

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

UMBRA TECHNOLOGIES LTD.,
Patent Owner.

IPR2024-00497
Patent 10,630,505 B2

Before ST. JOHN COURTENAY III, MICHAEL R. ZECHER, and
GREGG I. ANDERSON, *Administrative Patent Judges*.

ANDERSON, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Cisco System, Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–20 (“the challenged claims”) of U.S. Patent No. 10,630,505 B2 (Ex. 1001, “the ’505 patent”). Petitioner also filed a Declaration of Dr. A.L. Narasimha Reddy with the Petition. *See* Ex. 1003. UMBRA Technologies Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

We instituted *inter partes* review on September 5, 2024. Paper 9 (“Inst. Dec.”). Patent Owner filed a Patent Owner’s Response. Paper 21 (“PO Resp.”). Patent Owner also filed a Declaration of Dr. Micah Beck with the Patent Owner Response. *See* Ex. 2002. Petitioner filed a Petitioner’s Reply to Patent Owner’s Response. Paper 22 (“Pet. Reply”). Patent Owner filed a Patent Owner’s Sur-reply. Paper 24 (“Sur-reply”). In addition, an oral argument was held on June 4, 2025, and a transcript of the hearing is included in the record. Paper 31 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. Upon considering the record, for the reasons discussed below, we find Petitioner has shown by a preponderance of the evidence that claims 1–20 are unpatentable.

B. Related Proceedings

The parties identify the following related district court cases involving the ’505 patent: *Umbra Technologies Ltd. (UK) v. Cisco Systems, Inc.*, No. 1:23-cv-00903-DII (W.D. Tex.); *Umbra*

Technologies Ltd. (UK) v. VMware, Inc., No. 1:23-cv-00904-DII (W. D. Tex.). Pet. 74; Paper 17 (“Patent Owner’s Updated Mandatory Notice Information”), 2.

C. Real Parties-in-Interest

Petitioner identifies itself, Cisco Systems, Inc., as the real party-in-interest. Pet. 74. Patent Owner identifies itself, UMBRA Technologies Ltd., as the real party-in-interest. Paper 17, 2.

D. The ’505 Patent

The ’505 patent was filed under the Patent Cooperation Treaty on January 28, 2016, as U.S. Patent Application No. 15/546,247 (“the ’247 application”). Ex. 1001 at codes [21], [22]. The ’247 application is a continuation of application Nos. PCT/IB2016/000110 and PCT/US2015/064242, filed respectively on Jan. 5, 2016, and Dec. 7, 2015. *Id.* at code [63]. Five provisional applications were filed, the earliest of which is U.S. Provisional Patent Application No. 62/108,987, filed on Jan. 28, 2015. *Id.* at code [60]. Petitioner “assumes the earliest possible priority date of Jan. 28, 2015.” Pet. 16. The record does present any issue as to whether or not the references relied on are prior art.

1. Technical Background

The ’505 patent relates to “the configuration and operation of a global virtual network (GVN).” Ex. 1001, 1:25–26.

A Global Virtual Network (GVN) is a type of computer network on top of the internet providing global secure network optimization services utilizing a mesh of devices distributed around the world securely linked to

each other by advanced tunnels, collaborating and communicating via Application Program Interface (API), Database (DB) replication, and other methods.

Ex. 1001, 3:11–17.

The problem addressed by the '505 patent is managing “long distance connectivity and throughput due to issues related to distance, protocol limitations, peering, interference, and other problems and threats.” Ex. 1001, 1:30–34. One approach to the problem is wide area network (WAN) optimization which uses “a hardware (HW) device at the edge of a local area network (LAN) which builds a tunnel to another WAN optimization HW device at the edge of another LAN, forming a wide area network (WAN) between them.” *Id.* at 1:61–67. One way for creating WAN links “from one LAN to another LAN involve[s] the building of tunnels such as IPSec or other protocol tunnels between two routers, firewalls, or equivalent edge devices.” *Id.* at 2:48–51.

Advanced Smart Routing (ASR) for client devices, including End Point Device (EPD) and access point server (SRV_AP), ensures that traffic flows via the most ideal path from origin to destination. Ex. 1001, 3:17–32. A third layer of the GVN “is seen by client devices connected to the GVN as a normal internet path but with a lower number of hops, better security and in most cases lower latency than traffic flowing through the regular internet to the same destination.” *Id.* at 3:50–55.

2. The Global Virtual Network of the '505 Patent

The '505 Patent describes systems and methods for connecting endpoints via first and second devices with a communication path of “one or more intermediate tunnels connecting each endpoint device to one or more intermediate access point servers and one or more control servers.” Ex. 1001, at code [57]. Figure 23 of the '505 patent is reproduced below.

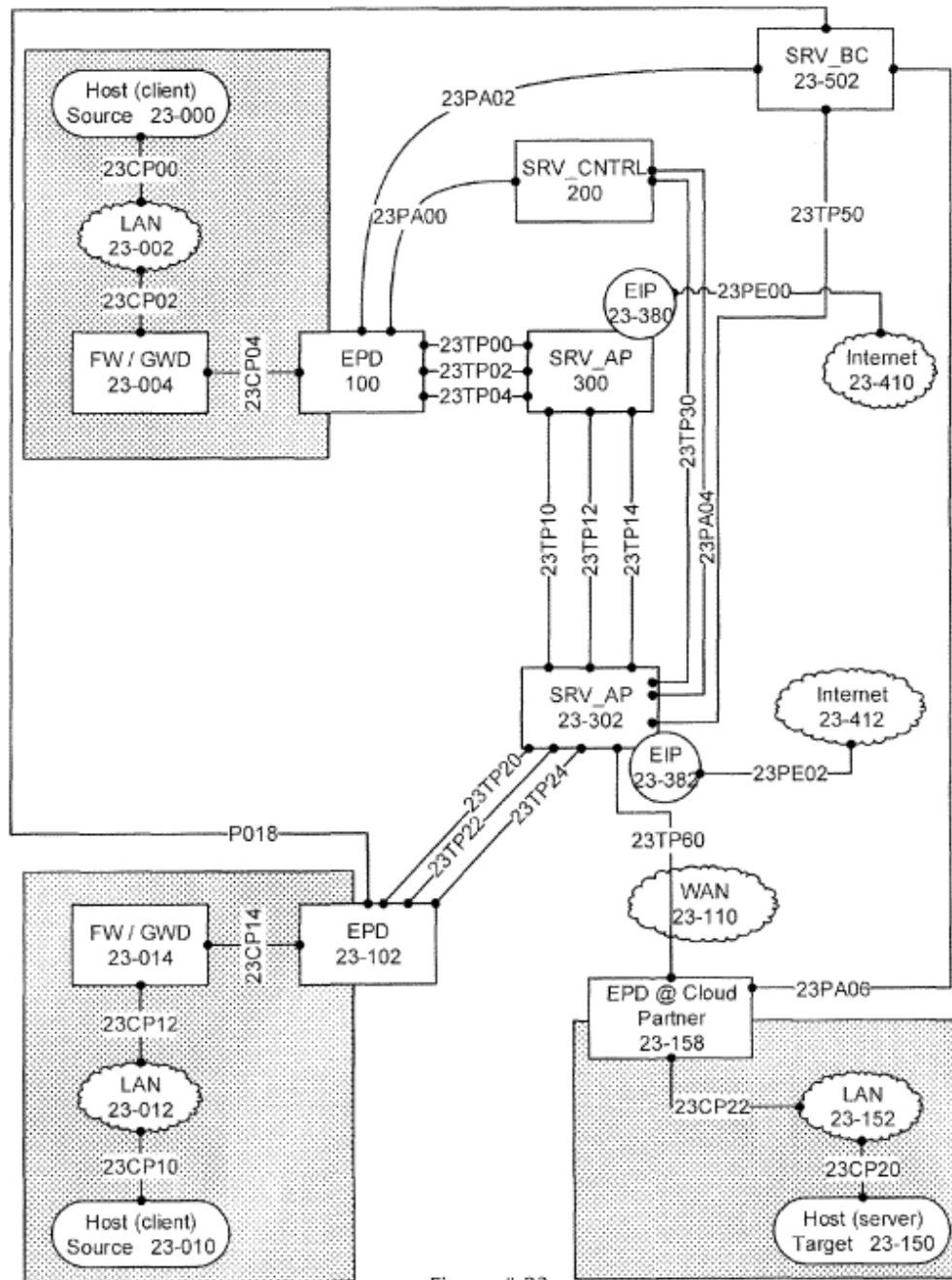


Figure # 23

Figure 23 illustrates multiple tunnel connectivity between End Point Devices (EPD) and Access Point Servers (SRV_AP).

Id. at 5:32–34, 23:55–57. With reference to Figure 23, the “tunnels can be used for client data traffic, internal system data or other transfers.” *Id.* at 23:57–59. Figure 23 shows the connection of “Global Virtual Network (GVN) infrastructure devices such as Central Server (SRV CNTRL) 200 and Back Channel Admin Server (SRV BC) 23-502 with other devices within the GVN.” *Id.* at 23:60–63. “Multiple tunnels between two devices such as 23TP00 23TP02 23TP04 or 23TP10 23TP12 23TP14 or 23TP20 23TP22 23TP24 can either offer a single communication path by sending traffic down one tunnel, or two or more tunnels can be aggregated together where two or more bound tunnels can carry traffic as if they are one tunnel.” *Id.* at 24:33–39.

Figure 33 of the '505 patent is reproduced below.

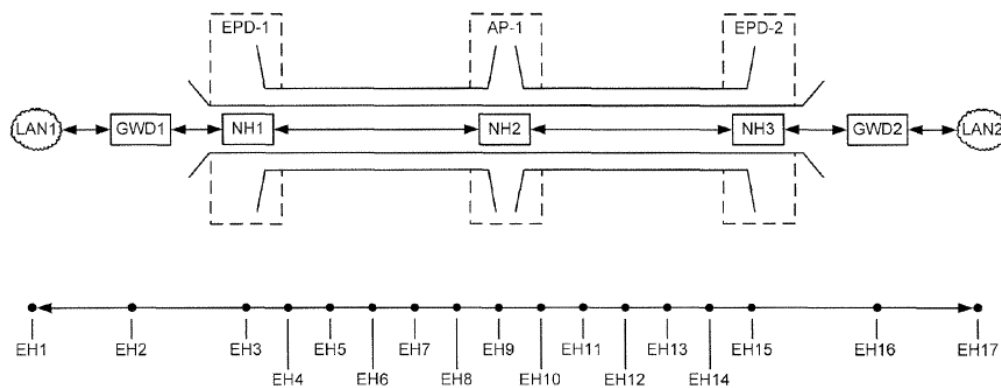


Figure # 33

Figure 33 illustrates a GVN Tunnel from LAN to EPD to SRV_AP to EPD to LAN.

Ex. 1001, 5:54–55, 32:50–51. Figure 33 illustrates a “third layer of the GVN with respect to neutrality and security of the GVN tunnel while comparing number of hops to the hops of the base Internet connection.” *Id.* at 32:42–45. Specifically, Figure 33 describes a “GVN Tunnel from LAN to EDP to SRV_AP to EPD to LAN. This variation illustrates an end-to-end GVN tunnel(s) between edges of two LANs via one SRV_AP.” Ex. 1001, 33:8–11.

Figure 34 of the '505 patent is reproduced below.

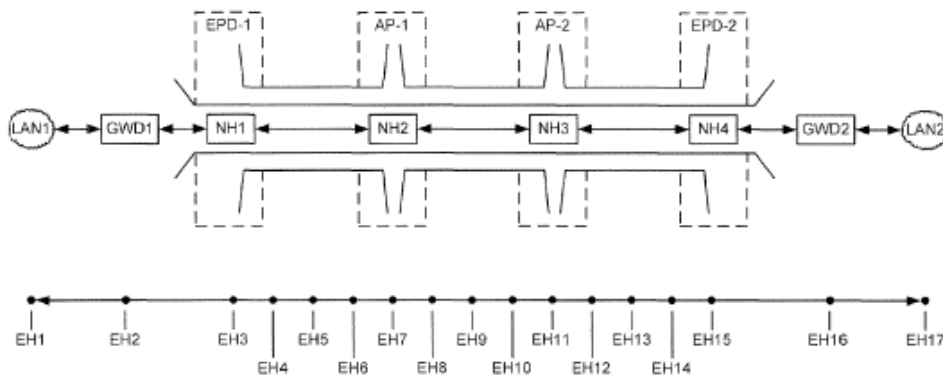


Figure # 34

Figure 34 illustrates a GVN tunnel from LAN to EPD to SRV_AP to SRV_AP to EPD to LAN.

Ex. 1001, 5:54–55, 33:25–26. Figure 34 illustrates another “third layer of the GVN with respect to neutrality and security of the GVN tunnel while comparing number of hops to the hops of the base Internet connection.” *Id.* at 32:42–45. Specifically, Figure 34 is an end-to-end GVN tunnel that has “a second AP-2 inserted into the path

to represent another joining of tunnels AP-1 to AP-2 and AP-2 to EPD-2.” *Id.* at 33:29–31.

E. Illustrative Claim

The Petition challenges claims 1–20, of which claims 1, 11, and 14 are independent claims directed to, respectively, “[a] network system,” “[a] method,” and “[a] system.” Ex. 1001, 58:13, 58:59, 59:16. Claims 2–10, 12, 13, and 15–20 ultimately depend from one of independent claims 1, 11, or 14. *Id.* at 58:25–58, 59:5–15, 60:4–27. Claim 1 is illustrative of the claimed subject matter and reproduced below:

- [1.0]¹ A network system comprising:
 - [1.1] a first device;
 - [1.2] a second device; and
 - [1.3] a plurality of intermediate access point servers that form a plurality of end-to-end tunnels connecting the first device and the second device; and
 - [1.4] a control server, wherein the control server receives information from at least one of the plurality of intermediate access point servers, and wherein the control server selects one of the plurality of end-to-end tunnels for communication between the first and second devices based on the information.

Ex. 1001, 58:12–24.

¹ Paragraph labeling in brackets is based on Petitioner’s format identifying the claim limitations. *See* Pet. 30–44 (showing for claim 1). Patent Owner also uses the same format. PO Resp. 6 (identifying “[e]lement 1.3). We adopt the same format for purposes of this Decision.

F. References

The Petition relies on the following references:

Hankins, et al., US 10,177,957 B1, issued January 8, 2019
(Ex. 1004, “Hankins”);

Munger, et al., US 6,502,135 B1, issued December 31, 2002
(Ex. 1005, “Munger”); and

Treuhaft, et al., US 2013/0275570 A1, published October 17,
2013 (“Treuhaft,” Ex. 1009)

G. Asserted Grounds of Unpatentability

Petitioner asserts the challenged claims are unpatentable on the
following grounds:

Grounds	Claims Challenged	35 U.S.C. §²	Reference(s)/Basis
1	1, 2, 4–12, 14–20	103	Hankins alone or Hankins, Munger
2	3, 13	103	Hankins alone or Hankins, Munger, Treuhaft

Pet. 21.

² Because the earliest application from which the ’505 patent claims priority was filed after March 16, 2013, the AIA (“America Invents Act”) version of § 103 applies. Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011).

H. Overview of the Prior Art

Of the asserted prior art, only Hankins is relevant to our Decision. Munger and Treuhaft are described below for completeness.

1. Hankins (Ex. 1004)

Hankins describes managing networks, including connecting a private network to the Internet and communicating signal packets from a first device in a first logical broadcast domain to another network device in another logical broadcast domains using a tunnel server. Ex. 1004, at code [57]. Hankins explains that broadcast domain refers to a set of devices occupying a network address space, in which any device is able to communicate with any other device in the broadcast domain without rerouting transmission. *Id.* at 6:33–40. “[N]etwork devices may comprise computing devices, non-computing devices, and/or other devices. A network device may comprise, as non-limiting examples, a router, gateway, hub, switch, host, mobile device, server, client, [network address translator] device” *Id.* at 8:15–19. A logical broadcast domain means that portions of the broadcast domain may not be entirely related to a particular set of physical devices and, instead, can be associated with a cloud implemented functionality. *Id.* at 4:12–16, 7:45–50.

Figure 2 of Hankins is reproduced below.

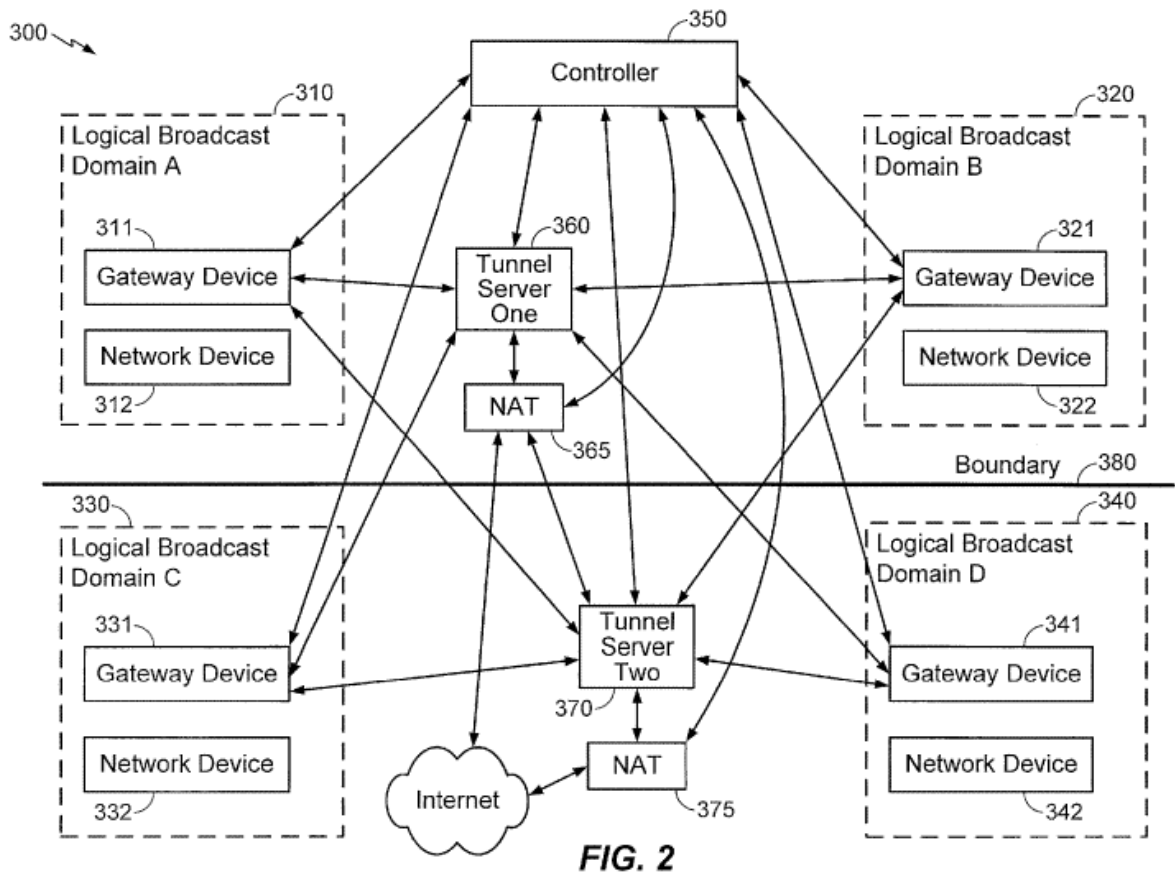


Figure 2 is a schematic diagram illustrating an embodiment to connect a private network to the Internet.

Ex. 1004, 1:45–46. As depicted in Figure 2, four logical broadcast domains A310, B320, C330, and D340 are in communication via one or more tunnel servers one 360 and two 370. *Id.* at 24:45–47, 24:58–67. For example, “[g]ateway devices 311, 321, 331, and 341 may generate a broadcast domain configuration for their respective logical broadcast domains.” *Id.* at 24:47–49. “Gateway devices 311, 321, 331, and 341 may forward respective broadcast domain configurations

to controller 350,” which “may provision tunnel server one, shown as 360.” *Id.* at 24:49–52.

Controller 350 may therefore initiate instructions to gateway devices 311, 321, 331, and 341 to additionally initiate communications with tunnel server two 370, while also continuing to be in communication with tunnel server one 360, for example. Gateway devices 311, 321, 331, and 341 may thus initiate communications to tunnel server two 370 after being deployed.

Id. at 25:22–29.

The communication channel between remote physical locations, e.g., Los Angeles and New York, may be enhanced by provisioning a tunnel server located more physically proximate to endpoints.

Ex. 1004, 25:7–18. “A path or channel may potentially be enhanced by controller 350 provisioning an additional tunnel server located more physically proximate to logical broadcast domain C 330 and logical broadcast domain D 340” *Id.* at 25:15–19.

2. *Munger (Ex. 1005)*

Munger describes a network where “[d]ata packets matching criteria defined by a moving window of valid addresses are accepted for further processing, while those that do not meet the criteria are quickly rejected.” Ex. 1005, at code [57]. Munger uses a “secure mechanism for communicating over the internet, including a protocol referred to as the Tunneled Agile Routing Protocol (TARP), [which] uses a unique two-layer encryption format and special TARP routers.” *Id.* at 2:66–3:2. “Each TARP packet’s true destination is concealed behind a layer of encryption generated using a link key.” *Id.* at 3:19–

20. Munger further teaches domain name servers (DNS) “provide a look-up function that returns the IP address of a requested computer or host.” *Id.* at 37:22–24.

3. *Treuhافت (Ex. 1009)*

Treuhافت discloses systems and methods for processing domain name system requests (DNS requests) in a network. Ex. 1009, at code [57]. Treuhافت explains that

Network resources such as those available via the Internet are accessed according to Internet Protocol (IP) addresses. IP addresses are represented numerically, traditionally as a quartet of values having the form 111.111.111.111. From the early inception of network computing, familiar alphanumeric name-based addressing has been used to allow users to more easily locate and remember the addresses for resources. For example, domain names are assigned to computing servers and clients. The domain name system facilitates the translation between IP addresses and domain names by maintaining accessible records that associate one or more domain names with one or more IP addresses.

Id. ¶ 4.

Treuhافت describes when a nameserver (network server) receives a DNS request, it “first checks a local cache to attempt to resolve the request.” *Id.* ¶ 6. The “DNS nameserver maintains the local cache with domain name records that have already been resolved to improve performance in responding to subsequent DNS requests.” *Id.* If the nameserver is maintaining the requested domain name in the local cache, it will issue a DNS response to the client with the domain name record including the IP address corresponding to the request.

Id. If the nameserver does not have an entry for the requested domain name, it will launch recursive processing to obtain it. *Id.* ¶ 7.

II. ANALYSIS OF THE CHALLENGED CLAIMS

A. Level of Ordinary Skill in the Art

Petitioner alleges a person of ordinary skill in the art would have a working knowledge of techniques for transmitting data via a [virtual private network (“VPN”)] and establishing tunneling links. A [person of ordinary skill in the art] would have gained knowledge of these concepts through a mixture of training and work experience, such as by having a Bachelor’s degree in computer science and four years of experience; or by obtaining a Master’s degree in computer science, but having only one to two years of experience; or by having no formal education but experience in storage systems of at least eight years.

Pet. 16–17 (citing Ex. 1003 ¶ 53).

Patent Owner does not propose a level of ordinary skill in the art. *See generally* PO Resp. Petitioner’s proposal is supported by the testimony of Dr. Reddy and is consistent with the ’505 patent and the asserted prior art. Accordingly, we apply Petitioner’s articulation in our obviousness evaluations below.

B. Claim Construction

We interpret claim terms using “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2023). In this context, claim terms “are generally given their ordinary and customary meaning,” as would have been understood by a person of

ordinary skill in the art in question at the time of the invention.

Phillips v. AWH Corp., 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1582 (Fed. Cir. 1996) (en banc)). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally operative meaning of claim language.’” *Phillips*, 415 F.3d at 1317 (citations omitted).

Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). We construe only those claim terms that require analysis to resolve the parties’ disputes. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

In the Petition, Petitioner argued no express construction was needed and proceeded on the basis of plain and ordinary meaning.
Pet. 15.

The term “end-to-end tunnels” appears in independent claims 1, 11, and 14. In the Institution Decision we preliminarily found that the

'505 patent does not define “end-to-end tunnels.” Inst. Dec. 20. At that time, we analyzed the intrinsic evidence. *Id.* at 20–21. We preliminarily determined that the term “end-to-end tunnels” means communication paths connecting endpoint devices to one or more intermediate access point servers and one or more control servers. *Id.* at 21 (citing Ex. 1001, 4:5–8). “Stated differently, the ‘end-to-end tunnels’ connecting endpoint devices may include intermediate access point servers or control servers.” *Id.*

During the course of trial, although both parties assiduously avoided proposing a specific construction, the dispute between the parties centers on whether Hankins teaches “end-to-end tunnels.” PO Resp. 7–19; Pet. Reply 2–4; PO Sur-reply 2–3. Petitioner framed the Patent Owner Response as being “directed to a single issue—the construction of the *end-to-end*[]*tunnels* recited in Claim 1.” Pet. Reply 2. During the oral hearing, there was a consensus that the term should be construed. Tr. 37:22–23 (Petitioner alleging ordinary meaning of limitation 1.3 “defines what the end-to-end tunnels are”), 40:25–41:1 (Patent Owner acknowledging that “we probably have consensus that claim construction is necessary with the admission that – the understanding that Petitioner’s proposal is ordinary meaning”).

The meaning of the term “end-to-end tunnels” is dispositive of our Decision here. *See* Pet. Reply 2 (“Patent Owner Response . . . is directed to a single issue—the construction of the *end-to-end*[]*tunnels* recited in Claim 1.” *See* Section II.D.2 below (limitation 1.3). Patent Owner’s patentability arguments center around construction of this term. PO Resp. 6–19. We construe the

term below and refer to our analysis of limitation 1.3 analyzing the parties' arguments regarding patentability. Neither party identifies another claim term that requires construction and, beyond limitation 1.3, no other limitation is at issue.

“end-to-end tunnels” (claims 1, 11, and 14)

The claim term “end-to-end tunnels” appears in each of independent claims 1, 11, and 14. Claim 1 is the only claim argued by the parties and is representative of this claim construction issue.

Patent Owner argues that the '505 patent supports a construction requiring an “end-to-end tunnel” to provide an “uninterrupted” path between two devices. *See* PO Resp. 9–10; *see also* Section II.D.2 below (addressing Patent Owner’s “uninterrupted” argument). Patent Owner also argues “the intrinsic record reveals that a single ‘tunnel’ is a connection between two devices with encapsulated traffic therebetween (e.g., EPD1 and EPD2) as shown by, for example, the prosecution history of the '505 patent.” PO Resp. 9.

Under *Phillips* we look to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence. *Phillips*, 415 F.3d at 1312–17. The words of a claim, however, “are generally given their ordinary and customary meaning.” *Id.* at 1312.

Limitation 1.3 recites “a plurality of intermediate access point servers that form a plurality of *end-to-end tunnels* connecting the first device and the second device.” Ex. 1001, 58:16–18 (emphasis added).

Based on the plain language alone, there are “end-to-end tunnels” which “connect[] the first device and the second device” of the network system.

In addition, “the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Phillips*, 415 F.3d at 1313. As already noted, the parties appear to agree that the specification does not define explicitly an “end-to-end tunnel.” In describing Figure 33 of the ’505 patent, reproduced above in Section I.D.2, the specification describes Figure 33 as illustrating “GVN Tunnel from LAN to EDP to SRV_AP to EPD to LAN. This variation illustrates an *end-to-end GVN tunnel(s)* between edges of two LANs via one SRV_AP.” Ex. 1001, 33:8–11 (emphasis added).

The specification further describes Figure 33 as showing one tunnel between EPD-1 and AP-1. This is joined to a second tunnel between AP-1 and EPD-2. There are three neutral hops within the Third Layer of the GVN represented by NH1, NH2, and NH3 as compared to the 13 hops on the base Internet between EH3 and EH15.

Id. at 33:15–19. This disclosure shows the end-to-end GVN tunnel has two hops, one between EPD-1 and AP-1, and one from AP-1 to EPD-2. The intermediate connection at AP-1 teaches the tunnel may be interrupted, contrary to Patent Owner’s assertion that Figure 33 of the ’505 patent supports a construction requiring the tunnel to be “uninterrupted.” *See* PO Resp. 9–10; *see also* Section II.D.2 below (addressing Patent Owner’s “uninterrupted” argument).

The '505 patent's Figure 33 (reproduced above at Section I.D.2) also illustrates a “plurality of tunnels” connecting two network devices. Petitioner's annotated Figure 33 is reproduced below.

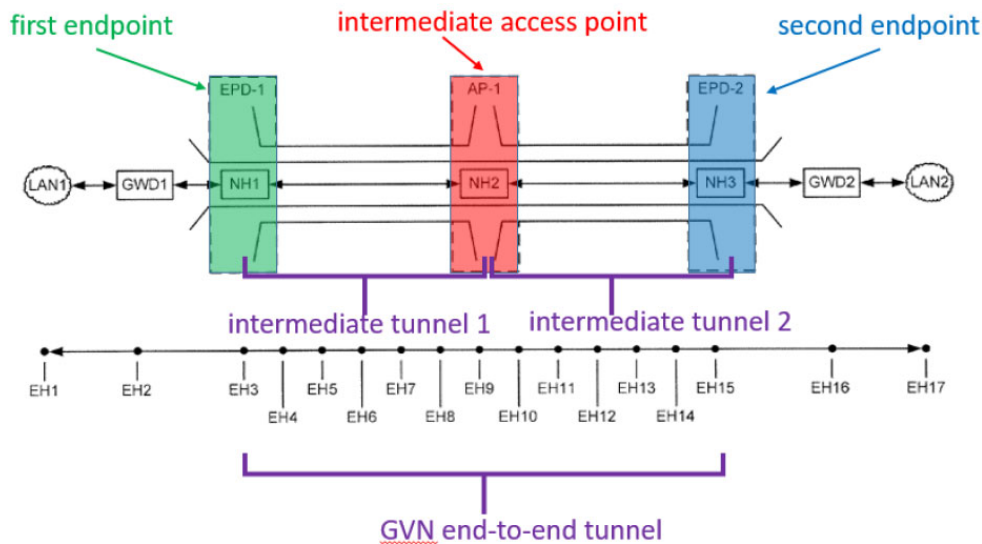


Figure # 33

Figure 33 of the '504 patent with annotations provided by Petitioner.

Pet. Reply 10. With respect to Figure 33, Petitioner argues,

There is “one tunnel between EPD-1 and AP-1” (intermediate tunnel 1), “joined to a second tunnel between AP-1 and EPD-2” (intermediate tunnel 2) which together form the GVN “tunnel that extends over the entirety of the transit” from one endpoint to the other.

Id. (citing Ex. 1001, 33:7–19).

Although we recognize that the “end-to-end GVN tunnel” disclosed in the Specification is not identical to the “end-to-end tunnel” required by independent claim 1, we find they are essentially the same. Our finding is supported by the fact that the '505 patent relates generally to a “Global Virtual Network” or GVN. *See* Ex.

1001 at code [54] (title). Neither party argues anything to the contrary. Indeed, at the oral hearing, both parties argued Figure 33 and “GVN end-to-end tunnel” in the context of presenting their arguments directed to whether Hankins teaches an “end-to-end tunnel.” Tr. 6:17–7:5 (Petitioner), 26:10–20 (Patent Owner).

In addition to consulting the Specification, a court “should also consider the patent’s prosecution history, if it is in evidence.” *Phillips*, 415 F.3d at 1317. The file history is in evidence. Ex. 1002. During prosecution, originally presented claim 1 was amended to issued claim 1 by deleting “communication path” and adding “a plurality of intermediate access point servers that form a plurality of end-to-end tunnels.” *Id.* at 145.³ During prosecution Patent Owner argued that separate VPN links between endpoint devices, as in Chen (Ex. 1006, US 2014/0359704 A1), are not “a plurality of end-to-end tunnels” because the VPN links provide encapsulated communication between an endpoint device and cloud server, constituting an “intermediate tunnel.” *Id.* at 150–151.

Here, Patent Owner argues, as it did during prosecution, that traversing “multiple segments” between two devices is a communication path—not an “end-to-end tunnel.” PO Resp. 7. More specifically, Patent Owner argues our preliminary “*sua sponte* construction” was incorrect because “a ‘*tunnel*’” is “a segment

³ All references to the prosecution history of the ’505 patent refer to the page numbers inserted by Petitioner in the bottom, right-hand corner of each page in Exhibit 1002.

connecting two endpoints with encapsulated communications therebetween” and does not include “traversing multiple segments.” *Id.*

Patent Owner’s arguments regarding Chen’s purported intermediate tunnel made during prosecution and traversing multiple segments presented at trial are not persuasive because they contravene the intrinsic evidence, specifically Figure 33 and its corresponding description showing that the end-to-end GVN tunnel includes an interrupted path with two hops, one between EPD-1 and AP-1, and one from AP-1 to EPD-2. Applying the plain and ordinary meaning in the context of the ’505 patent, as evidenced by the intrinsic evidence summarized above, we conclude that an “end-to-end tunnel” is not required to include an uninterrupted path that provides encapsulated communications between two devices, but instead may include separate segments between intermediate access point servers or control servers that connect two devices. Ex. 1001, 33:8–19 (“end-to-end GVN tunnel(s)”), 58:16–18 (limitation 1.3). We take this opportunity to note that our construction after considering the complete record is consistent with our preliminary construction set forth in the Institution Decision because both constructions allow an “end-to-end tunnel” connecting endpoint devices to include intermediate access point servers or control servers therebetween. *See* Inst. Dec. 21.

C. Obviousness

A claim is unpatentable as obvious under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such

that the claimed invention, as a whole, would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called “secondary considerations,” including commercial success, long-felt but unsolved needs, failure of others, and unexpected results. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Neither party has presented any evidence on the fourth *Graham* factor.

D. Claims 1, 2, 4–12, 14–20 as Obvious Over Hankins Alone or the Combination Hankins and Munger

Petitioner provides a limitation-by-limitation analysis as to how claims 1, 2, 4–12, and 14–20 would have been obvious over Hankins alone or the combination Hankins and Munger. Pet. 21, 23–66. Petitioner submits the Reddy Declaration to support its positions. Ex. 1003 ¶¶ 66–141.

1. Introduction

Patent Owner disputes only Petitioner’s showing as to limitation 1.3.⁴ PO Resp. 6. Patent Owner does not argue Petitioner’s

⁴ Claims 11 and 14 have corresponding limitations 11.1 and 14.3. See Pet. 56 (limitation 11.1), 64 (limitation 14.3); see also Ex. 1002, 153

showing for any other limitation of claim 1. *See* generally PO Resp. Claims 11 and 14 are not separately argued. *Id.* “[A]ny arguments not raised in the response may be deemed waived.” Paper 10 (“Scheduling Order”), 9. Inasmuch as Patent Owner did not argue any other limitation or claims 11 and 14 during trial or at the oral hearing, we find Patent Owner has waived or forfeited any potential argument it might have made as to any other limitation or claim.

The only issue presented by the parties during trial is whether Hankins teaches or suggests limitation 1.3. Patent Owner disputes our preliminary construction in the Institution Decision. PO Resp. 7–19. To the extent those arguments relate to claim construction arguments not addressed above, they are addressed below.

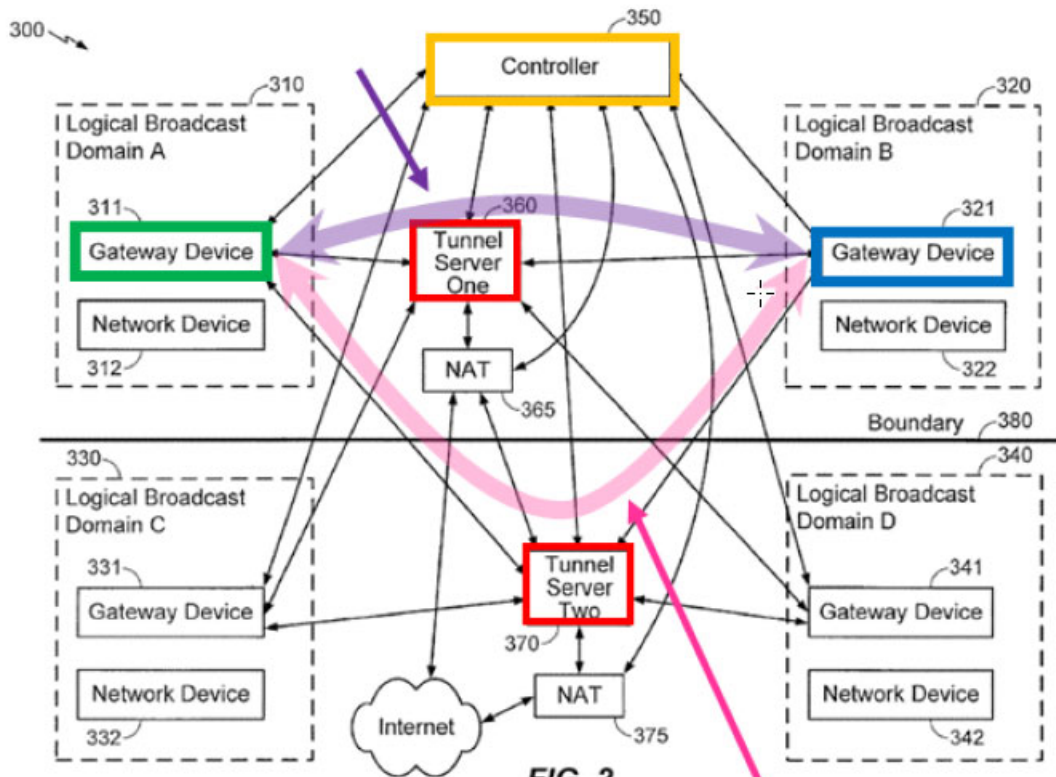
2. Limitation 1.3

Limitation 1.3 recites “a plurality of intermediate access point servers that form a plurality of end-to-end tunnels connecting the first and the second device.” Ex. 1001, 58:16–18. Above we determined the plain and ordinary meaning of “a plurality of end-to-end tunnels” may include intermediate access point servers or control servers. *See* Section II.B above.

Petitioner relies on an annotated version of Hankins’s Figure 2 to show the limitation, which is reproduced below.

(“[C]laims 11 and 14 recite[d] features that are substantially similar to those of amended claim 1.”)

1st E2E Tunnel



2nd E2E Tunnel

Hankins Annotated Figure 2 illustrating an embodiment to connect a private network to the Internet.

Pet. 33 (Hankins's Figure 2 with annotations provide by Petitioner);

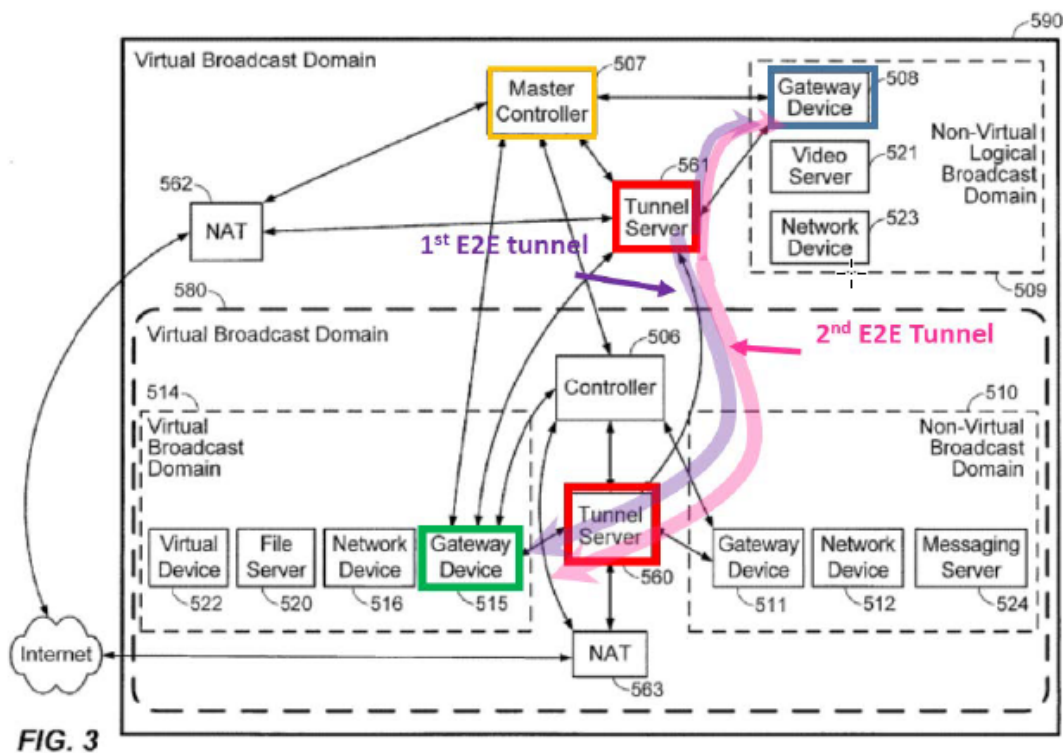
Ex. 1003 ¶ 86. Referring to Annotated Figure 2, Petitioner alleges

FIG. 2 shows a first end-to-end tunnel (**purple**) between gateway 311 and gateway 321 through tunnel server 360, and a second end-to-end tunnel (**pink**) between gateway 311 and gateway 321 through tunnel server 370. Thus, FIG. 2 discloses tunnel servers 360 and 370 (*a plurality of intermediate access point servers*) that form a first end-to-end tunnel from gateway 311 to gateway 321 through tunnel server 360, and form a second end-to-end tunnel from gateway 311 to gateway 321 through tunnel server

370 (a plurality of end-to-end tunnels connecting the first and the second devices).

Pet. 32 (citing Ex. 1004, 25:14–33, Fig. 2).

Petitioner further argues, in anticipation of Patent Owner’s argument that (*see* PO Resp. 8 discussed below) that each “end-to-end tunnel” passes through a plurality of intermediate access point servers, Hankins provides another embodiment that teaches this configuration. Pet. 33–34 (citing Ex. 1004, Fig. 3 with annotations provide by Petitioner). Petitioner’s Annotated Figure 3 is reproduced below:



Hankins Annotated Figure 3 is a block diagram showing connecting a private network to the Internet.

Pet. 34 (citing Ex. 1004, Fig. 3; Ex. 1003 ¶ 87). According to Petitioner, Hankins’s embodiment in Figure 3 discloses “a plurality of

end-to-end tunnels passing through tunnel servers 560 and 561.” *Id.* at 33.

In response, Patent Owner argues the following:

A single “end-to-end tunnel” will ‘run[] through,’ (Ex. 1001, 36:41–48), rather than ‘connect’ intermediate points. This concept allows a claimed single “end-to-end tunnel” to “extends over the entirety of the transit through [an underlying network].”

PO Resp. 8 (alterations in original) (citing Ex. 1001, 33:8–14). Patent Owner further argues “[t]here is simply no support in the ’505 patent, nor any of the art identified in the Petition, for a single tunnel to ‘be connecting three or more points.’” *Id.* at 9.

Our construction of an “end-to-end tunnel” addressed this argument. *See* Section II.B above. Our construction of this claim term includes a tunnel with intermediate network devices, i.e., separate segments, and it does not require an “uninterrupted” tunnel between network devices. Contrary to Patent Owner’s assertions, we are not persuaded that Figure 33 of the ’505 patent supports a construction requiring the tunnel to be “uninterrupted.” *See* PO Resp. 9–10. Indeed, Figure 33 illustrates a “third layer of the GVN with respect to neutrality and security of the GVN tunnel while comparing *number of hops* of the base Internet connection.” Ex. 1001, 32:42–45 (emphasis added). Figure 33 does not show an “uninterrupted” tunnel because it includes “hops.” *Id.* at 32:50–51 (“FIG. 33 illustrates GVN Tunnel from LAN to EPD to SRV AP to EPD to LAN.”); *see also* Pet. Reply 10 (citing annotated Fig. 33). We also note that, even were we to accept Patent Owner’s “run through” or “interrupted” arguments,

Petitioner's argument based on Hankins's Annotated Figure 3 above teaches an uninterrupted tunnel "run through" the network.

Citing Dr. Reddy's deposition testimony, Patent Owner further argues a "'tunnel' contemplated in the '505 patent is a *connection between two devices with encapsulated traffic* therebetween, wherein the encapsulated data packet is not unencapsulated until the packet exits the tunnel." PO Resp. 12–13 (citing Ex. 2001 (Reddy Deposition), 67:10–22, 69:5–9). Petitioner responds that "[n]one of the figures illustrating end-to-end tunnels discussed above include any discussion of encapsulation." Pet. Reply 17. We agree that "encapsulation" arguments have little relevance to either construction or patentability of limitation 1.3. Independent claim 1 only requires "communication between the first and second devices." There is simply no requirement in claim 1, much less in the Specification of the '505 patent, that indicates forming an end-to-end tunnel must include encapsulating traffic between the first and second devices.

Patent Owner further cites to an annotated version of Figure 39 of the '505 patent because, according to Patent Owner, the Specification explains that "[t]here can also be another tunnel, run through both of the other tunnels, joined at the SRV_AP 39-200 through which traffic can flow." PO Resp. 11–12 (emphasis omitted) (citing Ex. 1001, 36:41–48), 11 (annotated Fig. 39). Other than use of the words "run through," Patent Owner does not explain how Figure 39 supports its patentability position. Indeed, Figure 39 shows two separate segments (TUN 39-P10 and TUN 39-P12) connecting each of EPDs 39-100 and 39-102 to SRV_AP 39-200 with internal tunnel

INT TUN 39-20 running through them. PO Resp. 11 (annotated Fig. 39); Ex. 1001, 36:22–47. In our view, this only bolsters our position that an “end-to-end tunnels” may include separate segments and it does not require an “uninterrupted” path between two devices.

Patent Owner’s Sur-reply arguments do not change our determination. Patent Owner argues that an “end-to-end tunnel” is just one type of “tunnel type” disclosed in the ’505 patent. PO Sur-reply 3–15. For example, relying on another annotated version of Figure 39, Patent Owner argues that it presents an alternative option of “another . . . internal tunnel that ‘*can*’ be formed within the two adjacent tunnels (TUN 39-P10 and TUN 39-P12)” that were otherwise built as paths on either side of SRV_AP 39-200. *Id.* at 10–11. Beyond the “segment” argument addressed previously, Patent Owner does not provide evidentiary support explaining why the different tunnel configurations, *e.g.*, an “internal,” intermediate or “point-to-point” tunnels, are not “end-to-end tunnels” as we have construed the term. *Id.* at 3–15.

Next, Patent Owner argues that Petitioner’s construction is flawed by reiterating “that a single end-to-end tunnel cannot include multiple tunnels joined together at intermediate points.” PO Sur-reply 15 (citing Pet. Reply 14, 15–19). We disagree because, as we explain above, Petitioner’s arguments and evidence are consistent with our final construction of “end-to-end tunnels.”

The final argument in Patent Owner’s Sur-reply is that Hankins does not teach or suggest the “end-to-end tunnel” of limitation 1.3. PO Sur-reply 19–24. This argument is, once again, premised upon

Patent Owner's assertion that an "intermediate tunnel" is not an "end-to-end tunnel." *See, e.g.*, PO Sur-reply 20–21 (arguing Petitioner's annotated version of Figure 2 of Hankins teaches only "intermediate tunnels"). Given our claim construction *supra*, we find Hankins's tunnels are "end-to-end tunnels" even if they are made of separate segments.

Based on our final construction, and for the reasons discussed in Section II above, on this complete record we find that Petitioner has shown that Hankins teaches or suggests limitation 1.3. For completeness, we have reviewed Petitioner's arguments and evidence explaining how Hankins alone or in combination with Munger teaches the remaining limitations of claim 1, and we agree with and adopt Petitioner's analysis. *See* Pet. 30–32, 38–44. Accordingly, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Hankins alone or in combination with Munger.

Neither of independent claim 11 nor independent claim 14 is separately argued by Patent Owner. Further, none of dependent claims 2, 4–10, 12 or 15–20 is separately argued by Patent Owner. We have reviewed Petitioner's arguments and evidence explaining how Hankins alone or in combination with Munger teaches the limitation of claims 2, 4–12, and 14–20, and we agree with and adopt Petitioner's analysis. *See* Pet. 45–66. Accordingly, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 2, 4–12, and 14–20 would have been obvious over Hankins alone or in combination with Munger.

*E. Claims 3 and 13 as Obvious Over Hankins Alone or the
Combination of Hankins Munger, and Treuhaft*

Petitioner provides a limitation-by-limitation analysis as to how claims 3 and 13 would have been obvious over Hankins alone or the combination of Hankins, Munger, and Treuhaft. Pet. 66–71.

Petitioner submits the Reddy Declaration in support of its positions. Ex. 1003 ¶¶ 142–153. During trial, Patent Owner does not argue separately dependent claims 3 and 13. *See generally* PO Resp.

We have reviewed Petitioner’s arguments and evidence explaining how Hankins alone or in combination with Munger and Treuhaft teaches the additional limitation of dependent claims 3 and 13, and we agree with and adopt Petitioner’s analysis. *See* Pet. 66–71. Accordingly, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 3 and 13 would have been obvious over Hankins alone or in combination with Munger and Treuhaft.

III. CONCLUSION⁵

For the foregoing reasons, we have determined that Petitioner has shown by a preponderance of the evidence that claims 1–20 are unpatentable.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 4– 12, 14– 20	103	Hankins	1, 2, 4–12, 14–20	
1, 2, 4– 12, 14– 20	103	Hankins, Munger	1, 2, 4–12, 14–20	
3, 13	103	Hankins	3, 13	
3, 13	103	Hankins, Munger, Treuhaft	3, 13	
Overall Outcome			1–20	

⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IV. ORDER

For the foregoing reasons,

ORDERED that Petitioner has shown that challenged claims 1–20 are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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