

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ACTIVISION BLIZZARD, INC.,
ELECTRONIC ARTS INC.,
TAKE-TWO INTERACTIVE SOFTWARE, INC.,
2K SPORTS, INC., ROCKSTAR GAMES, INC., and
BUNGIE, INC.,
Petitioners,
v.
ACCELERATION BAY, LLC,
Patent Owner.

Case IPR2015-01996¹
Patent No. 6,829,634 B1

Before the Honorable SALLY C. MEDLEY, LYNNE E. PETTIGREW, and
WILLIAM M. FINK, *Administrative Patent Judges*.

**PETITIONERS ACTIVISION BLIZZARD, INC., ELECTRONIC ARTS
INC., TAKE-TWO INTERACTIVE SOFTWARE, INC., 2K SPORTS INC.,
AND ROCKSTAR GAMES, INC.'S NOTICE OF APPEAL**

¹ Bungie, Inc., who filed Petition IPR2016-00964, has been joined as a petitioner in
this proceeding.

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, VA 22313-1450

Pursuant to 35 U.S.C. §§ 141, 142, and 319, and 37 C.F.R. §§ 90.2-90.3, notice is hereby given that Petitioners Activision Blizzard, Inc., Electronic Arts Inc., Take-Two Interactive Software, Inc., 2K Sports Inc., and Rockstar Games, Inc. (collectively, “Petitioners”) appeal to the United States Court of Appeals for the Federal Circuit from the Final Written Decision of the Patent Trial and Appeal Board (“Board”) entered on March 29, 2017 (Paper 98 (sealed), which was later re-filed as Paper 101 (unsealed)) in IPR2015-01996, and from all underlying orders, decisions, rulings, and opinions regarding this *inter partes* review of U.S. Patent No. 6,829,634 (“’634 patent”). A copy of the Final Written Decision (Paper 101) is attached.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Petitioners further indicate that the issues on appeal include, but are not limited to, the following: (1) the Board’s determination that claims 10-18 of U.S. Patent No. 6,829,634 have not been shown to be unpatentable; (2) the Board’s determination that Petitioner has not demonstrated by a preponderance of the evidence that claims 10, 11, 15, and 18 of the ’634 patent are unpatentable under 35 U.S.C. §102(b) as anticipated by Peter J. Shoubridge & Arek Dadej, *Hybrid Routing in Dynamic Networks*, 3 IEEE INT’L

CONF. ON COMMS. CONF. REC. 1381-86 (Montreal, 1997) (“Shoubridge”); (3) the Board’s determination that Petitioner has not demonstrated by a preponderance of the evidence that claims 10-18 of the ’634 patent are unpatentable under 35 U.S.C. §103(a) as obvious over Shoubridge; (4) the Board’s determination that substitute claim 25 of the ’634 patent is patentable; (5) the Board’s construction of claims 10-18 and 25 of the ’634 patent; (6) the Board’s consideration of the expert testimony, prior art, and other evidence in the record; (7) the Board’s factual findings, conclusions of law or other determinations supporting or related to those issues; as well as all (8) other issues decided adversely to Petitioners in any orders, decisions, rulings, and opinions.

Simultaneous with this submission, a copy of this Notice of Appeal is being filed with the PTAB through the E2E System. In addition, copies of the Notice of Appeal, along with the required docketing fee, are being filed with the Clerk’s office for the United States Court of Appeals for the Federal Circuit.

Dated: May 31, 2017

Respectfully submitted,

By: _____ /*Andrew Thomases*/

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CERTIFICATE OF FILING

It is certified that, in addition to being filed electronically through the Patent Trial and Appeal Board's E2E System, a copy of PETITIONERS ACTIVISION BLIZZARD, INC., ELECTRONIC ARTS INC., TAKE-TWO INTERACTIVE SOFTWARE, INC., 2K SPORTS INC., AND ROCKSTAR GAMES, INC.'S NOTICE OF APPEAL has been filed by hand on May 31, 2017, with the Director of the United States Patent and Trademark Office, at the following address:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
10B20, Madison Building East,
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Dated: May 31, 2017 Respectfully submitted,

/Andrew Thomases/

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CERTIFICATE OF FILING

It is certified that, a copy of PETITIONERS ACTIVISION BLIZZARD, INC., ELECTRONIC ARTS INC., TAKE-TWO INTERACTIVE SOFTWARE, INC., 2K SPORTS INC., AND ROCKSTAR GAMES, INC.'S NOTICE OF APPEAL was filed electronically through the United States Court of Appeals for the Federal Circuit's CM/ECF system on May 31, 2017 and one paper copy delivered by hand on May 31, 2017, with the Clerk of the Court of the Federal Circuit, at the following address:

Clerk of the Court
717 Madison Place, N.W.
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Dated: May 31, 2017 Respectfully submitted,

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*Counsel for Petitioners Activision Blizzard, Inc.,
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CERTIFICATE OF SERVICE

The undersigned certifies that a true and copy of the foregoing
PETITIONERS ACTIVISION BLIZZARD, INC., ELECTRONIC ARTS INC.,
TAKE-TWO INTERACTIVE SOFTWARE, INC., 2K SPORTS INC., AND
ROCKSTAR GAMES, INC.'S NOTICE OF APPEAL was served on May 31,
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Case IPR2015-01996¹
Patent 6,829,634 B1

Before SALLY C. MEDLEY, LYNNE E. PETTIGREW, and
WILLIAM M. FINK, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

FINAL WRITTEN DECISION²
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Bungie, Inc., who filed a Petition in IPR2016-00964, has been joined as a petitioner in this proceeding.

² A sealed “Parties and Board Only” version of this Decision was entered on March 29, 2017. Pursuant to notice from the parties that this Decision may be made publicly available without any redactions, the Decision is reissued as a public version.

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Activision Blizzard, Inc., Electronic Arts Inc., Take-Two Interactive Software, Inc., 2K Sports, Inc., Rockstar Games, Inc., and Bungie, Inc. (collectively, “Petitioner”) challenge claims 1–18 (“the challenged claims”) of U.S. Patent No. 6,829,634 B1 (Ex. 1101, “the ’634 patent”), owned by Acceleration Bay, LLC (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1–9 are unpatentable but has not shown by a preponderance of the evidence that claims 10–18 are unpatentable.

A. Procedural History

Activision Blizzard, Inc., Electronic Arts Inc., Take-Two Interactive Software, Inc., 2K Sports, Inc., and Rockstar Games, Inc., filed a Petition for *inter partes* review of claims 1–18 of the ’634 patent. Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). On March 31, 2016, we instituted an *inter partes* review on the following grounds: (1) claims 10, 11, 15, and 18 of the ’634 patent as anticipated under 35 U.S.C. § 102(b)³ by Shoubridge,⁴ and (2) claims 1–18 of the

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. Because the ’634 patent has an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of 35 U.S.C. §§ 102 and 103.

⁴ Peter J. Shoubridge & Arek Dadej, *Hybrid Routing in Dynamic Networks*, 3 IEEE INT’L CONF. ON COMMS. CONF. REC. 1381-86 (Montreal, 1997)

IPR2015-01996
Patent 6,829,634 B1

'634 patent as obvious under 35 U.S.C. § 103(a) over Shoubridge. Paper 8, 19 (“Dec.”).

Subsequent to institution, Bungie, Inc. filed a Petition and Motion for Joinder with the instant proceeding. *Bungie, Inc. v. Acceleration Bay, LLC*, IPR2016-00964, Papers 2, 3. On June 23, 2016, we instituted an *inter partes* review and granted the Motion, joining Bungie, Inc. as a petitioner in this *inter partes* review. Paper 23.

Thereafter, Patent Owner filed a Patent Owner Response (“PO Resp.”). Paper 33 (confidential), Paper 94 (redacted). Petitioner filed a Reply to the Patent Owner Response (“Pet. Reply”). Paper 56. Patent Owner also filed a Contingent Motion to Amend requesting substitution of various claims in the event certain claims in the '634 patent were found to be unpatentable. Paper 31 (“Mot. Am.”). Petitioner filed an Opposition to Patent Owner’s Contingent Motion to Amend. Paper 54 (“Opp. Mot. Am.”). Patent Owner then filed a Reply in support of its Contingent Motion to Amend. Paper 69 (“Reply Mot. Am.”). Patent Owner also filed a Motion for Observation on Cross-Examination. Paper 76 (“Mot. Obsv.”). Petitioner filed a Response to Petitioner’s Motion for Observation. Paper 82 (“Resp. Obsv.”)

An oral hearing was held on December 7, 2016.⁵ A transcript of the hearing has been entered into the record. Paper 93 (“Tr.”).

(Ex. 1105) (“Shoubridge”).

⁵ A consolidated hearing was held for this proceeding and IPR2015-01951, IPR2015-01953, IPR2015-01964, IPR2015-01970, and IPR2015-01972. *See* Paper 80 (hearing order).

B. Related Matters

Petitioner identifies the following pending judicial matters as relating to the '634 patent: *Activision Blizzard, Inc. v. Acceleration Bay LLC*, Case No. 3:16-cv-03375 (N.D. Cal., filed June 16, 2016); *Electronic Arts Inc. v. Acceleration Bay LLC*, Case No. 3:16-cv-03378 (N. D. Cal., filed June 16, 2016); *Take-Two Interactive Software, Inc. v. Acceleration Bay LLC*, Case No. 3:16-cv-03377 (N.D. Cal., filed June 16, 2016); *Acceleration Bay LLC v. Activision Blizzard, Inc.*, Case No. 1:16-cv-00453 (D. Del., filed June 17, 2016); *Acceleration Bay LLC v. Electronic Arts Inc.*, Case No. 1:16-cv-00454 (D. Del., filed June 17, 2016); and *Acceleration Bay LLC v. Take-Two Interactive Software, Inc.*, Case No. 1:16-cv-00455 (D. Del., filed June 17, 2016). Paper 20, 2–3.

Petitioner and Patent Owner also identify five other petitions for *inter partes* review filed by Petitioner challenging the '634 patent and similar patents: IPR2015-01964 (the '634 patent); IPR2015-01951 and IPR2015-01953 (U.S. Patent No. 6,714,966 B1); and IPR2015-01970 and IPR2015-01972 (U.S. Patent No. 6,701,344 B1). Pet. 4; Paper 5, 1. Trials were instituted in those proceedings as well.

C. The '634 Patent

The '634 patent relates to a “broadcast technique in which a broadcast channel overlays a point-to-point communications network.” Ex. 1101, 4:29–30. The broadcast technique overlays the underlying network system with a graph of point-to-point connections between host computers or nodes through which the broadcast channel is implemented. *Id.* at 4:49–52.

Figure 1 of the '634 patent is reproduced below:

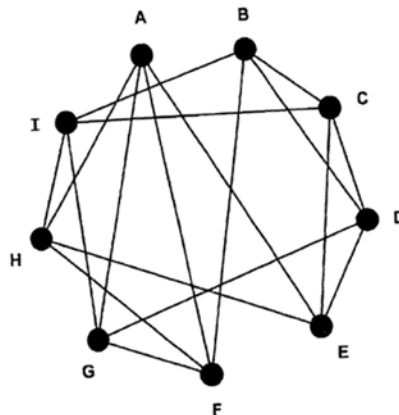


Fig. 1

Figure 1 illustrates a broadcast channel represented by a “4-regular, 4-connected” graph. *Id.* at 5:7–8. The graph of Figure 1 is “4-regular” because each node is connected to exactly four other nodes (e.g., node A is connected to nodes E, F, G, and H). *Id.* at 4:64–65, 5:8–12. A node in a 4-regular graph can only be disconnected if all four of the connections to its neighbors fail. *Id.* at 4:65–5:1. Moreover, the graph of Figure 1 is “4-connected” because it would take the failure of four nodes to divide the graph into two separate sub-graphs (i.e., two broadcast channels). *Id.* at 5:1–5.

To broadcast a message over the network, an originating computer sends the message to each of its four neighbors using the point-to-point connections. *Id.* at 4:56–58. Each computer that receives the message sends the message to its other neighbors, such that the message is propagated to each computer in the network. *Id.* at 4:58–60. Each computer, however, only sends to its neighbors the first copy of the message that it receives and disregards subsequently received copies. *Id.* at 7:66–8:2. Each computer that originates messages numbers its own messages sequentially so that each computer that receives the messages out of order can queue the messages

until it receives the earlier ordered messages. *Id.* at 2:52–53, 8:17–21, 30–35.

D. Illustrative Claims

Among the claims of the '634 patent at issue in this proceeding, claims 1 and 10 are independent and are illustrative of the claimed subject matter:

1. A non-routing table based computer network having a plurality of participants, each participant having connections to at least three neighbor participants, wherein an originating participant sends data to the other participants by sending the data through each of its connections to its neighbor participants, wherein each participant sends data that it receives from a neighbor participant to its other neighbor participants, wherein data is numbered sequentially so that data received out of order can be queued and rearranged, further wherein the network is m -regular and m -connected, where m is the number of neighbor participants of each participant, and further wherein the number of participants is at least two greater than m thus resulting in a non-complete graph.

10. A non-routing table based broadcast channel for participants, comprising:

a communications network that provides peer-to-peer communications between the participants connected to the broadcast channel; and

for each participant connected to the broadcast channel, an indication of four neighbor participants of that participant; and

a broadcast component that receives data from a neighbor participant using the communications network and that sends the received data to its other neighbor participants to effect the broadcasting of the data to each participant of the . . . broadcast channel, wherein the network is m -regular and m -connected, where m is the number of neighbor participants of each participant, and further wherein the number of participants is at least two greater than m thus resulting in a non-complete graph.

Id. at 29:12–25, 29:43–60.

II. DISCUSSION

A. *Principles of Law*

To prevail in its challenge to Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is anticipated if a single prior art reference either expressly or inherently discloses every limitation of the claim. *Orion IP, LLC v. Hyundai Motor Am.*, 605 F.3d 967, 975 (Fed. Cir. 2010). 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 of the invention to a person having ordinary skill in the art. *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 ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). The level of ordinary skill in the art may be reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

B. *Level of Ordinary Skill in the Art*

Citing its declarant, Dr. David R. Karger, Petitioner contends that a person having ordinary skill in the art at the time of the invention would have had a minimum of (1) a bachelor’s degree in computer science,

computer engineering, applied mathematics, or a related field of study; and (2) four or more years of industry experience relating to networking protocols or network topologies. Pet. 14; Ex. 1119 ¶ 19. Petitioner also contends that additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. Pet. 14; Ex. 1119 ¶ 19.

Patent Owner's expert, Dr. Michael Goodrich, opines that a person of ordinary skill in the art would have had (1) a bachelor's degree in computer science or related field, and (2) two or more years of industry experience and/or an advanced degree in computer science or related field. Ex. 2022 ¶ 25. Dr. Goodrich also states that his opinions would be the same if rendered from the perspective of a person of ordinary skill in the art as set out by Dr. Karger. *Id.* ¶ 28.

The levels of ordinary skill proposed by the parties do not differ significantly, as suggested by Dr. Karger's testimony that his opinions would be the same under either party's proposal. *See id.* Both parties' proposed descriptions require at least an undergraduate degree in computer science or related technical field, and both require at least two years of industry experience (although Petitioner proposes four years), but both agree that an advanced degree could substitute for work experience. For purposes of this Decision, we adopt Petitioner's proposed definition as more representative, but note that our analysis would be the same under either definition.

C. Claim Interpretation

In an *inter partes* review, claim terms in an unexpired patent are given their "broadest reasonable construction in light of the specification of the

patent in which they appear.” 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S.Ct. 2131, 2144–46 (2016). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

1. “*m-regular*”

Petitioner proposes the term “*m-regular*,” recited in at least independent claims 1 and 10, means “each node is connected to exactly m other nodes.” Pet. 13 (citing Ex. 1101, 4:64–65, 15:32–41). Patent Owner does not offer a construction of this term. Prelim. Resp. 12; PO Resp. 13–16. For purposes of institution, we agreed that Petitioner’s proposed construction accords with the broadest reasonable construction consistent with the specification, which, for example, describes a graph in which each node is connected to four other nodes as a 4-regular graph. Ex. 1101, 4:64–65. We see no need to alter that construction here. Accordingly, we construe “*m-regular*” to mean “each node is connected to exactly m other nodes.”

2. “*m-connected*”

Petitioner proposes the term “*m-connected*,” recited in at least independent claims 1 and 10, means “dividing the network into two or more separate parts would require the removal of at least m nodes.” Pet. 14 (citing Ex. 1101, 5:1–5). Patent Owner does not offer a construction of this term.

Prelim. Resp. 13; PO Resp. 13–16. The portion of the specification cited by Petitioner describes the 4-connected graph as having the property that it would take the failure of at least 4 nodes to divide the graph into disjoint subgraphs. Ex. 1101, 5:1–5. Because Petitioner’s construction accords with the specification description, we see no reason to alter that construction here. Accordingly, we construe “m-connected” to mean “dividing the network into two or more separate parts would require the removal of at least m nodes.”

3. “*participant*”

Patent Owner contends that the term “participant,” recited in at least independent claims 1 and 10, should be construed as “an application program that interacts with a logical broadcast channel that overlays an underlying network.” PO Resp. 14. Patent Owner contends that the specification’s statements that “[e]ach application program interfaces with a broadcaster component for each broadcast channel” and “the broadcast channel . . . overlays a point-to-point communication network” support its construction. *Id.* (citing, e.g., Ex. 1101, 15:65–16:1, 4:29–31). Thus, Patent Owner contends, the term “participant is used to refer to the application programs that interact with a broadcast channel in an overlay network rather than the physical components that communicate at the network level.” *Id.* (citing, e.g., Ex. 1101, 15:53–56, claims 7, 13–15).

Petitioner contends the specification uses “participant” without imposing any such limitations. Pet. Reply 2 (citing Ex. 1101, 1:46–51, 1:42–45, 1:56–2:2, 2:16–22, 2:32–39). Accordingly, Petitioner contends, under the broadest reasonable interpretation, the term “participant” should receive its plain meaning (“participant in the network”). *Id.*

The portions of the specification cited by Patent Owner, and the claims in particular, do not support Patent Owner’s attempt to read additional limitations into the term “participant.” For example, claim 7, which depends from claim 1, recites that “each *participant* is a *process executing on a computer*.” Ex. 1101, 29:36–37 (emphases added). The ’634 patent uses the term “process” in describing both application programs and parts of programs. *See, e.g., id.* at 15:65–16:3 (“Computer 600 includes multiple application programs 601 executing as separate processes. . . . Alternatively, the broadcaster component may execute as a separate process or thread from the application program.”), Fig. 9 (“Contact process”). Thus, as used in claim 7, participant encompasses more than *application programs*—the limitation Patent Owner seeks to impose on “participant” in claim 1. Similarly, claims 13–15, which depend from claim 10, respectively recite that each participant is a “computer process,” “computer thread,” or “computer.” *Id.* at 30:7–12. By imposing a narrower limitation on “participant” for purposes of claims 1 and 10 than the limitations imposed by dependent claims 7 and 13–15, Patent Owner’s proposed claim construction is inconsistent with the specification.⁶

⁶ Patent Owner contends that its constructions are “unrebutted” and that Petitioner’s declarant, Dr. Karger, testified that he had no understanding of the terms Patent Owner seeks to construe. PO Resp. 15–16 (citing, e.g., Ex. 2033, 100:23–101:8, 51:14–52:9). We disagree. Petitioner “interpret[ed] [terms] for purposes of this review with their plain and ordinary meaning consistent with the specification of the ’634 patent.” Pet. 13; Pet. Reply 2–3. Moreover, we have reviewed portions of Dr. Karger’s testimony cited by Patent Owner (*see* PO Resp. 18–19; Mot. Obsv. 1–5), and do not agree that he had no understanding of the terms. Although Dr. Karger did not attempt to provide an explicit definition of terms Patent Owner seeks to construe (*see, e.g.,* Ex. 2034, 120:10–11 (“I

In addition, independent claim 10 requires that “participants [be] connected to the broadcast channel.” Ex. 1101, 29:46–47. Because this claim already describes participants as connected to the broadcast channel, it would be superfluous to include in the construction of “participant” a requirement that a participant interact with a broadcast channel, as Patent Owner proposes.

Petitioner proposes that “participant” be construed to have its “plain meaning.” Pet. Reply 2 (“participant in the network”). For reasons discussed below, we agree that the plain meaning of the term “participant,” including the various constraints placed on it by the claims themselves, would be sufficiently clear to a person of ordinary skill in the art for purposes of the analysis.

4. “*connection*”

Patent Owner contends the term “connection” should be construed as “an edge between two application programs connected to a logical broadcast channel that overlays an underlying network.” PO Resp. 15–16 (citing Ex. 1101, 5:8–13, claim 1). As Petitioner points out, however, claim 6 recites that “connections are TCP/IP connections,” which means that connections may exist at the transport layer rather than at the application layer as Patent Owner’s construction requires.⁷ Pet. Reply 2 (citing Ex. 2022 ¶ 31). Similarly, in the specification, connections are described

was not asked to scope the exact boundaries of the meaning’’)), Dr. Karger did apply his understanding of the meaning of these terms to the art. For these reasons, we reject Patent Owner’s suggestion that his testimony be given no weight.

⁷ We point out that the specification does not use the term “layer” or refer to the OSI Reference Model.

without reference to application programs. *See* Ex. 1101, 1:46–48 (“The point-to-point network protocols, such as UNIX pipes, TCP/IP, and UDP, allow processes on different computers to communicate via point-to-point connections.”); 6:49–51 (discussing computer connections using the TCP/IP protocol).

Petitioner proposes that “connection” be construed to have its “plain meaning.” Pet. Reply 2–3 (“connection between participants”). For reasons discussed below, we agree that the plain meaning of the term “connection,” including the various constraints placed on it by the claims themselves—e.g., participants have connections through which data can be sent or received—would be sufficiently clear to a person of ordinary skill in the art for purposes of the analysis.

D. Asserted Anticipation of Claims 10, 11, 15, and 18 by Shoubridge

Petitioner contends that claims 10, 11, 15, and 18 are anticipated by Shoubridge. Pet. 42–51, 54, 56. We have reviewed the parties’ arguments in the Petition, Patent Owner Response, and Reply, as well as the relevant evidence discussed in those papers and other record papers, including the declarations of Dr. Karger and Dr. Goodrich. For the reasons that follow, we determine Petitioner has not shown by a preponderance of the evidence that claims 10, 11, 15, and 18 are anticipated by Shoubridge.

1. Summary of Shoubridge

Shoubridge describes techniques for routing messages to all the participants in a communications network. Ex. 1105, 1.⁸ Specifically, Shoubridge models a communication network as a graph in which “[e]ach

⁸ We refer to exhibit pagination.

node functions as a source of user traffic entering the network where traffic can be destined to all other nodes within the network.” *Id.* at 2. In a specific example, Shoubridge describes a “64 node network with connectivity of degree 4” modeled as a “large regular graph forming a manhattan grid network that has been wrapped around itself as a torus.” *Id.* at 3.

Shoubridge describes a routing protocol called “constrained flooding, the most efficient way to flood an entire network.” *Id.* at 2. In constrained flooding, a packet received at a node is rebroadcast on all links except the link it was received on, and packets are numbered such that if a “packet[] revisit[s] a node with the same sequence number, [it is] discarded.” *Id.* at 3. Shoubridge describes simulations using both constrained flooding and minimum hop algorithms that use routing tables. *Id.* at 2–4. Ultimately, a hybrid routing model is proposed in which constrained flooding is used if routing tables are unable to provide a next node entry for forwarding user traffic, but minimum hop is used if a valid next node entry exists. *Id.* at 4–5.

2. *Status of Shoubridge as a Prior Art Printed Publication*

As a preliminary matter, we address whether Shoubridge is a prior art printed publication under 35 U.S.C. § 102(b). *See* 35 U.S.C. § 311(b). It is Petitioner’s burden to prove that it is. *See* 35 U.S.C. § 316(e). The determination of whether a document is a “printed publication” under 35 U.S.C. § 102 “involves a case-by-case inquiry into the facts and circumstances surrounding the reference’s disclosure to members of the public.” *In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004). “Because there are many ways in which a reference may be disseminated to the interested public, ‘public accessibility’ has been called the touchstone in determining whether a reference constitutes a ‘printed publication’ bar under

35 U.S.C. § 102(b).” *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1348 (Fed. Cir. 2016) (citation omitted).

For purposes of institution, we accepted Petitioner’s unchallenged contention that Shoubridge was a paper published and presented at an IEEE conference in 1997. Dec. 6; Pet. 3, 17 (citing Ex. 1105; Ex. 1120). In its Response, Patent Owner now challenges this contention. PO Resp. 16–17. Specifically, Patent Owner argues that Dr. Shoubridge admitted in his deposition that the paper he identified in his declaration (Ex. 1120 at Exhibit B) as the paper presented at the 1997 International Conference on Communications in Montreal, on June 8–12, 1997, “was not the same paper that was presented at the conference.” *Id.* (citing Ex. 2031, 77:12–78:1, 83:4–11). Patent Owner also argues that the paper cannot be shown to have been disseminated or otherwise made available based on the publication date on the face of the paper. *Id.* at 17 (citing *Kyocera Wireless Corp. v. Int’l Trade Comm’n*, 545 F.3d 1340, 1350 (Fed. Cir. 2008)).

Petitioner disputes Patent Owner’s contention that Dr. Shoubridge could not identify his paper. Pet. Reply 4–5. Petitioner directs us to Dr. Shoubridge’s testimony that his paper (i.e., Shoubridge) was handed out to 500–1000 attendees as part of the proceedings and that the Exhibit “correlate[s] 100 percent with what was presented at the conference in

1997.” Pet. Reply 4 (citing Ex. 2031, 78:12–80:13).⁹ Petitioner also contends Dr. Shoubridge’s second declaration explains that the \$10 price tag and copyright notice (the alleged source of the discrepancy according to Patent Owner (Tr. 54:15–55:8)) was indeed on the copy distributed at the June 1997 conference. Pet. Reply 4–5 (citing Ex. 1136 ¶¶ 4–8; Ex. 1137).

We find that Petitioner has satisfied its burden of proving that Shoubridge was a printed publication that was publicly available as of June 1997. At the outset, we observe that Dr. Shoubridge is a third-party witness with no alleged interest in the outcome of these proceedings. *See* Ex. 2031, 7:9–16, 90:25–91:7. In his first declaration, he testified that the attached Exhibit B¹⁰ was the paper he presented at the 1997 conference. Ex. 1120 ¶¶ 6–7. Although Patent Owner is correct that the pages of Exhibit B were not the *actual* pages from the conference proceeding (as in physically obtained at the conference), but a reproduction, Patent Owner does not address Dr. Shoubridge’s repeated testimony that the content of the paper was identical in every respect to what was presented and distributed in bound conference volumes. Ex. 2031, 77:24–78:7 (“So I can confirm that that [Exhibit B] paper was the paper I presented at the conference and it was put in the proceeding. That was what was published in the -- that content of

⁹ We have considered Patent Owner’s contention that this portion of Petitioner’s Reply exceeds the proper scope of reply (*see* Paper 65), but we disagree. We determine that this portion of the Reply, as well as the others cited herein, is properly responsive to evidence and arguments raised by Patent Owner in its Response and Preliminary Response (*see also* Paper 67) and, therefore, does not raise a new issue or belatedly present evidence. *See* Patent Office Trial Practice Guide, 77 Fed. Reg. 48,756, 48,767 (Aug. 14, 2012).

¹⁰ Exhibit B is identical to the Shoubridge reference, Exhibit 1105.

that paper is what was published in the proceedings.”), 81:19–82:4 (“[P]ages 1381 to 1386 will correlate 100 percent with what was submitted as Exhibit [B]. So it’s an accurate reproduction, but it is not an actual bound – you know, it’s not pages out of the bound volume.”). Patent Owner does not direct us to any authority that requires the same physical paper to be in evidence for a reference to qualify as prior art.

We have considered the fact that Dr. Shoubridge was, at first, unable to confirm that the \$10 price indicated on the first page of the paper (*see* Ex. 1105, 1) was on the version of the paper presented in the conference and contained in the bound conference proceedings. Ex. 2031, 80:15–19 (“Maybe they do, but this one doesn’t.”). However, Dr. Shoubridge addressed this perceived discrepancy in his second declaration, where he stated that he was not looking at the first page of his article when asked about the price indication. *See* Ex. 1136 ¶¶ 4–8; Pet. Reply 4–5. We find this explanation credible. With its Reply, Petitioner submitted Exhibit 1137, which appears to be a scan of the bound version of Dr. Shoubridge’s article. Pages 31 to 36 of Exhibit 1137 appear to be identical to the Shoubridge reference in every respect including formatting, pagination, *and the \$10.00 indication on the first page.*¹¹ Consequently, Exhibit 1137 confirms Dr. Shoubridge’s deposition testimony as well as his second declaration that

¹¹ The issue of whether the bound conference proceeding contained the \$10 indication, therefore, is resolved by Exhibit 1137, which contains the \$10 indication on its first page. As Petitioner represents, and Dr. Shoubridge states in his second declaration, Dr. Shoubridge may not have been looking at the first page of the paper when being cross-examined about the price indication. Pet. Reply 4–5; Ex. 1136 ¶¶ 4–8.

the contents and \$10 price of the paper on Exhibit B were identical to those of the paper presented at the conference.

In sum, Dr. Shoubridge’s testimony, which we find to be credible, supports Petitioner’s contention that the Shoubridge reference (Ex. 1105) was a paper that was published and disseminated at the 1997 IEEE conference.¹² Because the 1997 date on the face of Shoubridge is supported by evidence, it is unnecessary to consider Patent Owner’s argument that standing alone, the 1997 date on the face of the paper, is insufficient evidence of publication date and public availability. We determine Shoubridge to be a printed publication for purposes of 35 U.S.C. §§ 102(b) and 311(b).

3. Enablement of Shoubridge

As a threshold matter, Patent Owner contends “Shoubridge is not enabled,” because it teaches a routing model simulation and “does not identify or describe an application layer m-regular incomplete graph overlay . . . in the real world.” PO Resp. 22 (citing Ex. 1105, 2–3). Patent Owner further contends that “[a] POSITA would have to perform undue experimentation to create an application layer overlay that would be m-regular and incomplete graph over an underlying network. *See* § II.C, *supra*

¹² Patent Owner does not argue that presentation and dissemination at the conference are insufficient to prove public availability. In any event, the circumstances of this IEEE conference, in which 500–1000 people attended and were given copies of the proceedings (Ex. 2031, 85:6–11, 86:1–10), are more than sufficient for Shoubridge to qualify as a printed publication. *See Massachusetts Inst. of Tech. v. AB Fortia*, 774 F.2d 1104, 1109 (Fed. Cir. 1985).

(describing the 3 year development of an m-regular, incomplete graph at the application layer).” *Id.*

Petitioner contends the claims are not limited to an application layer overlay and, in any event, a person of ordinary skill in the art would have found it straightforward to implement Shoubridge’s network as an overlay at the application layer. Pet. Reply 21 (citing Ex. 1105, 3; Ex. 1125 ¶ 208). Petitioner acknowledges that Shoubridge discloses the claimed network (i.e., using “flooding”) in a simulation, but contends that a person of ordinary skill in the art would have understood that the simulation could be implemented in a real-world network. *Id.* at 22 (citing Ex. 1125 ¶ 209). We agree with Petitioner.

To anticipate a claimed invention, a prior art reference must enable one of ordinary skill in the art to make the prior invention without undue experimentation. *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1354 (Fed. Cir. 2003).

Factors to be considered in determining whether a disclosure would require undue experimentation . . . include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

In re Wands, 858 F.2d 731, 737 (Fed. Cir. 1988). However, the cited prior art has a presumption of enablement and, therefore, the burden of proving non-enablement of a reference rests on Patent Owner. *See In re Antor*

Media Corp., 689 F.3d 1282, 1287–88 (Fed. Cir. 2012); *Impax Labs., Inc. v. Aventis Pharms., Inc.*, 545 F.3d 1312, 1316 (Fed. Cir. 2008).

Here, to begin with, Patent Owner’s argument based on the alleged difficulty of implementing Shoubridge at the application layer is not persuasive because we reject Patent Owner’s proposed constructions adding such a requirement. Moreover, we have considered Dr. Goodrich’s testimony that such an implementation would require undue experimentation, but this, as Petitioner points out, seems premised on the mistaken belief that “Shoubridge merely shows an adaptive routing algorithm.” Ex. 2022 ¶ 59. As set forth below in more detail, Shoubridge clearly teaches a simulation based on both routing algorithms and constrained flooding, the latter of which Petitioner relies on. Ex. 1105, 2–3, Fig. 1; *see* Pet. 43, 50 (citing Ex. 1105, 2–3); Ex. 1119 ¶ 156.

Aside from Patent Owner’s contentions, neither Patent Owner nor Dr. Goodrich provides a *Wands* factor analysis to support the assertion that undue experimentation would be required to implement Shoubridge’s network in the “real world,” except to note parenthetically that it took three years to implement an m-regular, incomplete graph. *See* PO Resp. 22. Patent Owner bases this contention on the testimony of inventors, Mr. Holt and Mr. Bourassa. *See id.* at 4. However, we observe that this three-year development was directed almost entirely at unclaimed features of the

system.¹³ *See, e.g.*, Ex. 2024 ¶¶ 12–14 (challenge associated with “joining a SWAN session”), ¶ 17 (challenge associated with node departures), ¶ 18 (challenge in enforcing a consistent state with no global reference). The lengthy development of unclaimed features does not support Patent Owner’s assertions of undue experimentation. *See Wands*, 858 F.2d at 737 (“breadth of the claims”).

For the foregoing reasons, we determine Patent Owner has not demonstrated that Shoubridge is not enabled.

4. Analysis

Independent claim 10 recites “[a] non-routing table based broadcast channel for participants, comprising: . . . for each participant connected to the broadcast channel, an *indication* of four neighbor participants of that participant” (emphasis added). Petitioner contends that Shoubridge discloses the “indication” limitation because it “presents an example of a broadcast network having 64 nodes (*i.e.*, participants), in which each computer is connected to four neighboring computers.” Pet. 47 (citing Ex. 1119 ¶ 164). Petitioner cites the declaration of Dr. Karger, who testifies that “each participant [in Shoubridge] has an indication of four neighbor participants of that participant, as a participant must know the identities of its neighbors in order to send messages to them.” Ex. 1119 ¶ 164. Petitioner

¹³ Indeed, an early version of the system supporting chat and drawing features was implemented by “early 1997,” which would have been only a few months after the project began in November 1996. *See* Ex. 2024 ¶ 16; Ex. 2026 ¶ 4 (“The SWAN project begin in November 1996 . . .”). This supports Dr. Karger’s testimony that a person of ordinary skill in the art would have been able to implement Shoubridge’s disclosure without undue experimentation. Ex. 1125 ¶ 87.

also relies on the prosecution history of the '634 patent, in which the Examiner found “an indication of four neighbor participants of that participant” disclosed by a prior art patent figure showing a participant connected to other participants. Pet. 47; *see* Ex. 1102, 164 (“McCanne teaches . . . for each participant connected to the broadcast channel, an indication of four neighbor participants of that participant (see Fig.1).”), 223. According to Petitioner, the applicants “did not dispute that this disclosed an ‘indication’ of neighbor participants.” Pet. 47.

We agree with Patent Owner that Petitioner fails to demonstrate that Shoubridge discloses a broadcast channel comprising an “indication” of neighbor participants for each participant as recited in claim 10. *See* PO Resp. 48–50. The '634 patent describes an “indication of neighbor participants” in the context of a broadcast channel:

Communication within the broadcast channel is controlled by a contact module and by a join module. The contact module locates a portal computer and requests the located portal computer to provide an indication of neighbor participants to which the participant can be connected. The join module receives the indication of the neighbor participants and establishes a connection between the seeking participant and each of the indicated neighbor participants.

Ex. 1101, 2:54–61. Patent Owner contends this passage and others establish that “the claimed ‘indication’ is an indicator of neighbor participants that is generated by [a] computer system such that this generated data structure can be passed or received.” PO Resp. 48. The cited passages, however, do not show the patentee clearly and precisely defined the term “indication” in a way that differs from its ordinary meaning. *See Paulsen*, 30 F.3d at 1480. According to a dictionary definition submitted by Patent Owner, an

“indication” is “something that serves to indicate.” Ex. 2039; *see* PO Resp. 49. Petitioner and Dr. Karger agree, as do we, that the ’634 patent uses the term “indication” according to this ordinary meaning. *See* Pet. Reply 19; Ex. 1125 ¶ 194.

Applying this ordinary meaning, however, we are not persuaded that Petitioner has met its burden to show Shoubridge’s description of a broadcast network in which every node is connected to four neighboring nodes discloses a broadcast channel with an “indication” of neighbor participants for each participant. An “indication” requires more than the existence of neighbors, as Dr. Karger appears to acknowledge when he opines that a participant must know the identities of its neighbors in order to send messages to them. *See* Ex. 1119 ¶ 164. The Petition, however, merely relies on the fact that each computer in Shoubridge’s network is connected to four neighbors. Pet. 47. For support, the Petition cites paragraph 164 of Dr. Karger’s declaration, but does not quote or otherwise convey the substance of his testimony, i.e., that a participant must know the identities of its neighbors. *Id.* Furthermore, not only does Dr. Karger fail to explain how a participant knows the identities of its neighbors, but also how, even if true with respect to Shoubridge’s network, such a fact discloses a broadcast channel comprising an indication of (i.e., something that serves to indicate) neighbors for each participant connected to the broadcast channel. *See* Ex. 1119 ¶ 164; Ex. 1125 ¶¶ 197–98. Anticipation requires every limitation to be disclosed either expressly or inherently in a single prior art reference. *Orion IP*, 605 F.3d at 975. Here, Petitioner does not argue Shoubridge inherently discloses the “indication” limitation, nor does Petitioner

sufficiently establish that Shoubridge expressly discloses the limitation. *See* Pet. 46–47; Pet. Reply 19–20.

Moreover, we agree with Patent Owner that the citation in the Petition to the prosecution history of the '634 patent does not support Petitioner's position. *See* PO Resp. 49–50; Pet. 47–48. It was unnecessary for the applicants to argue during prosecution that the cited prior art figure showing a participant connected to other participants did not disclose an "indication" as recited in the claim because the applicants overcame the allegedly anticipatory reference by arguing that it did not disclose other limitations of the claim. *See* Ex. 1102, 260–62, 268, 273.

For these reasons, Petitioner has not shown that Shoubridge discloses "a broadcast channel for participants, comprising . . . for each participant connected to the broadcast channel, an indication of four neighbor participants of that participant." Accordingly, Petitioner has not shown by a preponderance of the evidence that Shoubridge anticipates independent claim 10 or dependent claims 11, 15, and 18.

E. Asserted Obviousness of Claims 1–18 over Shoubridge

Petitioner contends that claims 1–18 are unpatentable under 35 U.S.C. § 103(a) as obvious over Shoubridge. Pet. 25–59. We have reviewed the parties' arguments in the Petition, Patent Owner Response, and Reply, as well as the relevant evidence discussed in those papers and other record

papers, including the declarations of Dr. Karger¹⁴ and Dr. Goodrich. For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that claims 1–9 would have been obvious over Shoubridge but has not shown by a preponderance of the evidence that claims 10–18 would have been obvious over Shoubridge.

1. Claim 1

Claim 1 recites “[a] non-routing table based computer network having a plurality of participants.”¹⁵ Petitioner relies on Shoubridge’s disclosure of “forwarding user traffic between source and destination nodes in a communications network” as disclosing the recited network and plurality of participants. Pet. 26 (citing Ex. 1105, 1; Ex. 1119 ¶ 100). Petitioner also

¹⁴ We disagree with Patent Owner that Dr. Karger’s opening obviousness analysis (Ex. 1119) is deficient for failure to consider secondary considerations, as Patent Owner alleges. *See* PO Resp. 21. Patent Owner directs us to no authority for the proposition that Dr. Karger’s opening declaration, submitted at the time of the Petition, was required to anticipate and address secondary considerations that had not yet been articulated by Patent Owner and submitted for the record. We have considered *Intri-Plex Technologies, Inc. v. Saint-Gobain Performance Plastics Rencol, Ltd.*, IPR2014-00309 (Paper 83) (PTAB Mar. 23, 2014), cited by Patent Owner, but that case simply states that secondary considerations, *if in evidence*, must be considered. *See* slip op. at 35. Here, once Patent Owner presented its evidence and arguments, in the Response, Dr. Karger submitted a rebuttal declaration addressing Patent Owner’s evidence. *See* Ex. 1125 ¶¶ 211–48.

¹⁵ Contrary to Patent Owner’s contention (PO Resp. 23–25), our Decision to Institute did not suggest “non-routing table based” is non-limiting preamble language. Dec. 9–11, 14. As we did in our Decision to Institute, we treat this phrase as a limitation for purposes of our unpatentability analysis.

relies on Shoubridge’s description of flooding algorithms broadcasting user traffic. *Id.* (citing Ex. 1105, 4; Ex. 1119 ¶ 100).

Patent Owner responds that Shoubridge does not disclose a “non-routing table based computer network having a plurality participants” because Shoubridge’s flooding algorithm is a network-level communications protocol operating at the level of an underlying network rather than at the application level. PO Resp. 25–26. Thus, according to Patent Owner, Shoubridge “does not deal with ‘participants’ and ‘connections’ as the terms are properly understood within the context of” the ’634 patent. *Id.* Moreover, Patent Owner contends, “Shoubridge’s alleged ‘connections’ and ‘participants’ are nothing more than simulations.” *Id.* at 26.

We agree with Petitioner that Shoubridge’s disclosure of using flooding over a communications network to broadcast information to nodes describes this limitation. *See* Ex. 1105, 1 (“Flooding based routing procedures *do not maintain routing tables . . .*” (emphasis added)); Ex. 1119 ¶ 100. Patent Owner’s arguments to the contrary are not persuasive for the following reasons. First, its contentions rely on constructions of “participant” and “connection” that we reject. As explained above, we determine that “participant” is not limited to an “application program” operating at the application layer, and a “connection” may exist at a layer other than the application layer. Thus, we agree with Petitioner that the term “participant” encompasses source and destination “nodes” receiving user traffic as disclosed in Shoubridge. Indeed, the ’634 patent contemplates computers and processes or programs executing on a computer as participants. *See* Ex. 1101, 13:55–56 (“[N]eighbors of a newly connecting computer are preferably selected randomly.”); 29:36–37 (“[E]ach participant

is a process executing on a computer.”); Ex. 1119 ¶ 140. In addition, although Shoubridge describes a simulation, we agree with Petitioner and Dr. Karger that a person of ordinary skill in the art would have understood the purpose of Shoubridge’s simulation was to evaluate the “real-world” routing strategies, including constrained flooding, described in the paper. *See* Pet. Reply 9; Ex. 1125 ¶ 138; Ex. 1105, 2 (“Due to the difficulty in analysing adaptive distributed routing procedures . . . , computer simulation modelling has been used for the evaluation of routing strategies in this paper.”). Accordingly, we find Shoubridge discloses the recited non-routing table based computer network having a plurality of participants.

Claim 1 also recites “each participant having connections to at least three neighbor participants.” Petitioner directs us to Shoubridge’s “64 node [manhattan] grid network with connectivity of degree 4” as disclosing connections to at least three neighbor participants. Pet. 28 (citing Ex. 1105, 3); Ex. 1119 ¶ 104. Patent Owner does not address this limitation. Dr. Karger, Petitioner’s declarant, testifies that a manhattan grid network with connectivity of degree 4 means each node is connected to exactly four other nodes. Ex. 1119 ¶ 116. We find this unrebutted testimony to be credible. Accordingly, we determine that Petitioner has sufficiently supported its contention that Shoubridge discloses “each participant having connections to at least three neighbor participants.”

Claim 1 further recites “wherein an originating participant sends data to the other participants by sending the data through each of its connections to its neighbor participants, wherein each participant sends data that it receives from a neighbor participant to its other neighbor participants.” For this “data sending” limitation, Petitioner cites Shoubridge’s description of

constrained flooding in which a packet is broadcast to all other participants (i.e. nodes) on outgoing links (i.e., all links except for the one it received the packet on) as disclosing the recited limitation. Pet. 30–31 (citing Ex. 1105, 2–3); Ex. 1119 ¶ 106.

Patent Owner contends that Shoubridge does not describe this limitation because it “merely discloses a routing protocol at the network layer, not the exchange of data between applications at the application layer” as required by Patent Owner’s construction of “participant” and “connection.” PO Resp. 27–28. According to Patent Owner, flooding means sending packets over the network layer of the OSI model, “not the application layer,” as its proposed construction requires. *Id.* at 28 (citing Ex. 2022 ¶ 77). Patent Owner’s argument is not persuasive because, as explained previously, we do not adopt Patent Owner’s proposed constructions of “participant” and “connection.”

Shoubridge describes constrained flooding as follows:

Any user packet transmitted from a node is copied and broadcast on all outgoing links. Intermediate transit nodes do not broadcast a packet on the same link that a packet was originally received on. Constrained flooding uniquely identifies packets associated with a particular flood search by using sequence numbering. Nodes store sequence numbers of packets already flooded. If any packets revisit a node with the same sequence number, they are discarded instead of being further broadcast to neighbours. This technique ensures that all nodes are visited at least once and duplicated traffic is kept to a minimum throughout the network.

Ex. 1105, 2–3. We find this description of “user packets” being copied and broadcast on all outgoing links to intermediate nodes and resent until all nodes are visited at least once to support Dr. Karger’s testimony that Shoubridge discloses “send[ing] data” in the manner required by the claim

limitation. *See* Ex. 1119 ¶ 106. Accordingly, we find Shoubridge satisfies the data sending limitation.

Next, claim 1 recites “wherein data is numbered sequentially so that data received out of order can be queued and rearranged.” Petitioner cites Shoubridge’s description of constrained flooding in which data packets are numbered sequentially and nodes store sequence numbers of packets already flooded so that they discard any packets with the same sequence number rather than further broadcasting them. Pet. 31–32 (citing Ex. 1105, 2–3). With support from Dr. Karger, Petitioner contends that a person of ordinary skill in the art would have understood that the sequence numbers used to prevent retransmission also could be used to queue and rearrange any data received out of order, as recited in claim 1. *Id.* at 32–33, 56–57; Ex. 1119 ¶¶ 113, 201–04.

In response, Patent Owner argues that Petitioner’s reasoning is “conclusory” and ignores the fact that Shoubridge addresses the problem of preventing rebroadcasting of packets to neighbors rather than the problem of data received out of order. PO Resp. 30–32. Patent Owner further argues that the problem solved by the claimed queueing and rearranging would not occur in Shoubridge because “[e]ach packet of data in Shoubridge is exactly the same, thus the order of packets received does not matter. . . . There was no reason for the data to be different in the Shoubridge simulation, so order does not matter, only the ability to discard already received packets.” *Id.* at 30–31.

We disagree with Patent Owner that Petitioner’s analysis is conclusory, and instead we find it fully supported by Dr. Karger’s testimony and other evidence of record. As Dr. Karger explains, the use of sequence

numbers to reorder messages that arrive out of sequence was well known in the art. Ex. 1119 ¶ 49 (citing Ex. 1112,¹⁶ 15–16, 20–21 (describing use of sequence numbers for this purpose in TCP/IP, the “basic communication protocol of the Internet”)). More importantly, Dr. Karger testifies that a person of ordinary skill in the art would have understood that the sequence numbers used to prevent retransmission of packets in a flooding protocol also could be used to queue and rearrange data received out of order, as set forth in a standard textbook on data networks:

By storing the highest sequence number received for each origin node, and by not relaying packets with sequence numbers that are less than or equal to the one stored, a node can avoid transmitting the same packet more than once on each of its incident links. Note that with these rules, links need not preserve the order of packet transmissions; the sequence numbers can be used to recognize the correct order.

Id. ¶¶ 113, 202 (quoting Ex. 1112, 30) (emphasis omitted).

Furthermore, we credit Dr. Karger’s testimony that in light of Shouridge’s disclosure of controlled flooding and its underlying assumption that links and nodes will fail intermittently and unpredictably, a person of ordinary skill would have understood that data packets could take more or less circuitous routes and arrive out of order at their destinations. *Id.* ¶ 203. Thus, we credit Dr. Karger’s view that an ordinarily skilled artisan would have been motivated to use Shouridge’s sequence numbers to address the problem of data received out of order. *Id.*; *see* Pet. Reply 11. Patent

¹⁶ Dimitri Bertsekas & Robert Gallager, DATA NETWORKS (1992).

Owner's Response does not address Dr. Karger's testimony on these points. *See* PO Resp. 29–32.

In addition, Patent Owner's assertion that rearranging packets would not occur in Shoubridge because each packet is exactly the same is unsupported. *See* Pet. Reply 11. As Patent Owner concedes, each packet in Shoubridge contains a unique sequence number. Ex. 1105, 3. And although Shoubridge describes a simulation, a person of ordinary skill in the art would have understood the purpose was to evaluate real-world networks in which the sequence of data is indisputably material. *See* Pet. Reply 11; Ex. 1125 ¶ 146. Accordingly, we conclude Petitioner has shown that a person of ordinary skill in the art would have been motivated to use Shoubridge's sequence numbers in the manner recited in claim 1.

Finally, claim 1 recites “wherein the network is m -regular and m -connected, where m is the number of neighbor participants of each participant” and “wherein the number of neighbor participants is at least two greater than m thus resulting in a non-complete graph.” Here again, Petitioner relies on Shoubridge's 64 node Manhattan grid network with connectivity of degree 4 as disclosing these limitations. Pet. 33–35 (Ex. 1105, 3). Petitioner also relies on Dr. Karger's testimony that a person of ordinary skill would have understood this description to disclose a non-complete graph that is m -regular (i.e., each participant has exactly 4 neighbor participants) and m -connected (i.e., it would take the failure of $m = 4$ nodes to divide the network into two or more separate parts) and in which the number of participants is at least two greater than m (i.e., 64 is at least two greater than 4). Ex. 1119 ¶¶ 104, 116–18, 122. Patent Owner does not present an argument in response to these contentions.

We agree the cited network in Shoubridge satisfies the construction of “m-regular” because each node is connected to exactly $m = 4$ neighboring nodes. Based on Dr. Karger’s unrebutted testimony, we also agree the cited network in Shoubridge is m-connected and forms a non-complete graph. We further agree that the number of participants (i.e., 64) is at least two greater than m (i.e., $64 > 2 * (m = 4)$), as required by claim 1.

For the foregoing reasons, Petitioner sufficiently establishes that Shoubridge would have conveyed to a person of ordinary skill in the art all the limitations recited in claim 1.

2. Claims 2, 3, and 9

Claim 2 recites that each participant of the computer network of claim 1 is “connected to 4 other participants.” Claim 3 recites that “each participant is connected to an even number of other participants.” Petitioner contends these limitations are satisfied by Shoubridge’s 64 node grid network *with connectivity of degree 4*, which satisfies both claim 2’s requirement for connections to four other participants and claim 3’s requirement for connections to an even number of participants. Pet. 35 (citing Ex. 1105, 3; Ex. 1119 ¶ 126). Patent Owner does not address these limitations.

Claim 9 recites that “each participant sends to each of its neighbors only one copy of the data.” For this limitation, Petitioner relies on Shoubridge’s statement that “[c]onstrained flooding uniquely identifies packets If any packets revisit a node with the same sequence number, they are discarded instead of being further broadcast to neighbours.” Pet. 41 (quoting Ex. 1105, 2); Ex. 1119 ¶ 150. Patent Owner does not address this limitation.

We have reviewed the foregoing contentions regarding claims 2, 3, and 9 and determine that they are supported by the record. Therefore, Petitioner sufficiently establishes that Shoubridge teaches all the limitations recited in claims 2, 3, and 11.

3. Claims 4 and 5

Claims 4 and 5 respectively require all the participants be peers and the connections be peer-to-peer connections. Petitioner contends these limitations are taught by Shoubridge's network topology and statement that the "total load entering (and leaving) the network . . . is evenly distributed across all N nodes." Pet. 36–37 (quoting Ex. 1105, 3); *see also* Ex. 1119 ¶ 131. Because user traffic is evenly distributed, according to Petitioner, nodes are treated equally. Ex. 1119 ¶¶ 131, 208 ("A POSITA would therefore have understood that the disclosed processors constitute peers connected in a peer-to-peer network by peer-to-peer connections."); Pet. Reply 17. Patent Owner contends that "[a] POSITA would . . . understand that peer-to-peer communications exist at the application-level, using a structured or unstructured overlay network," and that the '634 patent only discusses peer-to-peer networks in an application-level context. PO Resp. 42 (citing Ex. 1101, 2:25–39).

To begin with, as with the limitations of claim 1, we reject the attempt to read an "application-layer" requirement into the claims. Here, both Patent Owner and Dr. Goodrich cite page 1 of Exhibit 2038 ("Schollmeier") as supporting this application-layer interpretation of peer-to-peer, but provide

little further explanation.¹⁷ See PO Resp. 41; Ex. 2022 ¶¶ 100, 102.

Although Schollmeier does give “Napster” as an application-level example of a peer-to-peer network, it then states such networks can be described in “more . . . than in just an application specific way . . . simply as the opposite of Client/Server architectures.” Ex. 2038, 1. Indeed, the paper states that “[a] distributed network architecture may be called a Peer-to-Peer . . . network, if the participants share a part of their own hardware resources . . . to provide the Service and content offered by the network.” *Id.* (“Definition 1”).

These descriptions do not indicate that peer-to-peer is limited to “communications [that] exist at the application-level, using a structured or unstructured overlay network,” – as Patent Owner asserts (PO Resp. 42) – but broadly refer to “networks” in which participants share resources without a central server. Nor do we agree with Patent Owner that the ’634 patent “only discusses application-level peer-to-peer communications.” PO Resp. 42 (citing Ex. 1101, 2:25–39). As Dr. Karger explains, the cited portion from the Background section of the ’634 patent refers only to middleware that sits between applications and does not limit peer-to-peer networks generally to application-level networks. See Ex. 1125 ¶ 36. We, therefore, are not persuaded by Patent Owner’s arguments relating to an application-layer requirement of the term “peer-to-peer.”¹⁸

¹⁷ Patent Owner does not propose a construction for peer or peer-to-peer, or otherwise purport to analyze these terms under the broadest reasonable interpretation standard. See 37 C.F.R. § 42.104(b)(3).

¹⁸ We also reject Patent Owner’s contention that, unlike Shoubridge, peer-to-peer networks are “continuously evolving systems, with peers leaving and joining,” as unsupported by the record. See PO Resp. 41–42.

We find the evidence supports Dr. Karger’s declaration regarding peers and peer-to-peer connections in Shoubridge. Among other things, Shoubridge discloses that “[e]ach node functions as a source of user traffic entering the network where traffic can be destined to all other nodes within the network,” and “[t]he total load entering (and leaving) the network . . . is evenly distributed across all N nodes.” Ex. 1105, 2–3. In addition, in the constrained flooding algorithm, each node behaves the same, whereby each “user packet transmitted from a node is copied and broadcast on all outgoing links.” *Id.* at 3. We find this evidence supports Dr. Karger’s opinion that all nodes are peers (claim 4) because “*each node has a substantially identical function, and there is no hierarchy or privileged participant in the disclosed graph of 64 nodes.*” Ex. 1119 ¶ 131 (emphasis added); *see* Ex. 1125 ¶ 178 (“no node has a special role to play”). Similarly, with respect to claim 5, the above-cited evidence, specifically the fact that each node communicates with its neighboring nodes, supports Dr. Karger’s opinion that the disclosed network topology is peer-to-peer. *See* Ex. 1119 ¶¶ 131, 209. Because it is consistent with the evidence, we credit Dr. Karger’s testimony.

Petitioner contends that even if the disclosures in Shoubridge cited above do not sufficiently teach that the nodes on Shoubridge’s network are peers and the connections are peer-to-peer, it would have been obvious to a person of ordinary skill in the art that the nodes and connections in Shoubridge could be implemented in that manner. Pet. 57 (citing Ex. 1119 ¶¶ 206–12). Petitioner cites testimony of Dr. Karger stating that an ordinarily skilled artisan would have been motivated to do so to achieve, “for example, improved reliability.” Ex. 1119 ¶ 210. Patent Owner disputes Petitioner’s obviousness analysis, contending, for example, that Dr. Karger

never explains his rationale based on improved reliability and, thus, fails to explain why a person of ordinary skill in the art would have modified Shoubridge. PO Resp. 43–45. We need not address these arguments because, as explained above, we find Shoubridge teaches that its participants are peers and that its connections are peer-to-peer.

For the foregoing reasons, Petitioner sufficiently establishes that Shoubridge teaches the limitations recited in claims 4 and 5.

4. *Claim 6*

Claim 6 requires the connections of claim 1 to be “TCP/IP connections.” Petitioner contends it would have been obvious to implement the communications network disclosed in Shoubridge with TCP/IP connections as required by claim 6, because TCP/IP is a well-known network protocol and, therefore, an obvious design choice. Pet. 57–58; Ex. 1119 ¶¶ 213–17; Pet. Reply 12.

Patent Owner contends “[a] POSITA would understand that the ‘634 Patent is generally directed to providing a[] network that overlays an underlying network, like the TCP/IP communication protocol.” PO Resp. 32. We disagree because this argument again relies on proposed claim constructions that we reject, namely, that the claims require the presence of an overlay network in Shoubridge. In addition, Patent Owner fails to explain why a limitation directed at the implementation of a transport-layer protocol (i.e., TCP/IP) (*see, e.g.*, Ex. 2022 ¶ 31) would require an “overlay network” to work.

Patent Owner also contends Shoubridge is a simulation and intended for military applications, which do not use TCP/IP. PO Resp. 34 (citing Ex. 1105, 3; Ex. 1106 (“Shoubridge Thesis”), 67). Thus, according to Patent

Owner, a person of ordinary skill would have understood the flooding algorithms in Shoubridge to apply to a narrow set of uses, particularly the military, and would not have sought to modify Shoubridge to use TCP/IP. PO Resp. 35. We do not find this argument persuasive because Shoubridge does not specifically mention military applications and, although acknowledging high network utilization, it teaches the use of flooding generally for robustness in dynamic networks outside of the simulation context. *See* Ex. 1105, 2, 3 (“It is reasonable to conclude that a large network similar to the one modelled, would require a flooding procedure if the network is to operate in a very dynamic, or potentially very dynamic environment.”).

We also are not persuaded by Patent Owner’s and Dr. Goodrich’s conclusory and unsupported assertions that Shoubridge’s non-routing table based flooding algorithm cannot be applied using TCP/IP connections because “the IP protocol uses routing tables.” PO Resp. 34; *see* Ex. 2022 ¶ 113. As Petitioner explains, this argument mischaracterizes Petitioner’s and Dr. Karger’s position that it would have been obvious to use a flooding algorithm to broadcast data, as disclosed in Shoubridge, with TCP/IP connections at the transport/network layers. Pet. Reply 13; Ex. 1119 ¶ 216; Ex. 1125 ¶ 151.

To the extent Patent Owner contends that Petitioner has not taken into consideration that TCP/IP would somehow be in conflict with Shoubridge’s “hybrid routing model” (PO Resp. 33), this argument is misplaced. As we have noted throughout this Decision and the Decision to Institute, Petitioner relies on Shoubridge’s constrained flooding technique, not its hybrid routing algorithm. *See* Pet. 26; Dec. 14.

Dr. Karger provides unrebutted testimony that TCP/IP is the dominant protocol of the most obvious example of a communications network (i.e., the “Internet itself”). *See* Ex. 1119 ¶ 215. We find this testimony credible because it is consistent with the ’634 patent. Indeed, the specification describes TCP/IP as one of several background prior art point-to-point protocols allowing computers to communicate. Ex. 1101, 1:46–48. Thus, we agree that TCP/IP as the point-to-point protocol for constrained flooding, as disclosed in Shoubridge, would have been one of a “finite number of identified, predictable solutions.” Pet. Reply 12 (quoting *KSR*, 550 U.S. at 421). We also find Petitioner’s additional rationale for combining TCP/IP with constrained flooding, based on reliability, to be supported by the record. *See* Ex. 1125 ¶ 149 (“[A] POSITA would have selected between TCP if seeking robust transport mechanism . . . or UDP if seeking a simpler protocol . . . with fewer guarantees.”). Accordingly, we agree with and adopt Petitioner’s rationale and motivation in support of its argument for obviousness of claim 6.

5. Claim 7

Claim 7 requires that “each participant is a process executing on a computer.” Petitioner contends that, in view of Shoubridge’s discussion of constrained flooding as the most efficient way to flood an entire network (Ex. 1105, 2–3), it would have been obvious that the processors disclosed in Shoubridge are computers and the disclosed flooding protocol would comprise a process on a computer. Pet. 58; Ex. 1119 ¶¶ 218–23; *see also* Ex. 1105, 1. Patent Owner does not address this limitation. We determine the cited evidence supports Dr. Karger’s opinion that a person of ordinary skill would have found it routine to implement each of Shoubridge’s nodes

as a process on the disclosed computer (i.e., processor and memory). *See* Ex. 1119 ¶ 221. Accordingly, we agree with and adopt Petitioner’s rationale and motivation in support of its argument for obviousness of claim 7.

6. Claim 8

Claim 8 recites that “a computer hosts more than one participant.” Petitioner, relying on Dr. Karger, contends that the simulation of the 64 node (i.e., 64 participant) network in Shoubridge satisfies this limitation. *See* Pet. 58 (citing Ex. 1105, 2–3; Ex. 1119 ¶¶ 224–27). Dr. Karger states that a person of ordinary skill in the art would have understood this simulation to “typically run on a single computer, or at a minimum, simulated more than one participant using a single computer.” Ex. 1119 ¶ 147.

Patent Owner contends that “[a] POSITA would understand that this claim element means that a computer hosts multiple participants by running different applications or multiple instances of the same applications that interact with each other.” PO Resp. 36 (citing Ex. 1101, 15:46–53; Ex. 2022 ¶ 120; Ex. 2044, 176 (defining “host” as “a server that performs centralized functions”)). We do not find this argument persuasive. As an initial matter, we reject the attempt to add an “application” requirement to the claims for the reasons discussed above. Other than Patent Owner’s argument, we find no evidence in the specification that the term “hosts more than one participant” means different applications or instances of the same application. The cited portion of the ’634 patent does not mention a host at all and only mentions application programs as an *example* of a *process*. *See* Ex. 1101, 15:54–55 (“e.g., application programs”). Neither Patent Owner nor Dr. Goodrich (whose testimony substantially tracks Patent Owner’s argument in this regard) explains how the dictionary definition of “host”

(relating to a “server that performs centralized functions”) is applicable in the context of the ’634 patent.

Aside from its proposed construction of “hosts” and “participants,” Patent Owner’s contentions do not meaningfully address Dr. Karger’s evidence, which is that a single computer would typically host the disclosed simulation of multiple participants.¹⁹ For example, Patent Owner does not explain why such an assertion is “nonsensical,” or why it is “irrelevant to the language of the claims.” PO Resp. 37. Because this rebuttal is unsupported, it does not undermine Dr. Karger’s testimony that a single computer would typically run the simulation disclosed in Shoubridge. We, therefore, credit this testimony. Accordingly, we find Petitioner’s contention that a person of ordinary skill in the art would have recognized that the simulation of participants in Shoubridge would have typically been implemented on a computer (i.e., “as hosting more than one participant”) to be supported by the record and, therefore, adopt it as our own.

7. Claims 10–18

As explained above, the argument and evidence presented in the Petition with regard to anticipation of independent claim 10 are insufficient to show that Shoubridge describes a “broadcast channel for participants, comprising: . . . for each participant connected to the broadcast channel, an indication of four neighbor participants of that participant,” as recited in claim 10. *See* Pet. 47–48; Ex. 1119 ¶ 164; *see also supra* § II.D.4 (analysis of anticipation ground). Although the Petition also challenges claim 10 and

¹⁹ As explained with respect to claim 1, the simulation is of a 64 node network, which we agree discloses 64 participants in the network.

its dependent claims as obvious over Shoubridge, the obviousness analysis therein does not include any argument or evidence directed to this limitation of claim 10. *See* Pet. 57 (arguing obviousness of claims 10–18 because it would have been obvious to a person of ordinary skill in the art to implement Shoubridge’s nodes as peers, thus creating “peer-to-peer connections” as recited in claim 10). Instead, it simply relies on the argument and evidence relating to anticipation. *See id.* at 56.

In its Reply, Petitioner presents additional argument and evidence that Shoubridge at least renders obvious the “indication” limitation of claim 10. Pet. Reply 20–21; Ex. 1125 ¶¶ 193–205. Because the cited paragraphs of Dr. Karger’s reply declaration constitute “new evidence” necessary for Petitioner to make out its case of obviousness that could have been presented with the Petition, we do not consider them in this Decision. *See* Patent Office Trial Practice Guide, 77 Fed. Reg. at 48,767.

For the same reasons discussed in our anticipation analysis, Petitioner has not shown that Shoubridge teaches or suggests “for each participant connected to the broadcast channel, an indication of four neighbor participants of that participant,” as required by claim 10 and claims 11–18 dependent therefrom.

8. Petitioner’s Alleged Failure to Provide a Motivation

Patent Owner presents additional arguments against Petitioner’s obviousness challenges. To begin with, Patent Owner’s generalized contention that Petitioner “failed to explain why a POSITA would want to modify Shoubridge” (PO Resp. 52) is not persuasive because, as explained above, we determine that Petitioner has supported its contentions with respect to each of the challenged claims. We also do not find persuasive

Patent Owner's contention that "designing systems at the application layer is completely different than designing systems at the networking layer" (*id.*), because it relies on proposed claim constructions (i.e., including "application layer" and "overlay network" requirements) that we reject.

Patent Owner also argues that "it was impracticable to implement flooding at the application layer or the network layer in a large system due to the massive bandwidth usage. It was well known at that time that flooding had limited uses and would ultimately cause[] bandwidth issues in a large enough network." *Id.* at 53. The claims, however, do not require a "large network," but instead are directed to as few as six participants (e.g., "at least two greater than m ," where $m = 4$). It is also unclear how "caus[ing] bandwidth issues in a large enough network" is probative of non-obviousness, when the prior art (including Patent Owner's exhibits) acknowledges the limitations of flooding and constrained flooding techniques, yet teaches the use of such techniques even for a "large network." *See* Ex. 1105, 2 ("[Constrained flooding [is] the most efficient way to flood an entire network."), 4 ("It is reasonable to conclude that a *large network similar to the one modelled*, would require a flooding procedure if the network is to operate in a very dynamic, or potentially very dynamic environment." (emphasis added)); Ex. 2037, 623 ("constrained flood routing is most noted for its robustness"); Ex. 2046, 351.

To this end, Dr. Goodrich's simulation of Shoubridge's network is also not persuasive (*see* PO Resp. 53; Ex. 2002 ¶¶ 211–19), because it allegedly shows why Shoubridge's technique is not practical, when its advantages and disadvantages are already well documented in the prior art. The issue is whether, given Shoubridge's disclosure of constrained flooding

(which we determine teaches or suggests all the limitations of at least independent claim 1), a person of ordinary skill in the art would have modified Shoubridge in the ways contemplated by other challenged claims.

Regardless, we have considered Dr. Goodrich's simulation but we do not give it substantial weight. Among other things, Dr. Goodrich fails to sufficiently explain why he simulated a network within a network. According to Dr. Goodrich, his simulation is of "an 8-times-8 Manhattan grid network (with torus wrap-around) as an overlay on top of an 8-times-8 Manhattan grid network with torus wrap-around," which amounts to operating the topology of Shoubridge as an overlay on the Shoubridge network itself. Ex. 2022 ¶ 211. However, by using two networks, an overlay and an underlay, we agree with Petitioner that this simulation amounts to "flooding within flooding." Pet. Reply 24 & n.20. That is, it appears that "each time one node passed a message to a neighboring node, [Dr.] Goodrich also flooded the underlay network" (resulting in over 2 million messages for 2 original messages/node),²⁰ without explaining why this would be necessary. *See id.* at 25; Ex. 1125 ¶¶ 104–05. Therefore, we do not find this simulation to be representative of Shoubridge.

For the foregoing reasons, we do not find Patent Owner's contentions regarding the alleged failure of motivation to modify Shoubridge to be persuasive.

²⁰ For example, Dr. Goodrich does not explain how 2 million messages were generated. Therefore, we accept Dr. Karger's computation that Dr. Goodrich was flooding both networks as the explanation for this number of messages. *See* Ex. 1125 ¶ 105.

9. *Objective Indicia of Non-Obviousness*

Factual inquiries for an obviousness determination include secondary considerations based on evaluation and crediting of objective evidence of nonobviousness. *Graham*, 383 U.S. at 17–18. The totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that the challenged claims would not have been obvious to one of ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984).

Secondary considerations may include any of the following: long-felt but unsolved needs, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham*, 383 U.S. at 17; *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007). However, to be given substantial weight, the proponent must demonstrate a nexus between the merits of the claimed invention and the evidence of secondary considerations. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). “Nexus” is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining nonobviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988).

In its Response, Patent Owner presents evidence and arguments as to long-felt need, unexpected results, licensing and commercial success, industry praise, and copying. PO Resp. 56–63. Patent Owner also relies on the declaration of Dr. Bims in support of its contentions. *See Ex. 2023.*

a. Long-felt need and failure of others

Patent Owner contends the inventors (Fred Holt and Virgil Bourassa) began trying to solve a problem at the request of Boeing management to create a peer-to-peer communication platform that would allow for more than two users to communicate with high reliability and with low delay. PO Resp. 57–58 (citing Ex. 2024 ¶¶ 5, 8; Ex. 2025 ¶¶ 4, 7). According to Patent Owner, the inventors recognized that technology at the time was ill-equipped to achieve such a function. *Id.* at 58 (citing Ex. 2024 ¶¶ 6, 7; Ex. 2025 ¶¶ 5, 6; Ex. 2023 ¶¶ 26–29). Patent Owner contends that, according to Dr. Bims, this “problem existed for years” prior to the ’634 patent. *Id.* (citing Ex. 2023 ¶¶ 26–29).

We do not find this evidence persuasive. To begin with, the proffered evidence must show a long-felt need *recognized by those of ordinary skill in the art*. *In re Gershon*, 372 F.2d 535, 538 (CCPA 1967). Here, Patent Owner relies on the inventors’ recognition of the problem, which does not indicate it was a significant one. *See id.* (“[O]ne may question whether in fact such a ‘problem’ objectively existed, as distinguished from its acknowledged subjective existence in the minds of the inventors and their patent counsel.”). Although Patent Owner also cites its declarant Dr. Bims’s testimony that the problem existed for years, this, too, is based solely on his review of the inventors’ declaration and does not independently corroborate the existence of the long-felt need or failure of others. *See* Ex. 2023 ¶ 27 (“Based on [the inventors’] declarations, it is my opinion that they were solving a long felt need as the systems at the time did not support the collaboration of many participants in a reliable manner.”).

Additionally, we agree Patent Owner provides little evidence of nexus to the claimed invention. *See* Pet. Reply 26. “[O]bjective evidence of non-obviousness must be commensurate with the scope of the claims.” *Allergen, Inc. v. Apotex Inc.*, 754 F.3d 952, 965 (Fed. Cir. 2014). According to Patent Owner, the problems relating to the alleged long-felt need and failure of others are:

point-to-point network protocols did not scale as the number of participants increased; client/server middleware systems faced bottleneck performance issues as participants stored information in order to be shared and risked the failure of communications between the clients due to a server failure; multicasting networks were limited to single local-area networks; and peer-to-peer middleware communications systems relied on a user to assemble a point-to-point graph of the connections used for sharing the information and thus were not suitable for the needs of large-scale collaboration. *See* [Ex. 2028,] 2–5; Holt Decl. at ¶¶ 6, 7; Bourassa Decl. at ¶¶ 5, 6.

PO Resp. 58. Even accepting these contentions, Patent Owner does not explain which of these problems relate to claim limitations at issue. For example, there are no claim limitations directed to scaling, large-scale collaboration, or graph assembly by a non-user.

Accordingly, we also find that insufficient nexus has been established between the alleged “long-felt need” and “failure of others” and the claimed invention. Consequently, we accord little weight to Patent Owner’s contentions relating to long-felt need and failure by others.

b. Unexpected results

Patent Owner relies on the three years it allegedly took inventors to “identify a solution” as unexpected results. *See* PO Resp. 59 (citing Ex. 2024 ¶¶ 9–26; Ex. 2025 ¶¶ 8–41). According to Patent Owner, “[t]his

three-year period consisted of twenty-eight different epiphanies that were not readily apparent based on what was known in the art at that time.” *Id.* (citing Ex. 2025 ¶¶ 5–8; Ex. 2023 ¶¶ 30–32).

To begin with, we agree with Petitioner (Pet. Reply 27) that Patent Owner evidence of the difficulties in identifying a solution is not itself evidence of unexpected results. *See Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009) (noting that unexpected results requires a showing of some *superior property or advantage* that a person ordinary skill would have found *surprising or unexpected*).

Nevertheless, we have considered this testimony. We observe that most if not all of the inventors’ three-year development and twenty-eight “epiphanies” relate to developing unclaimed features of the system. *See, e.g.*, Ex. 2024 ¶¶ 12–14 (challenge associated with “joining a SWAN session”), ¶ 17 (challenge associated with node departures), ¶ 18 (challenge in enforcing a consistent state with no global reference); *see also* Ex. 2023 ¶¶ 30–32 (discussing inventor testimony). As such, this evidence does not support a conclusion of non-obviousness. *See U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1562 (Fed. Cir. 1997) (noting evidence of lengthy development was related to unclaimed features). There is no evidence, for example, of any development issues relating to any of the claim limitations that Patent Owner contends would not have been obvious. We conclude, therefore, that insufficient nexus exists between the alleged “unexpected results” and the claimed invention. For the foregoing reasons, we give little weight to Patent Owner’s contentions relating to unexpected results.

c. Licensing and commercial success

Patent Owner contends that “the patented invention described in the ‘634 Patent gained commercial success through its successful licensing of the claimed invention to Sony.” PO Resp. 60 (citing Ex. 2023 ¶ 10; Ex. 2029). Patent Owner further contends that Sony’s PlayStation is a commercial embodiment of the claimed invention of the ‘634 patent and that it has obtained increased sales as a result of products that practice the recitations of the challenged claims. *Id.* (citing Ex. 2023 ¶¶ 10–13; Ex. 2065 (chart mapping Sony products to licensed patents)).

We have considered Exhibit 2029, which purports to be a license agreement between Boeing Management Company and Sony Computer Entertainment for the ‘634 patent and related patents. *See* Ex. 2029, 1, 11 (“Attachment A”). We have also considered Dr. Bims’s opinion that at least Sony PlayStation is a commercial embodiment of the ‘634 patent, as evidenced by his claim chart purportedly mapping claim 1 of the ‘634 patent to PlayStation 3 and PlayStation 4. *See* Ex. 2065. In addition, we have considered Dr. Karger’s rebuttal testimony that Dr. Bims’s claim chart fails to show that the PlayStation products meet all of the limitations of claim 1. *See* Ex. 1125 ¶¶ 218–26.

We recognize that there is a presumption of nexus when the asserted objective evidence is tied to a specific product that is an embodiment of the claimed invention. *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329–31 (Fed. Cir. 2016). Secondary considerations evidence, however, must relate to the merits of the invention and not extrinsic factors, or features already known in the art. *In re Kao*, 639 F.3d 1057, 1070 (Fed. Cir. 2011); *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1323 (Fed. Cir. 2006). Thus, “[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) (internal quotation marks and citation omitted). Nonetheless, while a nexus may be lacking if the objective evidence “exclusively relates to a feature that was ‘known in the prior art,’ the obviousness inquiry centers on whether ‘the claimed invention as a whole’ would have been obvious.” *WBIP*, 829 F.3d at 1330 (quoting *Rambus, Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)).

Here, Patent Owner relies solely on a chart mapping the limitations of claim 1 to the Sony PlayStation. However, even if the Sony PlayStation products satisfy all the limitations of claim 1, which Petitioner disputes, we are not persuaded a nexus exists between the claimed invention and the license agreement. As explained above, the claimed invention as whole, as recited in claim 1 and other claims, is described in the prior art *as a whole*, i.e., in Shoubridge. In other words, “the merits of the claimed invention were readily available in the prior art.” *ClassCo*, 838 F.3d at 1220. Patent Owner does not direct us to any testimony or other evidence that suggests any limitations of the dependent claims that are not expressly disclosed in Shoubridge were embodied by the licensed product or that these features were important to the license. Thus, this case is distinguishable from *WBIP*, in which the Federal Circuit concluded a jury’s presumed factual findings relating to nexus were supported by substantial evidence when the merits of the invention involved a combination of prior elements that were known individually in the prior art. *WBIP*, 829 F.3d at 1331–32.

Patent Owner’s commercial success evidence suffers from the same deficiency because it also relates to the PlayStation products. *See Ex. 2023*

¶ 14. Consequently, there is no nexus between the alleged success and the merits of the invention.

For these reasons alone, we do not accord substantial weight to Patent Owner’s license and commercial success evidence.

Although we find Patent Owner’s evidence of nexus to be insufficient, we also have considered its “commercial success” argument based on Sony’s game division allegedly experiencing an increase of about 267 billion yen for the fiscal year ending March 31, 2008, and an increase in sales of PlayStation 3 from 5.63 million units to 9.24 million units over the same period. PO Resp. 61 (citing Ex. 2023 ¶ 14; Ex. 2060). Even assuming these numbers are accurate, a necessary component of the commercial success inquiry is determining market share associated with the alleged product, relative to competing products. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1300 (Fed. Cir. 2012). Here, without market share, or a sense of the total market, we cannot evaluate the significance of the increased sales amounts. *See id.* (“[T]he number of units sold without evidence of the market share is only weak evidence of commercial success.”). For example, we do not know whether PlayStation 3’s improvement in raw sales (an increase of 5.63 million units to a total of 9.24 million units) amounted to an increase in market share or whether the total market also increased proportionately.

Dr. Bims states that “[i]t is my opinion that the increase in sales were due in part because of Sony’s license to the ‘634 Patent. These sales are indicative of the commercial success of the inventions disclosed in the ’634 Patent because Sony has utilized the invention in products that have been commercially successful.” Ex. 2023 ¶ 14. However, in the absence of

further evidence, we find this reasoning to be conclusory as well as circular.²¹ Thus, we give little weight to Patent Owner’s commercial success arguments for these additional reasons.

d. Industry praise

Patent Owner contends that there was industry praise for the ’634 patent as evidenced by Boeing’s initiative to identify internal technologies that had commercial potential, which selected SWAN (an alleged embodiment of the ’634 patent) as a leader in the portfolio of possible spin-out companies. PO Resp. 61 (citing, e.g., Ex. 2024 ¶ 27). Petitioner contends that Boeing’s own “self-referential commendation” of the technology does not demonstrate industry praise. Pet. Reply 28 (quoting *Bayer Healthcare Pharms. v. Watson Pharms.*, 713 F.3d 1369, 1377 (Fed. Cir. 2013)).

We agree with Petitioner. While “praise in the industry for a patented invention, and specifically praise from a competitor, tends to indicate that the invention was not obvious, *self-serving statements from researchers about their own work do not have the same reliability.*” *In re Cree*, 818 F.3d 694, 702 (Fed. Cir. 2016) (agreeing that the Board was correct to discount self-recognition of inventor’s own work). Consequently, we do not consider Boeing’s effort to promote the work of its inventors as objective evidence of industry praise.

We have also considered Patent Owner’s contention that cites to the ’634 patent in “*almost 40 other patent applications*” by well-known

²¹ We also observe that Dr. Bims does not have any obvious qualifications as an economics expert (*see* Ex. 2023 ¶¶ 2–4 (describing graduate education in electrical engineering), Appendix A).

companies also represents praise. PO Resp. 61 (citing Ex. 2023 ¶¶ 21–23; Ex. 2069). Patent Owner’s declarant adds that “it is my opinion that the ‘634 Patent describes what the industry now calls ‘peer-to-peer relay’ technology” and “citation of the ‘634 Patent by companies in the gaming industry demonstrates that the gaming industry appreciates the significance of the invention described in the ‘634 Patent.” Ex. 2023 ¶¶ 21–22.

We do not find this evidence persuasive of praise. First, Patent Owner’s reliance on “bare . . . citations” to the ’634 patent by other patents is not suggestive of true praise. *See Bayer Healthcare*, 713 F.3d at 1377 (finding that brief discussions of Patent Owner’s product in journal articles “fall well short of demonstrating true industry praise”). Second, Dr. Bims’s statements that the ’634 patent describes what is now termed “peer-to-peer relay” and “the gaming industry appreciates the significance of the invention” rely solely on the same list of bare citations. *See* Ex. 2023 ¶¶ 21–22. As such, they are unsupported and conclusory. Accordingly, we give little weight to Patent Owner’s contentions relating to industry praise.

e. Copying

Patent Owner contends that Sony, after meeting with Boeing about the technology disclosed in the ’634 patent, filed applications for patents that are “essentially identical” to the ’634 patent. PO Resp. 62 (citing Ex. 2024 ¶ 28; Ex. 2023 ¶ 15; Exs. 2042 and 2043 (Sony patents)). According to Patent Owner, Sony’s patents are “strong evidence” that Sony copied the invention described in the ’634 patent. *Id.* We disagree.

First, Patent Owner’s evidence belies its assertion that the Sony patents are essentially identical to the ’634 patent. *See* Ex. 2024 ¶ 28 (Dr. Holt testifying that the Sony patents “contain similar technology” as

Patent Owner’s SWAN patents). Moreover, “copying *requires evidence of efforts to replicate a specific product*, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a replica, *or access to the patented product combined with substantial similarity to the patented product.*” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (emphases added). Here, Patent Owner points to no persuasive evidence that the Sony patents embody any actual products. A comparison of patents is insufficient evidence of copying.

Patent Owner also contends that “Petitioner’s products are embodiments of the patented invention described in the ‘634 Patent.” PO Resp. 63. In support, Patent Owner cites Dr. Bims’s declaration, which in turn cites Exhibits 2066, 2067, and 2068, which Dr. Bims represents as “infringement contentions filed in the parallel district court proceedings.” Ex. 2023 ¶¶ 16–20. Reliance solely on infringement contentions, however, is insufficient to demonstrate copying because “otherwise, every infringement suit would automatically confirm the nonobviousness of the patent.” *Wyers*, 616 F.3d at 1246 (internal quotations and citations omitted). Here, in his declaration, Dr. Bims cites the entirety of Patent Owner’s lengthy infringement contentions as evidence of copying and provides the same undifferentiated statement for each of the accused products that “these games have certain modes which allow individual players in different locations across the world.” *See* Ex. 2023 ¶¶ 17–19. Dr. Bims does not cite specific evidence, for example, of similarities between the accused product and Patent Owner’s product that would tend to show copying.

For these reasons, we give little weight to Patent Owner's contentions relating to copying.

10. Legal Conclusion of Obviousness

We have considered Patent Owner's evidence of non-obviousness in addition to Petitioner's showing above regarding the subject matter of claims 1–9 in view of Shoubridge. We find the evidence supports giving the proposed objective indicia of non-obviousness little weight overall. Considering the evidence as a whole, including Petitioner's rationales in support of its contentions that the limitations of claims 1–9 are unpatentable, either because a person of ordinary skill in the art would have recognized that Shoubridge teaches or suggests the relevant limitations or because the relevant limitations would have been obvious modifications for such an artisan, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1–9 would have been obvious in view of Shoubridge.

We reach a contrary result with respect to claims 10–18. As discussed above, Petitioner has not shown that Shoubridge teaches or suggests all the limitations of those claims. Accordingly, we conclude that Petitioner has not shown by a preponderance of the evidence that claims 10–18 would have been obvious in view of Shoubridge.

III. CONTINGENT MOTION TO AMEND

In its Contingent Motion to Amend, Patent Owner seeks to substitute claim 5 with claim 25, claim 8 with claim 26, and claim 10 with claim 27, but only if the original claims are determined to be unpatentable. Mot. Am. 2; Reply Mot. Am. 1. For the reasons that follow, we determine that

substitute claim 25 is patentable over the prior art of record and substitute claim 26 is unpatentable. Because we determine Petitioner has not shown claim 10 is unpatentable, we dismiss the Motion as moot with respect to substitute claim 27.

A. Substitute Claims

Patent Owner's proposed substitute claims 25 and 26 are set forth below "with: (1) underlining indicating inserted text, (2) italics indicating claim language previously incorporated by reference via a dependency clause and now explicitly recited, and (3) strikethrough indicating deleted text." Mot. Am. 4.

25. (Proposed Substitute for Claim 5) ~~The computer network of claim 1~~ *A non-routing table based computer network having a plurality of participants, each participant being an application program, and each participant having connections to at least three neighbor participants,*

wherein an originating participant sends data to the other participants by sending the data through each of its connections to its neighbor participants, wherein each participant sends data that it receives from a neighbor participant to its other neighbor participants,

wherein data is numbered sequentially so that data received out of order can be queued and rearranged,

further wherein the network is m-regular and m-connected, where m is the number of neighbor participants of each participant, ~~and~~

further wherein the number of participants is at least two greater than m thus resulting in a non-complete graph,

further *wherein the connections are peer-to-peer connections,*

further *wherein the network is an overlay network that overlays an underlying network,*

further *wherein each participant can interact with a broadcast channel with a channel type and a change instance,*

and further wherein the network is dynamic and participants can join and leave the network using the broadcast channel.

26. (Proposed Substitute for Claim 8) ~~The computer network of claim 1~~ A dynamic, overlay, non-routing table based computer network, which overlays an underlying network, having a plurality of participants, each participant being an application program, and each participant having connections to at least three neighbor participants,

wherein an originating participant sends data to the other participants by sending the data through each of its connections to its neighbor participants, wherein each participant sends data that it receives from a neighbor participant to its other neighbor participants,

wherein data is numbered sequentially so that data received out of order can be queued and rearranged,

further wherein the dynamic, overlay, non-routing table based computer network is m -regular and m -connected, where m is the number of neighbor participants of each participant, ~~and~~

further wherein the number of participants is at least two greater than m thus resulting in a non-complete graph, and

wherein a computer of the dynamic overlay non-routing table based computer network hosts more than one participant.

Mot. Am. 28–29 (formatting added).

B. Claim Interpretation

Patent Owner proposes constructions for several terms that it reasonably anticipates as being subject to dispute. Mot. Am. 5. Specifically, Patent Owner proposes construing “overlay computer network that overlays an underlying network,” “broadcast channel,” “connection,” and “dynamic, overlay . . . network.” *Id.* at 4–6.

As a general matter, Petitioner contends Patent Owner is seeking to use claim construction to add claim requirements, such as “application-layer,” “application program,” or “logical broadcast channel that overlays an

underlying network,” that are not reasonably supported by the written description of the ’634 patent. Opp. Mot. Am. 2–3. As an example, Petitioner contends “[the] ’634 [patent] gives no indication that the disclosed overlay network is at the application layer (*cf.* Mot.7). Ex1125 ¶255. [The] ’634 [patent] lacks discussion of network layers, the OSI layer construct, or ‘application layer’ operation. Ex1125 ¶255.” Opp. Mot. Am. 3. We agree with Petitioner.

To begin with, it bears pointing out that Patent Owner could have proposed substitute claims that explicitly recited the requirements it now seeks to add through claim construction. In any event, for reasons substantially similar to those discussed above (*see supra* § II.C), we agree with Petitioner that the proposed constructions are inconsistent with the specification of the ’634 patent. For emphasis, we refer specifically to the above claim construction discussion of the terms “participant” and “connection,” in which we determined that adding an “application program” or “application-layer” requirement was not consistent with the broadest reasonable interpretation of these terms given their usage in the specification. *See supra* § II.C.3–4. Moreover, in view of our findings below regarding the teachings of the prior art, we determine that it is unnecessary to further construe the terms proposed by Patent Owner.²²

²² We reject Petitioner’s argument that Patent Owner’s attempt to add new matter, through claim construction, amounts to a failure to provide written description support for its proposed substitute claims in contravention to 37 C.F.R. § 42.121(b)(1). *See* Opp. Mot. Am. 3. Rather, as required by our precedents (*see, e.g., MasterImage 3D, Inc. v. RealD Inc.*, Case IPR2015-00040 (PTAB July 15, 2015) (Paper 42) (precedential)), we find Patent Owner has sufficiently set forth the written description support it relies upon for its substitute claims. *See* Mot. Am. 13–14.

C. Whether Substitute Claims Are Patentable

1. Claim 26

In its proposed substitute claim 26, as shown above, Patent Owner adds limitations to original claim 8, requiring the computer network to be a “dynamic, overlay, non-routing table based computer network, which overlays an underlying network” and each participant to be an “application program.” According to Patent Owner, the prior art of record (including Lin, DirectPlay,²³ and Shoubridge) does not teach these additional limitations.²⁴ Mot. Am. 16–22. For example, Patent Owner contends Shoubridge does not teach “an overlay network [as an] m-regular incomplete graph at the application layer,” but only discloses a simulation operating at the network layer, as admitted by Dr. Karger. *Id.* at 19–20 (citing, e.g., Ex. 2032, 102:22–103:4).

Petitioner argues that the substitute claims including the additional limitations are rendered obvious by at least Shoubridge (Ground 4) or

²³ Lin and DirectPlay are cited in, e.g., IPR2015-01964, Paper 2. However, in the Final Written Decision in that proceeding, we have determined that Lin was not shown to be a publicly accessible printed publication under 35 U.S.C. § 102(a).

²⁴ As a procedural matter, in discussing Lin, DirectPlay, and Shoubridge, as well as other references of record, we find that Patent Owner has sufficiently addressed material prior art of record known to Patent Owner as relates to each added limitation as required by *MasterImage*. See Mot. Am. 16–22 (addressing prior art raised in the proceedings as well as prior art identified during prosecution).

Shoubridge and Gautier²⁵ (Ground 5). Opp. Mot. Am. 9. Regarding the requirement in claim 26 for a “dynamic, overlay” network that “overlays an underlying network,” Petitioner contends that a person of ordinary skill in the art would have found it obvious to implement Shoubridge’s grid network as a dynamic overlay over an underlying communication network, such as the Internet, which would form the links of the overlay network. *Id.* at 15 & n.12; *see* Ex. 1125 ¶¶ 272–79.

We find Petitioner’s contentions persuasive. Irrespective of whether Shoubridge fails to explicitly disclose an overlay network (*see* Mot. Am. 19–20; Reply Mot. Am. 7), it does not follow that “[b]y failing to show that Shoubridge applies to the application layer, Petitioner has failed to show that Shoubridge would render . . . obvious the substitute claims.” Reply Mot. Am. 7–8. Instead, the question is whether it would have been obvious to use Shoubridge’s network as an overlay based on Shoubridge’s teachings alone or in combination with other references. *See In re Keller*, 642 F.2d 413, 426 (CCPA 1981). We determine that it would be.

Dr. Karger testifies that a person of ordinary skill in the art would have implemented the communications network of Shoubridge as an overlay without having to make changes to the underlying network infrastructure, with the Internet being an obvious choice as the underlying network, and

²⁵ Laurent Gautier and Christophe Diot, *Design and Evaluation of MiMaze, a Multi-Player Game on the Internet*, IEEE INT’L CONF. ON MULTIMEDIA COMPUTING & SYS. (1998) (Ex. 1149) (“Gautier”). Although citing Ex. 1130 in its Opposition, Petitioner filed two versions of Gautier, authenticated by separate witnesses (*see* Ex. 1130 and Ex. 1149 (authenticated in Ex. 1132)); however, because the content of these two references is substantially the same in relevant part, we focus on Exhibit 1149 herein.

that such an implementation would work as expected. Ex. 1125 ¶ 270. By way of example, Dr. Karger contends that application-level overlays were routinely used for a “wide array of applications on the Internet.” *Id.* ¶ 20 (describing Ex. 1144²⁶); *id.* ¶ 118 (citing Ex. 1144); *id.* ¶ 279 (citing Exs. 1144 and 1130). We find this testimony credible. McCanne describes applications such as video, audio conferencing, and whiteboard conferencing implemented using the Internet as an underlying network. Ex. 1144, 33. McCanne relies on a multicast backbone as the “overlay network” (*see id.* (“virtual multicast ‘overlay’ network”)) using internet protocols as the underlying network (*see id.* at 39 (“RTP session” as “underlying transport session”). McCanne also discloses that group membership can be dynamic, allowing participants to join and leave. *See id.* at 34, Fig. 1. Thus, Dr. Karger’s testimony that dynamic, application-level overlays were routinely used is supported by evidence of record.

We have considered Dr. Goodrich’s response to this testimony (*see* Ex. 2103 ¶ 27), but do not find it persuasive. For example, Dr. Goodrich testifies that “Shoubridge [and others] describe systems that are not at the application layer and are instead at the lower network layer, in terms of the OSI layering hierarchy. Petitioner does not describe how to modify Lin or Shoubridge, nor McCanne or Gautier, so as to create a functional system.” *Id.* We disagree. As discussed above, Dr. Karger’s testimony is that a person of ordinary skill would have recognized that Shoubridge’s network could operate as an application layer overlay for the purpose of a wide-array

²⁶ Steven McCanne, *Scalable Multimedia Communication: Using IP Multicast and Lightweight Sessions*, IEEE INTERNET COMPUTING, Vol. 3, Issue 2, 33-45 (1999) (Ex. 1144) (“McCanne”).

of applications (as discussed, for example, in *McCanne*²⁷) using the Internet as an underlying network. Although Dr. Goodrich states that Dr. Karger did not explain how such a modification would function, we disagree.

According to Dr. Karger, by “forwarding user traffic,” the network of participants in Shoubridge creates an environment for sharing information. Ex. 1125 ¶ 120. Thus, Dr. Karger’s testimony that Shoubridge would have worked as expected as an overlay for an information sharing application (e.g., such as *McCanne*’s whiteboard or the ’277 patent’s database) is supported. *See KSR*, 550 U.S. at 421 (“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.”).

Dr. Goodrich further testifies that “a POSITA would be at [a] loss as to how to replicate with Lin or Shoubridge the many protocols that are referenced by *McCanne* as occurring at higher levels in the OSI hierarchy, including IGMP, PIM, DVMRP, CBT, LWS, RTP, and RTCP” and “since the Mbone described in *Gautier* is not an m-regular network, technologies such as Scalable Pruning Mechanism are incompatible with m-regular networks.” Ex. 2103 ¶ 27. We do not give Dr. Goodrich’s testimony substantial weight because his testimony is based on an assumption that obviousness is based on whether Shoubridge bodily incorporates *McCanne*’s (or *Gautier*’s) system in its entirety as opposed to what a person of ordinary

²⁷ Another example provided by Dr. Karger is U.S. Patent No. 6,122,277, which, according to Dr. Karger, discloses a distributed database application using a communication fabric such as a 4-regular torus network. *See* Ex. 1125 ¶ 251 (citing Ex. 1116, 13:57–67).

skill in the art would have understood Shoubridge to teach in view of McCanne. *See Keller*, 642 F.2d at 425. Accordingly, having credited Dr. Karger's testimony in support of Petitioner's contentions, we agree Shoubridge, at least in view of McCanne, teaches a "dynamic, overlay, non-routing table based computer network, which overlays an underlying network."

Claim 26 also requires each participant to be an "application program." Petitioner contends a person of ordinary skill in the art would have understood Shoubridge teaches that each participant is an application program (e.g., an application running on a node). *Opp. Mot. Am.* 23 n.20; *Ex. 1125* ¶ 290. As discussed above, we credit Dr. Karger's testimony that Shoubridge would have worked as expected as an overlay for an information sharing application. Accordingly, having credited Dr. Karger's testimony, we agree that Shoubridge teaches "each participant being an application program," as recited in claim 26.

We have considered Patent Owner's evidence of non-obviousness as set forth above (*see supra* § II.E.9) in light of substitute claim 26 that Patent Owner proposes here. Specifically, we determine that our analysis regarding the sufficiency of the proffered evidence of secondary considerations above applies to claim 26. In addition, Patent Owner has not presented argument or evidence showing a nexus between the alleged secondary considerations and the invention recited in claim 26. Consequently, Patent Owner's additional evidence of non-obviousness is entitled to little weight. Considering the evidence as a whole, we are persuaded that claim 26 is unpatentable as obvious in view of Shoubridge and additional references as explained above.

2. Claim 25

Claim 25 recites limitations similar to those discussed above (e.g., overlay and underlay networks and each participant being an application program). Claim 25 also recites that “each participant can interact with a broadcast channel with a channel type and a channel instance” and “participants can join and leave the network using the broadcast channel.” Petitioner contends that Gautier “teaches a game application program (e.g., ‘MiMaze application’) that interacts with a logical broadcast channel (e.g., ‘completely distributed communication architecture based on IP multicast’) that overlays an underlying network (e.g., ‘Internet’).” Opp. Mot. Am. 18. Petitioner further contends that “[b]ecause Gautier’s ‘IP multicast model’ is used an overlay to broadcast game status, POSITA would have understood that Gautier’s players can join and leave the game through the broadcast channel.” *Id.* at 21 n.16 (citing Ex. 1124 ¶ 232; Ex. 1125 ¶¶ 288–96). Petitioner also relies on disclosures of Lin, DirectPlay, and Shoubridge as teaching this limitation. *Id.* at 19–21.

We have considered Petitioner’s charts purporting to map the disclosures of Lin, DirectPlay, Shoubridge, and Gautier to the recited limitation, and agree with Patent Owner that none of the references teach or suggest the ability to join or leave *using the broadcast channel*.²⁸ Reply Mot. Am. 10–11 (citing Ex. 2103 ¶¶ 44–50). Regarding Gautier, we observe that Petitioner’s argument that it discloses this limitation is based on the description on page 2 that “[p]articipants can join or leave the session

²⁸ Although we determine that Petitioner has not shown Lin is available as prior art to the ’634 patent, *see* IPR2015-01964 (Final Written Decision), we consider Petitioner’s arguments regarding Lin for completeness.

dynamically” (*see* Opp. Mot. Am. 20–21), but Petitioner does not address the statement on page 2 that “*a server is only used when a new entity joins a session, e.g., to learn the session group address and to download the maze*” (Ex. 1149, 233 (emphasis added)). However, this aspect of Gautier’s network (i.e., that includes the server) is not a peer-to-peer network as claim 25 also requires (i.e., the “connections are peer-to-peer connections”). *See* Ex. 1149, Fig. 2 (“MiMaze architecture”). In other words, new participants do not join “using the broadcast channel.”²⁹ Petitioner does not account for the incompatibility between this aspect of Gautier’s teachings and the proposed claim.

For similar reasons, we find that Petitioner’s reliance on DirectPlay is also misplaced. For example, Petitioner cites DirectPlay’s statement that “you also need to consider the more mundane work of managing a session in progress. For instance, how will players join and leave game sessions?” Ex. 1103, 122. This statement only suggests the problem of accommodating participants who join and leave the session, and avoids addressing how this is accomplished. Moreover, other sections of DirectPlay explain that “DirectPlay can be a little bit of both [peer-to-peer and client/server], as shown in Figure 18–3.” *Id.* at 22. In the peer-to-peer discussion on the next page, DirectPlay explains that a new participant must contact the session host (e.g., Player #1) to obtain “the session’s name and other information.” *Id.* at 23. Once that participant connects to the host, it receives a list of other

²⁹ Nor can the joining participant use the broadcast channel, because, in Gautier’s system, the new participant must obtain the session group address (i.e., the recited channel instance according to Petitioner) from the server. Ex. 1149, Fig. 2.

DirectPlay objects (i.e., other participants) whereupon it no longer routes messages through the message host. *Id.* In other words, like Gautier, the suggestion is at least that peer-to-peer connections forming the broadcast channel are not used until after a new participant joins the overlay network. Accordingly, like Gautier, we find DirectPlay to be incompatible with claim 25.

We have also considered Dr. Karger's opinion as to how the foregoing references teach or suggest the recited limitation. *See, e.g.,* Ex. 1125 ¶ 277 (“[I]t would have been obvious for a participant to advantageously inform other participants in the network of its arrival or departure using the broadcast channel, *e.g.*, by broadcasting over the ‘grid network’ . . .”). However, in both Gautier and DirectPlay, new participants seeking to join must contact either a server or a session host to obtain information sufficient to join the broadcast channel. Thus, the only teachings in Gautier and DirectPlay describe a centralized mechanism for joining that involves a connection outside of the broadcast channel before joining. In view of these alternative teachings of both DirectPlay and Gautier, which neither Petitioner nor Dr. Karger addresses, we determine Dr. Karger's opinion that it would have been obvious to use the broadcast channel to join or leave the network is conclusory and entitled to little weight.

Finally, we have considered the cited portions of Shoubridge and Lin, but while we agree each teaches a dynamic network, we find both references to be silent on how new participants join or leave the network. *See* Opp. Mot. Am. 20–21. For example, regarding Lin, Dr. Karger relies on the statement that “one can use reliable broadcast based on the old set of processors to disseminate the new set of processors” (Ex. 1004, 24) as

teaching or suggesting joining or leaving the network using the broadcast channel. *See* Ex. 1124 ¶ 226. This statement, however, does not address a processor joining the network, just that, once joined, the broadcast protocol is used. Nor does it address leaving the network at all. Consequently, we find Dr. Karger’s testimony on this point to be conclusory.

For at least these reasons, we determine that Petitioner has not rebutted Patent Owner’s showing that its proposed substitute claim 25 is patentable over the prior art.

IV. PATENT OWNER’S MOTION TO EXCLUDE

Patent Owner filed a Motion to Exclude, Paper 77 (“PO Mot. Exc.”), Petitioner filed an Opposition, Paper 81 (“Pet. Opp. Mot. Exc.”), and Patent Owner filed a Reply, Paper 89 (“PO Reply Mot. Exc.”). For the reasons that follow, we deny the motion in part and dismiss the motion in part as moot.

A. Scope of Reply Objections

Patent Owner contends Exhibits 1125, 1126, 1128, 1130, 1131, 1136–1138, 1144, and 1145 should be excluded as exceeding the proper scope of reply. PO Mot. Exc. 1–5. A motion to exclude ordinarily is not the proper mechanism for raising the issue of whether a reply or reply evidence is beyond the proper scope permitted under the rules, as a motion to exclude is for challenging the “admissibility of evidence” under the Federal Rules of Evidence. 37 C.F.R. §§ 42.62, 42.64; Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,758, 48,767 (Aug. 14, 2012). As indicated above, we have considered whether the foregoing exhibits (to the extent they are relied upon) exceed the proper scope of a reply.

B. Objections to Dr. Karger's Declarations

Patent Owner contends Exhibits 1119, 1125, and 1145 (i.e., Dr. Karger's Declarations) should be excluded under FRE 702, because his opinions are conclusory, do not disclose underlying facts or data in support of his opinions, and are unreliable. PO Mot. Exc. 5–7. In particular, Patent Owner contends Dr. Karger did not have an understanding of the scope of the claims and did not consider secondary considerations in forming his preliminary obviousness analysis. *Id.* As to Exhibit 1145, we dismiss the motion as moot because we do not rely on it. As to Exhibits 1119 and 1125, we deny the motion because, as noted above, we do not agree that Dr. Karger did not have an understanding of the scope of the claims, nor do we require an expert declarant to consider secondary considerations in performing his initial analysis (i.e., before Patent Owner presents evidence of secondary considerations).

C. Objections to Dr. Shoubridge's Declarations

Patent Owner contends Exhibits 1120 and 1136 (i.e., Dr. Shoubridge's Declarations) should be excluded under FRE 401–402 because they are “conclusory and unreliable.” PO Mot. Exc. 7. However, we addressed the credibility of Dr. Shoubridge's Declarations and gave them appropriate weight (*see supra* § II.D.2). Accordingly, they are not inadmissible under FRE 401–402, and we, therefore, deny the motion.

D. Mr. Grenier's Declarations

Patent Owner contends Exhibit 1141, 1144, and 1132 (Mr. Grenier's Declarations regarding Shoubridge, McCanne, and Gautier, respectively) should be excluded because he failed to authenticate the respective references (FRE 901) and had no personal knowledge of the facts stated in

his declarations (FRE 602). PO Mot. Exc. 8–9. Patent Owner also states that “Mr. Grenier testified that IEEE was not available until the mid-2000’s, which is after the relevant time frame at issue here.” *Id.* at 9 (citing Ex. 2110, 14:15–20).

As to Exhibit 1141, we dismiss the motion as moot because we do not rely on Mr. Grenier’s testimony in support of the availability of Shoubridge. Regarding Exhibits 1132 and 1144, we have reviewed these declarations and we disagree that he failed to authenticate the references, which are attached as exhibits to the respective declarations. Rather, as a custodian of records for IEEE, we find that Mr. Grenier provided testimony sufficient to show that the publications (i.e., Gautier and McCanne, respectively) are what they purport to be, IEEE publications.³⁰ *See* FRE 901(a). We also find that Mr. Grenier’s testimony sufficiently demonstrates his personal knowledge of the business practices of IEEE for him to testify regarding these practices. *See* FRE 602.

Finally, regarding Patent Owner’s contention that “IEEE was not available until the mid-2000’s,” we find this is a mischaracterization of the testimony. First, the actual testimony is that the “IEEE *Digital Library*” was first made available in “June of 2000,” which is not the same as testifying that *IEEE* was not available until the *mid-2000’s*.³¹ Ex. 2110, 14:15–20.

³⁰ Patent Owner does not provide support for its contention that Gautier is not an IEEE article. *See* PO Mot. Exc. 9. Mr. Grenier provided credible, un rebutted testimony that the article attached to his declaration (Exhibit 1132, Exhibit A), which is the same as Exhibit 1149, was a proceeding presented at the 1998 IEEE International Conference on Multimedia Computing and Systems, July 1, 1998. *Id.* ¶ 8.

³¹ June of 2000 is before, not “after the relevant time frame at issue here” (PO Mot. Exc. 9). *See* Ex. 1101, at [22] (“Filed: July 31, 2000”).

Second, it is not necessary to rely on the *online* availability of the reference, because Mr. Grenier's testimony is that the references were available well before the relevant time frame, either on the last day of the conference in the case of Gautier (*see* Ex. 1132 ¶ 11 (conference date: July 1, 1998)) or no later than the last day of the second stated publication month in the case of McCanne (*see* Ex. 1144 ¶ 11 (publication month: March-April, 1999)). Accordingly, for the foregoing reasons, we deny the motion to exclude as to Exhibits 1132 and 1144.

E. Shoubridge

Patent Owner contends Exhibit 1105 (Shoubridge) should be excluded as unauthenticated, hearsay, and irrelevant. PO Mot. Exc. 10–13 (citing FRE 901, 801–803, 401–403). However, we observe that Patent Owner's contentions are substantially the same as those raised above regarding Shoubridge's status as a publicly available reference (*see supra* §§ II.D.2, IV.C). Because we determined above that Shoubridge was authenticated by a credible witness (i.e., Dr. Shoubridge) with personal knowledge of the time and circumstances of its public availability (*see id.*), Patent Owner's motion is denied as to Exhibit 1105.

F. Exhibits 1149–1151

Patent Owner contends Exhibits 1149 (library version of Gautier), 1150 (a website page), and 1151 (FTP directory) are not relevant because these exhibits are relied upon to establish the availability of Exhibit 1130—a different version of Gautier. PO Mot. Exc. 14–15. However, as noted above, we rely on Exhibit 1149 (authenticated by Mr. Grenier in Exhibit 1132) in lieu of Exhibit 1130 and, therefore, Exhibit 1149 is relevant. We,

therefore, deny the motion as to Exhibit 1149 and dismiss the motion as to Exhibits 1150 and 1151, which we do not rely on, as moot.

G. Objections to Other Exhibits

Patent Owner contends Exhibit 1126 (Dr. Bennett's Declaration), Exhibit 1104 (Mr. Little's Declaration), Exhibit 1130 (version of Gautier), and Exhibit 1131 (Ms. Stansbury's Affidavit) should be excluded. PO Mot. Exc. 8–10, 13. However, because we have not relied on Exhibits 1126, 1104, 1130, and 1131, we dismiss the motion as moot as it relates to these exhibits.

H. Uncited Exhibits

Patent Owner contends Exhibits 1103, 1104, 1106, 1108–1118, 1121, 1123, 1124, 1126–1129, 1131–1133, 1135–1143, 1145, and 1149–1151 should be excluded because Petitioner does not rely on them in either its Opposition or Reply and, therefore, they are irrelevant or inadmissible under FRE 401–402 and highly prejudicial under FRE 403. PO Mot. Excl. 15. However, because we have not relied on at least Exhibits 1103, 1104, 1108–1115, 1117, 1118, 1121, 1123, 1126–1129, 1131, 1133, 1135, 1138–1143, 1145, 1150–1151, we dismiss the motion to exclude as moot as to these exhibits.

As to the remaining exhibits, there is no requirement that Petitioner must cite evidence in its Reply or Opposition to be relevant. *See* 37 C.F.R. § 42.64(b)(2) (permitting supplemental evidence to be filed in response to an evidentiary objection). In any event, the remaining exhibits are cited in Patent Owner's Response (citing Ex. 1106), Dr. Karger's Declaration (citing Ex. 1116), Petitioner's Opposition to Patent Owner's Contingent Motion to Amend (citing Ex. 1124), or Petitioner's Reply (citing Exs. 1136, 1137).

Also, we cite to Exhibit 1149 in this Decision. Accordingly, we deny the motion as to Exhibits 1106, 1116, 1124, 1136, 1137, and 1149.

I. Conclusion

For the foregoing reasons, we deny the Motion to Exclude as to Exhibits 1105, 1106, 1116, 1119, 1120, 1124, 1125, 1132, 1136, 1137, 1144, and 1149, and we dismiss the Motion to Exclude as moot as to Exhibits 1103, 1104, 1108–1115, 1117, 1118, 1121, 1123, 1126–1129, 1130, 1131, 1133, 1135, 1138–1143, 1145, 1150, and 1151.

V. CONCLUSION

For the foregoing reasons, Petitioner has demonstrated by a preponderance of the evidence that claims 1–9 of the '634 patent are unpatentable as obvious over Shoubridge but has not shown by a preponderance of the evidence that claims 10–18 are unpatentable as obvious over Shoubridge. Patent Owner has shown that its proposed substitute claim 25 is patentable over the prior art, but we determine that Petitioner has shown that proposed substitute claim 26 is unpatentable.

VI. ORDER

Accordingly, it is:

ORDERED that claims 1–9 of U.S. Patent No. 6,829,634 have been shown to be unpatentable;

ORDERED that claims 10–18 of U.S. Patent No. 6,829,634 have not been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Contingent Motion to Amend is *granted* with respect to substitute claim 25, *denied* with respect to substitute claim 26, and *dismissed* as moot with respect to claim 27;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed* as moot as to Exhibits 1103, 1104, 1108–1115, 1117, 1118, 1121, 1123, 1126–1129, 1130, 1131, 1133, 1135, 1138–1143, 1145, 1150, and 1151, and *denied* as to Exhibits 1105, 1106, 1116, 1119, 1120, 1124, 1125, 1132, 1136, 1137, 1144, and 1149; 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.

IPR2015-01996
Patent 6,829,634 B1

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