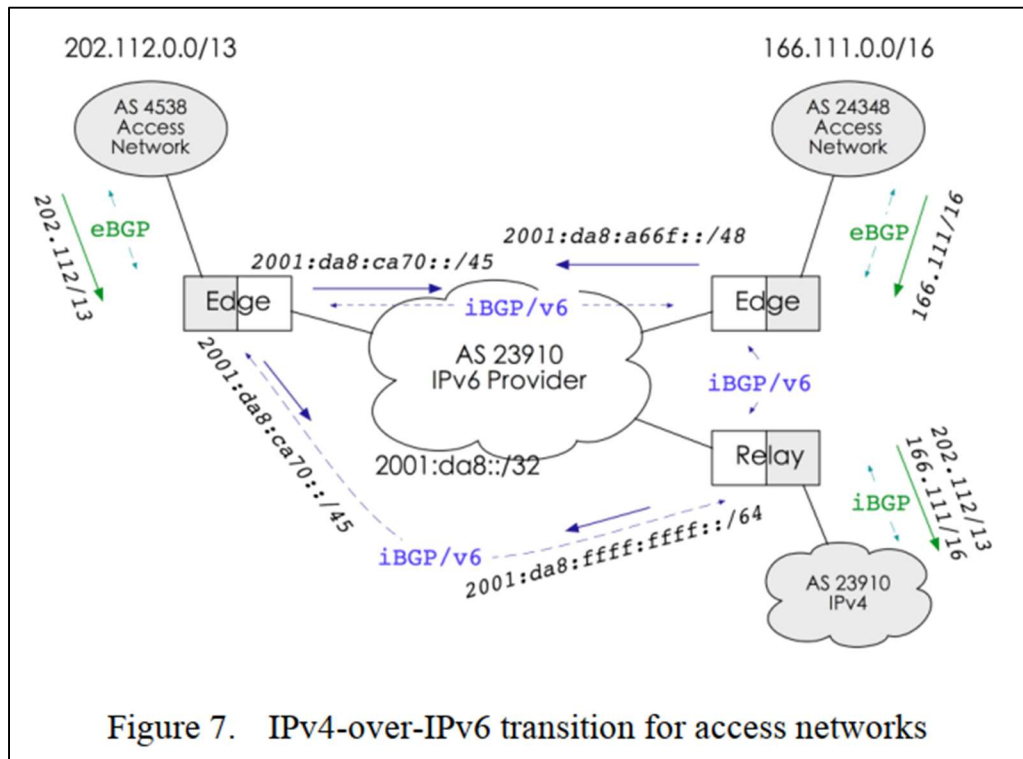
Section III of Li “illustrates the basic design, which is suitable for transition *in an intra-domain environment.*” EX1037 at 1 (emphasis added). Figure 1 presents an overview of the design, illustrating an autonomous domain comprised of two IPv4 subnets and an IPv6 backbone. *See id.* at 3. The domain is connected to the IPv4 Internet via a relay for routing packets to “IPv4 networks outside the autonomous domain” *Id.* at 3. Annotated Figure 1, presented below, highlights Li’s domain.



Id. (highlighting Li's domain). Li labels this figure as an *intra-domain* configuration.

Petitioner Contends that Figure 7 discloses an interdomain environment, noting that Li includes figure 7 in its “Extensions to Inter-Domain environment” section. Pet. at 32. Li explains that the inter-domain environment includes “two models.” The first, includes stub autonomous systems connected to an IPv6 backbone. This is the embodiment described in Figure 1 and relied on by petitioner. The second is a “transit autonomous systems [that] are inter-connected with each other.” EX1037 at 6. This describes the inter-domain connections described in Figure 8-10 in that section. Li does not teach that Figure 7 depicts an inter-domain configuration. So, this embodiment (sending a packet from AS 4538 to AS 24348) is still an *intra-domain* setting. EX2015 ¶69.

Figure 7, upon which Petitioner relies, depicts an identical network structure, including the same IP address distribution. EX2015 ¶70.

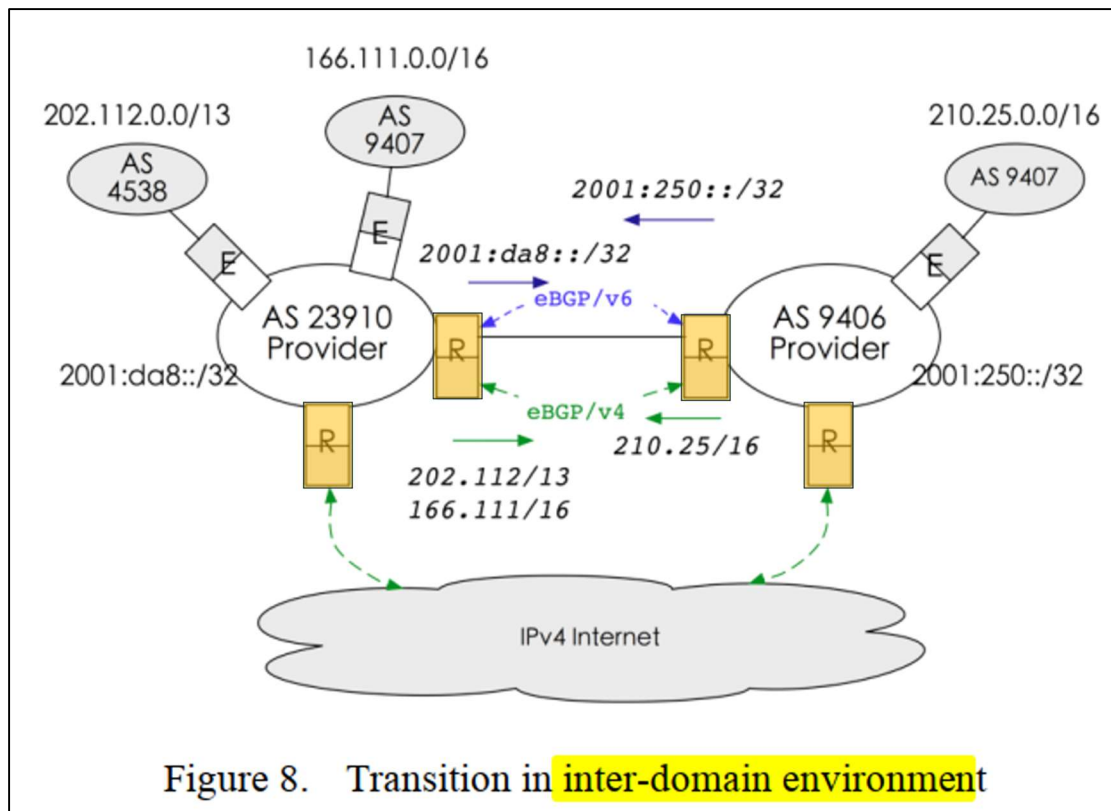


EX1037 at 7. Despite being in Li’s Extensions to Inter-Domain environment” section, Figure 7 (and specifically the embodiment Petitioner relies on) is still an intra-domain transmission. EX2015 ¶70. In that section, Li describes “two model: 1) stub autonomous systems are connected to an IPv6 backbone, as customer networks of the latter, and only have accesses to IPv4 hosts within the scope controlled by the provider; 2) transit autonomous systems are inter-connected with each other.” EX1037 at 6. This first model, depicted by Figure 7, is still an intra-domain embodiment. EX2015 ¶70. The primary difference between Figure 1 and Figure 7 is that “stub autonomous systems are connected to an IPv6 backbone, *as customer networks of the latter, and only have accesses to IPv4 hosts within the*

scope controlled by the provider . . .” EX1037 at 6 (emphasis added). The provider controls the networks in Figure 7, just as in Figure 1. EX2015 ¶70.

(b) Li’s Figures 8, 10, and 11 depict inter-domain environments

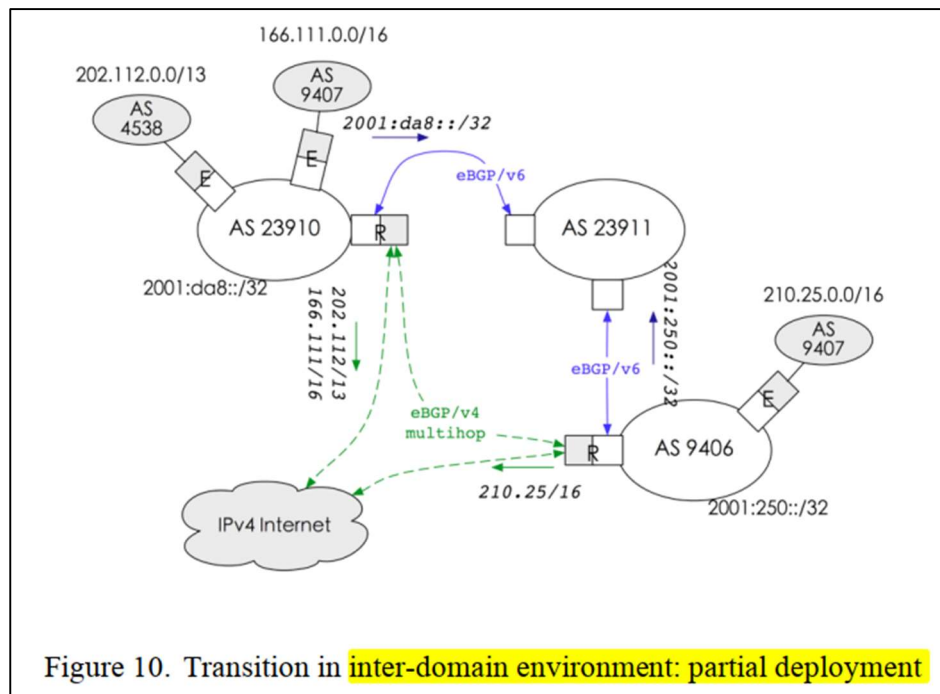
That Figures 1 and 7 illustrate an intra-domain solution is further confirmed by Figures 8, 10, and 11, which illustrate inter-domain deployments. For instance, Figure 8 depicts an inter-domain environment in which “two providers are inter-connected by native IPv6 link . . .” EX1037 at 8.



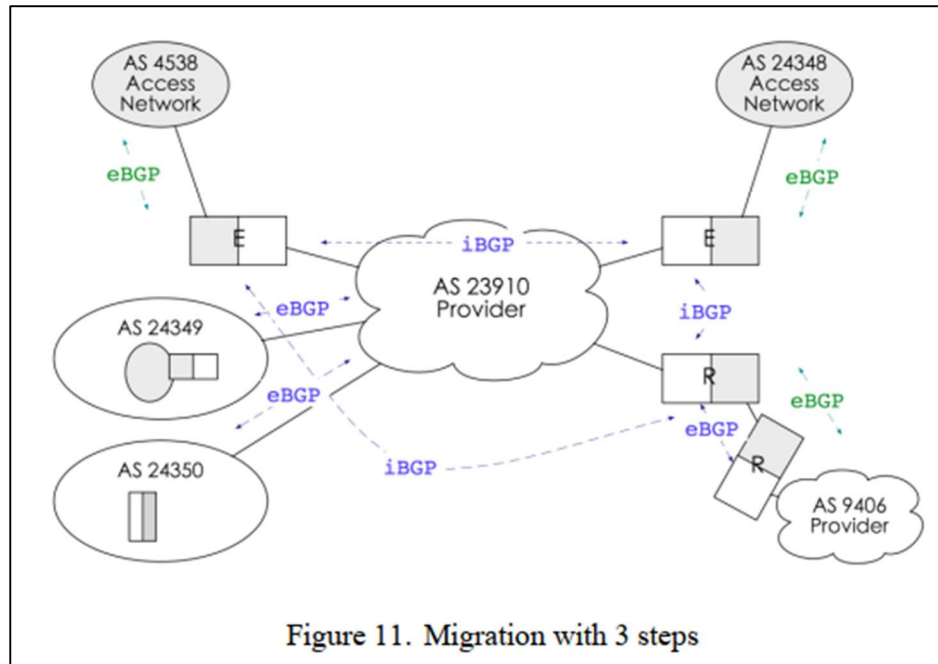
Id. (highlighting added). In order to support the inter-domain configuration, Li explains that it is “trying to extend the address mapping scheme and the functionality of the relay router . . .” *Id.* The relay routers can be seen connecting the two provider domains (marked with R and highlighted orange), and relay routers are also

used to connect the two provider domains to the IPv4 Internet. *See id.* at 9 (“[A] **relay router** is just a regular BGP speaker for both IPv6 and IPv4, **standing between two provider domains.**” (emphasis added)). Li teaches that its relay routers connect domains, and Petitioner has not relied on communications through Li’s relay routers in its contentions. EX2015 ¶¶71.

Similarly, Figure 10 illustrates the **partial deployment** of an **inter-domain environment**.



Id. at 9 (highlighting added). And Figure 11 illustrates “a simplified version for our **inter-domain solution** that is shown in Fig. 8.” *Id.* (emphasis added).



Id. Petitioner's grounds do not identify any of the inter-domain figures as the basis of its invalidity grounds for the independent claims. EX2015 ¶72. In fact, Petitioner repeatedly confirms that the communication scenario it is alleging teaches the claims is limited to the communications between the two IPv4 access networks contained in the single-provider domain illustrated in Figure 7. *See* Pet. at 17 (depicting the communication path at issue with a large black arrow); *id.* at 30 (same). Thus, per Li's teachings, Petitioner has relied on an intra-domain configuration to purportedly show inter-domain communications. EX2015 ¶72.

2. Petitioner's purported IPv6 domain and IPv4 domain are under common control

In addition to Li's explicit teachings that the Petitioner's identified IPv6 domain and IPv4 domain are actually part of the same provider domain, Li explains that these domains are under common control of a single Internet service provider. EX2015 ¶73-76; *see also* EX1037 at 2 ("Through out this paper, it is assumed that

an Internet service provider who would like to apply this approach holds at least one IPv6 prefix not smaller than /32. A part of a /32 prefix is utilized to do the address mapping.”).

For instance, when describing the address mapping upon which Petitioner relies (*see* Pet. at 34, 71), Li explains: “This rule of addressing is deployed without difficulty because the address assignment is fully controlled by the autonomous system itself, ***which is aware of all the IPv4 prefixes under its administration.***” EX1037 at 3 (emphasis added). This address mapping is introduced for Li’s Figure 1, but it also applies to Li’s Figure 7, which has the same network configuration and the same IPv4 prefix assignments as Figure 1. *Compare* EX1037 at 3 (Figure 1), *with id.* at 7 (Figure 7); *id.* at 7 (“The addressing scheme is similar to that in the basic design.”); *id.* (“[T]he mapped prefixes belong to the aggregation of the provider”); *id.* at 4 (“[E]ach edge should know a complete list of IPv4 network identifiers, ***which really belong to the autonomous domain.***” (emphasis added)).

Furthermore, when Li details Figure 7, it explains that the “stub autonomous systems are connected to an IPv6 backbone, ***as customer networks of the latter,*** and only have accesses to IPv4 hosts within the scope ***controlled by the provider***” *Id.* at 6 (emphasis added). Li explains that the provider controls the IPv4 addresses subject to mapping at the edge routers of Figure 7. *See id.* at 7 (“In the previous subsections, we employ a special prefix to avoid mapping the IPv4 route table explosion into IPv6. ***Only those IPv4 network identifiers that belong to the provider are mapped correspondingly*** while the others are merged into the special prefix.” (emphasis added)). And the addresses outside the scope of the provider’s control use

the special prefix. *See id.* (“It is also defined that a special prefix appended with ‘0xFFFFFFFF’ is correspondent to network identifiers elsewhere out of the scope that the provider serves.”); *id.* (“Meanwhile, the relay router advertises the special prefix with ‘0xFFFFFFFF’ ***for all the IPv4 networks outside the scope of the provider’s administration.***” (emphasis added)).

In conclusion, based on the explicit teachings of Li, the IPv4 and IPv6 networks of Figures 1 and 7 are commonly controlled, and thus belong to the same domain. EX2015 ¶¶73-76. Accordingly, all three of Petitioner’s grounds fail to identify the IPv4 domain and IPv6 domain required of every independent claim. *Id.* ¶76. Instead, Petitioner has identified and relied on networks within the same domain. *Id.*

B. Ground 1: Li and Li-2

1. Petitioner has failed to show that Li-2 is prior art

Petitioner alleges that “Li-2 is prior art under at least pre-AIA §102(a) because it was publicly available before the ’844 patent’s priority date of June 30, 2008.” Pet. at 20. To support this position, Petitioner relies primarily on three pieces of evidence: 1) Li-2 itself (which is dated June 21, 2008); 2) the declaration of Alexa Morris, Managing Director of the IETF Administration LLC (EX1009); and 3) the declaration of Juniper employee Ron Bonica (EX1008). As explained below, Petitioner’s evidence does not establish that Li-2 qualifies as a printed publication. *See also* EX2015 ¶¶77-78.

“When considering whether a given reference qualifies as a prior art ‘printed publication,’ the key inquiry is whether the reference was made ‘sufficiently

accessible to the public interested in the art' before the critical date. *Voter Verified, Inc. v. Premier Election Sols., Inc.*, 698 F.3d 1374, 1380 (Fed. Cir. 2012). "A given reference is 'publicly accessible' upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it." *SRI Int'l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008). Here, Petitioner's evidence fails to show public accessibility.

Petitioner contends that the June 21, 2008, date on the face of Li-2 indicates the date it was uploaded to the IETF website. Pet. at 20. The IETF declarant, Ms. Morris, also explains that the June 21, 2008, date on the face of Li-2 merely indicates the date on which the document was *submitted* to the IETF—not a date of publication. EX1009 ¶10. However, as detailed below, submission to the IETF does not constitute publication and does not mean that the document was reasonably accessible to a POSITA.

Ms. Morris explains the IETF's publication process as follows:

Internet-Drafts are posted to an IETF online directory. When an Internet-Draft is published, an announcement of its publication that describes the Internet-Draft is disseminated. Typically, that dated announcement is made within 24 hours of the publication of the Internet-Draft. The announcement is kept in the IETF email archive, and the date is affixed automatically.

EX1009 ¶7. And Ms. Morris confirms that Li-2 is an “*unpublished* Internet-Draft.” EX1009 ¶10 (emphasis added). Li-2 was never published by the IETF. EX1009 ¶11 (“[Li-2] was *cancelled* by the author following its submission and therefore *never became an official Internet-Draft published in the IETF directory.*” (emphasis added)). Because Li-2 was never published by the IETF, an announcement of its publication was never disseminated—Li-2 was never announced by the IETF. Instead, according to Ms. Morris, Li-2 merely resided in a staging directory, which contains documents *not published* by the IETF. See EX1009 ¶11 (“Nothing in the staging directory has actually finished submission to the IETF. That means that nothing in the staging directory was announced to the community.”); *id.* (“[Li-2] is not an official Internet-Draft of the IETF and therefore *did not move* from the staging directory *into the official repository* and *was not announced to the community.*” (emphasis added)).

It is also telling what Ms. Morris was not willing to say. She did assert that published Internet-Drafts are publicly accessible:

Any Internet-Draft published on the IETF website was reasonably accessible to the public and was disseminated or otherwise available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence could have located it. In particular, the Internet-Drafts were indexed and searchable on the IETF website.

Id. ¶6 (emphasis added). But the IETF was not willing to submit a sworn declaration stating that unpublished submissions—like Li-2—were reasonably accessible to the

public. And Ms. Morris did not testify that unpublished submissions—like Li-2—were indexed and searchable on the IETF website.

Moreover, further testimony from Ms. Morris confirms that Li-2 was not publicly accessible. As Ms. Morris testified, Li-2 is “an unpublished Internet-Draft.” EX2016 at 13:13-17. In contrast, published Internet-Drafts “are published online publicly, and they become -- potentially, they can become standards of the IETF, but an [unpublished] Internet-Draft itself is just a document that is something that might become a work item for the organization.” *Id.* at 14:8-13. A published Internet-Draft is “deposited into a public archive, ... announced to a specific e-mail list, and [] available for anyone to see.” *Id.* at 15:6-9.

An unpublished Internet-Draft can be created by anyone by submitting it to the IETF with a tool called the Datatracker. *Id.* at 14:16-25. But not every document submitted to the Datatracker is public. *Id.* 16:19-25. For example, cancelled documents, such as Li-2, are not public. *Id.* Li-2 was also never announced in an email to the IETF community. *Id.* at 18:22-24. Indeed, Ms. Morris confirmed that, unlike published IETF documents, she could not state that Li-2 was announced to the public or reasonably available to the public or a POSITA. *Id.* at 28:17-29:9.

In short, Ms. Morris’ testimony confirms that Li-2 was not published by the IETF—it is not a printed publication. Instead, Li-2 was cancelled by the author—it was never announced to the community. *See Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1372 (Fed. Cir. 2019) (“[A] work is not publicly accessible if the only people who know how to find it are the ones who created it.”).

Finally, Juniper submits the testimony of an interested witness—its own employee, Mr. Bonica—to support its contention that Li-2 was reasonably accessible to the public. However, Mr. Bonica never once states that Li-2 was reasonably accessible to a POSITA. Instead, he merely states that the staging folder was “publicly accessible.” EX1008 ¶4. However, as of May 9, 2024, the staging folder is not accessible. *See* EX2005. Ms. Morris also confirmed that the IETF did not advertise the “www.ietf.org/staging/” URL to the public. EX2016 at 33:15-34:4.

Furthermore, the link to Li-2 identified in Petitioner’s exhibit list did not work as of May 9, 2024. *See* EX2006. Additionally, the emails that Mr. Bonica identifies provide a different URL than “www.ietf.org/staging/.” *See, e.g.*, EX1046 (stating “Staging URL: <http://www3.ietf.org/proceedings/staging/draft-badra-tls-netconf-04.txt>”). And, Mr. Bonica confirmed that these URLs only direct to the relevant document. EX2017 at 22:20-25. Neither Mr. Bonica nor Ms. Morris have stated when the staging directory location changed, how often it was changed, and whether its location was published to the public.

Moreover, there is no evidence that the URL location <http://www3.ietf.org/proceedings/staging/> was ever publicly accessible. According to the Internet Archive, has never been indexed. *See* EX2010. The parent directory, “<http://www3.ietf.org/proceedings/>” was inaccessible in June 2008 and October 2008. *See* EX2011 (June 13, 2008 capture - “Directory access not available”); EX2012 (October 4, 2008 capture - “Directory access not available”). Mr. Bonica confirmed that there is no evidence of the staging folder at a URL <http://www3.ietf.org/proceedings/staging/>. EX2017 at 30:12-15; *see also id.* at

31:13-15 (confirming that he has never attempted to search on Google for the staging directory).

Even assuming the staging folder was accessible to the public, Mr. Bonica’s purported printout of that folder spans 200 pages and includes over 13,000 documents (about 67 per page). *See* EX1044. The staging folder, if it were accessible, contains many thousands of files that are not indexed. This massive collection of information is not reasonably accessible to a POSITA because it is not indexed or searchable. Mr. Bonica’s suggestion that the “filename” of the submission was sufficient to provide a meaningful index is incorrect. “Li” alone is not indicative of the content of a submission. And there is no evidence that “IVI” was a known term at the relevant time—instead, it appears to be a term coined by the authors of Li-2 as it required definition within the document itself. *See* EX1038 at 5 (“IVI: IV means 4 and VI means 6 in Roman representation, so IVI means bi-directional borrowing, mapping and translation between IPv4 and IPv6.”). Even Mr. Bonica only claims to have accessed the staging folder a single time, to find a document he already knew existed because he co-authored it. EX2017 at 25:21-26:16, 27:7-22.

Ms. Morris’ and Mr. Bonica’s testimony that the staging folder was publicly accessible is also belied by the Internet Archive on which Mr. Bonica relied to show the IETF Datatracker. *See* EX1056. The Internet Archive did not crawl the IETF’s homepage from June 21, 2008 until September 6, 2008. *See* EX2007. Since 2003, this is the only multi-month gap in the Internet Archive’s crawl of the IETF

homepage.⁴ Furthermore, the staging directory identified by the IETF declarant has only been crawled three times, and those occurred between May 23, 2022 and July 5, 2022. *See* EX2008. Records at the Internet Archive, upon which Mr. Bonica himself has relied, suggest that the IETF website was unavailable for crawling or indexing during the relevant time period between June 20, 2008 and June 30, 2008.

Mr. Bonica also refers to various IETF emails to purportedly show that documents in the staging directory were announced on email. *See* EX1008 ¶9. However, neither Mr. Bonica nor Ms. Morris stated that such emails were regularly distributed. Furthermore, any such emails were limited to IETF participants. *See id.* (explaining the emails were sent to IETF mailing lists and working groups). Additionally, there is no evidence in the record that such an email was sent for Li-2. Indeed, there is no evidence that *anyone* accessed Li-2 before June 30, 2008. *See* EX2017 at 39:19-21, 41:22-42:5.

Finally, Mr. Bonica’s testimony about the IETF Datatracker fails to support Petitioner’s contention that Li-2 was publicly available. He explains that when an author cancels their submission (as Li-2 was cancelled), “[a]fter a given period, it is removed from the Datatracker” EX1008 ¶11. But there is no evidence indicating when the submission was cancelled. Nor is there any evidence detailing how long a cancelled submission purportedly remains in Datatracker. Finally, Datatracker’s search capabilities are significantly limited, not even allowing for the

⁴ The Internet Archive also did not crawl the IETF during November 2010. *See* EX2007.

most basic types of search by topic or keyword. *See* EX1056; EX2017 at 36:1-21 (confirming that there was no way to search the Datatracker by keyword or for document text).

Moreover, Mr. Bonica’s testimony should be given very little weight as that of an interested witness. *See* EX2017 at 7:23-8:16 (testifying he has been an employee of Juniper for nearly 20 years). Furthermore, even accepting his testimony as true, it fails to show that Li-2 was reasonably accessible to a POSITA. Instead—if accepted as true—it only establishes that a staging directory containing thousands of unindexed IETF submissions were available at an unpublished URL location. And, as explained above, that same URL location has been crawled only three times by the Internet Archive, and the IETF homepage was not crawled at all from June 21, 2008 to July 1, 2008. This suggests that the internet crawlers used by search engines and the Internet Archive were unable to crawl the IETF website during the relevant time period.

The one case that Petitioner relies on, *Voter Verified, Inc. v. Premier Election Solutions, Inc.*, 698 F.3d 1374 (Fed. Cir. 2012), illustrates the insufficiency of Petitioner’s evidence. There, the parties disputed on appeal whether the district court erred in concluding the “Benson article” was a “printed publication” before the critical date. *Id.* at 1379. The Benson article was first posted to Risks Digests—“a public website well known to those interested in the art”—more than a decade before the critical date. *Id.* at 1379-80. “At that time, the Risks Digest was distributed online via a subscription mailing list and also made available for download through an FTP site....” *Id.* at 1380. By several years before the critical date, “all content published

in the Risks Digest (including the Benson article) became available worldwide on the internet through the [Risks Digest] website....” *Id.* at 1380. Notably, “the Risks Digest website has included a search tool that would have retrieved the Benson article in response to search terms such as ‘vote,’ ‘voting,’ ‘ballot,’ and/or ‘election.’” *Id.* at 1381.

According to the Federal Circuit, this record established that “an interested researcher would have found the Benson article using [the Risks Digest] website’s own search functions and applying reasonable diligence.” *Id.* at 1381. Therefore, the Federal Circuit concluded that “the Benson article was publicly available by the critical date and therefore qualifies as a prior art ‘printed publication’ under § 102(b).” *Id.*

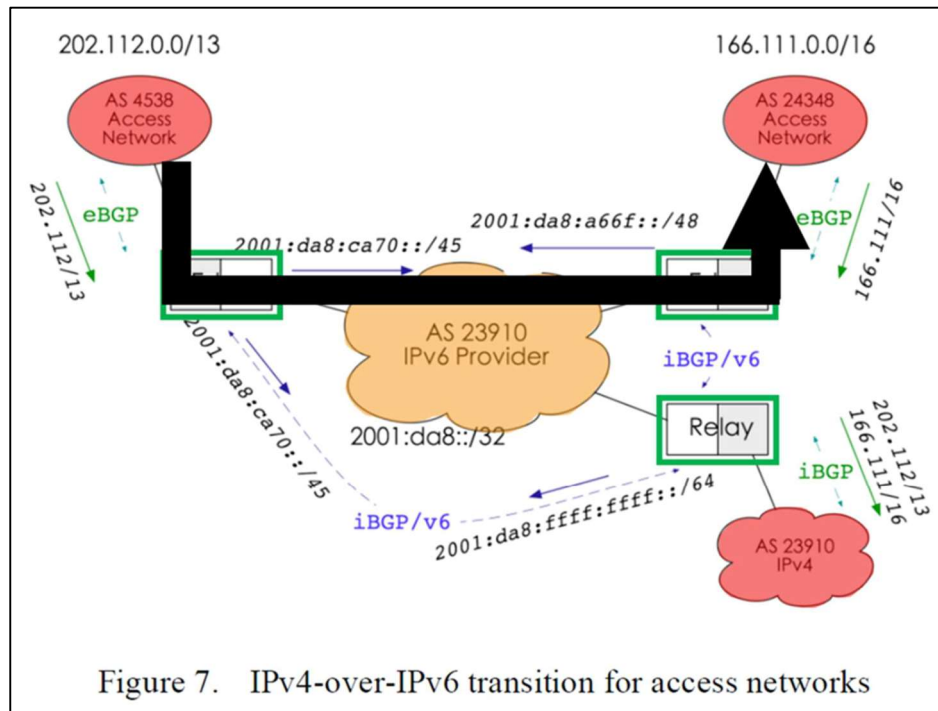
The evidence here shows that Li-2 shares none of these hallmarks of searchability. In particular and as noted above, there is no evidence that the IETF Datatracker allowed a POSITA to search for Li-2 using relevant search terms. Nor was there any evidence of a long history of availability prior to the critical date. Accordingly, Petitioner has not shown that Li-2 was publicly available prior to the critical date. *Accord* EX2015 ¶78.

2. A POSITA would not have been motivated to combine Li and Li-2 as proposed

(a) Li and Li-2 address different communication problems

Li addresses the problem of allowing IPv4 hosts within an IPv4 network to communicate with other IPv4 hosts across an IPv6-only network or backbone. EX2015 ¶79. This is shown in Petitioner’s annotated Figure 7 from Li, illustrating

the communication path between two IPv4 networks traversing an IPv6-only network.



Pet. at 17.

Li-2, on the other hand, addresses the problem of enabling hosts within an IPv6-only network to communicate with IPv4 hosts. EX2015 ¶80; *see* EX1038 at 2 (“Based on [IVI’s address borrowing] scheme, special IPv6 address blocks are defined, which can communicate with the global IPv6 networks directly and **with the global IPv4 networks** via stateless (or almost stateless) gateways.” (emphasis added)). Thus, Li and Li-2 are focused on solving different problems regarding communication within the context of IP networks. EX2015 ¶80. While Li targets IPv4 host to IPv4 host communications via an IPv6 network, Li-2 targets IPv6 host communications to IPv4 hosts. *Id.* These are different problems, and Petitioner has

failed to show that their solutions (or even components of their solutions) are interchangeable. *Id.*

(b) Li-2 is not an extension of Li

Petitioner's motivations to combine largely rest on its incorrect contention that Li-2 is an extension of Li. Regarding the first motivation, Petitioner states: "A POSITA would have had a reasonable expectation of success in combining Li and Li-2, especially because a POSITA actually did succeed in combining these references, since Li-2 is an extension of Li" Pet. at 25-26. Regarding the second motivation, Petitioner states: "A POSITA not only could have applied the known improvement technique from Li-2 to Li, but a POSITA actually did apply this technique, and the results would therefore not only have been predictable to a POSITA but are explicitly described in Li-2." *Id.* at 27. Regarding the third motivation, Petitioner states: "And the results would have been predictable, as a POSITA actually did make this substitution, as described in Li-2." *Id.* And finally, regarding the fourth motivation, Petitioner states: "Li-2 is an extension of the ideas described in the original Li reference" *Id.*

In fact, Petitioner opens the Petition with a mischaracterization of Li-2 as a purported expansion of Li: "Li's authors then published another paper ('Li-2') that expanded on this disclosure by replacing the unused padding with a port number." Pet. at 2. However, Petitioner never explains the manner in which Li-2 "extends" Li because it cannot. EX2015 ¶¶81-82. A cursory review of Li and Li-2 reveals that Petitioner's contentions regarding the relationship between Li and Li-2 are incorrect. *Id.*

As detailed above, Li and Li-2 address different problems. *See supra* Section V.B.2(a). Furthermore, Li-2 never references the Li paper, and it never suggests that Li-2 is an extension of Li. EX2015 ¶82. The reason is simple—Li-2 is *not* an extension of Li. *Id.* Rather, Li-2 addresses a problem that was not even contemplated by Li—enabling IPv6 hosts to communicate with IPv4 hosts. *Id.* Li, on the other hand, does not focus on IPv6 hosts at all—rather, it focuses on IPv4 hosts communicating *across an IPv6 transport network*. *Id.* Petitioner’s incorrect characterization of Li-2 as an extension of Li is a blatant attempt to provide a motivation to combine where none exists, and these mischaracterizations should be given no weight.

(c) Petitioner’s motivations to combine rely on references that are not prior art

Petitioner relies on purported “express teachings” in the prior art “that would have led a POSITA to combine Li and Li-2,” referring back to the Petitions’ “Technology Background” section for support. *See* Pet. at 25 (citing §IV.B). In that section, Petitioners state that “[m]ultiple prior art references disclose converting IPv4 addresses into IPv6 addresses” Pet. at 7 (citing EX1003 ¶¶38-39, discussing EXS1019-1020). However, Dr. Bhattacharjee’s cited analysis fails to support Petitioner’s statement. EX2015 ¶83-86. Dr. Bhattacharjee discusses two references in the paragraphs cited by Petitioner: Samprathi (EX1019) and Rooney (EX1020). But Petitioner mischaracterizes Rooney as prior art. Rooney says on its face that “[t]his is an unpublished work protected under the copyright laws.” EX1020 at 35.

Then, on the next page of the Petition, Petitioner states that “[b]y the priority date of the ’844 patent, POSITAs understood that computers typically utilize only a small portion of their available port numbers.” Pet. at 8 (citing EX1003 ¶41). In that paragraph, Dr. Bhattacharjee discusses EX1023 which is purportedly a paper presented at IEEE GLOBECOM 2008⁵, which occurred between November 30 and December 4, 2008—well after the priority date of the ’844 Patent—June 30, 2008. *See* EX2009 (Conference Proceedings Title Page). And the paper states that it is “for publication” in the conference proceedings: “This full text paper was peer reviewed at the direction of IEEE Communications Society subject matter experts *for publication* in the IEEE ‘GLOBECOM’ 2008 proceedings.” EX1023 at 5 (emphasis added).

Finally, Petitioner states “the prior art teaches constructing an IPv6 address by concatenating an IPv6 prefix, an IPv4 address, and a port number.” Pet. at 8 (citing EX1003 ¶¶45-48, discussing EXS1026-1032, 1038). In those cited paragraphs, Dr. Bhattacharjee discusses Li-2, which is not prior art, as detailed above. *See supra* Section V.B.1. Further, he discusses EX1026, which Petitioner has not shown was publicly available as of the priority date. EX2015 ¶85. And finally, Dr. Bhattacharjee relies on documents that he admits post-date the ’844 Patent’s priority date to further support his conclusions about what was purportedly known in the art. *See* EX1003 ¶46 (discussing EX1027 dated July 6, 2008; EX1028 dated

⁵ IEEE GLOBECOM refers to the IEEE Global Telecommunications Conference. *See* <https://globecom2008.ieee-globecom.org/>.

July 29, 2008; and EX1029 dated September 2008); *id.* ¶170 (admitting EX1029 was published in September 2008).

All of these improper references infect Petitioner’s motivations to combine, and their teachings should not be considered by the Board. EX2015 ¶83-86. This evidence is also improper simultaneous invention evidence, as detailed below. *See infra* Section V.C.2.

(d) The prior art identifies NAT tables as a well-known solution for IPv4 address exhaustion

Petitioner relies on the notion of IPv4 address exhaustion within its first two motivations to combine. *See* Pet. at 25 (explaining the “need to slow IPv4 address exhaustion by sharing a single public IPv4 address among multiple hosts.”); *id.* at 26 (explaining that Li “does not solve the issue of IPv4 address exhaustion”). However, the ’844 Patent explains that NAT tables provided a well-known solution for addressing IPv4 address exhaustion. *See* EX1001 at 2:11-14 (“To limit the number of IPv4 public addresses necessary to provide an IP connectivity service to an installed base of clients, a solution known as Double NAT or Operator NAT has been proposed and implemented.”); *see also id.* at 1:51-60 (discussing different types of NAT).

The prior art relied on by Petitioner confirms that this was an accepted approach to addressing IPv4 exhaustion. EX2015 ¶87-89. For instance, Dr. Bhattacharjee identifies Yeom (EX1021) for its teaching “there are a lot of ports in a node and only a small portion of them are used at any time.” EX1021 at 4 (cited by EX1003 ¶41). Yeom’s technique is to use port-address mapping tables. *See id.* at 5

(“Table 1: An example of port-address mapping table”); *id.* (Figures 4 and 5 depict a “PAT Mapping Table”). Dr. Bhattacharjee similarly relies on Rietz (EX1022) for the unremarkable teaching of NAT table capabilities. *See* EX1003 ¶41 (citing EX1022 at 9); *see also* EX1022 at 2 (“In the current Internet, Network Address Translation (NAT) gateways that provide port address translation are quite popular. These gateways allow many hosts to be multiplexed on one single IP address and still maintain full outbound connectivity.”). The same is true for King (EX1024). *See* EX1024 at Fig. 4; *id.* at 4:16-17 (“Fig. 4 is a table showing source address and port address translation at a CPE [customer premises equipment]”).

Petitioner provides no motivation to deviate from this known solution and form IPv6 addresses in the manner claimed by the ’844 Patent. EX2015 ¶89. Instead, using hindsight bias, Petitioner seeks to leap from a desire to solve IPv4 address exhaustion to implementing the claimed solution of the ’844 Patent. *Id.* Petitioner’s attempt to rely on references that post-date the ’844 Patent invention to supply a missing limitation further illustrates that the ’844 Patent solution was not well-known. *Id.* None of the references identified by Petitioner address the problem addressed by the ’844 Patent inventions: providing stateless solutions for routing data packets *across domains* using different versions of IP networks. *Id.*; EX1001 at Abstract, 1:15-21.

C. Ground 2: Li

1. Recognizing that Li-2 is not prior art, Petitioner raises a second ground based on Li alone in view of knowledge in the art. *See* Pet. at 62. Petitioner admits Li fails to teach port number limitations

Every independent claim requires either “constructing an IPv6 destination address by concatenating . . . [the/said] destination port number” or “extracting . . . the destination port number from the IPv6 destination address.” Petitioner admits that Li does not teach forming the claimed IPv6 address for failure to concatenate a destination port number. *See, e.g.*, Pet. at 64 (“Li teaches claim 1 except for concatenating a destination port number.”). And Petitioner admits that Li fails to teach extracting the destination port number from such an IPv6 address. *Id.* at 65 (“Li teaches limitation 3[a] except for extracting the destination port number from the IPv6 address.”); *see also* Pet. at 66-67 (similar for other claims). To remedy these deficiencies, Petitioner relies on evidence of simultaneous invention. *See* Pet. at 62-64.

2. Petitioner fails to show simultaneous invention

Petitioner’s simultaneous invention argument should be rejected because Petitioner has failed to show that any of the cited evidence constitutes the claimed invention. EX2015 ¶¶91-96. Petitioner relies on five exhibits to show simultaneous invention: (1) Li-2; (2) IVI Memo; (3) IVI Presentation; (4) Bush Paper; and (5) Bush Presentation. *See* Pet. at 62-64. Specifically, Petitioner states that “evidence of simultaneous invention further indicates that a POSITA would have been motivated to modify Li to form an IPv6 address that includes the destination port number.” Pet.

at 62. However, Petitioner has narrowed *the invention* to “form[ing] an IPv6 address that includes the destination port.” *Id.* This oversimplification of the ’844 Patent claims ignores numerous limitations that must be addressed to show simultaneous invention. EX2015 ¶91.

“[E]vidence of simultaneous invention cannot alone show obviousness.” *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1295-96 (Fed. Cir. 2018). Instead, “Simultaneous invention may serve as evidence of obviousness when considered in light of all of the circumstances.” *Id.* at 1295. However, Petitioner has failed to show that the evidence demonstrates simultaneous invention of all the limitations of the claims of the ’844 Patent. Accordingly, Petitioner’s evidence of simultaneous invention should not be given any weight, as it does not, in fact, show simultaneous invention.

With one exception, Petitioner relies on Li-2 only for the purpose of satisfying the “destination port number” of the claims. *See* Pet. at 33 (limitation 1[a] for “destination port number”); *id.* at 39 (limitation 3[pre] for “destination port number”); *id.* at 41 (limitation 3[a] for “destination port number”); *id.* at 42 (limitation 3[b] for “destination port number”). The exception concerns claim 9, where Petitioner relies on Li-2 to teach advertising IPv6 addresses purportedly containing port numbers. *See* Pet. at 60-61. The remaining references to Li-2 in Petitioner’s limitation-by-limitation analysis merely refer back to the previous claim limitations regarding specifically the “destination port number” limitation. *See id.* at 45 (limitation 5[a]); *id.* at 49 (limitation 6[c]); *id.* at 50 (limitation 6[d]); *id.* at 58 (claim 9).

Petitioner does not allege that Li-2 teaches any of the following limitations from independent claims 1 and 3:

- Claim 1: “generating an IPv6 data packet from the IPv6 constructed destination address and the received IPv4 packet,” EX1001 at 14:36-37;
- Claim 1: “routing the generated IPv6 data packet in the IPv6 domain using the IPv6 constructed destination address, said constructed address belonging to a range of IPv6 addresses routable to an interconnection equipment of the IPv6 domain with the IPv4 destination address,” EX1001 at 14:38-42;
- Claim 3: “extracting the IPv4 destination address . . . from the IPv6 destination address,” EX1001 at 14:55-56;
- Claim 3: “generating an IPv4 data packet from the IPv6 data packet, said packet including said IPv4 destination address . . . ,” EX1001 at 14:57-59⁶;
- Claim 3: “routing the IPv4 data packet to its IPv4 destination,” EX1001 at 14:60.

And aside from claim 9 (mentioned above), Petitioner does not rely on Li-2 to show the limitations of any other challenged claims except by reference back to Petitioner’s port number allegations in claims 1 and 3. *See generally* Pet. at 28-61.

⁶ The ellipsis omissions relate specifically to “destination port number” claim language.

Petitioner's reliance on Li-2 to show simultaneous invention must be disregarded because Petitioner has not meaningfully addressed any claim limitation beyond "destination port number." EX2015 ¶¶93-95.

Similarly, for the remaining four exhibits purportedly showing simultaneous invention, Petitioner only addresses the notion of forming an IPv6 address that includes a port number. *See* Pet. at 62-64. For the IVI Memo (EX1027), Petitioner only states that it "discloses using 'port multiplexing' to construct an IPv6 address with a destination port number." Pet. at 62-63. For the IVI presentation (EX1028), Petitioner again merely references port multiplexing to show combining an address with port number. *See* Pet. at 63. Regarding the Bush paper (EX1029), Petitioner states that Bush teaches "an IPv6 address is constructed by concatenating an IPv6 prefix, IPv4 address, and port number." Pet. at 63. Finally, for the Bush presentation (EX1041), Petitioner again asserts that Bush teaches forming an IPv6 address by combining a well-known prefix, IPv4 address, and port number. *See* Pet. at 63-64. As with Li-2, Petitioner only focuses on the format of an IPv6 address without regard for any of the other required claim limitations. EX2015 ¶96.

The invention is defined by the claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). Thus, a showing of simultaneous invention requires a showing that the purported simultaneous invention actually meets the limitations of the claims. In *Immunex Corp. v. Sandoz Inc.*, the patent infringement dispute involved claims directed to a chemical compound, etanercept, and methods of making the same. *See Immunex Corp. v. Sandoz Inc.*, 964 F.3d 1049, 1054 (Fed. Cir. 2020). Defendant Sandoz argued that "the court did not properly consider evidence

of simultaneous invention” *Id.* at 1067. However, “the district court found that three of the alleged instances of ‘simultaneous invention’ were directed to different fusion proteins, not etanercept.” *Id.* The Federal Circuit agreed that one of the instances, “the Jacobs ’690 patent[,] does not cover etanercept” and found “no clear error in the district court’s findings regarding the objective indicia of non-obviousness,” including simultaneous invention. *Id.* at 1067-68.

In another case involving allegations of simultaneous invention, the Federal Circuit affirmed a non-obviousness finding regarding claims directed to oxymorphone. *See Endo Pharm., Inc. v. Actavis LLC*, 922 F.3d 1365, 1367, 1378 n.14 (Fed. Cir. 2019). In that case, Defendant Actavis presented four alleged instances of simultaneous invention (three patent applications and one patent). *Id.* at 1378 n.14. The Federal Circuit found that “the three applications refer to formulations of *oxycodone*, not *oxymorphone*, and we agree with the District Court’s reasoning that the one successful purification of oxymorphone to the level of that claimed by the Asserted Claims, disclosed in the patent cited by Actavis, is unpersuasive with regard to obviousness.” *Id.* (internal citations omitted).

In *Intex Recreation Corp. v. Team Worldwide Corp.*, the Board was presented with simultaneous invention evidence in Petitioner’s reply brief supported by a declaration “includ[ing] an analysis of how Chaffee constitutes independent, near-simultaneous invention, by comparing the subject matter of certain Challenged Claims to the disclosure in [Chaffee].” *Intex Recreation Corp. v. Team Worldwide Corp.*, IPR2018-00859, Paper 128, 2019 Pat. App. LEXIS 13585, *54 (PTAB Oct. 21, 2019). Even so, the Board found that the expert’s “analysis does not persuasively

support Petitioner’s conclusory statement in its Reply, as it merely demonstrates that information in the Chaffee ’836 Provisional, together with information in Chaffee, corresponds to the claimed subject matter of the Challenged Claims.” *Id.* The Board emphasized the importance of considering the evidence of simultaneous invention “in light of all the circumstances” *Id.* at *54-55. And the Board found that the expert had failed to do so, and “[did] not afford any weight to this evidence.” *Id.*

Here, Petitioner does far less than petitioners in *Intex*. Petitioner has not even attempted to map the purported evidence of simultaneous invention to any of the challenged claims. Accordingly, Petitioner’s evidence of simultaneous invention should not be afforded any weight.

D. Ground 3: Li and Wu

Petitioner’s final ground—Li and Wu—should be rejected because a POSITA would not have been motivated to combine Li and Wu, which address completely different communication problems in the context of IP networks. EX2015 ¶¶97-111.

1. Li and Wu are directed to unrelated communication problems.

Li and Wu address unrelated communications problems. EX2015 ¶¶98-100. As detailed above, Li addresses the problem of allowing IPv4 hosts within an IPv4 network to communicate with other IPv4 hosts across an IPv6-only network or backbone. *See supra* Sections II.C.1, V.B.2(a). Wu, however, addresses the inverse of the problem in Li—the problem of allowing IPv6 hosts within a network to communicate with other IPv6 hosts across an IPv4 network. *See supra* Section II.C.3. Additionally, Wu is focused on the particular problem of traversing the NAT field (different types of NAT) within the IPv4 network across which

communications are sent. *See, e.g.*, EX1039 at 19-20 (illustrating communication between client ends of different NAT fields in Figures 7, 8, and 9); *id.* at 14-15 (describing Figures 7, 8, and 9).

Further, Wu's goal of enabling communication between two nodes that are already modified to support IPv6 is very different than the goal of providing IPv4 and IPv6 interconnection to hosts in a transparent manner such that hosts do not need to be modified. EX2015 ¶99. The terminal behind the NAT in Wu must have already been transitioned to a dual-stack node (supporting both IPv4 and IPv6) and must determine for itself whether to encapsulate and address a packet to the Silkroad server or transmit it directly to the destination. EX2015 ¶99; *see* EX1039 at 11-12. The terminal in Wu must also periodically send packets to the server in order to maintain its mapping in the NAT translation table. *See id.* at 11. This approach of offloading destination determination and connection management to the terminal rather (rather than handling it transparently at the router or other infrastructure) is an important design distinction that would tend to teach away from applying Wu's teachings to an implementation focused on operation that is transparent from the perspective of the terminal device, such as Li's. EX2015 ¶99.

The differences between Li and Wu are substantial, and a POSITA would not have been motivated to combine the references. EX2015 ¶100. First, Li is concerned with communications *between* IPv4 hosts; however, Wu is concerned with communications *between* IPv6 hosts. *Id.* Second, Li is concerned with communications that traverse an IPv6-only network; however, Wu, is concerned with communications that traverse an IPv4-only network that also includes a NAT

field. *Id.* Petitioner’s contention that a POSITA would have been motivated to combine these references treats IPv4 networks and IPv6 networks as if they are mix-and-match components. *Id.* However, the very problem with IPv4-IPv6 transition technologies is that the two types of networks are inherently incompatible. *Id.* To suggest that an IPv4-focused tunneling solution can simply be transplanted to an IPv6 transit domain solution, as Petitioner does, ignores this inherent incompatibility. *Id.*

Further, as detailed above regarding the proposed Li and Li-2 combination, Petitioner relies on references that are not prior art to support its proposed motivations to combine. *See supra* Section V.B.2(c). Additionally, the prior art identified by Petitioner teaches the use of NAT tables to address IPv4 address exhaustion, and Petitioner has not identified a motivation to deviate from this known solution. *See supra* Section V.B.2(d). For at least these reasons and those detailed above, a POSITA would not have been motivated to combine Li and Wu as proposed by Petitioner.

2. Combining Li with Wu would eliminate the benefits of Li

Stateless solutions provide an advantage over prior art prior IP transition techniques. EX2015 ¶101. In a stateful solution, border and/or edge devices must maintain the “state” of each connection or session within their networks. *Id.* As the ’844 Patent explains, “A solution based on NAT-PT that is not stateless is not to be recommended” and “would degrade the service provided”:

To summarize, the invention makes possible a first phase of migration of IP connectivity services towards IPv6 using packet routing mechanisms that takes the following factors into account:

Service operators suffer a problem of running out of IPv4 addresses.

The final migration to IPv6 will take a plurality of years (10 years minimum), mainly because of the large number of participants to “convince” to go over to IPv6, the large number of autonomous systems (AS), and the diversity of interconnection mechanisms. Moreover, it should be pointed out that the address problem is a priori of concern only to operators. Clients have no reason to modify the architecture of their local networks, in particular its FTP, HTTP, etc. servers, to IPv6. Operators must expect a long haul to assist clients with the changeover to IPv6.

Simply migrating a given domain to IPv6 does not solve the problem of global connectivity (contacting any remote machine present on the Internet). Interconnection with the IPv4 world must therefore be provided.

A solution based on NAT-PT that is not stateless is not to be recommended. This would degrade the service provided as value-added services linked to port forwarding configured by clients would not work.

'844 Patent 13:23-51 (emphasis added). The ability to implement stateless translation and encapsulation provides a significant advance over the prior approaches to routing IPv4 data packets over an intermediate IPv6 domain. EX2015 ¶101.

However, Wu is a stateful system. EX2015 ¶102. Figure 1 of Wu shows “the IPv6 address adopted when the client end communicates.” EX1039 at 3 (Claim 3). The Brief Description of the Drawings states that Figure 1 is the form of “SilkRoad address **assigned to the client end** by the server.” *Id.* at 11 (Wu specification). In other words, Wu requires that various mapping information must be maintained and regularly updated. *Id.* at 11-12.

On the other hand, Li is a stateless solution. EX2015 ¶103. Li explains that an important aspect of Li's disclosure is the stateless nature of the system. EX1037 at 3 (“With the address-mapping rule commonly known within the autonomous domain, IPv4 source and destination addresses in a packet can be translated into their IPv6 version without any explicitly stored states”). This allows packets to be transmitted without the overhead required to initialize a connection, maintain and update information about the connection, and modify incoming and outgoing packets. EX2015 ¶103.

Thus, a POSITA would not look to Wu to improve Li. Even if Li and Wu could be combined, doing so would eliminate any advantages of Li's stateless technique. EX2015 ¶104.

3. Wu does not teach a destination address constructed with a destination port number

Wu also does not teach the claimed destination port number of the '844 Patent. EX2015 ¶105-111. As Petitioner's expert acknowledges, Wu's "NAT [] translates a *source* port number into an external port number." EX1003 ¶205 (emphasis added). Petitioner does not acknowledge this difference between the claims and Wu, nor does Petitioner explain how or why Wu could be modified to teach a destination port.

Figure 1 of Wu shows the IPv6 address adopted when the client end communicates. EX1039 at 3 (Claim 3), 17. The Brief Description of the Drawings in Wu states that Figure 1 is the form of "SilkRoad address assigned to the client end by the server." *Id.* at 11. The specification states that "The IPv6 address adopted by the client ends during communication is a kind of address with prescribed form" that includes a 64-bit IPv6 address prefix and a 64-bit interface ID. *Id.* Wu indicates that the address shown in Figure 1 is the address of the client, and thus it will be used as the source address in communications from the client. EX2015 ¶106. This is confirmed by the discussion of the IPv4 header, which indicates that "The source IPv4 address is the IPv4 address of the client end." *Id.* at 12. This SilkRoad address is generated and assigned to the client as part of a registration process that occurs before it conducts transmissions on the network. *Id.* Thus, the IPv6 address assigned to the client occurs in a preliminary operation. EX2015 ¶106. It is not an IPv6 address that is constructed in response to receiving an IPv4 data packet. *Id.*

The IPv6 address of Figure 1 includes a pseudo external port field that appears to be a NAT-mapped port value (the private IPv4 address of the client has been

mapped to a public “external” address). EX2015 ¶107. This field reflects the value that the “client end sends [in] an initialized data packet to the server”. The UDP port value of the client is mapped to a different port when the packet passes the NAT, and this value is used to generate the IPv6 address as part of the initialization configuration of the client. EX1039 at 11-12. The NAT translation table maintains the mapping of the client port and the external port. *Id.* at 3, 11. The pseudo port field in Figure 1 is at best the source port of the client, not a destination port. EX2015 ¶107.

The IPv6 address in Figure 1 also includes a pseudo external address. This field appears to reflect the value of the client’s private IPv4 address, mapped to a public IPv4 address when the packet passes the NAT. EX1039 at 12; EX2015 ¶108. The NAT table maintains a state table of the mapping between the private IPv4 address and the public (external) IPv4 address. EX1039 at 12; EX2015 ¶108

A POSITA would not understand “pseudo external port” or “pseudo external address” to be terms of art, and Petitioner made no attempt to explain what a “pseudo external port” or “pseudo external address” is. EX2015 ¶109. Wu’s characterization of a pseudo external port is “[t]he external port (NAT-mapped port) and 0xFFFF and/or the subsequent 16-bit numerical value.” EX1039 at 11. However, a POSITA would never implement an “external port (NAT-mapped port) and 0xFFFF and/or the subsequent 16-bit numerical value.” EX2015 ¶109. A POSITA would understand that 0xFFFF in binary would be a 16-bit number consisting entirely of ones. *Id.* If a POSITA treated the definition from Wu as a suggested bit manipulation, an “and” bitwise operation between 0xFFFF and any 16-bit number simply results

in the same value as the original number. *Id.* An “or” bitwise operation between 0xFFFF and any 16-bit number always results in the value 0xFFFF. *Id.* Neither operation would make sense to a POSITA—doing extra work to always get back either the same value or 0xFFFF is simply illogical. *Id.* Based on the definition in Wu, a POSITA would not necessarily understand a “pseudo external port” to even be a port number, much less understand from Wu how a destination port number should be used when constructing an IPv6 destination address. *Id.* The same logic applies to the “pseudo external address,” which a POSITA would also not necessarily understand to be an IPv4 destination address as claimed. *Id.*

As these discussions indicate, at best the pseudo external address and pseudo port represent source information of the client that is configured as part of an initialization of the client device. *Id.* at 110. These external source and port values do not describe destination address and port information. *Id.*; EX1039 at 3, 11-12.

The server in Wu also does not perform IPv6 destination address construction as specified in the ’844 claims. EX2015 ¶111. The ’844 Patent claims refer to constructing an IPv6 destination address by concatenating certain parameters from a received IPv4 data packet, including the IPv4 destination address and port information included in the received IPv4 data packet. *Id.* This concatenation operation that forms part of the constructing process requires an operation in which each of these pieces of information are appended together to form a single unit in a contiguous pattern. *Id.* The server in Wu does not perform any sort of concatenating operation, or otherwise append any of the discrete values required into an IPv6 address. *Id.* Rather, it simply strips the IPv4 header from the packet and forwards

the un-encapsulated IPv6 data packets. *Id.*; EX1039 at 15. The server itself does not construct an address and removing an encapsulating header or copying an IPv6 address is different than constructing an address through a concatenation operation. EX2015 ¶111. As a result, the operation performed in Wu of retrieving the encapsulated IPv6 address also does not meet the requirement of the constructing limitation because no concatenation occurs at the server. *Id.*

VI. Conclusion

Patent Owner respectfully requests that the Board affirm the validity of the '844 Patent for the reasons stated herein.

Dated: October 30, 2024

Respectfully submitted,
By: /R. Allan Bullwinkel/
R. Allan Bullwinkel (Reg. No. 77,630)
Attorney for Patent Owner
Monarch Networking Solutions LLC

CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a copy of the foregoing PATENT OWNER'S RESPONSE TO PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 8,451,844 was served via email to lead and backup counsel of record for Petitioners as follows:

Lead Counsel for Petitioner
James M. Glass (Reg. No. 46,729) Quinn Emanuel Urquhart & Sullivan, LLP 51 Madison Ave., 22nd Floor New York, New York 10010 jimglass@quinnemanuel.com (212) 847-7000
Back-Up Counsel for Petitioner
Todd M. Briggs (Reg. No. 44,040) Quinn Emanuel Urquhart & Sullivan, LLP 555 Twin Dolphin Drive, 5th Floor Redwood Shores, CA 94065 toddbriggs@quinnemanuel.com (650) 801-5000
Nima Hefazi (Reg. No. 63,658) Quinn Emanuel Urquhart & Sullivan, LLP 865 S. Figueroa St., 10th Floor Los Angeles, California 90017 nimahefazi@quinnemanuel.com (213) 624-7707
Kevin Johnson (Reg. No. 38,927) Quinn Emanuel Urquhart & Sullivan, LLP 555 Twin Dolphin Drive, 5th Floor Redwood Shores, CA 94065 kevinjohnson@quinnemanuel.com (650) 801-5000

Dated: October 30, 2024

Respectfully submitted,

By: /R. Allan Bullwinkel/
R. Allan Bullwinkel (Reg. No. 77,630)
Attorney for Patent Owner
Monarch Networking Solutions LLC

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that this brief complies with the type-volume limitation of 37 C.F.R. § 42.24 because this brief contains 13,671 words.

Dated: October 30, 2024

Respectfully submitted,

By: /R. Allan Bullwinkel/
R. Allan Bullwinkel (Reg. No. 77,630)
Attorney for Patent Owner
Monarch Networking Solutions LLC