

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMERSON ELECTRIC CO.,
Petitioner

v.

IP CO., LLC,
Patent Owner

Case IPR2016-01602

Patent 6,249,516

PATENT OWNER'S NOTICE OF APPEAL
35 U.S.C. § 142 & 37 C.F.R. § 90.2

Pursuant to 37 C.F.R. § 90.2(a), Patent Owner, IP CO., LLC, hereby provides notice of its appeal to the United States Court of Appeals for the Federal Circuit for review of the Final Written Decision of the United States Patent and Trademark Office (“USPTO”) Patent Trial and Appeals Board (“PTAB”) in Inter Partes Review 2016-01602, concerning U.S. Patent 6,249,516 (“the ’516 patent”), entered on January 9, 2018, attached hereto as Appendix A.

ISSUES TO BE ADDRESSED ON APPEAL

- A. Whether the Board violated the administrative notice requirements under the Administrative Procedure Act (APA) by failing to provide the PatentOwner a meaningful opportunity to respond to legal and factual basis introduced for the first time by the Board and Petitioner at oral argument and in the Board’s Final Written Decision?
- B. Whether the PTAB erred in construing the following claim limitations:
“a map of data packet transmission paths of a plurality of clients of said first network, where a transmission path of a client of said first network to said server can be through one or more of other clients of said first network”;
“changing the transmission path from the client to the gateway so that the path to the gateway is chosen”; and

“reverse link”?

- C. Whether the PTAB erred in ruling that claims 1, 4, 10, 13, 14 of the ‘516 patent would have been obvious over Burchfiel, Schwartz, and Heart?
- D. Whether the PTAB erred in ruling that claims 2, 5, and 11 of the ‘516 patent would have been obvious over Burchfiel, Schwartz, Heart and the Online Encyclopedia?
- E. Whether the PTAB erred in giving insufficient weight to Patent Owner’s secondary considerations of non-obviousness?

Simultaneous with submission of this Notice of Appeal to the Director of the United States Patent and Trademark Office, this Notice of Appeal is being filed with the Patent Trial and Appeal Board. In addition, this Notice of Appeal, along with the required docketing fees, is being filed with the United States Court of Appeals for the Federal Circuit.

Dated: February 28, 2018

Respectfully submitted,

/Gregory J. Gonsalves/

Dr. Gregory Gonsalves

Reg. No. 43,639

2216 Beacon Lane

Falls Church, Virginia 22043

(571) 419-7252

gonsalves@gonsalveslawfirm.com

CERTIFICATE OF SERVICE

The undersigned certifies that in addition to being filed electronically through the Patent Trial and Appeal Board’s E2E system the foregoing PATENT OWNER’S NOTICE OF APPEAL was served on the Director of the United States Patent and Trademark Office, at the following address (in accordance with 37 C.F.R. §§ 90.2(a), 104.2):

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
United States Patent and Trademark Office
P.O. Box 1450 Alexandria, Virginia 22313-1450

CERTIFICATE OF FILING

The undersigned certifies that on February 28, 2018, a true and correct copy of the foregoing PATENT OWNER’S NOTICE OF APPEAL was filed electronically with the Clerk’s Office of the United States Court of Appeals for the Federal Circuit at the following address:

Clerk of Court
United States Court of Appeals for the Federal Circuit
717 Madison Place NW
Washington, DC 20005

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing PATENT OWNER'S NOTICE OF APPEAL was served on February 28, 2018, by filing this document through the PTAB's E2E system as well as by delivering a copy via electronic mail to EmersonPTAB_service@ropesgray.com to the attorneys of record for the Petitioners listed below:

Lead Counsel

James L. Davis, Jr.
Reg. No. 57,325
ROPES & GRAY LLP
1900 University Avenue, 6th Floor
East Palo Alto, CA 94303-2284
P: 650-617-4794/F: 650-566-4147
james.l.davis@ropesgray.com

Backup Counsel

James R. Batchelder (pro hac vice)
ROPES & GRAY LLP
1900 University Avenue, 6th Floor
East Palo Alto, CA 94303-2284
P: 650-617-4018/F: 650-566-4134
james.batchelder@ropesgray.com

Matthew R. Shapiro
Reg. No. 70,945
ROPES & GRAY LLP
1211 Avenue of the Americas
New York, NY 10036-8704
P: 212-596-9427/F: 646-728-1784
matthew.shapiro@ropesgray.com

Dated: February 28, 2018

/Gregory J. Gonsalves/
Dr. Gregory Gonsalves
Reg. No. 43,639
2216 Beacon Lane
Falls Church, Virginia 22043
(571) 419-7252
gonsalves@gonsalveslawfirm.com

Appendix A

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMERSON ELECTRIC CO.,
Petitioner,

v.

IP CO., LLC,
Patent Owner.

Case IPR2016-01602
Patent 6,249,516 B1

Before THOMAS L. GIANNETTI, BRYAN F. MOORE, and
TREVOR M. JEFFERSON, Administrative Patent Judges.

GIANNETTI, Administrative Patent Judge.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Emerson Electric Co. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) seeking *inter partes* review of claims 1, 2, 4, 5, 10, 11, 13, and 14 of U.S. Patent No. 6,249,516 B1 (Ex. 1001, “the ’516 patent”). IP CO., LLC (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”).

Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we granted Petitioner’s request and instituted an *inter partes* review on all challenged claims. Paper 10 (“Institution Dec.”).

Following institution, Patent Owner filed a Response to the Petition (Paper 19, “PO Resp.”) and Petitioner filed a Reply (Paper 21, “Pet. Reply”). In addition, Patent Owner filed a motion for observations on the cross-examination of Petitioner’s expert, Mr. Geier, and Petitioner filed a response. Papers 23, 26. In addition, a final oral hearing was held on November 13, 2017. A transcript of that hearing has been entered in the record. Paper 32 (“Hr’g Tr.”).

For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that all challenged claims of the ’516 patent are unpatentable.

A. *Related Proceedings*

The parties advise us that Patent Owner has asserted the ’516 patent against Petitioner in *SIPCO, LLC v. Emerson Electric Co.*, No. 6:15-cv-00907 (E.D. Tex.), which has been transferred to the Northern District of Georgia, Case No. 1:16cv2690. Pet. 3–4; Paper 4. The parties have identified another *inter partes* review challenging the ’516 patent, IPR2014-

00147, which has been terminated, and several involving related patents. *Id.* In addition, the '516 patent has been reexamined. *See* Ex. 1001, 58–60 (Ex Parte Reexamination Certificate US 6,249,516 C1).

B. The '516 Patent (Ex. 1001)

The '516 patent is titled “Wireless Network Gateway and Method for Providing Same.” Figure 1 of the '516 patent is reproduced here:

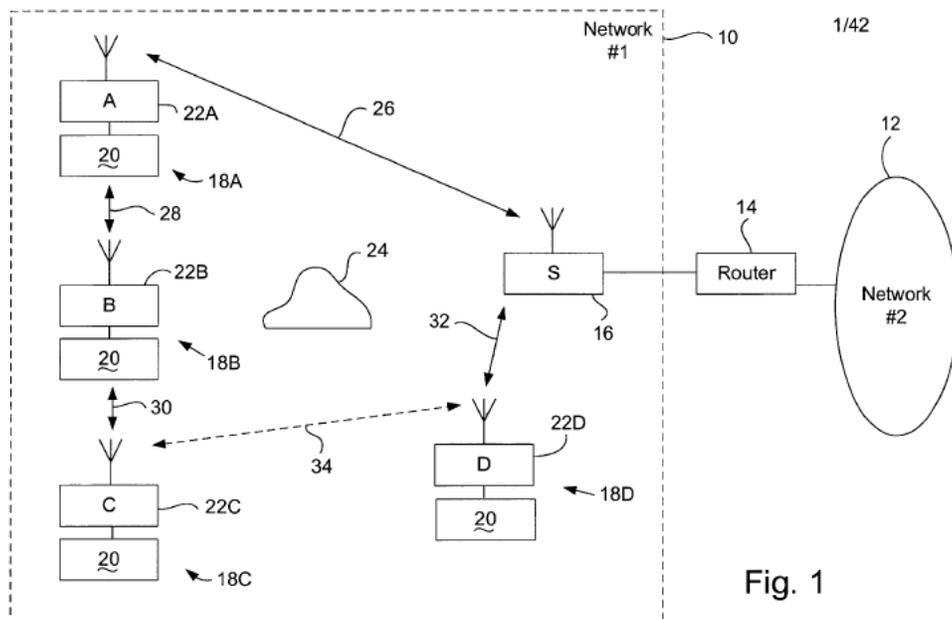


Fig. 1

Figure 1 illustrates a first wireless network 10 in communication with second wireless network 12 via router 14. Ex. 1001, col. 7, ll. 37–40. Server 16 acts as a gateway between the two networks. *Id.* col. 7, ll. 62–66. Clients 18 each include a client machine 20 (a digital processor) and radio modem 22. *Id.* col. 8, ll. 17–19.

In operation, a client of the wireless network has either a direct (1 hop) or an indirect (2 or more hops) path to a server of the wireless network system. *Id.* col 4, l. 66–col. 5, l. 11. The patent describes an optimization

process which minimizes the number of hops from the clients to the servers, on the theory that the fewer the number of hops, the better the performance of the network. *Id.* col. 5, ll. 11–16.

The server includes a radio modem capable of communicating with the first wireless network, a network interface capable of communicating with the second network (a wired TCP/IP network such as the Internet), and a digital controller coupled to the radio modem and to the network interface. Ex. 1001, col. 5, ll. 54–61. The digital controller maintains a map of the links of the first network and provides that map to first network clients on request. *Id.* col. 5, l. 8–col. 6, l. 2. By maintaining a map of the first network links, the server is able properly to address packets received from either the first network or the second network to the appropriate client of the first network, and allows the clients of the network to maintain and upgrade their data communication paths to the server. *Id.* col. 6, ll. 2–7.

C. Illustrative Claims

Of the challenged claims, claims 1 (directed to an apparatus) and 10 (directed to a method) are independent.

Claim 1 reads as follows:

1. A server providing a gateway between two networks, where at least one of the two networks is a wireless network, said server comprising:

a radio modem capable of communicating with a first network that operates, at least in part, by wireless communication;

a network interface capable of communicating with a second network; and

a digital controller coupled to said radio modem and to said network interface, said digital controller communicating with said first network via said radio modem and communicating with said second network via said network interface, said digital controller passing data packets received from said first network that are destined for said second network to said second network, and passing data packets received from said second network that are destined for said first network to said first network, said digital controller maintaining a map of data packet transmission paths of a plurality of clients of said first network, where a transmission path of a client of said first network to said server can be through one or more of other clients of said first network;

wherein said digital controller changes the transmission paths of clients to optimize the transmission paths including changing the transmission path from the client to the gateway so that the path to the gateway is chosen from the group consisting essentially of the path to the gateway through the least possible number of additional clients, the path to the gateway through the most robust additional clients, the path to the gateway through the clients with the least amount of traffic, and the path to the gateway through the fastest clients.

Challenged claims 2, 4, and 5 depend from claim 1.

Claim 10 was modified in *ex parte* reexamination.¹ Claim 10, as modified, reads as follows:

10. A method providing a gateway between a wireless network and a second network comprising:

receiving a data packet from a client of said wireless network, converting said data packet to a proper format for said second network, and sending said data packet to said second network; and

receiving a data packet from said second network, adding a header to said packet including a reverse link and a data

¹ See Reexamination Certificate US 6,249,516 C1 (Ex. 1001, 58–60).

packet type if said data packet is destined for a client of said wireless network, said reverse link being one of a direct link to said client and an indirect link to said client through one or more other clients of said network, and transmitting said data packet with said header; and

changing transmission paths of clients to optimize the transmission paths including changing the transmission path from the client to the gateway so that the path to the gateway is chosen from the group consisting essentially of the path to the gateway through the least possible number of additional clients, the path to the gateway through the most robust additional clients, the path to the gateway through the clients with the least amount of traffic, and the path to the gateway through the fastest clients.

Challenged claims 11, 13, and 14 depend from claim 10.

D. Prior Art Relied Upon

We instituted trial based on the following references:

1. J. Burchfiel, et al., *Functions and Structure of a Packet Radio Station*, AFIPS NATIONAL COMPUTER CONFERENCE, Vol. 44, at 245–51 (1975) (Ex. 1005; “Burchfiel”)
2. F. E. Heart, et al., *The Interface Message Processor for the ARPA Computer Network*, AFIPS SPRING JOINT COMPUTER CONFERENCE, Vol. 36, at 551–67 (1970) (Ex. 1006; “Heart”)
3. M. Schwartz, *TELECOMMUNICATION NETWORKS: PROTOCOLS, MODELING AND ANALYSIS*, Addison-Wesley Pub. Co. (1987) (Ex. 1007; “Schwartz”)
4. B. Aboba, et al., *THE ONLINE USER’S ENCYCLOPEDIA BULLETIN BOARDS AND BEYOND*, Addison-Wesley Pub. Co. (1993) (Ex. 1008; “Online Encyclopedia”)

In addition, both parties rely on expert testimony. Petitioner relies on a Declaration of James T. Geier submitted with the Petition (Ex. 1004, “Geier I Decl.”). With its Preliminary Response, Patent Owner submitted a Declaration of Dr. Kevin C. Almeroth (Ex. 2002; “Almeroth I Decl.”). With

its Response, Patent Owner submitted a second declaration of Dr. Almeroth (Ex. 2004; “Almeroth II Decl.”). Finally, with its Reply, Petitioner submitted a rebuttal declaration of Mr. Geier (Ex. 1031, “Geier II Decl.”).

Patent Owner has also submitted deposition testimony of Mr. Geier (Ex. 2006, “Geier I Dep.”; Ex. 2007 “Geier II Dep.”).

E. The Asserted Grounds

Trial was instituted on two grounds of obviousness under 35 U.S.C. § 103 as follows:

References	Challenged Claims
Burchfiel, Schwartz, and Heart	1, 4, 10, 13, 14
Burchfiel, Schwartz, Heart, and Online Encyclopedia	2, 5, 11

II. ANALYSIS

A. Legal Principles

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter 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) (“the *Graham* factors”).

B. Level of Ordinary Skill

The parties differ on the level of ordinary skill applicable to this case. Petitioner contends the person of ordinary skill “would have a minimum of a bachelor’s degree in Electrical Engineering and 2-3 years of experience in the development and design, or technical marketing, of radio communications and computer network systems, or the equivalent.” Pet. 11. Patent Owner’s expert, Dr. Almeroth, responds: “a person of ordinary skill in the art for the patent-in-suit would have the equivalent of a four-year degree from an accredited institution (usually denoted as a B.S. degree) in computer science, computer engineering or the equivalent and experience with, or exposure to, computer networks and routing. A person of ordinary skill in the art would also have approximately two years of professional experience with computer networking, routing, and wireless networks.” Almeroth II Decl. ¶ 74. Dr. Almeroth takes issue with Petitioner’s definition “since it does not specifically list Computer Science as a possible degree.” *Id.* at ¶ 78.

We adopt Patent Owner’s slightly more inclusive definition. As the definitions do not differ substantially, however, under either we would reach the same result.

C. Claim Construction

In an *inter partes* patent review of an unexpired patent, claim terms are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

The '516 patent has expired. Accordingly, the parties appear to agree that the *Phillips* standard of claim construction should apply. Pet. 9; Prelim. Resp. 11–12. For claims of an expired patent, the Board's claim interpretation is similar to that of a district court. *See In re Rambus, Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012). “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 v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc)). However, there is a presumption that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

Petitioner offered constructions of several claim terms. Pet. 9–11. Patent Owner responded with additional constructions, and by disputing Petitioner's proposed constructions. Prelim. Resp. 13–20.

In our Institution Decision, we addressed the scope of two claim terms: “link”/“path” and “map of data packet transmission paths.” Institution Dec. 7–8. For this Final Written Decision, however, we address two additional terms: “changing the transmission path from the client to the gateway so that the path to the gateway is chosen” and “reverse link.” We determine that it is unnecessary to construe any other claim terms. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”).

1. “link”/“path”

These terms appear in all challenged claims. The ’516 patent specification describes a link as follows:

It should be noted that the term “link” is used to convey both the connection to an adjacent client as well as the entire path from a client to a server. It will therefore be understood that when speaking of a link to an adjacent client, that this also implicitly includes all necessary links from that adjacent client to the server, i.e. a link is the entire path description from a given client to a given server.

Ex. 1001, col. 10, ll. 10–16. Accordingly, and consistent with the specification, we construed the terms “link”/“path” as “connections between adjacent nodes and the entire path description from a given client to a given server.” Institution Dec. 8.

Although both parties addressed this construction in their post-institution submissions (see PO Resp. 8–11, Pet. Reply 2), the parties appear to agree that the construction of this term is not critical to the outcome of this case. Petitioner states “[t]he construction of this term does not affect the outcome of these proceedings.” Pet. Reply 2. Similarly, at oral argument, after discussing the Board’s construction, Patent Owner agreed that “this particular dispute . . . doesn’t have to be resolved here.” Hr’g Tr. 22:19–21. Accordingly, we do not address the parties’ arguments on this issue, and for the purposes of this Decision, apply the same construction as in our Institution Decision.

2. “map of data packet transmission paths”

This phrase appears in challenged claims 1, 2, 5, 13, and 14. Petitioner does not propose a construction for this phrase. The specification of the ’516 patent states:

The digital controller further maintains a map of the links of the first network and provides that map to first network clients on request. By maintaining a map of the first network links, the server is able to properly address packets received from either the first network or the second network to the appropriate client of the first network, and allows the client of the network to maintain and upgrade their data communication paths to the server.

Ex. 1001, col. 5, l. 65–col. 6, l. 7. Consistent with this description, we construed the term “map” as containing the paths or links to a node in the network. Institution Dec. 8.

Patent Owner contends that the term “map of transition paths” means “a data structure containing a representation of a plurality of transmission paths from the client to the server through one or more other clients.” PO Resp. 11. Patent Owner emphasizes that a map must contain a “plurality” of paths from a client to the server. *Id.* Patent Owner relies on a dictionary definition of “map” as “a representation usually on a plain surface, of a region of the earth or heavens.” *Id.* at 11 (citing Ex. 2001, 827). Patent Owner also relies on the fact that the phrase itself refers to plural “paths.” *Id.* at 11–12. Patent Owner criticizes the Board’s construction of “map” as “incomplete.” *Id.* at 12.

Petitioner opposes the construction of “map” as requiring multiple transmission paths from a particular client to the server. Pet. Reply 5–6. Petitioner responds that Patent Owner’s dictionary definition relates to “a physical map, not a structure for organizing data in mathematics or computer science.” *Id.* at 6. We agree with Petitioner that this particular definition of “map” is not pertinent to the subject matter of the ’516 patent, and therefore give Patent Owner’s argument based on this definition little weight. *See id.*

If anything, the dictionary entry cited by Patent Owner supports Petitioner's view that the construction of "map" should not be limited to multiple paths from one client. Thus, the second definition of "map" in the dictionary entry is not limited to multiple elements: "The correspondence of *one* or more elements in one set to *one* or more elements in the same set or another set." Ex. 2001, 827 ("map," definition 2; emphasis added). We deem this second definition, identified as pertaining to mathematics ("*Math.*"), to be more pertinent to the technology of the '516 patent than that chosen by Petitioner.

Nor are we persuaded by Patent Owner's other argument, based on the reference in the '516 patent claims to plural "paths." PO Resp. 11–12. As Petitioner points out, claims 1 and 13 recite "changing *the* transmission path [singular] from the client to the gateway so that *the* path to the gateway is chosen." Pet. Reply 6.

We are, therefore, not persuaded by the arguments presented that the construction of this term in our Institution Decision requires modification. We therefore construe the term "map" as containing the paths or links to a node in the network, including a single path.

3. "changing the transmission path from the client to the gateway so that the path to the gateway is chosen"

We declined to construe this language from claims 1 and 10 in our Institution Decision. Institution Dec. 7. Petitioner contends that the term should take its plain and ordinary meaning and does not require an express construction. Pet. Reply 6–7. Patent Owner proposes the following construction: "changing the selection of a transmission path including an identification of an entire path from the client to the server." PO Resp. 14.

We agree with Petitioner that this term needs no express construction. However, we determine that it is necessary to address Patent Owner's proposed construction, as it is central to its defense to Petitioner's challenge.

Patent Owner's construction of this term is related to its proffered construction of "map of data packet transmission paths," discussed *supra*. According to Patent Owner, "[t]he claim language itself . . . requires the server to change *the selection* of a transmission path including an identification of an entire path from the client to the server." PO Resp. 13 (emphasis added). We disagree with this interpretation. The claim uses the word "chosen," not "select." We agree with Petitioner that this is a significant difference, in that "chosen" does not necessarily imply a selection among alternative paths. Pet. Reply 7. Further support for this conclusion is found in our discussion of "map of data packet transmission paths," *supra*. There, we conclude that "map" should not be limited to multiple paths from a client. *See supra*. In the same way, the claim language should not be construed as requiring choosing from a selection of alternative paths.

Patent Owner points to a decision in which another panel of the Board, in IPR2015-01901, construed the word "select" in a "related patent." PO Resp. 13–14. We are not persuaded by that decision that we are misconstruing the claims at issue here, which do not use the word "select." In the context of the '516 patent claims, we do not regard "chosen" as having the same meaning as "select."

4. "reverse link"

Patent Owner did not request an express construction for the term "reverse link" in the Preliminary Response. Patent Owner now contends "[t]he proper construction of the claim term 'reverse link' is a 'path from

a gateway to a client through the same nodes as a link from the client to the gateway, in the opposite order.” PO Resp. 15. Petitioner responds the Board need not construe this term because the cited prior art, namely, Burchfiel, meets this limitation, even under Patent Owner’s construction. Pet. Reply 8.

We do not agree with Patent Owner’s construction insofar as it requires traversing the same nodes. We see nothing in the claim language that would restrict the term “reverse path” to a path following the same nodes in the opposite order. Moreover, we are not persuaded by Patent Owner’s reference to examples in the specification. PO Resp. 15–16. While claims must be read in view of the specification, limitations from the specification are not to be read into the claims. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1326 (Fed. Cir. 2001) (citations omitted). Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction. *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) (citing *Teleflex, supra*). To construe “reverse link” as requiring the same path to be followed would violate this principle.

As is discussed *infra*, however, we agree with Petitioner that Burchfiel meets this limitation even under Patent Owner’s construction. Pet. Reply 8. Accordingly, we do not further construe this term.

D. Claims 1, 4, 10, 13, and 14 – Obviousness over Burchfiel, Schwartz, and Heart

Petitioner challenged the patentability of these claims as obvious over Burchfiel alone, as well as over the combinations of Burchfiel and Schwartz

and Burchfiel, Schwartz, and Heart. Pet. 11–55. We instituted trial on this obviousness challenge based on Burchfiel, Schwartz, and Heart.

1. Burchfiel (Ex. 1005)

Burchfiel is titled “Functions and Structures of a Packet Radio Station.” Ex. 1005, 245. Burchfiel’s “Packet Radio Network (PRN)” is comprised of central station, mobile terminals, and remote repeaters. Pet. 10 (citing Ex. 1005, 245). Communication on the PRN is accomplished using a “Packet Radio Unit, or PRU.” *Id.* at 12 (citing Ex. 1005, 245). Burchfiel’s station is responsible for initializing and maintaining the PRN, including identifying routes between station and each PRU and making “dynamic routing changes.” Pet. 13 (citing Ex. 1005, 247–48, 250).

A station determines routes by building a “connectivity matrix” identifying PRUs “capable of direct communication with each other,” and then uses this “connectivity matrix” to generate routes between station and each PRU. Pet. 13–14 (citing Geier Decl. I ¶¶ 74–75); Ex. 1005, 247. Burchfiel also teaches the “PRN must provide routing which adapts dynamically to component failures.” Pet. 14 (citing Ex. 1005, 245). Once routes are established, the station is able to reconfigure the PRN by “recomputing minimum distance routes” to the PRUs/terminals. Ex. 1005, 248; Geier Decl. I ¶ 76. “The station performs this reconfiguration by updating the connectivity matrix to indicate that the failed element is incommunicado; by recomputing minimum distance routes to the elements which are still active; and finally, by updating repeater routing parameters to routes.” Ex. 1005, 248.

Burchfiel also teaches a digital controller in station that is interfaced to ARPANET through an ARPANET IMP (Interface Message Processor)

and functions as a gateway by forwarding packets between the PRN and ARPANET. Pet. 14 (citing Ex. 1005, 246, 249-50). Burchfiel's gateway also may provide "conversion between the host-host protocols of the two networks." Ex. 1005, 249.

2. Heart (Ex. 1006)

Heart is a published paper titled "The Interface Message Processor for the ARPA Computer Network." Heart discloses a "host special interface" which serves as a network interface to ARPANET. Pet. 14–15 (Ex. 1006, 551–52, 554). These are "Interface Message Processors" or "IMPs," and are connected by common-carrier circuits. *Id.*

3. Schwartz (Ex. 1007)

Schwartz is a textbook titled "Telecommunication Networks: Protocols, Modeling and Analysis." Schwartz discloses network routing protocols and algorithms. Pet. 17 (citing Ex. 1007, 259-60). Schwartz teaches shortest-path algorithms are designed to provide a least-cost path between two nodes. *Id.* at 17–18 (citing Ex. 1007, 261).

4. Analysis

Petitioner has provided detailed claim charts for challenged claims 1, 4, 10, 13, and 14 in relation to Burchfiel, Schwartz, and Heart. Pet. 21–55. In addition, Petitioner provides supporting testimony from its expert, Mr. Geier. Geier I Decl. ¶¶ 66–275. As explained by Mr. Geier,

it is my opinion that claims 1, 4, 10, 13 and 14 are, at minimum, rendered obvious by the teachings of Burchfiel, and by the teachings of Burchfiel in view of the teachings of Schwartz, and by the teachings of Burchfiel in view of the teachings of Schwartz and Heart.

Geier I Decl. ¶ 67.

Petitioner’s arguments are summarized as follows. In asserting obviousness of these claims, Petitioner relies mainly on Burchfiel for teaching or suggesting all limitations. Thus, for example, Petitioner relies on Burchfiel’s server or station as providing a gateway between two networks, the PRN and ARPANET. Pet. 21–22. Petitioner identifies Burchfiel’s PDP-11 digital computers with the digital controller called for in the claims. *Id.* at 29–30. Petitioner identifies Burchfiel’s connection table with the map of data transmission paths called for in the claims. *Id.* at 36–37.

Petitioner relies on Heart for its disclosure of network interfaces (“IMPs”) capable of communicating with ARPANET. *Id.* at 25–28. Petitioner relies on Schwartz for its disclosure of algorithms for optimizing transmission paths including changing the transmission path from the source to the destination. *Id.* at 38–42. Petitioner also relies on Heart for its disclosure of adding a header to a packet and for “additional details about implementing data packet headers.” *Id.* at 48–51.

Petitioner provides detailed analyses including claim charts for each of the challenged claims in relation to Burchfiel, Schwartz, and Heart. Pet. 21–55. Petitioner also provides a rationale for combining these references. *Id.* at 18–20. For example, Petitioner asserts

[i]t would have been obvious to POSITA to apply Heart’s advantageous express teachings of the ARPA Network IMP and ARPA Network in implementing station and ARPANET IMP disclosed in Burchfiel, such that station interfaces with the ARPANET IMP and serves as a gateway to ARPANET, as already disclosed in Burchfiel, but with less of the advantageous implementation detail provided in Heart.

Id. at 18. Similarly, Petitioner asserts “[i]t would have been obvious to POSITA to apply Schwartz’s advantageous express teachings of network routing algorithms running on a centralized network management center in implementing Burchfiel’s station to recompute minimum distance routes as part of relabeling and reconfiguring the repeater routing parameters and connections between station and PRUs.” *Id.* at 19 (internal quotation marks and brackets omitted).

We find Petitioner’s analysis of Burchfiel, Heart, and Schwartz and the supporting evidence to be persuasive that each element of claims 1, 4, 10, 13, and 14 is taught or suggested by the combination. We determine, also, that Petitioner’s rationale for combining the references is persuasive, and therefore adopt Petitioner’s analysis. Our reasoning will be discussed in greater detail *infra*.

We have considered Patent Owner’s arguments to distinguish Burchfiel, Schwartz, and Heart, and find them unavailing for the following reasons. PO Resp. 18–23.

a. “maintaining a map . . . ”

Patent Owner contends that Burchfiel does not teach “maintaining a map of data packet transmission paths” as recited in claims 1 and 13 and their dependent claims. PO Resp. 46–50. Patent Owner asserts: “Burchfiel’s connectivity matrix is not a data structure containing a plurality of *descriptions of the entire path* from a client to the server or gateway.” *Id.* at 47. Patent Owner contends that the connectivity matrix has routes to the client only and thus does not describe the entire path. *Id.*

We find that Petitioner has demonstrated that Burchfiel’s connectivity matrix meets this claim limitation. Pet. 35–35; 54. We are not persuaded by

Patent Owner's arguments in rebuttal. First, addressing the "plurality of descriptions" argument, we have construed the term "map" as not limited to storing multiple paths from one client to the server. Thus, Patent Owner's argument calling for a "plurality of descriptions" of a path from *a* client to the server is contrary to our construction. Moreover, we are not persuaded that a map must contain the "entire path." We have construed "map" as containing the paths or links to a node in the network, including a single path. *See infra*. Thus, the "entire path" argument fails for this reason alone.

We find, however, that even under Patent Owner's construction of map as requiring a "description of the entire path," Burchfiel would meet this limitation. Ex. 1005, 246. Burchfiel teaches a map containing both the path from the station to the server and from the server to the station.

According to Burchfiel, a connection table provides a map of path information:

Once a station has labelled all PRU's and established connections to them, the information for maintaining these connections is entered into the station's *connection table*. This contains the status information described above for handling the connection protocol.

Ex. 1005, 247 (emphasis added). As Petitioner points out, Burchfiel specifically describes these connections as "bidirectional." Pet. Reply 9 (citing Ex. 1005, 246 ("Since most expected uses of the PRN will require bi-directional communication, the PRN connection is bi-directional.")).

Petitioner provides persuasive expert testimony to the effect that "it would have been obvious to recompute the route in both directions, to the extent not disclosed by Burchfiel, based on Burchfiel's disclosure that, e.g., the 'PRN connection is [a] bidirectional' 'data transmission path.'" Geier II Decl. ¶ 69. We find that at the very least, therefore, Burchfiel's reference to

“bi-directional” connections suggests such a computation. “Even if a reference’s teachings are insufficient to find anticipation, that same reference’s teachings may be used to find obviousness.” *CRFD Research, Inc. v. Matal*, 876 F.3d 1330, 1345 (Fed. Cir. 2017). We find based on the foregoing that Burchfiel’s disclosure would teach or suggest to a person of ordinary skill that the connection table stores bidirectional path information.

We have considered Patent Owner’s additional rebuttal arguments and find them unconvincing. PO Resp. 46–50. For example, Patent Owner contends that in Burchfiel, dynamic routing is used for the return path, instead of using a provided path from the station to the terminal. PO Resp. 48–49. We are not persuaded by this argument. As Petitioner points out, dynamic routing in Burchfiel is used when a certain number of attempts to forward a packet “along its specified route” fail. Pet. Reply 24 (emphasis omitted)(quoting Ex. 1005, 247). Thus, we are not convinced by Patent Owner’s argument that Burchfiel does not describe a return path from station to terminal.

b. “changes the transmission paths . . . ”

Patent Owner argues “Burchfiel does not teach that a digital controller ‘changes the transmission paths of clients to optimize the transmission paths including changing the transmission path from the client to the gateway’ as recited in claim 1 and as similarly recited in claim 10.” PO Resp. 19, 25–35.

Patent Owner further explains: “Burchfiel does not optimize an existing transmission path; it instead establishes a path to a packet radio node (PRN) only when a path does not exist (*i.e.*, at network initialization, or when a repeater or station fails).” *Id.* at 19.

We do not agree that Burchfiel does not teach changing paths. According to Burchfiel, the connection table provides a map of path information. Ex. 2005, 247. Burchfiel goes on to explain that the connection table changes when additional terminals are added:

As terminals come “on-line” within the PRN, each terminal is also given a connection to its controlling station, and this information is added to the station’s connection table.

Id. We are persuaded that Burchfiel changes transmission paths from client to server when clients are added. Patent Owner’s argument (PO Resp. 25–30) that the claim requires changing an existing path is addressed in the following section.

Furthermore, we find that Burchfiel’s digital controller also changes the transmission paths of clients to optimize the transmission paths from the client to the gateway when a repeater or station fails. Pet. 37–38. As Petitioner points out, according to Burchfiel, “[t]he station performs this reconfiguration by updating the connectivity matrix to indicate that the failed element is incommunicado; by recomputing minimum distance routes to the elements which are still active; and finally, by updating repeater routing parameters to route packets along these new routes.” *Id.* at 38 (emphasis omitted) (quoting Ex. 1005, 248).

Petitioner relies additionally on Schwartz’s optimization of transmission paths to meet this limitation. Pet. 17–18, 38–39. As noted *supra*, Schwartz is a textbook titled “Telecommunication Networks.” Ex. 1007. Schwartz devotes a chapter to network routing protocols and algorithms, including shortest-path routing algorithms. *Id.* at 267–282. For example, Schwartz discloses “[r]outing algorithms used to establish the appropriate routing paths or the equivalent routing table entries in each node

along a path.” *Id.* at 259; Geier I Decl. ¶¶ 87-88. Schwartz also teaches shortest-path algorithms are designed to provide a least-cost path between two nodes based on the “linear sum of the costs of each hop in a given path.” Ex. 1007, 261. Schwartz also discloses it is possible to determine the shortest paths at a centralized location and then distribute the routing information to all nodes on the network. *Id.* at 267. In order to determine the shortest path, Schwartz describes “assigning a ‘cost’ measure to each link (or possibly even each node) in the network.” *Id.* at 260; Geier I Decl. ¶¶ 89-92. Schwartz’s treatment of optimization is discussed further *infra*. For the foregoing reasons, we find that Petitioner has demonstrated that this claim limitation is met by these references.

c. “optimize the transmission paths . . .”

Petitioner asserts that this element is met by Burchfiel and Schwartz. Pet. 37–45; 51–54. Petitioner contends that Burchfiel describes computing minimum distance routes and Schwartz’s textbook provides appropriate routing algorithms. *Id.*

Patent Owner responds: “Burchfiel does not optimize an *existing* transmission path; it instead establishes a path to a packet radio node (PRN) only when a path does not exist (*i.e.*, at network initialization, or when a repeater or station fails).” PO Resp. 19, 25–30 (emphasis added). This contention, and what it means to change an “existing” path, were explored during final oral argument:

[THE BOARD]: [L]et’s say that I am taking a trip and I use MapQuest to chart out a route for me, to say, from here to New York City. And unbeknownst to me or to MapQuest there is an interruption on, say, I-95. Let’s say I-95 is out. So I start along my route and then at some point realize that there’s a

problem and I get rerouted by the GPS. Would you say that that is changing the route? Or is it giving me a new route?

[PATENT OWNER'S COUNSEL]: Well, given that the route that it initially gave you no longer exists - -

[THE BOARD]: It existed at the time they gave it to me.

[PATENT OWNER'S COUNSEL]: But it doesn't exist at the time you're changing it.

[THE BOARD]: So, I'm not changing the route, you would say? Because the route doesn't exist anymore?

[PATENT OWNER'S COUNSEL]: The route doesn't -
- in order to change something it has to exist.

Hr'g Tr. 31:17–32:6. We are not convinced by Patent Owner's argument that providing a new route is not a route change to optimize a path as the claims require. We find further that there is no persuasive support for requiring that the change be to an "existing" path, as Patent Owner uses that term in the example above. We find, instead, that Petitioner has demonstrated that Burchfiel meets this claim limitation. We agree with Petitioner that whether there is a path does not depend on the status of individual nodes. Pet. Reply 10 (citing Geier II Decl. ¶ 65). By changing the transmission path of clients when a repeater or station fails, Burchfiel affects a path change to optimize the transmission path, for the reasons explained by Petitioner at the oral hearing in response to the I-95 analogy just discussed:

[I]n your computer, your car, which would be rerouting you from D.C. to New York for example, on I-95, you would have a stored route. That stored route exists and even though there might be an outage on road or you might need to get rerouted, it then would need to be changed into a different route.

That's precisely the same situation in Burchfiel. Burchfiel has a connection table that stores each and every one of the

connections when there is a problem. When there is a component failure for example. There needs to be a change to what's written in there, the path is therefore changed by deleting the old entry and then putting in the new one. The path still exists; it's just no longer optimal.

Hr'g Tr. 43:8–18.

We are persuaded this limitation is met by Burchfiel, even if we were to accept Patent Owner's position on what constitutes a path change to optimize. As Petitioner points out, Burchfiel constantly performs dynamic routing changes that involve optimization. Pet. Reply 10 (citing Ex. 1005, 247–48, 250; Geier II Decl. ¶ 66).

Petitioner relies also on Schwartz's description of optimization algorithms. Pet. 38–41. Specifically, Petitioner relies on Schwartz's description of "least cost" routing in a network, exemplified by Schwartz's Algorithm A. *Id.* at 49. Patent Owner directs several arguments to Schwartz's description of optimization. PO Resp. 31–33. For example, Patent Owner contends that Schwartz's routing algorithm "discloses only the capability to determine the next hop in a path, not a transmission path." PO Resp. 31 (citing Almeroth II ¶ 129). We are not persuaded by this argument. Petitioner relies on Burchfiel as disclosing changing transmission paths, as well as recomputing minimum distance routes from the client to the server. Pet. 37–38. Schwartz is relied on as providing "additional implementation detail" of assigning costs in Burchfiel's connectivity matrix. Pet. Reply 12. According to Petitioner, Schwartz "provides additional advantageous implementation detail (*e.g.*, Algorithm A) for how to use such a matrix to calculate a minimum-distance or -cost route to any (or all) destinations." *Id.* (citing Ex. 1007, 268–270; Pet. 38–42). Patent Owner's argument fails because it is directed to Schwartz alone, and does not address the

combination of Burchfiel and Schwartz. One cannot show nonobviousness by attacking references individually where the challenge is based on combinations of references. *See In re Keller*, 642 F.2d 413, 426 (CCPA 1981); *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986).

Patent Owner contends that “merely applying Schwartz’s routing algorithm in Burchfiel would lead to unpredictable results and would not arrive at the claimed invention.” PO Resp. 34. Elsewhere, Patent Owner makes a similar argument, that combining Burchfiel and Schwartz would render Burchfiel “inoperable and unsuitable for its intended purpose.” *Id.* at 55–58. We are not persuaded by these arguments. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d at 425. That is because an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Petitioner’s argument for applying Schwartz’s routing algorithms is consistent with *KSR*’s guidance that “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. For the foregoing reasons, we agree with Petitioner that

Schwartz's optimization algorithms would have been combined with Burchfiel to meet this limitation.

d. "chosen from the group . . ."

Petitioner contends that Burchfiel meets this limitation in combination with Schwartz. Pet. 37–41, 51–52. Burchfiel discusses reconfiguring the PRN to route traffic around a failed element by “recomputing minimum distance routes.” Ex. 1005, 248. As Petitioner points out, this “minimum distance route” is the minimum number of hops between source and destination. Pet. Reply 17. This is explained by Petitioner's expert, Mr. Geier. Geier I Decl. ¶ 186 (“Burchfiel explains that these transmission paths are continuously updated, so that the station has always the shortest routes (*i.e.*, minimum number of hops) to the active network elements.”)

We find that Schwartz, as discussed *supra*, presents an optimization algorithm (“Algorithm A”) that determines the path to the gateway through the least possible number of additional clients. Pet. Reply 18 (citing Geier I Decl. ¶¶ 196–204). The Petition (at pages 39–41) provides a more detailed explanation of Schwartz's Algorithm A, which provides the “shortest paths from a source to all other nodes.” Ex. 1007, 268. We agree with Petitioner that assigning an equal cost (“1”) to each hop in Schwartz's algorithm would determine the path to the gateway through the least possible number of additional clients. Pet. Reply 18. We are further persuaded that a person of ordinary skill would have looked to the Schwartz textbook, which is specifically directed to telecommunications networks, for a more specific implementation of the least cost optimizing algorithm in Burchfiel's network. *See* discussion *supra* and Pet. 19–20.

Patent Owner contends “Burchfiel does not teach choosing any of the transmission paths in the group that is recited in claims 1 and 10 of the ‘516 patent.” PO Resp. 19, 35–41. Further Patent Owner contends Burchfiel “does not teach, for example, choosing ‘the path to the gateway through the least possible number of additional clients,’ as recited in claims 1 and 10.” *Id.* We are not persuaded by this alleged distinction. As discussed *supra*, we do not construe this claim language as calling for Burchfiel to “select” a path from a number of alternatives presented. We have specifically declined that construction proffered by Patent Owner. *See supra*. We therefore determine that Petitioner demonstrates sufficiently that this claim element is met.

e. “adding a header to said packet including a reverse link and a data packet type . . .”

Petitioner convinces us that Burchfiel in combination with Heart discloses adding a header with a reverse link and data packet type to a received data packet. Pet. 47–48. Specifically, Figure 3 of Burchfiel shows a header having both the “reverse link” and “data packet type” required by the claims. *Id.* at 48. Figure 3 of Burchfiel (as annotated by Petitioner) follows:

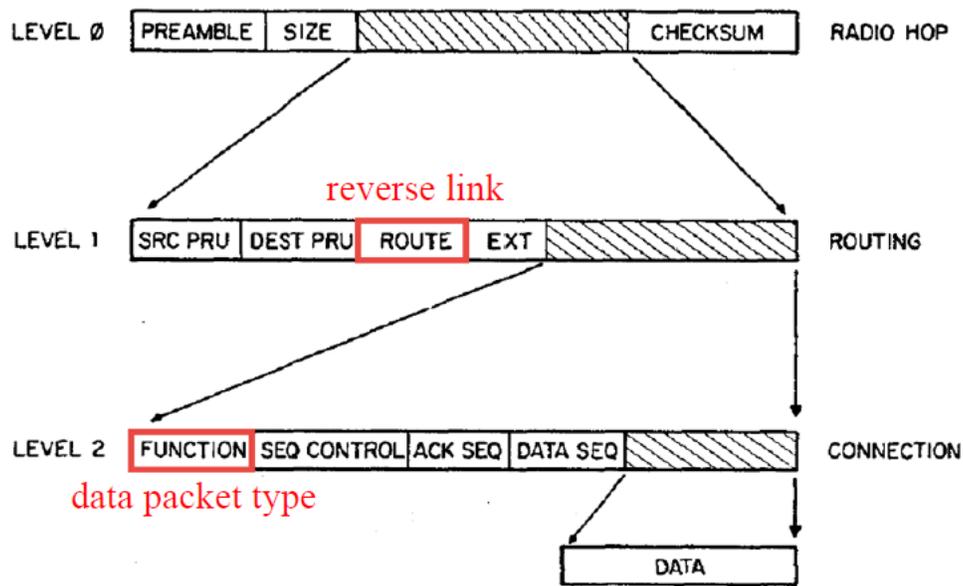


Figure 3—Protocols for support of a PRN connection

Pet. 48. Figure 3 of Burchfiel (annotated by Petitioner) shows protocols for support of a PRN connection showing both the “route” and “function field” in the header. *Id.* at 50. Petitioner asserts that in Burchfiel, a packet routed from station to PRU in the network includes a “route” that is the reverse of the “route” used to label and provide a connection to the PRU. *Id.* (citing Ex. 1005, 250; Geier I Decl. ¶ 241). The function field disclosed by Burchfiel, which is used to indicate whether a specific type of control packet is being sent, would indicate a “data” packet is being sent when the field includes a code for something other than one of the control processes—thus serving as an indicator of data packet type. *Id.* (citing Ex. 1005, 247, 248; Geier I Decl. ¶¶ 243–244).

We find these proofs convincing. Patent Owner asserts in rebuttal that “Burchfiel also does not teach ‘adding a header to said packet including a reverse link and a data packet type if said data packet is destined for a client

of said wireless network, said reverse link being one of a direct link to said client and an indirect link to said client through one or more other clients of said network,’ as recited in claim 10. PO Resp. 20, 41–46. According to Patent Owner, the reverse link included in the header “must describe a path through the same nodes as a link from the client to the server (i.e., forward link), except in the opposite direction.” *Id.* at 20.

We are unconvinced by these rebuttal arguments. We determined, *supra*, that the plain meaning of “reverse link” does not require the same path, only that the source and destination be reversed. Under this construction, Patent Owner’s rebuttal argument fails because it is based on a construction that we did not adopt. However, even if we were to accept Patent Owner’s “same path” requirement for the reverse link, we are still persuaded that this limitation is met by Burchfiel. As Petitioner’s expert points out in Burchfiel, “a packet routed from the station to a packet radio in the network includes a ‘route’ that is the reverse of the ‘route’ used to provide a connection to the packet radio back to the station.” Geier I Decl. ¶ 241. Further, we are convinced by Mr. Geier’s testimony that “to the extent it is argued that further disclosure of a reverse link is required, it would have been obvious to a POSITA for the same reasons and because the reverse of the minimum distance route used to label and provide a connection to a repeater/terminal is advantageously the fastest route to send a packet from the station to the repeater/terminal.” *Id.* ¶ 242.

Patent Owner also contends “there is no teaching in Burchfiel of adding a header to a received packet that includes route information to a client (*i.e.*, a direct or indirect link).” PO Resp. 20; *see also id.* at 41–46.

Also, “there is no teaching in Burchfiel that its ‘function’ is a packet type as required by claim 10.” *Id.*

Petitioner responds to the first contention as follows: in Burchfiel “a packet routed from station to PRU in the network includes a ‘route’ that is the reverse of the ‘route’ used to label and provide a connection to the PRU.” Pet. Reply 20–21 (quoting Pet. 50). Petitioner addresses the second contention by pointing to the function field in Burchfiel, which “indicates whether a specific type of control packet is being sent (*e.g.*, a packet containing an address for ‘the control process, the debugging process, or the measurement process’), and also indicates when the packet is a data packet by omitting an address.” *Id.* at 21 (citing Ex. 1005, 247; Geier I Decl. ¶ 243; Pet. 47-51; Geier II Decl. ¶ 103). Alternatively, Petitioner relies on Heart’s disclosure of a data packet type field in the header. *Id.* (citing Pet. 48–51, Geier I Decl. ¶¶ 246–249). Heart’s Figure 5, reproduced at page 49 of the Petition, shows the format of a packet with a field defining the data packet type (discard, priority, etc.).

We are persuaded by Petitioner’s argument that Burchfiel describes a reverse link and that Heart provides the teaching of a data packet type field, and further, that a person of ordinary skill would have been motivated to apply Heart’s teachings of a data packet type header field to Burchfiel’s header. *Id.* at 22–23. Petitioner supports this conclusion with expert testimony. Geier I Decl. ¶¶ 243–249; Geier II Decl. ¶¶ 99–114. *See further discussion infra.* Also, we agree that many of Patent Owner’s arguments directed to Heart fail because they relate to limitations for which Petitioner relies on Burchfiel, *e.g.*, “Heart makes no mention whatsoever of wireless

communication or a wireless network.” PO Resp. 44. *See* further discussion *infra*.

Patent Owner’s argument that in Burchfiel there is “no teaching” of these features (PO Resp. 20) ignores the evidence summarized above, including the combination of Burchfiel with Heart, is contrary to the record, and unavailing. The record presented by Petitioner is persuasive that this limitation is met by the combination of Burchfiel and Heart.

f. “chosen from the group consisting essentially of . . .”

Patent Owner contends that “Schwartz does not choose paths in accordance with any of the criteria required by independent claims 1 and 10.” PO Resp. 21. This argument is initially addressed *infra*.

Claims 1 and 10 include four alternative optimization criteria for choosing the path to the gateway, only one of which must be met. These are described in the claims as paths through (1) the least possible number of additional clients, (2) the most robust additional clients, (3) the clients with the least amount of traffic, and (2) the fastest clients. As Petitioner points out, Schwartz discloses “least cost” optimization algorithms, where costs are assigned based on particular optimization criteria. Pet. Reply 18. Petitioner points to Figure 6-5 in Schwartz, where certain costs are assigned to each “hop” based on particular criteria. *Id.* By assigning a cost of “1” to each hop, Schwartz’s Algorithm A would determine the “path to the gateway through the least possible number of additional clients.” *Id.* (citing Geier I Decl. ¶¶ 196-204; Ex. 1007, 268-269; Ex. 2006, 107:19-109:11; Geier II Decl. ¶ 88).

In addition, Schwartz’s disclosure of assigning costs based on whether links are secure (Ex. 1001, 260) or based on average traffic or speed (*id.*,

261) meet other pathway optimization requirements of the claim. *See* Pet. Reply 19–20 (discussing “most robust,” “least traffic,” and “fastest” client requirements). In light of the foregoing, we agree with Petitioner’s analysis that at least one of the four optimization requirements in the claims are met by Schwartz.

g. Motivation to Combine

Patent Owner challenges the motivation to combine Burchfiel, Schwartz, and Heart. PO Resp. 50–55. Patent Owner contends “Petitioner did not suggest why a person of skill in the art would modify Burchfiel to use Schwartz’s routing algorithm.” *Id.* at 51. We disagree. We are persuaded by Petitioner’s argument that a person of ordinary skill would have combined Burchfiel and Schwartz. Pet. 19–20, 42; Geier I Decl. ¶ 206–214. We find credible support in Mr. Geier’s testimony that a person of ordinary skill would have turned to the Schwartz textbook for implementation details of minimum distance routes in Burchfiel: “While Burchfiel describes the route selection at a high level with one example of a criterion for optimization (*i.e.*, “minimum distance routes”), the Schwartz textbook advantageously provides additional criteria as well as specific implementation examples that a POSITA would have found helpful in implementing Burchfiel’s disclosed system.” Geier I Decl. ¶ 111; Geier II Decl. ¶ 83. We also find this combination is consistent with *KSR*’s admonition, quoted *supra*: “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way.” *KSR*, 550 U.S. at 417.

Also unconvincing are Patent Owner’s “incompatibility” and other arguments based on their assertion that Schwartz’s algorithm “is a

decentralized algorithm.” PO Resp. 51–54. As Petitioner points out, Schwartz expressly discloses that Algorithm A can be used for centralized computation. Pet. Reply 12 (citing Ex. 1007, 268). For the same reason, Patent Owner’s argument that Burchfiel “teaches away from using Schwartz’s decentralized algorithm” is unavailing. PO Resp. 53.

We have considered Patent Owner’s other arguments that these references would not have been combined and find them to be without merit. As to Heart, we find that a person of ordinary skill would have been motivated to apply Heart’s teachings regarding data packet headers to Burchfiel. As discussed *supra*, Burchfiel itself discloses the use of headers. *See* Fig. 3 of Burchfiel, reproduced *supra*. As Petitioner explains: “The addition of such a small data packet type field would advantageously provide additional information about the packet being sent, and would not encumber the network. Pet. Reply 22 (citing Geier I Decl. ¶¶ 246–249; Geier II Decl. ¶¶ 107–108). Mr. Geier explains,

[A] POSITA would have been motivated to apply the teachings of Heart’s data packet headers in implementing Burchfiel’s level 2 protocol. Geier Decl. ¶247. Specifically, Heart advantageously provides additional details about data packet headers, including details concerning the identification of the data packet type in the header as shown in Fig. 5. Ex. 1007, Fig. 5. It would have been obvious to a POSITA to apply these advantageous teachings in implementing Burchfiel’s header to provide additional information about the packet being sent into the PRN, such as whether the packet has “priority,” so the receiving PRUs prioritize sending or processing priority packets over other packets, for example.

Geier II Decl. ¶ 108. We are persuaded by this testimony that Petitioner’s rationale for adding Heart’s additional details to Burchfiel’s disclosure of headers is sound. We are not persuaded by Patent Owner’s contrary

arguments. For example, Patent Owner argues “Petitioner did not suggest why a person of skill would modify Burchfiel to use Schwartz’s routing algorithm or Heart’s IMP (*id.*)” PO Resp. 51. This argument is misleading. As noted *supra*, Petitioner relies on Schwartz for its optimizing algorithm and Heart for its header description.

Along these lines, Patent Owner describes Heart as “a simple network including only four nodes.” PO Resp. 22. Further, “Heart makes no mention whatsoever of wireless communication or a wireless network, let alone a wireless server that maintains a map of data transmission paths from wireless clients to the server and optimizes the paths according to certain criteria that is disclosed and claimed by the ‘516 patent.” *Id.* at 22–23. As noted *supra*, however, Petitioner relies on Burchfiel, not Heart, for these disclosures. These arguments do not persuasively rebut Petitioner showing that a person of ordinary skill would have looked to Heart’s teachings to implement Burchfiel’s headers. Geier II Decl. ¶ 107.

5. Secondary Factors

Patent Owner relies on various “secondary considerations” of non-obviousness. PO Resp. 60–64. Patent Owner contends that there was a long-felt, but unmet need for “a packet-based wireless computer network that is both robust and efficient.” *Id.* at 60 (quoting Ex. 1001, col. 4. Ll. 40–42). In support, Patent Owner points to discussions in the ‘516 patent specification of prior wireless communications systems (Ricochet and AX.25) that it contends “exhibited a number of drawbacks.” *Id.* at 60–62. Patent Owner also contends that “others failed to accomplish what the claimed invention achieved.” *Id.* at 63. Patent Owner relies on the testimony of Dr. Almeroth that other protocols, such as AX.25 (used in

Ricochet) as well as Burchfiel and the other cited references “do not teach finding paths that are more optimal than an existing path.” *Id.* at 63–64.

To be relevant, secondary evidence of nonobviousness must be commensurate in scope with the claimed invention. *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011). “For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *Id.* (emphasis and internal quotation marks omitted) (quoting *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010)). A nexus may not exist where, for example, the merits of the claimed invention were “readily available in the prior art.” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016) (citation omitted). The burden of showing that there is a nexus lies with the Patent Owner. *See In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994).

We find that Patent Owner has not provided sufficiently persuasive evidence of a long-felt need, or of a nexus between the claimed invention and the alleged long-felt need. The generalized discussions of prior systems in the ’516 patent specification are insufficient evidence of the existence of a long-felt need. As explained by Petitioner’s expert, Mr. Geier, these systems did not use shortest path routing as taught in Burchfiel and Schwartz. Geier II Decl. ¶ 129. We find that any need for such an improvement was already met by the prior art including Burchfiel. *Id.* ¶ 130. Path optimization in networks was already well known, as is demonstrated by our discussion of Burchfiel and Schwartz, *supra*.

We find also that Patent Owner has not sufficiently demonstrated the failure of others to develop alternatives to the alleged invention of the ’516

patent. Patent Owner asserts “[t]he prior art such as Ricochet, the systems that used the AX.25 protocol, and the references asserted in this proceeding (e.g., Burchfiel, Schwartz, and Heart) did not achieve the level of efficiencies and robustness of the ‘516 patent because they do not teach finding paths that are more optimal than an existing path.” PO Resp. 63 (citing *Almeroth I* ¶ 187). We find that this statement relies on an argument the we have rejected, namely, that Burchfiel, alone and in combination with Schwartz, fails to meet the requirements of the claim for path optimization. *See* discussion *infra*. To be persuasive of a failure by others, the evidence must suggest that the prior attempts failed because the devices lacked the claimed features. *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1313 (Fed. Cir. 2006). We find that there was no failure by others because Burchfiel and Schwartz already provided a solution. We find, therefore, that Patent Owner’s argument for failure by others does not succeed because path optimization as called for in the claims was already available in the prior art.

At oral argument, Patent Owner asserted that “after a patent owner has established a nexus between the secondary consideration of non-obviousness and the claimed invention which Dr. Almeroth has done[,] [a] petitioner must present evidence to rebut the established nexus.” Hr’g Tr. 37:11–13. We are not persuaded that this argument is applicable here, for we find that Patent Owner’s evidence does not sufficiently establish a nexus. For the foregoing reasons, we do not find the proffered evidence, including Dr. Almeroth’s testimony, sufficient to persuade us that Patent Owner’s burden of showing the existence of secondary considerations has been met.

We find that Dr. Almeroth’s testimony on this issue to be uncorroborated and conclusory, and therefore not convincing. *See Velandar*

v. Garner, 348 F.3d 1359, 1371 (Fed. Cir. 2003) (“[W]hat the [PTAB] consistently did was accord little weight to broad conclusory statements that it determined were unsupported by corroborating references. It is within the discretion of the trier of fact to give each item of evidence such weight as it feels appropriate.” (citation omitted)); *see also In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he [PTAB] is entitled to weigh the declarations and conclude that the lack of actual corroboration warrants discounting the opinions expressed in the declarations” (citations omitted)); *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1041 (Fed. Cir. 2017).

Finally, we recognize “there is a presumption of nexus for objective considerations when the [Patent Owner] shows that the asserted objective evidence is tied to a specific product and that product “is the invention disclosed and claimed in the patent.” *WBIP v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016). That presumption does not apply here, however, as Patent Owner has not cited any specific products and bases its arguments solely on the invention of the ’516 patent.

6. Summary

In sum, for the foregoing reasons we are persuaded that Petitioner has sufficiently demonstrated by a preponderance of the evidence that claims 1, 4, 10, 13, and 14 would have been obvious over Burchfiel, Schwartz, and Heart. We have considered Patent Owner’s arguments and proffered expert testimony and are not convinced that they adequately rebut Petitioner’s showing of obviousness.

E. Claims 2, 5, and 11 – Obviousness over Burchfiel, Schwartz, Heart, and Online Encyclopedia

Petitioner challenged the patentability of these claims as obvious over Online Encyclopedia in combination with Burchfiel, Burchfiel and Schwartz, and Burchfiel, Schwartz, and Heart. Pet. 55–69. We instituted trial on the obviousness challenge based on Burchfiel, Schwartz, Heart, and Online Encyclopedia. These claims require that the recited “second network” use TCP/IP protocols. Petitioner has provided detailed claim charts for each of the challenged claims in relation to those references. Pet. 57–69. In addition, Petitioner provides supporting testimony from its expert, Mr. Geier. Geier I Decl. ¶¶ 276–355.

We find Petitioner’s analysis to be persuasive that each element of claims 2, 5, and 11 is met by the combination. Petitioner sets forth a convincing argument that a person of ordinary skill would have combined these references. Claims 2, 5, and 11 specifically call for the use of TCP/IP in the second network, Online Encyclopedia discusses the use of TCP/IP on ARPANET after 1983. Pet. 55–56; Geier I Decl. ¶ 277. According to Petitioner, a person of ordinary skill would have been motivated to combine the teachings of Online Encyclopedia with Burchfiel and Heart. Pet. 56–57; Geier I Decl. ¶¶ 278–283. Petitioner provides several reasons for this. *Id.* For example, Petitioner contends those references all relate to networking and all describe ARPANET. Pet. 56; Geier I Decl. ¶ 279. Thus, in implementing Burchfiel’s station to interface with Heart’s IMP over ARPANET, a person of ordinary skill would have consulted the Online Encyclopedia for details concerning ARPANET. Pet. 56; Geier I Decl. ¶¶ 280–283.

We have considered Patent Owner’s arguments to distinguish Burchfiel, Schwartz, and Heart, and find them unavailing. *See supra*. Patent Owner responds to this challenge that Online Encyclopedia does not supply any of the limitations “missing” from the combination of Burchfiel, Schwartz, and Heart. PO Resp. 52. Patent Owner also argues because TCP/IP and the protocol disclosed in Burchfiel are different, the use of TCP/IP would eliminate the ability to include within a packet any of the information from the packet structure in Burchfiel (including the “ROUTE” and “FUNCTION” fields) and any of the packet structure in Heart (including any of the header bits). *Id.* at 24, 59.

We are not persuaded by these arguments. As to the first argument, we have determined that the combination of Burchfiel, Schwartz, and Heart discloses all the elements of the claims from which claims 2, 5, and 11 depend. Therefore, Petitioner does not need to rely on Online Encyclopedia for “missing” elements. As to the second argument, we are not persuaded by Patent Owner that “using TCP/IP would eliminate the ability to include any of the information from the packet structure in Burchfiel . . . and any of the packet structure in Heart.” PO Resp. 59. In fact, as Petitioner asserts, Burchfiel specifically discloses ARPANET as the second network, and ARPANET switched to TCP/IP in 1983. Pet. 57–58, Geier I Decl. ¶ 277. In any case, to the extent that Dr. Almeroth’s and Mr. Geier’s testimony conflict on this issue, we credit Mr. Geier’s. In general, while we have considered the testimony of both experts, we found Mr. Geier’s testimony

less argumentative and conclusory and, therefore, more helpful and credible than Dr. Almeroth's.²

We have also considered Patent Owner's evidence of "secondary considerations." PO Resp. 60–64. For the reasons discussed *supra*, we find they are not persuasive. We have considered Patent Owner's other arguments and proffered expert testimony and are not convinced that they adequately rebut Petitioner's showing of obviousness. In sum, for the foregoing reasons we are persuaded that Petitioner has sufficiently demonstrated by a preponderance of the evidence that claims 2, 5, and 11 would have been obvious over Burchfiel, Schwartz, Heart, and Online Encyclopedia.

III. SUMMARY

Petitioner has demonstrated by a preponderance of the evidence that claims 1, 4, 10, 13, and 14 of the '516 patent would have been obvious over Burchfiel, Schwartz, and Heart, and claims 2, 5, and 11 would have been obvious over those references further combined with Online Encyclopedia.

IV. ORDER

For the foregoing reasons, it is:

ORDERED that claims 1, 2, 4, 5, 10, 11, 13, and 14 of U. S. Patent 6,249,516 B1 are unpatentable under 35 U.S.C. § 103;

² For example, Dr. Almeroth criticizes Mr. Geier for relying on an "altered" figure from Burchfiel. Almeroth II Decl. ¶ 120. The "alterations" Dr. Almeroth cites—red highlighting around three boxes—are trivial and in no way convince us to discredit Mr. Geier's opinions.

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FURTHER ORDERED that this is a Final Written Decision of the Board under 35 U.S.C. § 318(a); 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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PETITIONER:

James L. Davis, Jr.
Matthew Shapiro
james.l.davis@ropesgray.com
matthew.shapiro@ropesgray.com

PATENT OWNER:

Gregory J. Gonsalves
gonsalves@gonsalveslawfirm.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMERSON ELECTRIC CO.,
Petitioner,

v.

IPCO, LLC
Patent Owner.

Case IPR2016-01602
Patent 6,249,516 B1

Before THOMAS L. GIANNETTI, BRYAN F. MOORE, and
TREVOR M. JEFFERSON, *Administrative Patent Judges*.

GIANNETTI, *Administrative Patent Judge*.

ERRATA
FINAL WRITTEN DECISION

In email correspondence to the Board dated January 19, 2018, Petitioner has requested correction of typographical errors in the Board's Final Written Decision, Paper 33, entered January 9, 2018. Petitioner represents that Patent Owner does not object to bringing these issues to the Board's attention.

In view of the foregoing, it is

ORDERED THAT the Final Written Decision, Paper 33, entered January 9, 2018, is modified as follows:

On page 12 of the Decision, the last sentence in the first paragraph is modified to read: "We deem this second definition, identified as pertaining to mathematics (*Math.*), to be more pertinent to the technology of the '516 patent than that chosen by Patent Owner."

On page 18 of the Decision, the last full sentence and accompanying record citation are modified to read: "We find that Petitioner has demonstrated that Burchfiel's connection table meets this claim limitation. Pet. 35–37; 54."

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PETITIONER:

James L. Davis, Jr.
James.l.davis@ropesgray.com

Matthew R. Shapiro
Matthew.shapiro@ropesgray.com

PATENT OWNER:

Gregory Gonsalves
gonsalves@gonsalveslawfirm.com