

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC. AND JUNIPER NETWORKS, INC.,¹
Petitioner,

v.

ORCKIT CORPORATION,
Patent Owner.

IPR2023-00402
Patent 8,830,821 B2

Before KRISTEN L. DROESCH, NATHAN A. ENGELS, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable

¹ Juniper Networks, Inc. filed a motion for joinder and a petition in IPR20240-00026, which were granted. Accordingly, Juniper Networks, Inc has been joined as a petitioner in this proceeding.

I. INTRODUCTION

We have authority to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, Cisco Systems, Inc. and Juniper Networks, Inc. (collectively “Petitioner”) has established by a preponderance of the evidence that claims 1–13 and 17–20 of U.S. Patent No. 8,830,821 B2 (Ex. 1001, “the ’821 Patent”) are unpatentable. Petitioner, however, has not established by a preponderance of the evidence that claims 14–16 of the ’821 Patent are unpatentable.

A. Procedural History

Cisco Systems, Inc. (“Cisco”) filed a Petition requesting *inter partes* review (“IPR”) of claims 1–20 of U.S. Patent No. 8,830,821 B2 (Ex. 1001, “the ’821 Patent”). Paper 2 (“Pet.”). Orckit Corporation (“Patent Owner”) timely filed a Preliminary Response. Paper 7. With our authorization, Cisco filed a Preliminary Reply (Paper 9) and Patent Owner filed a Preliminary Sur-reply (Paper 10) to address discretion to deny institution. Pursuant to 35 U.S.C. § 314, we instituted trial as to all of the challenged claims and all of the grounds raised in the Petition on September 12, 2023. Paper 11 (“Dec. on Inst.”).

Following institution of trial, Juniper Networks, Inc. (“Juniper Networks”) filed a Petition requesting *inter partes* review along with a Motion for Joinder. Pursuant to 35 U.S.C. §§ 314, 315(c), we instituted trial and granted the Motion for Joinder. Paper 29.

After institution of trial, Patent Owner filed a Response (Paper 22, “PO Resp.”) to which Petitioner filed a Reply (Paper 28, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 33, “PO Sur-reply”).

Petitioner filed a Declaration of Henry Houh, Ph.D., (Ex. 1003) to support its Petition and a Supplemental Declaration of Henry Houh, Ph.D., (Ex. 1038) to support its Reply. Patent Owner filed a Declaration of Miguel Gomez Ph.D., (Ex. 2025) to support its Response.

Dr. Houh and Mr. Gomez were cross-examined during trial, and a transcript of Dr. Houh’s deposition (Ex. 2027) and a transcript of Mr. Gomez’s deposition (Ex. 1037) are included in the record.

Oral argument was held on June 12, 2024. A transcript of the oral argument is included in the record. Paper 38.

B. Related Matters

The parties identify the following current or former proceedings involving the ’821 Patent:

Orckit Corporation v. Cisco Systems, Inc., 2:22-cv-276 (E.D. Tex.)

Orckit Corporation v. Juniper Networks, Inc., 1:23-cv-00822 (D. Del.)

Orckit Corporation v. Arista Networks, Inc., 1:23-cv-00821 (D. Del.)
Pet. 90; Paper 3, 2; Paper 27, 1.

C. Overview of the ’821 Patent (Ex. 1001)

The ’821 Patent “relates to telecommunications and more particularly, is related to high availability of telecommunication entities.” Ex. 1001, 1:16–19. “[W]hen a failure is detected in a network device or connection, network traffic is switched to a standby network device or connection.” *Id.* at 1:27–29. A multiprotocol label switching-transport profile (MPLS-

TP) accomplishes a node or span failure recovery by defining a protection transport entity between the same endpoints as the working transport entity. *See id.* at 1:38–49. “[These] working and protection entities do not share the span or nodes against whose failure protection is required” (*id.* at 1:50–51), but “may not protect against one or several failures affecting both [entities]” (*id.* at 1:64–66). Thus, “there is a need for a protection mechanism to provide . . . recovery in the event of a failure in any of the transport entities.” *Id.* at 2:1–3.

The ’821 Patent discloses

an entity selection method by an MPLS network device
. . . [that] provid[es] a plurality of MPLS transport entities
between a first endpoint and a second endpoint, determin[es] an
overall cost for each pair of entities of the plurality of entities,
select[s] a pair of entities from the plurality of transport entities
based at least in part upon the entity pair cost, and[,] if an entity
pair reselection event occurs, reselect[s] the entity pair.

Id. at 2:9–18. “The method . . . may further include . . . selecting a working entity from the plurality of transport entities, selecting a protection entity from the plurality of transport entities, and selecting an active entity from the set consisting of the working entity and the protection entity.” *Id.* at 2:22–26.

Figure 1 of the '821 Patent is reproduced below.

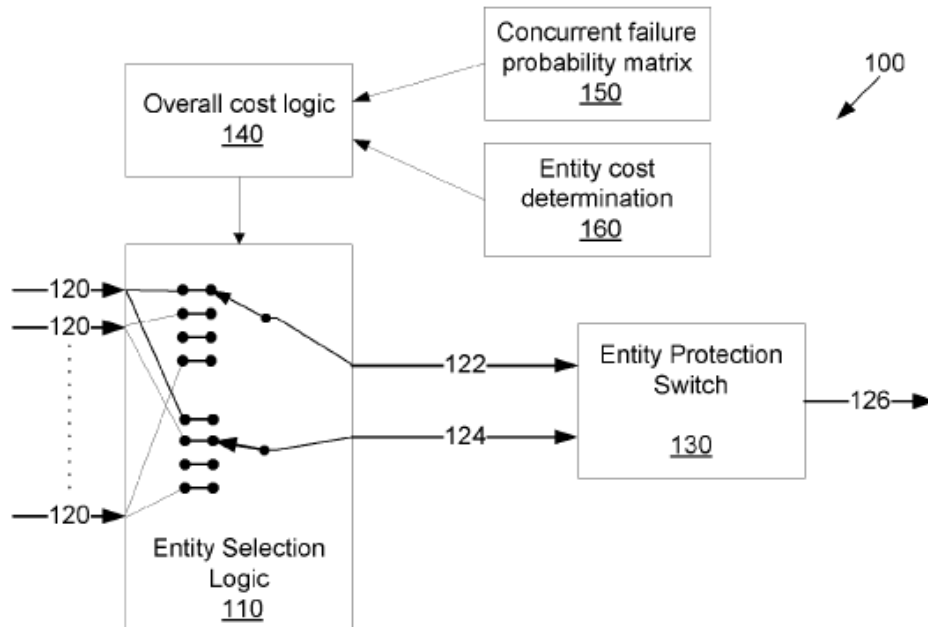


Figure 1 depicts “a block diagram of a first exemplary embodiment of an entity protection system.” Ex. 1001, 2:59–60. “An entity protection switch 130 switches between a working entity 122 and a protection entity 124[, which are] from a set of entities 120 . . . represented within an entity selection logic block 110.” *Id.* at 3:33–36. “Each entity 120 represents a network route between a first endpoint and a second endpoint.” *Id.* at 3:36–37. “An overall cost logic block 140 uses results from a concurrent failure probability matrix 150 and an entity cost determination block 160 to select the working entity 122 and the protection entity 124 from the set of entities 120.” *Id.* at 3:40–44. “[A] pair having multiple spans and/or nodes in common may be more likely to simultaneously fail than a pair having no spans or nodes in common.” *Id.* at 3:47–50.

“Each possible entity pairing is examined for cost.” *Id.* at 4:13. “The overall cost may be determined based on the probability of simultaneous failure of the working and protection entities (SFP), . . . the entity cost, or a

combination of SFP and entity cost.” *Id.* at 4:16–19. “[E]ach entity of the selected entity pair may be selected as a working entity, a protection entity, or an active entity.” *Id.* at 4:30–32. “[E]ntity pair reselection may be triggered when the operational status changes for an entity . . . , when an entity is added . . . , when an entity is removed . . . , or due to combined cost changes in one or more entities.” *Id.* at 4:35–41.

“[An] entity pair may be selected based upon each entity of the pair having the lowest possible probability of individual failure.” Ex. 1001, 5:42–43. “Alternatively, the entity pair may be selected to minimize the probability of a span or node failure simultaneously affecting the working and protection entities.” *Id.* at 5:44–46. “An example [approach] would be to minimize SFP . . . by selecting working and protection entity pairs with the lowest SFP, and, if there are multiple pairs with the same SFP within an error margin, . . . choosing the pair that minimizes entity IGP [(interior gateway protocol)] cost.” *Id.* at 5:59–66.

D. Illustrative Claim

Claims 1, 14, and 17 are independent, and claims 2–13, 15, 16, and 18–20 depend directly or indirectly therefrom, respectively. *See* Ex. 1001, 7:48–10:20. Claims 1 and 14 are illustrative and reproduced below:

1. An entity selection method performed by a network device, comprising the steps of:
providing a plurality of multi protocol label switching (MPLS) transport entities between a first endpoint and a second endpoint;
determining an overall cost for each entity pair of said plurality of entities;
selecting an entity pair from said plurality of transport entities based at least in part upon said overall cost; and

if an entity pair reselection event occurs, reselecting said entity pair from the group consisting of said entity pair and a replacement entity pair comprising at least one entity distinct from the entities of said entity pair,
wherein said entity pair reselection event is selected from a group consisting of adding an entity to said plurality of transport entities, removing an entity from said plurality of transport entities, an operational status change for one of said plurality of transport entities, and a change in overall cost for one of said plurality of transport entities.

Ex. 1001, 7:48–67.

14. A system for selecting entities within an MPLS network, comprising:
a data structure comprising a plurality of transport entity descriptors;
an entity protection switch configured to switch between a working entity and a protection entity; and
digital logic configured to select said working entity and said protection entity from said plurality of transport entity descriptors, comprising: logic configured to determine a probability of concurrent failure of said working entity and said protection entity;
logic configured to determine an entity cost of said plurality of transport entity descriptors: and
logic configured to reselect said working entity and said protection entity from said plurality of transport entity descriptors upon a reselection event,
wherein said reselection event is selected from a group consisting of adding an entity to said plurality of transport entities, removing an entity from said plurality of transport entities, an operational status change for one of said plurality of transport entities, and a change in overall cost for one of said plurality of transport entities.

Ex. 1001, 8:42–63.

E. Asserted Patentability Challenges and Asserted Prior Art

Petitioner asserts that claims 1–20 are unpatentable on the following grounds (Pet. 14):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–7, 9–11, 13, 17–20	103(a) ²	Doshi, ³ Guichard ⁴
8, 12	103(a)	Doshi, Guichard, Huang ⁵
14–16	103(a)	Doshi, Guichard, Xu ⁶

II. ANALYSIS

A. Claim Construction

In an *inter partes* review proceeding, the Board applies the same claim construction standard as that applied in federal courts in a civil action under 35 U.S.C. § 282(b), which is generally referred to as the *Phillips* standard. *See* 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Under the *Phillips* standard, “words of a claim ‘are generally given their ordinary and customary meaning.’” *Phillips*, 415 F.3d at 1312.

“Petitioner submits that, for the purposes of this proceeding and the grounds presented herein, no claim term requires express construction.” Pet. 13. Nonetheless, Petitioner asserts that the term “entity” recited in each independent claim includes an MPLS label switch path (LSP) or pseudo

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the ’821 Patent claims an effective filing date prior to March 16, 2013, we refer to the pre-AIA version of § 103.

³ US 2004/0205239 A1, published Oct. 14, 2004 (Ex. 1005).

⁴ Guichard et al., *Definitive MPLS Network Designs*, Cisco Press, Indianapolis, IN, 2005 (ISBN: 1-58705-186-9) (Ex. 1006).

⁵ US 2003/0117950 A1, published June 26, 2003 (Ex. 1007).

⁶ US 2011/0141877 A1, published June 16, 2011 (Ex. 1025).

wires (PW). *Id.* (citing Ex. 1003 ¶¶ 44–45). Patent Owner does not explicitly address any claim constructions in the Response. *See* PO Response *generally*.

“Selecting an Entity Pair”

In the Reply, Petitioner contends that although Patent Owner does not explicitly construe any terms, Patent Owner argues that “selecting an entity pair” recited in claims 1 and 17 requires selecting from the total number of potential paths associated with “said plurality” of entities and excludes selecting from a “subset of transport entities.” *See* Pet. Reply 7 (citing PO Resp. 25–26, 28, 30). Petitioner asserts that Patent Owner’s implicit claim construction should be rejected because it is contrary to the claim language and excludes embodiments in the ’821 Patent Specification. *See id.*

More specifically, Petitioner directs attention to dependent claim 9, which recites “selecting a subset of entity pairs” and “selecting an entity pair from said subset,” and, according to Petitioner, these limitations of claim 9 confirm that “selecting” recited in claim 1 is not so limited. *See* Pet. Reply 7 (citing Ex. 1001, 8:22–30). According to Petitioner, on this basis, “the scope of independent claim 1 ‘includes selecting an entity pair from a subset of entity pairs.’” *Id.* (citing Ex. 1038 ¶ 5).

Petitioner further contends that Patent Owner’s implicit construction would exclude an embodiment in the Specification, shown in Figure 4C, where an entity pair is selected from a subset. *See* Pet. Reply 8 (reproducing Ex. 1001, Fig. 4C (with Petitioner’s added annotations)). Petitioner asserts that Patent Owner’s declarant Mr. Gomez and Petitioner’s declarant Dr. Houh both agree that the embodiment of Figure 4C is within the scope of claim 1. *See id.* (citing Ex. 1037, 152:18–25; Ex. 1038 ¶¶ 6–8). Petitioner

contends that it would be erroneous to interpret claim 1 to exclude the subset-selection embodiment of Fig. 4C. *See id.* at 9 (citing *Vitrionics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583–84 (Fed. Cir. 1996); *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007)). Petitioner urges the Board to construe “selecting an entity pair from said plurality of transport entities based at least in part upon said overall cost” according to its plain meaning, which includes selecting an entity pair from a subset. *See id.* (citing Ex. 1038 ¶ 9).

In the Sur-reply, Patent Owner contends that Petitioner’s claim construction for “selecting an entity pair from said plurality of transport entities based at least upon said overall cost” is untimely as neither the Petition nor the Patent Owner Response construe this claim limitation. *See* PO Sur-reply 3 (citing Pet. 12–13, 37; 37 C.F.R. 42.104(b)(3); *SAS Institute Inc. v. Iancu*, 138 S.Ct. 1348, 1351 (2018)). According to Patent Owner, the Response “applies the ordinary and customary meaning of the terms Petitioner proposes construing” and its “arguments are rooted in the claim language consistent with the Petition’s interpretations.” *Id.* (citing PO Resp. 28, 30, 51–52; Pet. 35–40, 80–82). Patent Owner contends that it had no notice that the Reply would advance new constructions different than the Petition and that it had no opportunity to submit rebuttal evidence. *See id.* (citing *Belden v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015)). Patent Owner urges the Board to disregard Petitioner’s new construction. *See id.*

We do not agree that Petitioner’s Reply arguments addressing this limitation are untimely. Petitioner’s Reply arguments are responsive to Patent Owner arguments advancing an implicit construction for “selecting an

entity pair from said plurality of transport entities based at least in part upon said overall cost” so as to exclude selecting an entity pair from a subset of entity pairs of said plurality of transport entities. *See* PO Resp. 27–33. And Patent Owner’s Sur-reply arguments, addressed immediately below, confirm that Patent Owner advances this construction of this limitation.

Patent Owner contends that Petitioner is incorrect that claim 1 includes selecting an entity pair from a subset of entity pairs. *See* PO Sur-reply 5. Referring to Figure 2 of the ’821 Patent, Patent Owner asserts that “the entity pair is selected (230) after examining *all* entity pairs (222). Thus, for 10 entities, 90 corresponding pairs are examined; and for 3 entities, 6 pairs are examined.” *Id.* at 4 (citing PO Resp. 30–31). According to Patent Owner, “[c]laim 1’s ‘determining an overall cost for each entity pair’ is an input to—and thus a separate limitation from—‘selecting an entity pair.’” *Id.* at 5 (citing Ex. 1001, claim 1). Patent Owner disagrees with Petitioner’s arguments regarding dependent claim 9 by asserting that claim 9 includes selecting from a subset as a further limitation on claim 1’s selecting an entity pair limitation through dependent claims 2 and 4. *See id.* (citing Ex. 1001, claim 9). Patent Owner also disputes Petitioner’s assertion that Patent Owner’s implicit construction excludes the embodiment of Figure 4C. *See* PO Sur-reply 5–6 (reproducing Ex. 1001, Figs. 2, 3, 4C (with Patent Owner’s added annotations); citing Ex. 1001, 2:63–65, 4:24–29).

We decline to adopt Patent Owner’s implicit construction that would require “selecting an entity pair from” all of the entity pairs of “said plurality of transport entities.” Contrary to Patent Owner’s arguments addressing the claim language, the plain language of claim 1 does not require the selection to be from all of the entity pairs of the plurality of transport entities for

which an overall cost has been determined. The plain language of claim 1 also does not preclude the selection to be from a subset of the entity pairs of the plurality of transport entities for which an overall cost has been determined. Rather, dependent claim 9, through its dependence on claims 1 and 4, explicitly allows for the selection to be from a subset of the entity pairs of the plurality of transport entities. Patent Owner's arguments advocate for the importation of limitations from the '821 Patent Specification into the claim—namely the disclosure that all entity pairs of transport entities examined in step 220 of Figure 2 are input to the entity pair selection step 230. *See* PO Sur-reply 4. It is well settled that it is improper to read an extraneous limitation into a claim from the specification. *See e.g., Commark Comm's Inc. v. Harris Corp.*, 156 F.2d 1182, 1186 (Fed. Cir. 1998); *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433 (Fed. Cir. 1988). An extraneous limitation is “a limitation read into a claim from the specification wholly apart from any need to interpret what the patentee meant by particular words or phrases in the claim.” *E.I. du Pont de Nemours*, 849 F.2d at 1433.

Accordingly, we construe “selecting an entity pair from said plurality of transport entities based at least upon said overall cost” according to its plain meaning, the scope of which includes selecting an entity pair from all or a subset of the entity pairs of the plurality of transport entities for which an overall cost has been determined.

“Working Entity” and “Protection Entity”

Petitioner asserts that, although Patent Owner does not provide express claim constructions for “working entity” and “protection entity,” Patent Owner implicitly construes “protection entity” as an entity that is not

actively transmitting and receiving. *See* Pet. Reply 9 (citing PO Resp. 51–52). Petitioner does not agree with Patent Owner’s implicit construction on the basis that it is contrary to the ’821 Patent Specification. *See id.* (citing Ex. 1038 ¶ 10); *see also id.* at 9–10 (addressing the ’821 Patent Specification, citing Ex. 1001, 1:58–61, 3:20–22; Ex. 1043 ¶¶ 5, 11; *Vitrionics*, 90 F.3d at 1583–84; *Verizon Servs.*, 503 F.3d at 1305). Petitioner does not believe that “working entity” and “protection entity” need explicit construction and urges the Board to not adopt Patent Owner’s implicit construction. *See id.* at 9–10. Alternatively, Petitioner provides proposed explicit constructions for the terms, should explicit constructions be deemed necessary. *See id.* at 10. Patent Owner disagrees with Petitioner’s proposed explicit constructions. *See* PO Sur-reply 2, 7–9.

As demonstrated in the analysis below, we need not construe “working entity” and “protection entity” in order to resolve the controversy before us. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Other Claim Terms and Phrases

As demonstrated in our analysis below, we need not construe any other claim terms or phrases to resolve the controversy before us. *See, e.g., Realtime*, 912 F.3d 1368, 1375.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art (“(‘POSITA’) on June 22, 2011, would have had a working knowledge of network

communications and multiprotocol label switching (‘MPLS’) techniques available at the time.” Pet. 12 (citing Ex. 1003 ¶¶ 27–29). Petitioner further asserts that “[a] POSITA would have had a bachelor’s degree in computer science, computer engineering, electrical engineering, or equivalent training, and approximately two years of experience working in the field of network communications and been knowledgeable regarding MPLS techniques.” *Id.*

“Patent Owner does not dispute Petitioner’s level of ordinary skill for purposes of this Patent Owner Response.” PO Resp. 25.

We adopt Petitioner’s definition of a person of ordinary skill in the art because it is supported by declaration testimony and is consistent with the level of skill reflected by the ’821 Patent Specification and the asserted prior art.

C. Principles of Law

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) if in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).⁷

⁷ The parties do not present evidence or arguments addressing secondary considerations.

D. Patentability Challenge Based on Doshi and Guichard

1. Overview of Doshi (Ex. 1005)

Doshi “relates to network communications and, more specifically, to restoration path sharing.” Ex. 1005 ¶ 4. Doshi discloses “a shared mesh network (SMN) that includes components for [use of] . . . network sharing information . . . and improved service primary and restoration path calculation as a function of the sharing information.” *Id.* ¶ 9. “The SMN includes components that determine primary/restoration path pairs . . . [for] grouping of certain links within the network into shared-risk link groups (SRLGs).” *Id.* ¶ 11. “Links that belong to SRLGs having a primary path link[] are set to a link cost of infinity.” *Id.* “[R]emaining links that do not belong to such SRLGS are evaluated as to their ability to support sharing of restoration bandwidth.” *Id.* “If a link supports sharing, its link cost is reduced by . . . a function of the sharing degree for the link.” *Id.* “Ultimately, the adjusted link costs are used in a minimum-cost primary/restoration path calculation.” *Id.*

The invention also provides a method and network manager “for determining primary and restoration paths for a new service in a mesh network having a plurality of nodes interconnected by a plurality of links.” Ex. 1005 ¶ 14.

For each of a plurality of candidate path pairs for the new service, each candidate path pair comprising a candidate primary path and a candidate restoration path for the new service, a path cost associated with said each candidate path pair is generated, [and] the path cost for a candidate path pair is a function of shareability of links within the corresponding candidate restoration path.

Id. “The primary and restoration paths for the new service are selected from the plurality of candidate path pairs based on the path cost of each candidate path pair.” *Id.*

Figure 1 is reproduced below and is described as “an exemplary shared mesh data network (SMDN).” *Id.* ¶ 16.

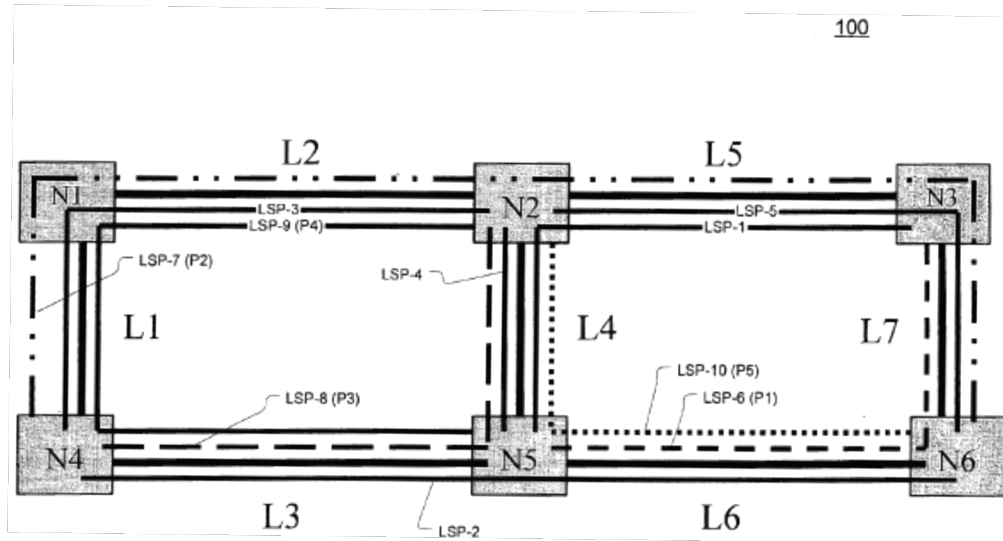


Figure 1 shows that “SMDN 100 includes six ingress/egress nodes N1 to N6 interconnected by seven bidirectional links L1 to L7.” Ex. 1005 ¶ 48.

“These nodes and links provide different paths between different pairs of nodes.” *Id.* “SMDN 100 has been provisioned with five primary label-switched paths (LSPs) LSP-1 to LSP-5.” *Id.* ¶ 50. “A label-switched path is effectively a tunnel between two nodes that carries service traffic according to a predetermined route[; e.g.,] LSP-1 is a tunnel from node N3 to node N5 that follows the path N3-N2-N5.” *Id.* There are “five primary LSPs as follows: LSP-1 carries traffic along path N3-N2-N5, LSP-2 carries traffic along path N4-N5-N6, LSP-3 carries traffic along path N2-N1-N4, LSP-4 carries traffic along path N2-N5, and LSP-5 carries traffic along path N2-N3-N6.” *Id.* ¶ 52. “[E]ach LSP may have an associated demand of any

reasonable value (e.g., 2Mbps, 10 Mbps, and 100 Mbps).” *Id.* ¶ 51. “[F]or this example, each of the LSPs in FIG. 1 is assumed to be of unit demand.” *Id.*

Figure “1 also illustrates five exemplary protection paths LSP-6 to LSP-10 (also of unit bandwidth in this example) that have been reserved to use for protection of services given a failure of one of the primary paths.” Ex. 1005 ¶ 54. “[T]he tag for each protection LSP carries a parenthetical suffix indicating the primary LSP it protects[; e.g., Figure 1’s label of] LSP-6 (P1) indicates the protection role that LSP-6 plays for primary LSP-1.” *Id.* In all, the protection paths are: “LSP-6 (along path N3-N6-N5) protects LSP-1, LSP-7 (along path N4-N1-N2-N3-N6) protects LSP-2, LSP-8 (along path N2-N5-N4) protects LSP-3, LSP-9 (along path N2-N1-N4-N5) protects LSP-4, and LSP-10 (along path N2-N5-N6) protects LSP-5.” *Id.*

Figure 11 is reproduced below and “depicts an exemplary method for calculating a minimum-cost primary/restoration path pair for a new service in consideration of link utilization, utilization threshold, administrative weight, and sharing degree.” Ex. 1005 ¶ 26.

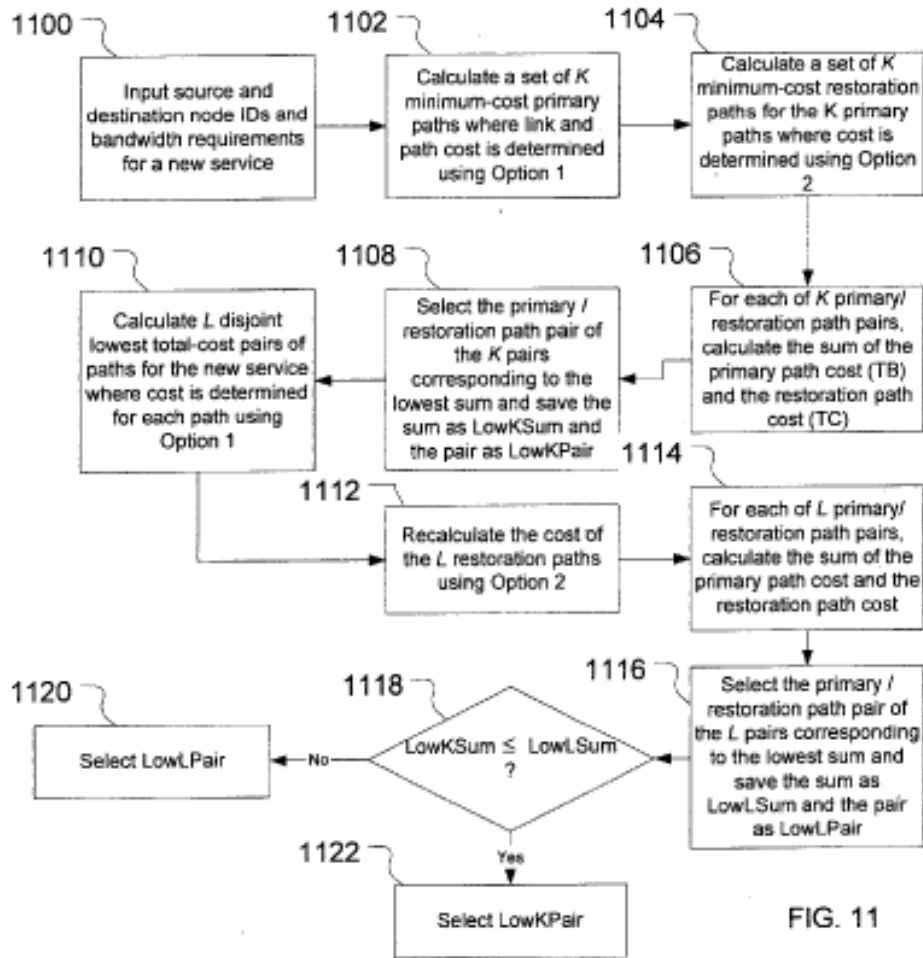


FIG. 11

“[I]n step 1100 [of Figure 11], the bandwidth and source and destination IDs for a new service are input.” *Id.* ¶ 142. “[I]n step 1102, the first flow starts with selection of K minimum cost primary paths.” *Id.* ¶ 143. “[I]n step 1104, a set of K minimum-cost restoration paths are calculated and priced.” *Id.* “[I]n step 1106, the Path Costs that were calculated in steps 1102 and step 110[4] are used in the calculation of a sum of the pair cost for each of the K primary/restoration path pairs.” *Id.* “In step 1108, the minimum sum is saved in the variable LowKSum and the minimum-cost pair is saved in the data structure LowKPair.” *Id.* “In step 1110, the second flow starts with the calculation of L disjoint lowest total-cost pairs of paths for the new service where cost is determined for each path.” *Id.* ¶ 144. “[I]n

step 1114, the sum is calculated of the cost of the primary and the restoration path for each of the L pairs.” *Id.* “[I]n step 1116, the lowest sum is stored in the variable LowLSum and the lowest-cost pair is stored in the data structure LowLPair.” *Id.* “[I]n the test of step 1118, LowKSum is compared to LowLSum.” *Id.* ¶ 145. “If LowKSum is lower than or equal to LowLSum, then in step 1122, LowKPair is selected as the minimum-cost path pair.” *Id.* “If it is not lower, then in step 1118, LowLPair is selected.” *Id.*

2. Overview of Guichard (Ex. 1006)

Guichard is a textbook directed to “MPLS Network Designs” and includes a section titled “Reoptimizing a Traffic Engineering LSP.” Ex. 1006, 1, 3. Guichard discloses that “[n]etwork state keeps changing.” *Id.* at 3. “Links and nodes fail and recover; new TE ([traffic engineering]) LSPs are set up while others may be torn down.” *Id.* at 3. “Consequently, for any TE LSP, a more optimal path may appear in the network.” *Id.* “It is then highly desirable to detect the existence of such a path and reoptimize a TE LSP along a better path when it becomes available.” *Id.*

Guichard further discloses that “[a]n important aspect of any MPLS TE network design relates to the reoptimization triggers.” *Id.* at 5. Examples of “reoptimization triggers” include manual reoptimization, timer-based reoptimization, and event-driven reoptimization. *See id.*

3. Analysis of Claim 1

a. Preamble—[1.0] An entity selection method performed by a network device, comprising the steps of:

Petitioner asserts that Doshi teaches the preamble recitation based on Doshi’s disclosure of a shared mesh data network (SMDN) that is configured to support RFC 3031 MPLS architecture standard and disclosure

of a method implemented by the SMDN manager for selecting primary and restoration paths that correspond to label-switched-paths (LSPs). *See* Pet. 23–25 (reproducing Ex. 1005, Fig. 1 (with Petitioner’s added annotations); citing Ex. 1003 ¶¶ 67–73; Ex. 1005 ¶¶ 14, 16, 49, 52–54, 82, 141–145, 156, 270–281; code (57), claim 11, Figs. 10, 11, 17, 18).

Patent Owner does not address or rebut Petitioner’s showing for the preamble. *See* PO Resp. *generally*. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Based on the entire record, we determine Petitioner shows that Doshi teaches the preamble recitation. *See* Pet. 23–25.

b. [1.1] providing a plurality of multi protocol label switching (MPLS) transport entities between a first endpoint and a second endpoint;

Petitioner asserts that Doshi teaches a plurality of MPLS transport entities between a first endpoint and a second endpoint, based on Doshi’s disclosure of the MPLS network having a plurality of LSPs (e.g., LSP-1 through LSP-10) provisioned between nodes (e.g., N1 through N6). *See* Pet. 25–26 (reproducing Ex. 1005, Fig. 1 (with Petitioner’s added annotations); citing Ex. 1003 ¶¶ 74–78; Ex. 1005 ¶¶ 16, 50–54, 56, 142, 154–156, 188, 190, 192, 195, 267, Figs. 5, 8, 11, 17, 18, 20). According to Petitioner, “[a]ny two (or more) LSPs provided between two end nodes correspond to ‘a plurality of multi protocol label switching (MPLS) transport entities.’” Pet. 26 (citing Ex. 1003 ¶¶ 77–78). Referring to Doshi’s Figure 1, Petitioner provides an example of providing LSP-2 as a primary path and LSP-7 as a protection path between end node N4 and end node N6. *See* Pet. 26–27 (reproducing Ex. 1005, Fig. 1 (with Petitioner’s

added annotations); citing Ex. 1003 ¶ 79). According to Petitioner, “[a]lthough Figure 1 only illustrates two LSPs between N4 and N6, Doshi makes clear that this figure is merely ‘**exemplary**’ and expressly teaches ‘**two or more paths between**’ the end nodes,” and “also contemplates making ‘[v]arious **modifications**’ to the exemplary embodiments.” Pet. 27 (citing Ex. 1003 ¶ 80; Ex. 1005 ¶¶ 16, 48–55, 300) (alteration in original). Petitioner asserts that a “POSITA would have found it obvious to provide additional LSPs between two nodes.” *Id.* (citing Ex. 1003 ¶ 81). Petitioner contends that Doshi “contemplates more than two LSPs between two nodes by disclosing ‘two or more paths between’ the end nodes and that there are a ‘plurality of candidate path pairs,’ from which to select for communication.” Pet. 27–28 (citing Ex. 1005, code (57), ¶¶ 14, 48). According to Petitioner, “[t]his would mean that any two nodes would have at least two primary LSPs and two protection LSPs, with different primary and protection LSP combinations corresponding to candidate pairs.” Pet. 28 (citing Ex. 1003 ¶ 81; Ex. 1005 ¶ 14; Pet. 32–45).

Petitioner provides another example of Doshi providing two primary LSPs and two protection LSPs between nodes N4 and N6. Pet. 28 (reproducing Ex. 1005, Fig. 1 (with Petitioner’s added annotations)). According to Petitioner, “[a] POSITA would have recognized that providing more than two LSPs between each node pair (e.g., at least two primary LSPs and two protection LSPs) would be beneficial since doing so facilitates path diversity to reduce the probability of service interruption between the nodes.” Pet. 28–29 (citing Ex. 1003 ¶ 83). Petitioner asserts that “[p]roviding more than two LSPs between two end nodes is desirable

because it facilitates reoptimization by providing more potential paths to select from over time.” Pet. 29.

Patent Owner does not address or rebut Petitioner’s showing for this claim limitation. *See* PO Resp. *generally*. In any event, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record, we determine Petitioner shows that Doshi teaches this limitation of claim 1. *See* Pet. 25–29.

c. [1.2] determining an overall cost for each entity pair of said plurality of entities;

Petitioner contends that Doshi teaches this limitation based on Doshi’s disclosure of calculating the cost of each primary or protection path as the sum of the link costs, and using the path cost to determine the cost of each path pair. *See* Pet. 32 (citing Ex. 1003 ¶¶ 90–94; Ex. 1005 ¶¶ 14, 26, 46, 50–54, 76, 82, 125, 130, 142–181, code (57), Figs. 1, 10–13). Petitioner further asserts that “Doshi identifies the path pair with an ‘**overall-minimum cost**,’” and “the cost of each candidate [path] pair is determined by summing a primary path cost and a protection path cost.” *See* Pet. 32–33 (reproducing Ex. 1005, Fig. 11 (with Petitioner’s added annotations); citing Ex. 1003 ¶¶ 95–97; Ex. 1005 ¶ 142).

According to Petitioner, “[a] POSITA would have understood that Doshi’s cost determination—which considers a myriad of factors such as link utilization, sharing degree, and path disjointedness—represents the ‘*overall cost*’ for each candidate path pair.” Pet. 33 (citing Ex. 1003 ¶¶ 96–97). Petitioner further contends that it would have been obvious for the path to be implemented as LSPs because Doshi’s Figure 1 supports

MPLS architecture and provides a plurality of LSPs. *See* Pet. 34 (citing Ex. 1003 ¶ 98).

Patent Owner does not address or rebut Petitioner’s showing for this claim limitation. *See* PO Resp. *generally*. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record, we determine Petitioner shows that Doshi teaches this limitation of claim 1. *See* Pet. 32–34.

d. [1.3] selecting an entity pair from said plurality of transport entities based at least in part upon said overall cost; and

Petitioner contends that Doshi discloses that primary and protection paths are selected from the plurality of candidate path pairs based on the path cost of each candidate path pair. *See* Pet. 35 (citing Ex. 1005, code (57), ¶¶ 14, 46, 76, 142–145, claims 1, 11). Petitioner asserts that “it would have been obvious for the ‘plurality of candidate path pairs’ (pairs of primary and protection LSPs) to correspond to the provided plurality of LSPs of the MPLS architecture.” *Id.* (citing Ex. 1003 ¶¶ 102–103; Pet. 25–34). Petitioner asserts that Doshi teaches the selection is based on the overall cost because the lowest cost pair is selected as the overall minimum-cost pair. Pet. 35–36 (reproducing Ex. 1005, Fig. 11 (with Petitioner’s added annotations); citing Ex. 1003 ¶ 104; Ex. 1005 ¶¶ 26, 125–139, 142–145). According to Petitioner, “[t]herefore, Doshi discloses selecting an LSP pair from the plurality of MPLS LSP[s] based on the selected pair having the overall minimum-cost.” Pet. 36 (citing Ex. 1003 ¶¶ 102–105).

Patent Owner contends that, in the context of the limitations “providing a plurality of . . . transport entities between a first endpoint and a second endpoint” and “determining an overall cost *for each entity pair of said plurality* of entities,” “[a] POSITA would . . . understand that the claimed selection is made from each of the ‘entity pairs of said plurality of entities,’ for which the overall cost has been determined.” *See* PO Resp. 28 (citing Ex. 2025 ¶ 65). Stated in other terms, according to Patent Owner, “a POSITA would understand claim 1 . . . requires selecting from the total number of potential paths associated with ‘said plurality’ of entities; and the number of pairs associated with a set of entities (i.e., a plurality) always exceeds the number of entities.” *Id.* at 30.

Patent Owner asserts that Doshi does not teach this claim limitation because “Doshi teaches a simplified selection process in which an entity pair is selected from a narrow subset of the candidate pairs associated with *said* plurality of entities.” PO Resp. 28; *see id.* at 28–29 (reproducing Ex. 1005, Fig. 11 (with Patent Owner’s added annotations); citing Ex. 1005 ¶ 143); *see also id.* at 31–33 (addressing the disclosure of Doshi’s Figure 11; reproducing Ex. 1005, Fig. 11 (with Patent Owner’s added annotations); citing Ex. 1005 ¶ 144). According to Patent Owner, “Doshi instructs calculating the cost for K pairs of paths and selecting one pair from those K pairs; thus for a plurality of K entities, Doshi instructs a POSITA to create a set of candidate pairs with K members.” *Id.* at 29. Patent Owner contends that “[t]his differs from the total number of pairs that the method of the ‘821 Patent would yield from the same number of entities.” *See id.* (citing Ex. 2025 ¶ 67). Patent Owner asserts that Doshi’s selection process curbs the size of the candidate selection set. *See id.* at 31 (citing Ex. 2025 ¶ 71).

We do not agree with Patent Owner’s arguments because, as explained above in Section II.A., we decline to adopt Patent Owner’s implicit claim construction that would require selecting an entity pair from all of the entity pairs of said plurality of transport entities, and would exclude selecting an entity pair from a subset of the entity pairs of said plurality of transport entities. Petitioner also advances arguments addressing the teachings of Doshi in accordance with Patent Owner’s implicit construction (*see* Pet. Reply 11–14) and Patent Owner provides arguments responsive thereto (*see* PO Sur-reply 9–13). We need not address these Reply and Sur-reply arguments because “selecting an entity pair from said plurality of transport entities based at least in part upon said overall cost” is construed according to its plain and ordinary meaning.

Having considered both parties’ arguments and the evidence cited by the parties to support their respective arguments, we are persuaded that Doshi teaches “selecting an entity pair from said plurality of transport entities based at least in part upon said overall cost.” Based on the entire record, we determine Petitioner shows that Doshi teaches this limitation of claim 1. *See* Pet. 35–36.

e. [1.4] if an entity pair reselection event occurs, reselecting said entity pair from the group consisting of said entity pair and a replacement entity pair comprising at least one entity distinct from the entities of said entity pair,

Petitioner contends that the combination of Doshi and Guichard teaches this limitation. *See* Pet. 40–45. Petitioner asserts that Guichard teaches event driven reoptimization where it may be desirable to trigger a reoptimization upon the occurrence of a particular event, such as the restoration of a link in the network. *See* Pet. 40 (citing Ex. 1003

¶¶ 115–116; Ex. 1006, 5⁸). Petitioner asserts that Guichard teaches the evaluation of any potential reoptimization each time a new link is advertised as newly operational, and that optimization may be triggered when links or nodes fail or recover, and when new LSPs are set up or torn down. *See id.* (citing Ex. 1003 ¶¶ 115–116; Ex. 1006, 3–4). Petitioner contends that Guichard teaches “it is ‘highly desirable to detect the existence of [network changes] and reoptimize a TE LSP along a better path when it becomes available.’” Pet. 21 (citing Ex. 1003 ¶ 60; Ex. 1006, 3). According to Petitioner, “[a] POSITA would have understood that Guichard generally teaches that the current LSP path selection should be evaluated following a trigger event (e.g., LSP set up, LSP torn down, restoration of a link, or new link) to determine whether a more optimal LSP path is available.” Pet. 40 (citing Ex. 1003 ¶ 117). Petitioner further asserts that “[a] POSITA would have recognized that this evaluation may or may not result in a reoptimization.” *Id.* (citing Ex. 1003 ¶ 117; Ex. 1006, 5; Ex. 1035 ¶¶ 57–59).

Petitioner asserts that “[i]t would have been obvious to a POSITA, in view of Guichard, to perform event-driven reoptimization, when implementing Doshi’s MPLS architecture, to determine if there are better LSP paths available or if the currently selected LSP pair represents the overall minimal cost.” Pet. 41 (citing Ex. 1003 ¶ 118; Pet. 20–23). Similarly, Petitioner contends that “[a] POSITA would have been motivated to perform reoptimization evaluations, as taught by Guichard, when implementing Doshi’s pair calculation and selection techniques to identify a

⁸ Throughout the Petition and responsive briefing, the parties refer to the document’s page numbers, not the page numbers of Exhibit 1006.

potentially better LSP (e.g., for primary or protection LSP paths) with an even lower overall minimum-cost.” Pet. 21 (citing Ex. 1003 ¶ 61).

According to Petitioner, “a POSITA would have recognized that it would be advantageous—indeed ‘highly desirable,’ as Guichard puts it—to evaluate the potential for reoptimization to determine whether the selected LSP pair remains the overall minimum-cost pair or whether there is a better pair available for reoptimization.” Pet. 21–22 (citing Ex. 1003 ¶ 61). Petitioner further contends that “[p]erforming repeated optimization evaluations (based on various triggers), as taught by Guichard, furthers Doshi’s stated objective of using the optimal path.” Pet. 22 (citing Ex. 1003 ¶ 61; Ex. 1005 ¶¶ 172, 200). Petitioner asserts that Doshi describes attempting to identify the shortest primary and protection paths as part of optimization, and reoptimization would allow for selecting a shorter path if one becomes available. *See id.* (citing Ex. 1003 ¶ 61; Ex. 1005 ¶¶ 151, 165, 172).

Petitioner further contends that “[t]he combination represents the use of a known technique (Guichard’s reoptimization evaluation in response to various triggers) to improve a similar system or device (Doshi’s MPLS architecture) in the same way with predictable results (ongoing optimization).” Pet. 22 (citing Ex. 1003 ¶ 62). Petitioner explains “[i]n implementing the combination with Doshi, a POSITA would have evaluated any restored and new LSPs along with all existing LSPs (including the currently utilized LSP pair) by repeating Doshi’s candidate pair cost determination and selection techniques . . . in response to a trigger event to potentially reoptimize the selection.” Pet. 41 (citing Ex. 1003 ¶ 119; Pet. 32–40). According to Petitioner, “[i]t would have been obvious to a POSITA that repeating Doshi’s candidate path pair cost determination and

selection would—in certain instances—result in the reselection of the currently utilized LSP pair.” *Id.* (citing Ex. 1003 ¶ 120; Pet. 32–34). Petitioner further explains, “[i]n the combination, Doshi’s currently utilized LSP pair would be repeatedly evaluated and reselected, per Guichard’s event-driven reoptimization technique, if it continues to have the overall-minimum cost per Doshi’s cost determination.” Pet. 41–42 (citing Ex. 1003 ¶ 120; Pet. 32–34). Petitioner further explains that, in the proposed combination, “[t]he currently used primary and protection LSP pair would be initially selected based on the overall minimum cost and the remaining LSPs would be available (with any restored or new LSPs in the network that generate the trigger event, per Guichard) as potential replacements during reoptimization.” Pet. 42 (omitting internal citation, citing Ex. 1003 ¶ 122; Pet. 32–34); *see* Pet. 43–44 (reproducing Ex. 1005, Fig. 1 (with Petitioner’s modifications and added annotations); citing Ex. 1003 ¶¶ 123–125; Ex. 1005 ¶¶ 14, 142).

Patent Owner disputes that the combined teachings of Doshi and Guichard teach or suggest this limitation. *See* PO Resp. 34–44. Patent Owner challenges the reasons why a person of ordinary skill in the art would have combined the teachings of Doshi and Guichard and why a person of ordinary skill in the art would have adapted the combined teachings of Doshi and Guichard. *See. id.*

More specifically, Patent Owner argues that Guichard does not disclose the use of entity pairs or a protection entity but teaches only optimization of a single entity while Doshi does not disclose reoptimization of an entity pair or a protection entity. *See* PO Resp. 35; *see also id.* at 38, 41 (similar arguments); PO Sur-reply 13 (similar argument, citing PO

Resp. 36–40), 14 (similar arguments, citing PO Resp. 34–35), 16 (similar argument, citing Ex. 1005 ¶ 14), 15–16 (citing Ex. 1006, 80).

Patent Owner contends that Petitioner’s combination of Doshi and Guichard

rests on two steps: *first*, combining Guichard’s primary path reoptimization with Doshi’s entity pair to produce a system in which the primary path is reoptimized, and *second*, adapting this combination to practice reoptimization of both a primary path (as disclosed in Guichard) and a protection path (which is not disclosed in either Doshi or Guichard).

PO Resp. 35; *see id.* at 41–42 (citing Ex. 2025 ¶ 96). According to Patent Owner, “to the extent that a POSITA were to adapt Doshi to practice reoptimization (or reselection)[,] that reoptimization would occur with respect to individual entities in a pair, rather than all pairs associated with a given plurality of entities,” and “reoptimization would be used only with respect to the primary path.” PO Resp. 41 (citing Ex. 2025 ¶¶ 95–96); *see* PO Sur-reply 16⁹ (citing Ex. 1005, Fig. 11; Ex. 2025 ¶ 89).

⁹ In the Sur-reply, Patent Owner presents the following arguments for the first time: (1) “[T]he claims require . . . reselecting from the group consisting of said entity pair and a replacement entity pair;” and (2) “Nothing in Doshi’s ‘candidate pair cost determination and selection techniques’ teaches reselection . . . from a group consisting of a current entity pair and a replacement entity pair.” PO Sur-reply 16 (citing Ex. 1001, claim 1; *AFG Indus., Inc. v. Cardinal IG Co.*, 239 F.3d 1239, 1245 (Fed. Cir. 2001) for the discussion of closed transition phrases such as “consisting of” as being understood to exclude any elements not specified in the claim); *see also id.* at 15 (“The claim requires reselecting between **two** sets of pairs.”). Patent Owner does not sufficiently identify arguments in the Reply to which these Sur-reply arguments are responsive. *See* PO Resp. 16. Patent Owner’s citation to the Reply at 20 and Exhibit 1038 paragraph 24 for an admission by Petitioner’s expert “that Doshi’s LSP pair would be **reselected from all possible LSP pair combinations**,” (*see id.*) is merely a restatement of the

We do not agree with Patent Owner’s arguments because they are misplaced. Contrary to Patent Owner’s suggestion, the Petition does not specifically propose combining Guichard’s primary path optimization with the teachings of Doshi. Instead, Petitioner relies on Guichard for teaching event-driven reoptimization upon the occurrence of a particular event, such as the failure, restoration, or new availability of links and nodes (*see* Pet. 40 (citing Ex. 1003 ¶¶ 115–116; Ex. 1006, 79–81)), and posits that “[i]t would have been obvious to a POSITA . . . to perform event-driven reoptimization, when implementing Doshi’s MPLS architecture to determine if there are better LSP paths available or if the currently selected LSP pair represents the overall minimal cost.” Pet. 41 (citing Ex. 1003 ¶ 118; Pet. 20–23); *see* Pet. 21–22 (citing Ex. 1003 ¶¶ 61–62). As explained in the Petition, and reiterated in the Reply, “[i]n implementing the combination [of Guichard] with Doshi, a POSITA would have evaluated any restored and new LSPs along with all existing LSPs (including the currently utilized LSP pair) by repeating Doshi’s candidate pair cost determination and selection techniques . . . in response to a trigger event to potentially reoptimize the selection.”

Petition’s argument that “[i]n implementing the combination with Doshi, a POSITA would have **evaluated any restored and new LSPs along with all existing LSPs (including the currently utilized LSP pair) by repeating Doshi’s candidate pair cost determination and selection techniques.**” Pet. 41 (citing Ex. 1003 ¶ 119). Patent Owner’s belated new arguments exceed the proper scope of a sur-reply and are not considered in rendering this Final Written Decision. *See* 37 C.F.R. § 42.23(b) (“A sur-reply may only respond to arguments raised in the corresponding reply”); Patent Trial and Appeal Board Consolidated Trial Practice Guide (“CTPG,” available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>) 73–74 (“Sur-replies should only respond to arguments made in reply briefs.”), 74 (“[A] reply or sur-reply that raises a new issue . . . may not be considered.”)

Pet. 41 (citing Ex. 1003 ¶ 119); Pet. Reply 19 (citing Ex. 1003 ¶ 119; Pet. 40–45); *see* Pet. 21–22 (similar argument, citing Ex. 1003 ¶ 61).

Patent Owner contends that Petitioner fails to provide a reason why a person of ordinary skill in the art would have combined Doshi and Guichard. *See* PO Resp. 35–40. Patent Owner highlights the following arguments presented in the Petition: a person of ordinary skill in the art “would have combined Guichard and Doshi because (i) Guichard teaches that reoptimization is ‘highly desirable’ . . . and (ii) a ‘POSITA considering Doshi would have naturally considered the teachings of Guichard’ because both references ‘generally pertain to MPLS networks and address the problem of selecting LSPs’ with a low cost.” *Id.* at 36 (citing Pet. 20–21). According to Patent Owner, “[t]hat both Guichard and Doshi are purportedly directed to an efficient and reliable MPLS network does not (and cannot) as a matter of law provide a reason to combine these two specific references.” *Id.* (citing Ex. 2025 ¶¶ 86–88; Pet. 20–21). Patent Owner contends these are the types of generic needs the Federal Circuit has held insufficient to provide reason to combine prior art references. *See id.* at 37 (citing *Forest Labs. LLC v. Sigmapharm Labs., LLC*, 918 F.3d 928, 936 (Fed. Cir. 2019); *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1337 (Fed. Cir. 2016); *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993–94 (Fed. Cir. 2017)); *see also id.* at 40 (similar argument, citing *In re Nuvasive, Inc.*, 842 F.3d 1376, 1381–82 (Fed. Cir. 2002); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)), 43 (similar argument); PO Sur-reply 14 (arguing that “[s]electing a shorter path if one becomes available’ is a generic need,” citing *Active Video Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012)).

Patent Owner also highlights the Petition argument that the combination represents what would have been common sense to a person of ordinary skill in the art. *See* PO Resp. 36; Pet. 22. Patent Owner asserts that “it is well-settled that the ‘common sense’ . . . that Petitioner and its expert invoke[,] cannot alone provide a reason to combine references.” PO Resp. 37–38 (citing Pet. 22; *In re Van Os*, 844 F.3d 1359 (Fed. Cir. 2017)).

In Reply, Petitioner contends that Patent Owner’s Response ignores specific reasons to combine provided in the Petition. *See* Pet. Reply 15. Petitioner also asserts that the Petition’s analysis did not rely on generic efficiency and reliability. *See* Pet. Reply 16. Petitioner contends the *Forest Laboratories* case, cited by Patent Owner, is readily distinguishable on its facts because in that case the petitioner argued for a generic need for more antipsychotic treatment options. *See id.* at 15. According to Petitioner, “[h]ere, Petitioner does not argue for a ‘generic need for more . . . options,’ but instead identified specific aspects for improvement.” *Id.* at 16. Petitioner nonetheless argues that “a rationale is not inherently suspect merely because it’s generic in the sense of having broad applicability or appeal.” *Id.* at 16–17 (citing *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 785, 797 (Fed. Cir. 2021); *Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick*, 464 F.3d 1356, 1368 (Fed. Cir. 2006)).

Petitioner asserts that the Petition provided articulated reasoning based on rational underpinning to support combining the teachings of Doshi and Guichard. *See* Pet. Reply 17 (citing Pet. 20–23). Petitioner contends that “the Petition explained that the combination would detect better LSP paths that may be used [to] reduce overall cost in Doshi’s system.” *Id.* (citing Pet. 21; Ex. 1006, 3). Petitioner also reiterates “that Guichard

teaches that it is ‘highly desirable’ to detect better paths and that ‘[a] POSITA would have been motivated to perform reoptimization evaluations, as taught by Guichard, when implementing Doshi’s pair calculation and selection techniques to identify a potentially better LSP . . . with an even lower overall minimum-cost.” *Id.* at 15 (citing Pet. 21).

We do not agree with Patent Owner’s arguments. Patent Owner’s arguments focus on certain common sense and natural consideration arguments in the Petition, and Patent Owner characterizes some of Petitioner’s arguments as identifying generic needs. As highlighted by Petitioner (*see* Pet. Reply 15, 17), the Petition identifies specific teachings in Guichard that provide reasons for combining the teachings of Guichard with the teachings of Doshi, for example, that it is highly desirable to detect network changes and reoptimize a LSP along a better path when is becomes available. *See e.g.*, Pet. 21. Therefore, we cannot agree with Patent Owner’s arguments that the Petition only identifies generic needs, or relies only on common sense or natural considerations as reasons to combine.

Patent Owner further contends that Petitioner did not address Guichard’s additional disclosures “that restoration systems (like Guichard) and protection systems (like Doshi) belong to different ‘families of network recovery systems.’” PO Resp. 39 (citing Ex. 2025 ¶ 90); *see id.* at 38 (citing Ex. 2028, 120¹⁰); *see also* PO Sur-reply 14 (“Guichard distinguishes between **different** network recovery systems,” citing PO Resp. 38; Ex. 2028, 120). Patent Owner asserts that Guichard teaches that protection systems like Doshi may be faster in some respects, but also require more network

¹⁰ Throughout the Response, Reply, and Sur-reply, the parties refer to the document’s page numbers, not the page numbers of Exhibit 2028.

overhead. *See* PO Resp. 39 (citing Ex. 2028, 120–121). Patent Owner further contends that Guichard explains that combining restoration and protection recovery mechanisms requires extra care to avoid a lack of optimality in terms of backup resources. *See id.* (citing Ex. 2028, 120). According to Patent Owner, “[i]n this context, a POSITA would **not** understand Guichard’s disclosure of reoptimizing a primary path as a reason to combine Guichard’s restoration system with Guichard’s protection system.” *Id.*

Patent Owner further asserts that a person of ordinary skill in the art would have been deterred from combining Doshi and Guichard. *See* PO Resp. 39 (citing Ex. 2025 ¶¶ 91–92). Patent Owner contends that “[a] POSITA reading Guichard would understand that protection systems like Doshi’s and reoptimization techniques like Guichard’s entail significant costs and tradeoffs (such as increased network overhead) that might make such a combination disadvantageous; and Guichard teaches expressly that such combinations are very likely to be suboptimal.” *Id.* (citing Ex. 2025 ¶¶ 91–92); *see* PO Sur-reply 14 (citing Ex. 2025 ¶¶ 90–92; Ex. 2028, 120–121). According to Patent Owner,

Guichard’s disclosures that protection mechanisms require substantially more “network overhead” due to the “extra state” that is required, and that combining mechanisms from different families creates a “a lack of optimality,” teach against implementing the reoptimization of a restoration system (like Guichard) in a protection system (like Doshi), as this would increase the computational complexity of the recovery scheme and likely decrease its optimality, *i.e.*, undercut the goal of reoptimization.

PO Resp. 42–43 (citing Ex. 2025 ¶ 99); *see id.* at 46 (similar argument); *see also* PO Sur-reply 15 (“Guichard teaches avoiding such *combinations* unless

users can figure out how to mitigate costs and tradeoffs,” citing *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016)), 17 (“Guichard specifically counsels against combining recovery mechanisms,” citing Ex. 2028, 120). In support, Patent Owner contends that Petitioner’s own exhibits are replete with disclosures about the use of heuristics to reduce computation complexity, how such heuristics are preferable to optimal computation solutions that may be impractical, how precomputation increases network overhead, and how a person of ordinary skill in the art must choose carefully among different protection levels to balance optimality with other design constraints. *See* PO Resp. 43 (citing Ex. 1025, code (57), ¶¶ 30, 49, 56–57; Ex. 1007 ¶¶ 10–14; Ex. 2025 ¶¶ 99–102; Ex. 2028, 120–121); *see* PO Sur-reply 17 (similar argument, citing PO Resp. 43). According to Patent Owner, “Petitioner fails to address, let alone analyze these tradeoffs as would be required to demonstrate that a POSITA would have chosen to take the ‘extra care’ require to combine” Doshi and Guichard. PO Resp. 40, *see id.* at 42 (similar argument).

In the Reply, Petitioner asserts that Guichard and Patent Owner’s expert Mr. Gomez confirm that combining protection and reoptimization mechanisms would have been recognized as desirable. *See* Pet. Reply 18 (citing Ex. 1038 ¶¶ 19–20). According to Petitioner, “Guichard teaches that it may . . . **‘be desirable to elect to use a combination of recovery mechanisms’** and that any lack of optimality can be **‘avoid[ed].’**” *Id.* (citing Ex. 2028, 96). Petitioner contends that Patent Owner’s expert Mr. Gomez agreed that it might be desirable in narrow sets of cases to combine multiple recovery systems. *See id.* (citing Ex. 1027, 167:3–12). Petitioner further asserts that, even if there were tradeoffs, it is not necessary to show

that a combination is the best option, only that it is a suitable option. *See id.* (citing *Intel Corp. v. Pact XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023); Ex.1038 ¶ 21).

In the Sur-reply, Patent Owner asserts that Guichard teaches that the use of a combination of recovery mechanisms create race conditions between recovery mechanism and double protection, which may lead to a lack of optimality. *See* PO Sur-reply 14 (citing Reply 18; Ex. 2028, 120). According to Patent Owner, “[a]dding Guichard’s reoptimization to Doshi’s protection scheme creates exactly the race conditions Guichard warns against.” *Id.* at 14–15 (citing Ex. 2025 ¶ 93). Patent Owner contends that “Mr. Gomez testified that a POSITA would not use ‘a combination of recovery mechanisms’ unless it had ‘been validated to work and to not have additional issues’ precisely because of ‘unintended issues,’ e.g., Guichard’s ‘race conditions.’” *Id.* at 15 (citing Ex. 1037, 167:8–22; Ex. 2025 ¶¶ 90–93).

We do not agree that a person of ordinary skill in the art would be deterred from combining the teachings of Doshi and Guichard based on Guichard’s cited additional teachings. We find that Guichard discloses protection mechanisms and restoration mechanisms as two families of network recovery mechanisms, where restoration mechanisms require computation on the fly but protection mechanisms are faster but require more network overhead. Ex. 2028, 121. We, however, do not agree with Patent Owner’s argument that Guichard teaches that combinations of a protection mechanism and a restoration mechanism are likely to be suboptimal. *See* PO Resp. 39. Contrary to Patent Owner’s argument, Guichard does not explicitly address the combination of a protection

mechanism and a restoration mechanism. *See* Ex. 2028, 120–121. Rather Guichard presents a list of several criteria for consideration when evaluating various network recovery mechanisms, such as, convergence time, the scope of recovery, QoS during failure, network overhead, cost, and network stability. Ex. 2028, 120. In the context of this discussion of evaluating network recovery mechanisms in view of these criteria, Guichard discloses generally that “[i]n some cases it might be desirable to elect to use a combination of recovery mechanisms,” while cautioning that “such an option requires some extra care to avoid race conditions between recovery mechanisms and double protection, which may lead to a lack of optimality in terms of backup resources.” *Id.* at 120.

Although a person of ordinary skill in the art reading Guichard would understand that protection systems like Doshi’s and reoptimization techniques like Guichard’s may entail costs and tradeoffs, such as increased network overhead, that might make such a combination disadvantageous, we do not find that these potential disadvantages would undercut the advantages identified by Petitioner, for example, the advantage of reoptimizing a LSP along a better path when it becomes available following the detection of a network change. *See* Pet. 21. “[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). “The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another.” *Id.* (quoting *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340,

1349 n.8 (Fed. Cir. 2000)). We also cannot agree that Petitioner was required to address or analyze any tradeoffs in combining the teachings of the references in order to demonstrate that a person of ordinary skill in the art would have combined the teachings of the references. Patent Owner does not direct us to persuasive authority to support its argument that Petitioner was required to make this showing.

We also do not agree with Patent Owner's Sur-reply arguments. We do not credit Patent Owner's attorney argument that "[a]dding Guichard's reoptimization to Doshi's protection scheme creates exactly the race conditions Guichard warns against." PO Sur-Reply 14–15 (citing Ex. 2025 ¶ 93). The cited evidence does not support Patent Owner's attorney argument. *See* Ex. 2025 ¶ 93. Argument of counsel cannot take the place of objective evidence. *See Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009). In addition, we give little weight to Patent Owner's argument that Mr. Gomez testified that a person of ordinary skill in the art would not use a combination of recovery mechanisms unless it had been validated to work and not have or present additional issues. Contrary to Patent Owner's assertion, Mr. Gomez's deposition testimony is not offered from the perspective of a person of ordinary skill in the art. *See* Ex. 1037, 167:3–22. Instead, Mr. Gomez testifies that "**I** would never use one [a combination of recovery mechanisms] if they haven't already been validated to work and to not have additional issues or present additional issues." *Id.* at 167:19–22 (emphasis added).

Based on the entire record and after having considered Petitioner's citations to Doshi, Guichard, and Dr. Houh's testimony (Ex. 1003) as well as Patent Owner's citations to Doshi, Guichard and Mr. Gomez's testimony, we

are persuaded Petitioner sets forth sufficient articulated reasoning with rational underpinning to support the conclusion that it would have been obvious to one of ordinary skill in the art to combine the teachings of Doshi with Guichard’s teachings of reoptimization of a LSP path triggered by a network change. *See* Pet. 20–22, 40–45; *KSR*, 550 U.S. at 418.

Petitioner asserts that “[t]he results of the combination would have been predictable and there would have been a reasonable expectation of success since Doshi and Guichard both address the same technology.” Pet. 22 (citing Ex. 1003 ¶¶ 63–65). According to Petitioner, “a POSITA would have had a reasonable expectation of success in reoptimizing Doshi’s LSP pair selection because Guichard provides significant implementation details, including when to trigger reoptimization evaluations and how to ‘avoid network instabilities.’” Pet. 22–23 (citing Ex. 1003 ¶¶ 63–65; Ex. 1006, 5). Petitioner asserts that a reasonable expectation of success is evidenced by other skilled artisans that reoptimized similar systems. *See* Pet. 23 (citing Ex. 1003 ¶¶ 63–65; Ex. 1009, 136; Ex. 1010, 1; Ex. 1023, 34; Ex. 1034 ¶¶ 27–33, claim 19; Ex. 1035 ¶ 24). In support, Petitioner contends that “the combination would be within a POSITA’s skillset since Doshi already sets forth the calculation and selection techniques that would be utilized during the reoptimization evaluation.” *Id.* (citing Ex. 1003 ¶¶ 63–65). According to Petitioner, “since Doshi is already ‘monitoring and updating . . . network topology’ . . . event-based reoptimization evaluation per Guichard, would be directly applicable.” *Id.* (citing Ex. 1003 ¶¶ 63–65; Ex. 1005 ¶¶ 270–281).

Patent Owner contends that there is not a reasonable expectation of success in combining the teachings of Doshi and Guichard because Petitioner did not provide a sufficient rationale to combine the teachings.

See PO Resp. 44–45 (citations omitted). Patent Owner also disputes Petitioner’s assertion that Guichard provides significant implementation details. *See id.* at 45 (citing Pet. 22–23). According to Patent Owner, “[t]hough Guichard gives some high level guidance on the types of tools that can be used for reoptimization of a primary path, [Petitioner’s citation to Guichard] “is entirely silent on how to reoptimize both a protection and a primary path, the scenarios in which such a reoptimization would even be appropriate, the relevant design trade-offs, or any other detail that would lead a POSITA to form a reasonable expectation of success.” PO Resp. 45–46 (citing Ex. 1006, 3–5). Patent Owner reiterates that Guichard teaches against combining reoptimization with precomputed protection paths. *See id.* at 46; *see also* PO Resp. 42.

In the Reply, Petitioner contends that Patent Owner concedes that Guichard provides guidance on the types of tools that can be used for reoptimization of a primary path, which Petitioner asserts is evidence of an expectation of success. *See* Pet. Reply 20 (citing PO Resp. 45). Petitioner asserts that Patent Owner’s arguments that Guichard teaches against the combination are baseless because Guichard recognizes the desirability of using a combination of recovery mechanisms. *See id.* at 21 (citing Ex. 1006, 3, Ex. 2028, 120; PO Resp. 44–45). Petitioner further asserts that the teachings of Guichard support a reasonable expectation of success by advising a person of ordinary skill in the art to avoid race conditions. *See id.* (citing Ex. 2028, 120). In the Sur-reply, Patent Owner asserts that “Guichard does not teach how a POSITA could avoid race conditions, or whether it would be possible to do so in the Doshi/Guichard combination.” PO Sur-reply 17 (citing Pet. Reply 20–21; PO Resp. 45–46).

Patent Owner also disputes Petitioner’s assertion that skilled artisans had reoptimized similar systems. *See* PO Resp. 46. Patent Owner asserts that Petitioner’s expert admitted that all but one of the references cited by Petitioner failed to disclose optimization. *See id.* (citing Ex. 2027 90:20–24, 92:17–23, 95:25–96:7, 969:12–25, 130:21–131:5). Patent Owner contends that the only reference that mentions reoptimization in the context of protection systems is Zamfir which is different because it “does not describe a protection system based on entity pairs between two end points.” *Id.* (citing Ex. 1003 ¶ 65; Ex. 1034; Pet. 23); *see* Pet. Reply 17. According to Patent Owner, “[b]ecause Zamfir differs materially from Petitioner’s proposed combination it cannot create a reasonable expectation of success.” Pet. Reply 17–18 (citing Ex. 2025 ¶ 107); *see* PO Resp. 46.

Patent Owner further asserts, “[t]hat Doshi contains some techniques that might work *without* reoptimization cannot possibly provide a POSITA with a reasonable expectation that the same techniques would work in the context of the Doshi/Guichard combination.” PO Resp. 47 (citing Ex. 2025 ¶¶ 108–109). Patent Owner contends that “Doshi’s techniques are designed to work in a system that employs shortcuts and heuristics to reduce computational complexity.” *Id.* (citing PO Resp. 27–33, 47–55). According to Patent Owner, “[p]erforming the same computations repeatedly in response to state changes—as taught by Guichard—would increase the computational complexity of the Doshi system.” *Id.* (citing Ex. 2025 ¶ 99); *see* Ex. 2025 ¶ 112. Patent Owner concludes, “[g]iven the teachings in Doshi and in other art (e.g., Xu, Guichard) concerning the desirability of reducing network overhead and simplifying network calculations, a POSITA would not understand Doshi’s disclosed techniques as a reason for which an

adapted Doshi/Guichard combination would enjoy a reasonable expectation of success.” *Id.*; *see* Ex. 2025 ¶ 112.

We do not agree with Patent Owner’s arguments. As explained above, we are persuaded Petitioner sets forth sufficient articulated reasoning with rational underpinning to support the conclusion that it would have been obvious to one of ordinary skill in the art to combine the teachings of Doshi and Guichard. Patent Owner’s arguments are premised on a requirement that the prior art must teach precisely how one with ordinary skill in the art would combine Guichard’s reoptimization with Doshi’s teachings in order to support a reasonable expectation of success. Patent Owner does not direct us to persuasive authority to support such an exacting standard for a reasonable expectation of success. “[C]ertainty and absolute predictability are not required to establish a reasonable expectation of success.” *Salix Pharms, Ltd. v Norwich Pharms Inc.*, 98 F.4th 1056, 1062 (Fed. Cir. 2024). “[A]ll that is required is a reasonable expectation of success.” *In re O’Farrell*, 853 F.2d 894, 904 (Fed. Cir. 1988). The teachings of Doshi (*see* Ex. 1005) and Guichard (*see* Exs. 1006, 2028), and the agreed upon skill level of a person of ordinary skill in that art (*see* Section II.B. *supra*), as well as Petitioner’s articulated reasons for combining, support finding that a person of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Doshi and Guichard.

Having considered both parties’ arguments and the evidence cited by the parties to support their respective arguments, we are persuaded that the combination of Doshi and Guichard teaches or suggests “if an entity pair reselection event occurs, reselecting said entity pair from the group consisting of said entity pair and a replacement entity pair comprising at

least one entity distinct from the entities of said entity pair.” Based on the entire record, we determine Petitioner shows that the combined teachings of Doshi Guichard teaches this limitation of claim 1. *See* Pet. 20–23, 40–45.

f. [1.5] wherein said entity pair reselection event is selected from a group consisting of adding an entity to said plurality of transport entities, removing an entity from said plurality of transport entities, an operational status change for one of said plurality of transport entities, and a change in overall cost for one of said plurality of transport entities.

Petitioner contends Guichard teaches this limitation based on Guichard’s disclosure that the reoptimization evaluation is triggered if a link is restored in the network, each time a new link is advertised as newly operational, when new LSPs are set up, and when other LSPs are torn down. *See* Pet. 45–46 (citing Ex. 1003 ¶¶ 128–133; Ex. 1006, 3, 5; Pet. 23–45).

Patent Owner does not address or rebut Petitioner’s showing for this claim limitation. *See* PO Resp. 20–46. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. Based on the entire record, we determine Petitioner shows that Guichard teaches this limitation of claim 1. *See* Pet. 45–46.

g. Summary

Based on the entire record, Petitioner shows by a preponderance of the evidence that the subject matter of claim 1, as a whole, would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Doshi and Guichard. *See* Pet. 20–46. Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claim 1 is unpatentable under 35 U.S.C. § 103(a) over Doshi and Guichard.

4. Analysis of Independent Claim 17

Independent claim 17 recites limitations similar to the limitations recited in claim 1, except that claim 17 is directed to a non-transitory computer readable media configured to perform a method. *Compare* Ex. 1001, 7:48–67 *with, id.* at 9:1–19. Petitioner’s analysis addressing the limitations of claim 17 is substantially the same as, and relies upon, Petitioner’s analysis addressing claim 1. *Compare* Pet. 63–65 *with*, Pet. 20–46. Patent Owner’s arguments do not address the limitations of claim 17 apart from the disputed limitations of claim 1. *See* PO Resp. 25–47.

Based on the entire record, for same reasons as those explained above addressing claim 1, we determine Petitioner shows by a preponderance of the evidence that the subject matter of claim 17, as a whole, would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Doshi and Guichard. *See* Pet. 20–46, 63–65. Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claim 17 is unpatentable under 35 U.S.C. § 103(a) over Doshi and Guichard.

5. Analysis of Dependent Claims 2 and 18

Claim 2 depends from claim 1, and claim 18 depends from independent claim 17. *See* Ex. 1001, 8:1–4, 10:1–9. Claim 2 recites “wherein said step of selecting an entity pair further comprises: selecting a working entity from said entity pair; and selecting a protection entity from said entity pair.” *See id.* at 8:1–4. Claim 18 recites: “selecting a working entity from said plurality of transport entities; selecting a protection entity from said plurality of transport entities; and selecting an active entity from

the set consisting of said working entity and said protection entity.” *See id.* at 10:4–9.

Petitioner asserts that Doshi discloses selecting an LSP pair from said plurality of MPLS LSPs including selecting a working path and selecting a protection path. *See* Pet. 46 (citing Ex. 1003 ¶¶ 134–135; Ex. 1005 code (57), ¶¶ 14, 46, 142–145, claims 1, 11); *see also* Pet. 65 (addressing claim 18; citing Ex. 1003 ¶¶ 192–194; Ex. 1005 ¶ 46). Petitioner contends that Doshi describes switching between working and protection LSPs after detecting a failure. *See* Pet. 46 (citing Ex. 1005 ¶¶ 266–267); *see* Pet. Reply 31 citing Ex. 1005 ¶¶ 266–267); *see also* Pet. 47 (addressing limitations of dependent claim 3 similar to the limitations of claim 18). According to Petitioner, “[s]ince Doshi’s working and protection LSPs are part of the selected LSP pair, a POSITA would have understood that the selection of the working and protection LSPs are ‘*from said entity pair.*’” Pet. 47 (citing Ex. 1003 ¶¶ 136–137).

Petitioner asserts that “Doshi’s working LSP is the path actively carrying traffic absent a failure while Doshi’s protection LSP becomes active when traffic is switched over following a failure.” Pet. 47; *see also* Pet. 65 (addressing claim 18). According to Petitioner, “Doshi’s switching decisions, which select which of the working LSP and protection LSP is in use, render obvious” “selecting an active entity from the set consisting of said working entity and said protection entity,” as recited in claim 18. Pet. 47 (citing Ex. 1003 ¶¶ 138–140), *see* Pet. 65 (addressing claim 18, citing Ex. 1003 ¶ 195).

In Response, Patent Owner asserts that Doshi does not disclose the limitations of claims 2 and 18. *See* PO Resp. 55. Addressing claim 2, Patent

Owner contends that “claim 2 requires selecting an ‘entity pair’ (i.e., 2) of transport entities” and “[f]rom this already-selected ‘entity pair’ (i.e., a set of 2 entities), claim 2 requires that one transport entity is selected as a working entity and one is selecting as a protection entity.” *Id.*; see PO Sur-reply 25 (similar arguments) Patent Owner asserts that Doshi discloses something different from what is required by claim 2 because Doshi first selects a set of K minimum cost primary paths out of all available paths, then selects a set of K minimum cost restoration paths out of all available paths, then selects a primary path or working entity from the set of k minimum cost primary paths and a restoration path or protection entity from the set of K minimum cost restoration paths. See PO Resp. 55–56 (citing Ex. 1005 ¶ 143; Fig. 11); PO Sur-reply 25–26.

In Reply, Petitioner asserts that Patent Owner does not address Petitioner’s citation of Doshi’s claim 1 which recites “selecting the primary and restoration paths for the new service from the plurality of candidate path pairs” and does not address Petitioner’s analysis of Doshi’s claim 1 equating the selected candidate path pair to “said entity pair.” See Pet. Reply 31 (citing Pet. 46–47; Ex. 1003 ¶¶ 135–137; Ex. 1005 ¶ 14, claim 1). Petitioner also contends “[t]he Petition additionally explained that like the ’821 patent, Doshi describes ‘Switching **Between** Working and Protection LSPs’ of the entity pair.” *Id.* (citing Ex. 1005 ¶¶ 266–267). According to Petitioner, “Patent Owner ignores (and therefore concedes) that the cited teachings in Doshi disclose the claimed limitations.” *Id.*

In the Sur-reply, Patent Owner asserts that the Reply does not address the Response arguments. See PO Sur-Reply 25 (citing Pet. Reply 31; PO Resp. 55–56). According to Patent Owner, “[t]he functionality Petitioner

relies on in Doshi (Reply, 31) describes ‘switch[ing] traffic from a primary (i.e., working) LSP to its corresponding protection LSP’ ‘after detecting a failure.’” PO Sur-reply 26 (citing Ex. 1005 ¶¶ 156, 267). Patent Owner contends that there is no selection because the primary entity has already failed, and once the protection LSP is switched to the primary LSP, there is no corresponding new protection entity to select as the “pair” no longer exists because the former working LSP is no longer operational. *See id.*

We do not agree with Patent Owner’s arguments. As an initial matter, Patent Owner’s arguments address claims 2 and 18 together but focus on the limitations of claim 2. Claim 18 does not recite selecting a working entity and selecting a protection entity “from an entity pair,” but instead “from said plurality of transport entities.” *Compare* Ex. 1001, 10:1–7; *with id.* at 8:1–4. Accordingly, Patent Owner’s arguments addressing “from said entity pair” are not commensurate in scope with the limitations of claim 18.

As to the limitations of claim 2, we do not agree with Patent Owner’s arguments that focus on certain teachings of Doshi, while overlooking the teachings of Doshi relied upon by Petitioner. For example, Patent Owner focuses on paragraphs 143, 156, and 267, and Figure 11 of Doshi (*see* PO Resp. 55–56; PO Sur-reply 26), but does not address paragraphs 14, 46, 142, 144, 145, and 266, the abstract, and claims 1 and 11 cited by Petitioner to support its arguments (*see* Pet. 46).

As pointed out by Petitioner, claim 1 of Doshi recites “selecting the primary and restoration paths for the new service from the plurality of candidate path pairs.” Ex. 1005, claim 1. Claim 11 includes a similar recitation, and paragraph 14 of Doshi includes a similar disclosure as claims 1 and 14. In addition, paragraphs 142 and 144 of Doshi, relied upon

by Petitioner, discloses calculating L lowest total-cost pairs of paths and a primary/restoration path pair corresponding to the lowest sum is selected and stored. *See* Ex. 1005 ¶¶ 142, 144; Fig. 11: steps 1110, 1112, 1114, 1116.

To the extent Patent Owner’s arguments are premised on selection of only one entity pair with the one entity pair consisting of only two transport entities and selecting one of the two transport entities of the entity pair as the working entity and one of the two transport entities as the protection entity, we do not agree because the claims are not limited in this manner. *See* PO Resp. 55–56. The recitation of “an indefinite article ‘a’ or ‘an’ in patent parlance carries the meaning of ‘one or more.’” *Baldwin Graphic Systems*, 512 F.3d at 1342. Thus, “an entity pair” as recited in “selecting an entity pair from said plurality of transport entities,” of claim 1 carries the meaning of selecting one or more entity pairs. Likewise, “a working entity” and “a protection entity” as recited in “selecting a working entity from said entity pair; and selecting a protection entity from said entity pair,” of claim 2 carries the meaning of selecting one or more working entities from said one or more entity pairs and selecting one or more protection entities from said one or more entity pairs.

Having considered both parties’ arguments and the evidence cited by the parties to support their respective arguments, we are persuaded that the limitations of claims 2 and 18 are disclosed or taught by Doshi. Based on the entire record, including the reasons explained above addressing independent claims 1 and 17, we determine Petitioner shows by a preponderance of the evidence that the subject matter of claims 2 and 18, as a whole, would have been obvious to a person of ordinary skill in the art in view of combined teachings of Doshi and Guichard. *See* Pet. 46–47, 65.

Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claims 2 and 18 are unpatentable under 35 U.S.C. § 103(a) over Doshi and Guichard.

6. Analysis of Dependent Claim 13

Claim 13 depends from claim 1 and recites “if said entity pair reselection results in both working and protection entities being replaced, sequentially replacing said working entity and said protection entity.”

Ex. 1001, 8:38–8:41. Petitioner reiterates that

Doshi teaches that a primary and a protection pair (e.g., LSP pair) are selected from the plurality of paths of the MPLS network and that, in view of Guichard’s teaching of ongoing reoptimization efforts, it would have been an obvious to perform Doshi’s cost calculations repeatedly to attempt to determine whether the originally selected LSP pair still has the overall minimum-cost or if another LSP pair should be selected.

It would have been obvious for the LSPs of the originally selected pair (e.g., a primary LSP and a protection LSP) to be sequentially replaced as the ongoing reoptimization efforts identify lower cost LSPs.

Pet. 60 (citing Ex. 1003 ¶¶ 176–177; Pet. 35–45); *see* Pet. 61 (reproducing Ex. 1005, Fig. (with Petitioner’s modifications and added annotations)).

Petitioner provides an exemplary scenario in which, depending upon network conditions, the working entity and protection entity would be sequentially replaced during subsequent reoptimization evaluations. *See* Pet. 61–62.

Petitioner reasons, “[w]hen both LSPs are determined to be suboptimal, a POSITA would have found it obvious to replace the LSPs sequentially to minimize interruption in service. In that regard, a POSITA would have appreciated the desirability of maintaining a working and

protection path throughout the replacement process.” Pet. 62 (citing Ex. ¶¶ 174–180); *see* Pet. 62–63 (providing supporting explanation of sequential replacement when both LSPs are suboptimal). According to Petitioner, “[a] POSITA would have recognized that such sequential replacement would advantageously maintain two LSPs (e.g., one primary and one protection) throughout the replacement.” Pet. 63 (citing Ex. ¶¶ 174–180).

Patent Owner contends that Petitioner concedes that neither Doshi nor Guichard disclose this limitation, and instead argues that person of ordinary skill in the art would import the completely missing limitation. *See* PO Resp. 57, 58 (citing Ex. 2025 ¶ 141). Patent Owner contends that Petitioner relies on common sense to supply the missing limitation, and contends that reliance on common sense should generally only be done when the missing limitation is simple and straightforward. *See id.* at 57–58 (citing *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016); *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1338 (Fed. Cir. 2020)). According to Patent Owner, “Petitioner has not shown that this limitation is unusually simple or the technology particularly straightforward.” *Id.* at 58. Patent Owner contends that entity pair reselection for path selection in MPLS technology is a very complex subject and multiple references demonstrate that there are numerous ways to perform MPLS path selection, none of which are obviously preferred. *See id.* (citing Ex. 2025 ¶¶ 137–140).

Patent Owner further asserts that the Petition does not provide reasoned analysis or evidentiary support supporting its allegation that “sequentially replacing said working entity and said protection entity” in the context of claims 1 and 13 is part of the general or common knowledge of a

person of ordinary skill in the art. *See* PO Resp. 58–59. Patent Owner contends that Petitioner does not cite evidence to show that “sequentially replacing said working entity and said protection entity” in the MPLS network technology of claim 1 would be within the common knowledge of a person of ordinary skill in the art. *See id.* Patent Owner asserts that the Petition’s analysis rests on hindsight assumptions and speculation. *See id.* at 59, 61. Patent Owner further contends that Petitioner’s annotations are not reasoned analysis or evidentiary support. Patent Owner contends that Petitioner cites its expert declaration in support of the speculative arguments, but the declaration does not cite evidence to support the opinions. *See id.* at 61 (citing Pet. 56–63; Ex. 1003 ¶ 174–180). Patent Owner contends that Dr. Houh’s testimony is entitled to little, if any, weight. *See id.* (citing *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 12 (PTAB Feb. 10, 2023)).

In the Reply, Petitioner asserts that Patent Owner “ignores Dr. Houh’s confirming testimony during deposition and its own submitted evidence, which . . . demonstrates that it was common knowledge to sequentially replace LSPs.” Pet. Reply 32 (citing Ex. 2027, 115:1–116:7; Ex. 2028, 105, 412; Ex. 2033, 19; Ex. 2035, 22; Ex. 1038 ¶ 45).

We do not agree with Patent Owner’s arguments. Petitioner provides sufficient reasoned analysis, supported by Dr. Houh’s testimony (Ex. 1003, Ex. 2027) and the evidence of record (Ex. 1006, 5; Ex. 2028, 105, 412; Ex. 2033, 19; Ex. 2035, 22) to support its contentions that it would have been obvious to a person of ordinary skill in the art at the time of the invention to sequentially replace the working entity and protection entity to minimize service interruption. *See* Pet. 60–63. Contrary to Patent Owner’s

arguments, in our view sequentially replacing the working entity and the protection entity is simple and straightforward. Sequential replacement is one of two solutions for replacing a working entity and a protection entity—a working entity and a protection entity can be replaced either simultaneously or sequentially.

Having considered both parties' arguments and the evidence cited by the parties to support their respective arguments, we are persuaded that the limitations of claim 13 are or taught or suggested by the combination of Doshi and Guichard. Based on the entire record, including the reasons explained above addressing independent claim 1, we determine Petitioner shows by a preponderance of the evidence that the subject matter of claim 13, as a whole, would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Doshi and Guichard. *See* Pet. 60–63. Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claim 13 is unpatentable under 35 U.S.C. § 103(a) over Doshi and Guichard.

7. Analysis of Dependent Claims 3–7, 9–11, 19 and 20

Claims 3–7 and 9–11 depend directly or indirectly from claim 1, and claims 19 and 20 depend directly or indirectly from independent claim 17. *See* Ex. 1001, 7:48–8:41, 9:1–10:18. We have reviewed Petitioner's contentions and cited supporting evidence addressing how the combined teachings of Doshi and Guichard discloses, teaches, or suggests each of the limitations recited in dependent claims 3–7, 9–11, 19, and 20. *See* Pet. 46–66.

Patent Owner does not substantively address or rebut Petitioner's showing for the limitation recited in claims 3–7, 9–11, 19, and 20. *See* PO

Resp. 20–62. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record, including the reasons explained above addressing independent claims 1 and 17, we determine Petitioner shows by a preponderance of the evidence that the subject matter of dependent claims 3–7, 9–11, 19, and 20, as a whole, would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Doshi and Guichard. Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claims 3–7, 9–11, 19, and 20 are unpatentable under 35 U.S.C. § 103(a) over Doshi and Guichard.

E. Patentability Challenge Based on Doshi, Guichard, and Huang

1. Overview of Huang (Ex. 1007)

Huang “relates to protection of connections formed through a mesh-type communication network and, in particular, relates to a link redial protection scheme for such network.” Ex. 1007 ¶ 1. Huang discloses “Multi-Protocol Label Switching (MPLS) . . . for managing network traffic flow.” *Id.* ¶ 4. “A path between a given source node and a destination node may be predetermined at the source node.” *Id.* “The nodes along the predetermined path are then informed of the next node in the path by way of a message sent by the source node to each node in the predetermined path.” *Id.* “Each node in the path associates a label [in the received packet, included at the source node,] with a mapping of output to the next node in the path.” *Id.* “The path arranged in this way is called a Label Switched Path (LSP).” *Id.*

“Rather than redial each path affected by a fault on a single fiber used by those paths, the connections using the faulty fiber may be routed through

one or more backup bundles[] where bandwidth has been reserved expressly for that purpose.” *Id.* ¶ 15

[The] link-redial service . . . [thus] includes[:] receiving a request to set up a [LSP] segment [(]over a direct connection between a head end node and a tail end node[]) and] specifying a required protection bandwidth for the [LSP] segment[:] and determining a backup route to the tail end node, responsive to the receiving, where the backup route avoids use of the direct connection.

Id. ¶ 16.

“To create a [LSP], a source node determines a route for the LSP and sends a Connection Request message to each node along the determined route[: the message] . . . indicat[ing] the determined route and allow[ing] a node along that route to . . . forward the . . . message to the next node.”

Ex. 1007 ¶ 30. “Once traffic is flowing over the LSP, the established link can be called a working link.” *Id.* “For a given direct connection between a head end node and a tail end node, there may be multiple working links[] each associated with a different LSP” (*id.* ¶ 31), that “employ a given fiber between a head end node . . . and a tail end node . . . [, and] may be logically considered a ‘working bundle’.” *Id.* ¶ 32. “A backup LSP may be set up between the head end node . . . and the tail end node . . . to protect each of the working links in the working bundle.” *Id.* “[I]n the event of a failure in the fiber, each of the working links in the working bundle may be switched to corresponding individual backup LSPs, i.e., a backup bundle.” *Id.*

“[B]ackup bandwidth on the path segments of backup LSPs is reserved, but may be shared among other backup bundles.” *Id.* ¶ 53. “[T]o reserve link redial protection bandwidth . . . , the head end node . . . selects a backup route . . . from a table of routes that have been pre-computed to

connect the head end node . . . to the tail end node.” *Id.* ¶ 40. “[The] table of routes may be organized by a metric called ‘cost’, in which case the table may be called a Minimum Cost Route (MCR) table.” *Id.*

2. Analysis of Dependent Claims 8 and 12

Claims 8 and 12, ultimately dependent from claim 1 via different intermediary claims, recite “the step of configuring said working entity as revertive.” Ex. 1001, 8:20–21, 8:36–37. Petitioner asserts that Doshi incorporates by reference in its entirety RFC 3209, which describes returning to an original path when the failed resource becomes re-activated. *See* Pet. 70 (citing Ex. 1005 ¶ 56; Ex. 1011, 12). According to Petitioner,

[s]ince Doshi describes switching from a working LSP to a protection LSP after a failure, and since Doshi incorporates RFC 3209’s disclosure of returning to an original path that is re-activated after a failure, it would have been obvious to a POSITA to configure the working LSPs as revertive.

Id. (citing Ex. 1003 ¶¶ 214–215) (emphasis omitted).

In a second position, Petitioner relies on Huang for teaching that in the event of a failure of a working link, traffic may be switched to a corresponding individual backup LSP, and also discloses revertive switching where the connection will be switched from the backup LSP to the working link once the working link has cleared the failure that caused the switchover. *See* Pet. 70 (citing Ex. 1003 ¶¶ 216–218; Ex. 1007 ¶¶ 30–31, 53).

Petitioner asserts that “[a] POSITA would have found it obvious to utilize revertive switching in Doshi, as taught by Huang, such that the switch configures the working LSP to be used again once the fault is cleared,” as “[a] POSITA would have recognized that in some instances, e.g., in the case of a quickly resolved mistaken failure diagnosis, it would be simpler to

revert back to the working LSP instead of calculating the costs for all LSPs only to again select the working LSP.” Pet. 70–71 (citing Ex. 1003 ¶¶ 214–220; Pet. 67–69); *see* Pet. 68 (similar argument, citing Ex. 1003 ¶¶ 207–208). Based on Petitioner’s citations to Doshi, Huang, and Dr. Houh’s testimony (Ex. 1003), we are persuaded Petitioner sets forth sufficient articulated reasoning with rational underpinning to support the conclusion that it would have been obvious to one of ordinary skill in the art to combine the teachings of Doshi with Huang’s teachings of reverteive switching. *See* Pet. 69–71; *KSR*, 550 U.S. at 418.

Patent Owner does not address or rebut Petitioner’s showing for claims 8 and 12. *See* PO Resp. *generally*. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record, including the reasons explained above addressing claims 1, 2, 4, and 9–11, we determine Petitioner shows by a preponderance of the evidence that the subject matter of claims 8 and 12, as a whole, would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Doshi, Guichard, and Huang. *See* Pet. 67–71. Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claims 8 and 12 are unpatentable under 35 U.S.C. § 103(a) over Doshi, Guichard, and Huang.

F. Patentability Challenge Based on Doshi, Guichard, and Xu

1. Overview of Xu (Ex. 1025)

Xu “relates generally to networking and networking architecture, and more particularly, to combining path protection and traffic engineering for providing fast recovery time when network failures are detected.”

Ex. 1025 ¶ 1. Xu discloses “balancing load in a network after failure of a link.” *Id.* ¶ 5. “At an ingress router, traffic is routed by automatically balancing traffic load over a predefined set of paths from the ingress router to [an] egress router according to . . . splitting ratios.” *Id.* ¶ 6 (omitting variable identifiers/labels). “Each splitting ratio defines a fraction of the demands . . . to be transmitted over a path . . . of the set of paths [during] a detectable failure state . . . [of a] set of modeled failure states.” *Id.* “[Each] modeled failure state[] . . . cause[s] at least one path . . . of the predefined set of paths to . . . fail . . . [and] has at least a predetermined probability of occurrence.” *Id.* “[The] goal is to compute paths and splitting ratios that minimize congestion over the range of possible failure states.” *Id.* ¶ 53.

“[T]he ingress router has a simple static configuration that determines the traffic-splitting ratios among the available paths, while intermediate routers merely forward packets over preestablished paths.” *Id.* ¶ 35. “Using pre-established end-to-end paths allows fast failure recovery as the ingress router can shift the load away from the failed paths.” *Id.*

2. Analysis of Independent Claim 14 and Dependent Claims 15 and 16

Independent claim 14 is directed to a system and recites “digital logic . . . configured to determine a probability of concurrent failure of said working entity and said protection entity.” Ex. 1001, 8:48–52. Petitioner asserts that “Doshi’s path calculation considers disjointedness of the working LSP and the protection LSP.” Pet. 80 (citing Ex. 1003 ¶¶ 249–250; Pet. 32–34, 46–47, 50–52). According to Petitioner, “a POSITA would have found it obvious to use ‘*digital logic*’ to perform Doshi’s flowchart logic, including path calculation and selection techniques.” *Id.* (citing Ex. 1003 ¶¶ 249–250; Pet. 78–80).

Petitioner explains that “Doshi recognizes that when two paths are disjoint, e.g., by being node- and link-disjoint, ‘then a failure affecting one of them will not affect the other.’” Pet. 80 (citing Ex. 1005 ¶ 40). According to Petitioner, “[a] POSITA would have understood that probability of concurrent failure is inversely related to disjointedness—as paths become more disjoint, the likelihood they will fail concurrently goes down.” *Id.* (citing Ex. 1003 ¶¶ 249–250). Petitioner explains that it would take two distinct failures (one affecting each path) for both paths to fail concurrently. Pet. 81 (citing Ex. 1003 ¶¶ 250–251). According to Petitioner, because “Doshi explains that the ‘probability of occurrence’ of two such failures is ‘**very insignificant**,’ a POSITA would have understood that determining that two paths are disjoint with no nodes or links in common is also a determination that the paths have a “very insignificant” probability of failing concurrently. *Id.* (citing Ex. 1003 ¶¶ 250–251; Ex. 1005 ¶ 40). Petitioner concludes that “determining path disjointedness (as part of Doshi’s flowchart) corresponds to ‘*determine[ing] a probability of concurrent failure*’ since knowledge of, e.g., strict disjointedness represents a determination that there is a ‘very insignificant’ probability that the paths will fail at the same time.” *Id.* (citing Ex. 1003 ¶¶ 250–251); *see* Pet. Reply 24 (similar argument, citing Ex. 1038 ¶ 30).

Petitioner also asserts that Xu discloses a network architecture that uses multiple paths between each ingress-egress router pair and provides techniques for selecting the end-to-end paths between the pair by Network Management Software. *See* Pet. 81 (citing Ex. 1003 ¶¶ 252–253; Ex. 1025 ¶¶ 30–38). Petitioner asserts that Xu models failure states that would cause at least one path to fail in order to inform path selection. *See id.* (citing

Ex. 1003 ¶¶ 252–253; Ex. 1025 ¶¶ 6, 49, 80, claims 1, 11). Petitioner contends that Xu explains that each failure state has a predetermined probability of occurrence and each failure state is assigned a weight in Xu’s selection function based on how common the state is. *See* Pet. 82 (citing Ex. 1003 ¶ 254; Ex. 1025 ¶¶ 6 10, 33, 45, 53, 80). According to Petitioner, “[a] POSITA would have understood that a ‘predetermined’ probability has been ‘*determine[d]*.’” *Id.* (citing Ex. 1003 ¶ 254).

Petitioner asserts that “[a] POSITA would have understood that at least some of the modeled failure states would be states in which the failure affects two paths simultaneously—corresponding to a state of concurrent failure.” Pet. 81 (citing Ex. 1003 ¶¶ 252–253). Petitioner reasons that “[w]hen a failure state is one where the failure affects two paths simultaneously—a state of concurrent failure—Xu’s predetermining a probability of occurrence for that failure state corresponds to ‘*determin[ing] a probability of concurrent failure.*’” Pet. 82 (citing Ex. 1003 ¶ 254); *see* Pet. Reply 27. Petitioner asserts that “a POSITA would have found it obvious [to] determine the probability of occurrence of failure states, as taught by Xu, when implementing Doshi’s calculation and selection techniques and would have been motivated to determine the probability of various failure states to achieve a more refined selection between pairs of paths that have the same disjointedness.” Pet. 82 (citing Ex. 1003 ¶¶ 255–257; Pet. 72–73); *see* Pet. 73 (citing Ex. 1003 ¶ 230); Pet. Reply 27.

In the Decision on Institution, we preliminarily stated that Patent Owner’s Preliminary Response arguments raised questions as to the sufficiency of Petitioner’s showing for this limitation. *See* Dec. on Inst. 38.

In the Response, Patent Owner asserts that the Decision on Institution was correct and Petitioner's showing fails. *See* PO Resp. 47–48. According to Patent Owner, “[n]either Doshi nor Xu discloses determining such a probability, let alone the probability of concurrent failure of a working [entity] and protection entity.” *Id.* at 48; *see* PO Sur-reply 18–19 (arguing Doshi does not disclose determining a probability of concurrent failure). Patent Owner asserts that both Doshi and Xu describe different heuristics for selecting entity pairs that are less susceptible to concurrent failure. *See* PO Resp. 49. According to Patent Owner, the heuristics disclosed in Xu and Doshi are used in lieu of determining a probability of concurrent failure. *See id.* Specific to the teachings of Doshi relied upon by Petitioner, Patent Owner contends that the disclosure from paragraph 40, relied upon by Petitioner, teaches a person of ordinary skill in the art to ignore the probability of failure and instead opt for protection because the protection path is disjoint from the primary path. *See id.* at 50 (citing Ex. 1005 ¶ 40; Ex. 2025¹¹ ¶ 119).

In response to Patent Owner's arguments addressing Doshi, Petitioner contends that “Doshi plainly considers the probability of simultaneous failure as part of its pair calculations and selection process of Figure 11.” *See* Pet. Reply 23 (citing Ex. 1038 ¶ 28). According to Petitioner, Doshi “utilizes one calculation (LowKSum) that is based on shared paths (which have a higher probability of joint failure) and another calculation (LowLSum) for disjoint paths (with ‘very insignificant’ probability of joint failure).” *Id.* (citing Ex. 1038 ¶ 28). Petitioner reproduces Figure 4C of

¹¹ Patent Owner incorrectly lists Exhibit 1001 instead of Exhibit 2025.

the '821 Patent and Figure 11 of Doshi and asserts that both processes are similar and both determine a subset of entity pairs with minimum probability of failure, and ultimately select the lowest cost pair. *See id.* at 23–24 (reproducing Ex. 1001, Fig 4C (with Petitioner’s added annotations); Ex. 1005, Fig. 11 (with Petitioner’s added annotations); citing Ex. 1001, 5:55–66, 8:22–30; Ex. 1005 ¶¶ 56, 144; Ex. 1038 ¶ 29). Petitioner contends that “Doshi’s disclosure of selection logic configured to perform the method of Figure 11, including logic to determine disjoint pairs that have ‘very insignificant’ probability of simultaneous failures, teaches this limitation.” *Id.* at 24 (citing Ex. 1038 ¶ 30).

In the Sur-reply Patent Owner contends that Petitioner does not dispute that Doshi’s description of the likelihood of the simultaneous failure of two disjoint paths as “very insignificant” is an assumption rather than a determination of probability. *See* PO Sur-reply 18 (citing Pet. Reply 23; PO Resp. 49–51). Patent Owner asserts that nothing in steps 1110 or 1116 in Doshi’s Figure 11 discusses determining a probability of concurrent failure as required by the claim. *See id.* at 19. Patent Owner contends that steps 1110 and 1116 instead discuss determining lowest total-cost pairs which is different from probability of failure. *See id.* (citing Ex. 1004 ¶ 144, Fig. 11). According to Patent Owner, “in Doshi, ‘a path’s cost [i]s a function of link utilization and sharing.’” *Id.* (citing Ex. 1005 ¶ 141).

Consistent with Patent Owner’s arguments, we find that Doshi does not disclose, teach, or suggest “digital logic . . . configured to determine probability of concurrent failure of said working entity and said protection entity,” as required by claim 14. Although Doshi discloses selecting a subset of path pairs based on cost (*see* Ex. 1005 ¶ 144, Fig. 11), and disjoint

path pairs may have a very insignificant probability of failure, Petitioner does not direct us to where Doshi discloses, teaches, or suggests “digital logic . . . configured determine the probability of concurrent failure of the primary path and the restoration path.” *See* Pet. 80–81; Pet. Reply 23. We give little weight to Petitioner’s expert Dr. Houh’s testimony (Ex. 1003 ¶ 251) that determining path disjointedness corresponds to determining a probability of concurrent failure is entitled to little weight because it is not supported by an underlying factual basis. *See* 37 C.F.R. § 42.65(a) (Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight). For example, Petitioner does not provide a factual basis for equating a determination of path disjointedness (e.g., strictly disjoint, partially disjoint) with a determination of the probability of concurrent failure of the primary and restoration path. We also give little weight to Dr. Houh’s testimony (Ex. 1038 ¶ 30) that Doshi’s disclosure of selection logic configured to perform the method of Figure 11 teaches logic configured to determine probability of concurrent failure of said working entity and said protection entity because it also is not supported by an underlying factual basis. *See* Ex. 1038 ¶¶ 28–30; Ex. 1005 ¶¶ 142–145; Fig. 11.

In Response, and specific to the teachings of Xu relied upon by Petitioner, Patent Owner argues that “Xu teaches a ‘predetermined probability of occurrence’ that is a predetermined threshold probability of failure (used to inform the appropriate splitting ratios in a static system . . .), not the actual probability of individual failure states.” PO Resp. 53 (citing

Ex. 1025 ¶ 49; Ex. 2025¹² ¶ 126). Patent Owner contends that “Xu discloses a ‘set of failure scenarios S’ comprised of the links and nodes that are most likely to fail It does not disclose a mechanism or logic for determining the probability of concurrent failure of an entity pair, as required by claim 14.” *Id.* at 53–54 (citing Ex. 1025 ¶ 49); *see* PO Sur-reply 20–21 (similar argument, citing Ex. 1025 ¶ 49; Pet. 81; PO Resp. 53–54).

Patent Owner contends that Petitioner’s argument that predetermined probability fed into Xu’s system must be determined is illogical. *See* PO Resp. 54. Patent Owner points out that “[t]he claims require ‘logic configured to determine a probability’—not using a predetermined probability.” *Id.* Patent Owner further asserts that Xu’s predetermined probabilities are different from calculating probabilities in an MPLS network. *See id.* According to Patent Owner, “Xu does not explain how or whether its system determines probabilities for individual failure states, let alone provide any reason to a POSITA that those probabilities were actually determined (as opposed to, for example, extracted from historic data or other assumptions).” *Id.*

In the Reply, Petitioner contends that contrary to Patent Owner’s argument that Xu’s predetermined probabilities are different from calculating probabilities, Petitioner asserts that Patent Owner’s expert Mr. Gomez testified that claim 14 does not require computing probabilities or dictate an order of when the logic is executed. *See* Pet. Reply 27–28 (citing Ex. 1037, 173:20–174:22). Petitioner further asserts that Patent Owner’s argument is wrong because Xu’s failure model is similarly configured to the

¹² Patent Owner incorrectly lists Exhibit 1001 instead of Exhibit 2025.

one disclosed in the '821 Patent, in that both Xu and the '821 Patent disclose a network operator that inputs predetermined probabilities for failure scenarios involving links and nodes. *See* Pet. Reply 28–29 (citing Ex. 1001, 6:20–33; Ex. 1025 ¶¶ 6, 33, 40, 41, 49); Ex. 1038 ¶¶ 36–37). According to Petitioner, “a POSITA would have understood that in the '821 patent, the network operator assigning failure probabilities of spans and/or nodes (which have been predetermined) configures the probability matrix to determine a probability of simultaneous failure for a pair that has the spans or nodes in common.” Pet. Reply 28 (citing Ex. 1038 ¶ 36). Petitioner asserts “in the instance where multiple paths (e.g., working and protection paths) traverse the same node (e.g., router), a POSITA would have understood that a probability of simultaneous failure of the paths that traverse the node corresponds to a probability of failure of the node.” *Id.* at 29 (citing Ex. 1038 ¶ 37); *see id.* at 29–30 (reproducing Ex. 1025, Fig. 1; providing an example based on Xu’s disclosures). On the basis of Petitioner’s assertion that Mr. Gomez does not dispute that the probability matrix of the '821 Patent corresponds to a failure model, Petitioner reasons that Xu’s failure model corresponds to the claimed “logic.” Pet. Reply 30 (citing Ex. 1038 ¶ 40). According to Petitioner, “[t]he network operator inputting failure scenarios (with a predetermined probability of occurrence) for links and nodes that are shared among different paths, ‘*configures*’ the failure model ‘*to determine a probability of concurrent failure*’ because the probability of failure for shared links and nodes corresponds to a probability of simultaneous failure for a pair that has the links or nodes in common.” *Id.* (citing Ex. 1038 ¶ 40).

In the Sur-reply, Patent Owner contends that Petitioner incorrectly implies that Mr. Gomez testified that the digital logic of claim 14 need not determine a probability of concurrent failure. *See* PO Sur-reply 21. According to Patent Owner, “Mr. Gomez testified that the limitation ‘determining a probability of concurrent failure includes . . . computational hardware for computing the matrix of probabilities.’” *Id.* at 21–22 (citing Ex. 1037, 174:10–16). Patent Owner further contends that Petitioner is incorrect that, in the ’821 Patent, a network operator assigning predetermined failure probabilities of spans and/or nodes configures the probability matrix to determine a probability of simultaneous failure for a pair that has spans or nodes in common. *Id.* at 22 (citing Pet. Reply 28; Ex. 1038 ¶ 36). Patent Owner asserts that claim 14 requires digital logic to determine a probability of concurrent failure, but Petitioner’s argument relies on the network operator who is not digital logic. *See id.* (citing Ex. 1001, claim 14), 23 (citing Ex. 1001, claim 14). According to Patent Owner, “Xu receives predetermined probabilities of occurrence from an external source.” *Id.* at 23 (citing Ex. 1025 ¶ 6; Reply 28). Patent Owner further asserts that the passage of the ’821 Patent relied upon by Petitioner for disclosing predetermined probabilities of failure entered by network operators also discloses that span failure probabilities may be automatically calculated by the network, for example, by a management entity. *See id.* (citing Ex. 1001, 6:23–29). Patent Owner asserts that Petitioner incorrectly argues that Xu’s failure model is similar to the ’821 Patent. *See id.* (citing Pet. Reply 28–29).

We do not agree with Petitioner’s suggestion that claim 14 does not require computing probabilities on the basis of Mr. Gomez’s testimony. As

pointed out by Patent Owner, claim 14 recites “digital logic . . . comprising: logic configured to determine a probability of concurrent failure of said working entity and said protection entity.” We find that “digital logic . . . configured determine the probability of concurrent failure” implicitly requires an algorithm or calculation to be performed by the digital logic in order for the digital logic to be configured to determine the probability of concurrent failure. We agree with Patent Owner that Xu’s disclosures of failure states or scenarios with predetermined probabilities input into a failure state model (*see* Ex. 1025 ¶¶ 6, 33, 40–41, 49) does not teach or suggest “digital logic . . . configured to determine a probability of concurrent failure,” in other words, Xu does not teach digital logic that performs an algorithm or calculation to determine a probability of concurrent failure.¹³

Based on the entire record, we are not persuaded that Doshi alone and the combination of Doshi, Guichard, and Xu teaches or suggests “digital logic . . . configured to determine a probability of concurrent failure of said

¹³ Although not raised by Patent Owner, we note that many of Petitioner’s arguments in the Reply were not presented in the Petition, and not directly responsive to Patent Owner’s arguments. Petitioner utilizes Patent Owner’s arguments addressing Xu as a springboard for presenting new arguments and new evidence. *See* Pet. Reply 27–30. For example, Petitioner’s arguments equating the ’821 Patent’s disclosure related to a network operator assigning failure probabilities and Xu’s disclosure related to a network operator inputting potential or planned failure states or scenarios (*see* Pet. 28–29 (citing Ex. 1038 ¶¶ 36–37)), were not presented previously in the Petition. *See* Pet. 81–82. As another example, Petitioner’s argument that Xu’s failure model corresponds to the claimed “logic” (*see* Reply 30 (citing Ex. 1038 ¶ 40)) was not presented previously in the Petition. *See* Pet. 81–82. In any event, as explained above, we are not persuaded that Xu teaches or suggests “digital logic . . . configured to determine a probability of concurrent failure.”

working entity and said protection entity,” as recited in claim 14. In sum, based on the entire record, Petitioner has not shown by a preponderance of the evidence that the subject matter of independent claim 14, and claims 15 and 16, dependent therefrom, would have been obvious over the combination of Doshi, Guichard, and Xu. Therefore, based on the entire record, Petitioner has not established by a preponderance of the evidence that claims 14–16 are unpatentable under 35 U.S.C. § 103(a) over Doshi, Guichard, and Xu.

III. CONCLUSION

For the foregoing reasons, and after having analyzed the entire record and assigning appropriate weight to the cited supporting evidence, Petitioner has established by a preponderance of the evidence that claims 1–13 and 17–20 are unpatentable.¹⁴ Petitioner, however, has failed to establish by a preponderance of the evidence that claims 14–16 are unpatentable.

¹⁴ Should Patent Owner pursue amendment of the challenged claims in a reissue or reexamination proceeding, we direct Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner files a reissue application or a request for reexamination, Patent Owner is reminded of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–7, 9–11, 13, 17–20	103(a)	Doshi, Guichard	1–7, 9–11, 13, 17–20	
8, 12	103(a)	Doshi, Guichard, Huang	8, 12	
14–16	103(a)	Doshi, Guichard, Xu		14–16
Overall Outcome			1–13, 17–20	14–16

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, Petitioner has established by a preponderance of the evidence that claims 1–13 and 17–20 of the '821 Patent are unpatentable;

FURTHER ORDERED that, Petitioner has not established by a preponderance of the evidence that claims 14–16 of the '821 Patent are unpatentable; and

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

IPR2023-00402
Patent 8,830,821 B2

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