

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

PORTSMOUTH NETWORK CORP.,
Patent Owner.

IPR2024-01450
Patent 7,596,088 B2

Before CHARLES J. BOUDREAU, JUSTIN T. ARBES, and
PETER D. SHAPIRO, *Administrative Patent Judges*.

SHAPIRO, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Petitioner Cisco Systems, Inc., filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–4, 6–11, and 13–20 of U.S. Patent No. 7,596,088 B2 (Ex. 1001, “the ’088 patent”) pursuant to 35 U.S.C. § 311(a). Patent Owner Portsmouth Network Corp. filed a Preliminary Response (Paper 6) pursuant to 35 U.S.C. § 313. After considering the Petition, the Preliminary Response, and the evidence of record, the Board instituted an *inter partes* review of the challenged claims (Paper 9, “Dec. on Inst.”). Thereafter, Patent Owner filed a Response to the Petition (Paper 16, “PO Resp.”), Petitioner filed a Reply (Paper 22, “Reply”), and Patent Owner filed a Sur-reply (Paper 23, “Sur-reply”). We held an oral hearing in this proceeding on February 9, 2026, and a transcript of the hearing has been entered into the record. Paper 34 (“Tr.”). Following the oral hearing, the Board sought limited claim construction briefs from the parties related to the term “other connections.” Paper 31. The parties filed their claim construction briefs on February 20, 2026. Papers 32 (“PO Supp. Br.”), 33 (“Pet. Supp. Br.”).

This is a final written decision under 35 U.S.C. § 318(a) as to whether the claims challenged in the *inter partes* review are unpatentable. We have jurisdiction under 35 U.S.C. § 6. For the reasons discussed below, we conclude that Petitioner has not established by a preponderance of the evidence that any of the challenged claims are unpatentable.

B. *Related Matters*

The parties indicate that the ’088 patent was the subject of *Portsmouth Network Corp. v. Cisco Systems, Inc.*, No. 23-cv-00441 (E.D. Tex.), which

has been dismissed. *See* Pet. 80; Paper 4, 2. Petitioner filed petitions challenging other patents previously asserted in the district court case in IPR2024-00503 (instituted), IPR2024-00505 (instituted), IPR2024-00506 (instituted), and IPR2024-00954 (denied). A different petitioner filed petitions challenging two of those patents in IPR2024-00893 (instituted), IPR2024-00913 (instituted), and IPR2024-00989 (instituted and consolidated with IPR2024-00913).

C. The '088 Patent

The '088 patent discloses “methods and systems for selecting routes for communication connections that share bandwidth allocations in ring configurations.” Ex. 1001, col. 1, ll. 6–9. According to the '088 patent, “[c]ommunication connections traversing a communication network are sometimes allowed to share bandwidth allocation in common network segments,” but known routing protocols did not “take into account the ability to share bandwidth allocations between different connections,” so route selection was “often non-optimal for cases in which bandwidth sharing is permitted.” *Id.* at col. 1, l. 65–col. 2, l. 12, col. 5, ll. 20–32.

Figure 1 of the '088 patent is reproduced below.

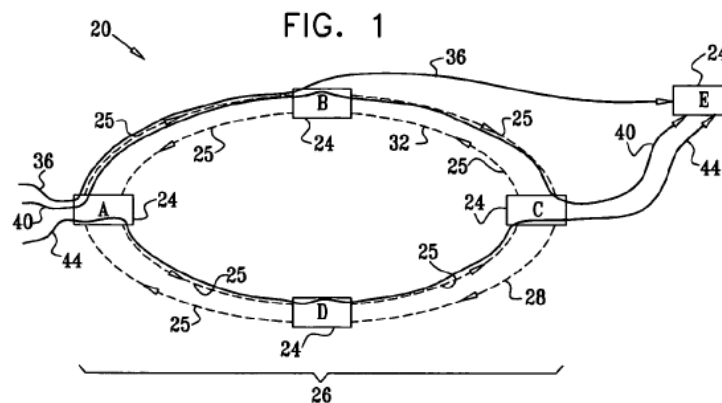


Figure 1 depicts communication network 20 with multiple network nodes 24 “connected by network links, referred to as segments 25,” arranged in ring

configuration 26. Ex. 1001, col. 4, ll. 28–40. “Ring 26 comprises two ringlets, namely a clockwise (CW) ringlet 28 and a counterclockwise (CCW) ringlet 32.” *Id.* at col. 4, ll. 40–42. The ’088 patent describes an example scenario in which connection 36 from node A to node B to node E has already been defined and “requir[es] a 100 Mbps bandwidth allocation in the segments along its route.” *Id.* at col. 4, ll. 44–51. In the described example, a new 50 Mbps connection is to be established from node A to node C to node E, such that there are two alternative routes for the connection: route 40 (A to B to C to E) and route 44 (A to D to C to E). *Id.* at col. 4, ll. 52–63. The ’088 patent discloses that

the new connection may be allowed to share its bandwidth allocation with existing connection 36. For example, the new connection may be set up to protect the existing connection against failure of a node or segment along its route. In other cases, bandwidth may be allocated to connections with a certain degree of oversubscription. In other words, shared bandwidth may be allocated simultaneously to two or more connections, assuming that not all of these connections will actually use all of the allocated bandwidth simultaneously.

Id. at col. 5, ll. 4–13. Thus, route 40 is selected as the “preferred route that achieves the smallest bandwidth allocation, taking into account bandwidth sharing,” whereas previous algorithms and protocols may have selected route 44 “because more bandwidth is available on the segments of this route, without regard to sharing considerations.” *Id.* at col. 5, ll. 33–46. “As a result of bandwidth sharing, the capacity of ring 26 is significantly improved, enabling it to deliver more bandwidth at a given [quality of service (QoS)] or to deliver higher QoS at a given capacity.” *Id.* at col. 5, ll. 48–51.

The '088 patent further describes a centralized connection admission control (CCAC) module that performs the route selection. Ex. 1001, col. 5, ll. 46–48, col. 6, ll. 38–44, Fig. 4. The CCAC module “checks whether the new connection may share its bandwidth allocation with any of the existing connections that traverse ring 26” by receiving a “sharing definition,” distributed “using a signaling or reservation protocol,” that defines the connections that may share bandwidth allocations. *Id.* at col. 7, ll. 1–12. The CCAC module “calculates the cumulative additional bandwidth reservation that would be allocated in the ring segments of ring 26 to the new connection” for each of the two candidate routes (CW and CCW). *Id.* at col. 7, ll. 26–53. The '088 patent discloses the following equations for calculating such reservation:

$$\Delta BW_{CW} = \sum_{S \in \left\{ \begin{array}{l} \text{Clockwise ring} \\ \text{segments along} \\ \text{candidate route} \end{array} \right\}} (BW_{new}^S - BW_{existing}^S)$$
$$\Delta BW_{CCW} = \sum_{S \in \left\{ \begin{array}{l} \text{Counter-clockwise ring} \\ \text{segments along} \\ \text{candidate route} \end{array} \right\}} (BW_{new}^S - BW_{existing}^S)$$

The above equations show the summation of “the difference between the bandwidth allocated to these connections with and without the new connection” for each segment of the candidate routes (CW and CCW).

Ex. 1001, col. 7, l. 35–col. 8, l. 10. In the described example, $\Delta BW_{CW} = 50$ Mbps and $\Delta BW_{CCW} = 100$ Mbps, so route 40 (CW) is chosen. *Id.* at col. 8, ll. 41–63.

D. Illustrative Claim

Challenged claims 1, 8, 15, and 17 of the '088 patent are independent. Claims 2–4, 6, and 7 depend from claim 1; claims 9–11, 13, and 14 depend from claim 8; claim 16 depends from claim 15; and claims 18–20 depend from claim 17. Claim 1 recites the following (with bracketed numerical designations used in the Petition to refer to the various limitations):

1. A method for establishing a connection through a communication network that includes multiple segments, comprising:

[1.1] identifying two or more candidate routes for a new connection having a requested bandwidth to be established through the network;

[1.2] providing a sharing definition specifying one or more other connections, which have respective bandwidths and which are permitted to share a bandwidth allocation with the new connection,

[1.3] such that a total bandwidth allocated jointly to the new connection and to the other connections in any given segment is equal to a maximum of the requested bandwidth and of the bandwidths of the other connections in the given segment;

[1.4] for each of the two or more candidate routes, calculating a cumulative additional bandwidth reservation to be allocated to the new connection in the segments along the candidate route, responsively to the sharing definition;

[1.5] selecting a preferred route having a minimum value of the cumulative additional bandwidth reservation out of the two or more candidate routes; and

[1.6] establishing the new connection using the preferred route.

E. Evidence

Petitioner relies on the following prior art:

U.S. Patent Application Publication No. 2003/0198213 A1, published Oct. 23, 2003 (Ex. 1007, “Jensen”);

U.S. Patent Application Publication No. 2004/0190445 A1, published Sept. 30, 2004 (Ex. 1006, “Sathyanath”);¹ and

U.S. Patent Application Publication No. 2005/0220026 A1, published Oct. 6, 2005 (Ex. 1005, “Dziong”).

F. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–4, 6–11, and 13–20 of the ’088 patent are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. §	References/Basis
1–4, 6, 8–11, 13, 15–20	103(a) ²	Dziong, Sathyanath
7, 14	103(a)	Dziong, Sathyanath, Jensen

II. ANALYSIS

A. Legal Standards

In an *inter partes* review, a petitioner bears the burden of persuasion to prove “unpatentability by a preponderance of the evidence.” *Dynamic*

¹ Because Exhibits 1005 and 1006 both list Zbigniew M. Dziong as the first named inventor, we follow the parties’ practice of referring to Exhibit 1006 by reference to its second named inventor, Ajay Sathyanath.

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the challenged claims of the ’088 patent have an effective filing date before the effective date of the applicable AIA amendment, we refer to the pre-AIA version of 35 U.S.C. § 103. *See* Pet. 14; Ex. 1001, code (22).

Drinkware, LLC v. Nat’l Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015) (quoting 35 U.S.C. § 316(e)). This burden never shifts to the patent owner. *Id.* at 1378 (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–1327 (Fed. Cir. 2008)). The petitioner must explain with particularity how the prior art would have rendered the challenged claims unpatentable. 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.”).

A claim is unpatentable for obviousness if, to one of ordinary skill in the pertinent art, “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103(a)). The question of obviousness is resolved on the basis of underlying factual determinations, including “the scope and content of the prior art”; “differences between the prior art and the claims at issue”; and “the level of ordinary skill in the pertinent art.” *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Additionally, secondary considerations, such as “commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy.” *Id.* When conducting an obviousness analysis, we consider a prior art reference “not only for what it expressly teaches, but also for what it fairly suggests.” *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1049 (Fed. Cir. 2019).

A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418. An obviousness determination based on a combination of references requires finding “both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (quoting *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012)); *see KSR*, 550 U.S. at 418 (for an obviousness analysis, “it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does”).

“Although the *KSR* test is flexible, the Board ‘must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.’” *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (quoting *Kinetic Concepts*, 688 F.3d at 1368). Further, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *accord In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (stating that “conclusory statements” amount to an “insufficient articulation[] of motivation to combine”; “instead, the finding must be supported by a ‘reasoned explanation’” (quoting *In re Lee*, 277 F.3d 1338, 1342 (Fed. Cir. 2002)));

In re Magnum Oil Tools Int’l, Ltd., 829 F.3d 1364, 1380 (Fed. Cir. 2016) (“To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.”).

B. Level of Ordinary Skill in the Art

Petitioner argues that a person of ordinary skill in the art as of the priority date of the ’088 patent (January 2006) would have had “a bachelor’s degree in computer science, computer engineering, electrical engineering, or equivalent training, and approximately four years of experience working in the field of network communications, including experience with [Multiprotocol Label Switching (MPLS)] tunnels and bandwidth allocation,” where “[a]dditional work experience can substitute for specific educational background, and vice versa.” Pet. 12 (citing Ex. 1003 ¶¶ 20–21). Petitioner further contends that a person of ordinary skill in the art would have been

knowledgeable and familiar with the network communications technologies discussed in [the specification of the ’088 patent], including bandwidth reservations, quality of service techniques, routing protocols (including Open Shortest Path First (OSPF)), tunneling protocols (including [MPLS]), resource reservations (including Resource ReSerVation Protocol (RSVP)), traffic engineering (including relevant extensions to OSPF, IS-IS, and RSVP), and ring networking standards (e.g., Synchronous Optical Network (SONET) and resilient packet ring (RPR) defined by IEEE 802.17).

Id. Patent Owner states that “[f]or the purposes of [its] Response, Patent Owner does not dispute Petitioner’s definition of a [person of ordinary skill in the art].” PO Resp. 4. Based on the record presented, including our

review of the '088 patent and the types of problems and solutions described in the '088 patent and cited prior art, we agree with Petitioner's proposed definition and apply it for purposes of this Decision.

C. Claim Interpretation

1. Generally

We interpret each challenged claim

using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b). Specifically, we apply the principles set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc).

“In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.”

DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc., 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

The words of a claim are generally given their ordinary and customary meaning, and that is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *See Phillips*, 415 F.3d at 1312–13. Claims are not interpreted in a vacuum but are a part of and read in light of the specification. *See Slimfold Mfg. Co. v. Kinkead Indus., Inc.*, 810 F.2d 1113, 1116 (Fed. Cir. 1987). Although it is improper to read a limitation from the specification into the claims, *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed.

Cir. 1993), the claims still must be read in view of the specification of which they are a part. *See Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1347 (Fed. Cir. 2004). Only those terms which are in controversy need to be construed and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

2. “Other Connections”

Petitioner initially indicated that no term required express construction and that the terms should all be given their plain and ordinary meaning. Pet. 12–13. The Board did not construe any terms in the Decision on Institution. Dec. on Inst. 10–11. Patent Owner did not offer any construction or take issue with Petitioner’s initial assertion. *See generally* PO Resp. However, it became clear from the Reply, Sur-reply, and the oral arguments at the hearing that a primary issue in dispute here is the meaning of “other connections.” *See* Reply 7–12; Sur-reply 2–8; *see generally* Tr.

This claim interpretation dispute relates to whether the prior art Dziong and Sathyanath references teach or suggest the “sharing definition” in claim limitations 1.2 and 1.3. Reply 7–9; Sur-reply 2–5. As previously presented, those limitations recite:

[1.2] providing a sharing definition specifying one or more *other connections*, which have respective bandwidths and which are permitted to share a bandwidth allocation with the new connection, [1.3] such that a total bandwidth allocated jointly to the new connection and to the *other connections* in any given segment is equal to a maximum of the requested bandwidth and of the bandwidths of the other connections in the given segment.

Ex. 1001, claim 1 (emphasis added). According to Petitioner, Dziong and Sathyanath teach these limitations because, e.g., the link protection paths in Dziong are “other connections” that are shared with a new contemplated link

protection path as shown in Petitioner’s annotated versions of Figure 6(b) of Dziong (reproduced below in Section II.D.3.b). Pet. 33–44. The parties seem to largely agree that Dziong and Sathyanath describe sharing of bandwidth between connections that are reserved for failure protection but not yet activated for transmitting network traffic. *See, e.g.*, Pet. 20–23; PO Resp. 6–8. Nonetheless, Patent Owner contends “other connections” is limited to established connections with bandwidth allocated to them so that they are capable of transmitting network traffic, and the combination of Dziong and Sathyanath does not teach or suggest a sharing definition specifying such connections. *See* PO Resp. 8–9; Sur-reply 2–5. Petitioner contends “other connections” includes connections that are contemplated for failure protection that have bandwidth reserved for them but have not yet been individually allocated bandwidth to transmit network traffic. *See* Reply 7–9; Pet Supp. Br. 1–3. Therefore, the dispute over whether Dziong and/or Sathyanath teach or suggest a “sharing definition” centers on the interpretation of “other connections” in limitations 1.2 and 1.3 (and similar limitations in the other independent claims).

Following the hearing, we ordered each party to submit a short claim construction brief specifically addressing the interpretation of the term “other connections” and whether that term can include connections that have bandwidth reserved but not allocated for transmission until a link failure. *See* Paper 31, 3.

The parties’ contentions

Petitioner asserts that “[n]othing in the independent claims’ language limits the ‘other connections’ to ‘active’ or ‘working’ connections.” Pet. Supp. Br. 1 (emphasis omitted). “An ‘other connection[]’ does not require

bandwidth assigned for its individual use (i.e., bandwidth ‘allocated for transmission,’ as may occur for an active working path or a protection path that is activated after a link failure).” *Id.* at 2 (emphasis omitted).

According to Petitioner, interpreting “other connections” as “requiring individual allocations would be antithetical to the ’088 patent’s ‘*share[d]*’ bandwidth allocations.”” *Id.* (citing Ex. 1001, col. 1, ll. 8–9; Ex. 1043, 44:17–18). Petitioner also asserts that “[c]laim differentiation principles likewise indicate that the ‘other connections’ include those that provide failure protection for another path.” *Id.* (emphasis omitted) (citing Ex. 1001, claims 5 and 12, col. 1, l. 67–col. 2, l. 3; col. 5, ll. 4–8; col. 3, ll. 11–14). Finally, Petitioner cites the specification’s examples and other parts of the ’088 patent as purportedly supporting this position by describing “other connections” broadly. *Id.* at 2–3 (citing Ex. 1001, col. 1, ll. 19–25; col. 1, ll. 42–52; col. 4, ll. 64–67; col. 5, ll. 13–15; col. 5, ll. 56–63).

Patent Owner responds that the “’088 patent is clear that these ‘other connections’ are existing connections in the network that already have bandwidth allocated to them and that this sharing differentiates the ’088 patent from prior art reservation protocols.” PO Supp. Br. 1 (citing Ex. 1001, col. 5, ll. 20–39). According to Patent Owner, the present-tense requirement in the claims that the “other connections” “*have* respective bandwidths” and that they “*are* permitted to share a bandwidth allocation” with a new connection, indicates that the bandwidth must have already been allocated. *Id.* (quoting Ex. 1001, claim 1) (emphasis added). Patent Owner also points to the descriptions in the specification including examples, which all describe sharing bandwidth between active connections. *Id.* at 1–2 (citing Ex. 1001, Fig. 1, col. 1, ll. 7–9; col. 2, ll. 13–17; col. 4, ll. 44–48;

col. 5, ll. 4–5; col. 5, ll. 9–13; col. 5, ll. 15–19; col. 5, ll. 36–39).

Furthermore, Patent Owner notes that the example shown in Figure 1 of the '088 patent is described as having the new connection share bandwidth with “existing connection 36.” *Id.* at 2 (citing Ex. 1001, col. 5, ll. 15–19).

Regarding claims 5 and 12, Patent Owner contends that, “when . . . viewed as a whole, it is clear they claim the purpose for which the new and ‘other connections’ are established.” *Id.* at 3.

Discussion

After considering the additional briefing and the evidence presented in the record, we agree with Patent Owner that “other connections” means “existing connections in the network that already have bandwidth allocated to them.” PO Supp. Br. 1. Such a connection would be capable of transmitting network traffic without further setup. *See id.*

First, the claims use present-tense language, “one or more other connections, which *have* respective bandwidths and which *are* permitted to share a bandwidth allocation with the new connection.”³ Ex. 1001, claim 1 (emphasis added). The exclusive use of the present tense *have* indicates “other connections” must have current possession of the bandwidth. For these other connections to share bandwidth with a newly established connection, they must already exist and have bandwidth ready for immediate use, rather than merely holding a dormant “reservation” pending a network failure. *See* PO Supp. Br. 1. The Federal Circuit addressed a similar situation where the Court found the present-tense limitation “is connected to the computer network” means a device was required to be connected at the

³ Independent claims 8, 15, and 17 have limitations similar to the language of claim 1 discussed herein.

time of the query, rather than merely “registered” with the server. *See Straight Path IP Group, Inc. v. Sipnet EU S.R.O.*, 806 F.3d 1356, 1360 (Fed. Cir. 2015) (“The present tense ‘is’ in ‘is connected to the computer network’ plainly says that the query transmitted to the server seeks to determine whether the second unit is connected at that time, *i.e.*, connected at the time that the query is sent.”).

This interpretation is further supported by other limitations in the claims. *See Hockerson-Halberstadt, Inc. v. Converse Inc.*, 183 F.3d 1369, 1374 (Fed. Cir. 1999) (“Proper claim construction . . . demands interpretation of the entire claim in context, not a single element in isolation.”). Limitation 1.6 reads “establishing the new connection using the preferred route,” so in addition to requiring that bandwidth sharing be “permitted” (limitation 1.2), the claim also contemplates that the bandwidth allocated to the “other connections” is ready to be shared with the “new connection” as soon as it is established (in limitation 1.6). *See, e.g.*, Ex. 1001, claim 1. These limitations, when taken together, indicate sharing bandwidth that is presently ready for network traffic, not just sharing future reserved bandwidth that might be allocated if there is a network failure. In other words, the “other connections” in limitation 1.2 are established, existing connections that have bandwidth allocated to them, whereas the “new connection” does not have bandwidth allocated to it until it is established in limitation 1.6 (after which the bandwidth allocated to the “other connections” can be shared with the bandwidth now allocated to the “new connection”). *See* Tr. 26:4–14.

The specification of the ’088 patent also repeatedly refers to the other connections as “existing connections.” *See, e.g.*, Ex. 1001, col. 2, ll. 13–17

(establishing a connection “taking into account the ability to share bandwidth between the new connection and *existing* connections” (emphasis added)), col. 3, ll. 4–10 (“[T]he sharing definition states that the new connection may share the bandwidth with an *existing connection* traversing at least one common segment . . . and establishing the new connection includes sharing a bandwidth allocation . . . between the new connection and the *existing connection*.” (emphasis added)), col. 5, ll. 36–39 (“[T]hese methods and systems take into account the ability to share bandwidth between the new connection and *existing connections* that traverse ring 26.” (emphasis added)).

Moreover, the specification explains that the system calculates the “additional bandwidth reservation, . . . which would be allocated to the new connection if it were established.” Ex. 1001, col. 2, ll. 21–26. This explanation is consistent with the sequence set forth in the independent claims for the “new connection”: a “reservation” “to be allocated” to the new connection is calculated in limitations 1.4 and 1.5, then the new connection is “establish[ed]” in limitation 1.6, i.e., bandwidth is allocated at that point, and the new connection now *exists* (and can share a bandwidth allocation with the other connections, which already have bandwidth allocated to them, per limitations 1.2 and 1.3). Ex. 1001, claim 1. The bandwidth for the “new connection” is merely reserved during the calculation phase, and is not allocated until the connection is actually “establish[ed]” in limitation 1.6. Therefore, an “other connection” that already has a bandwidth allocation (per the claim language) must be an established connection.

Patent Owner’s proposed interpretation also is consistent with all of the exemplary embodiments in the ’088 patent, which describe “other connections” as established connections with bandwidth already allocated to them. *See* Ex. 1001, Fig. 1, col. 4, ll. 44–48 (identifying “connection 36” as an “existing connection” that currently has “100 Mbps bandwidth allocation in the segments along its route”), col. 5, ll. 15–19 (describing that when a new connection is established, it “may share its 50 Mbps bandwidth allocation . . . with the 100 Mbps bandwidth allocation of *existing* connection 36” (emphasis added)), col. 5, ll. 20–30 (explaining that prior art protocols did not account for dependencies between the “newly -*established* connection” and “previously -*existing* connections,” including “the ability to share bandwidth allocation” (emphasis added)). These embodiments show two actual, established connections sharing bandwidth simultaneously, not a new connection sharing bandwidth with a theoretical, reserved backup path. The ’088 patent does not describe any embodiment in which bandwidth is shared with an unestablished connection that is only reserved but not currently allocated to be able to handle network traffic.

Finally, Patent Owner’s expert, James Olivier, Ph.D., also provides evidence that supports that the distinction between “reserved” and “established” would be recognized by a person of ordinary skill in the art. Dr. Olivier explains that such a person would understand that “calculating a path is entirely different than establishing one. The first step . . . is the path calculation, which is then followed by the signaling phase where the path is established.” *See* Ex. 2008 ¶ 39; *see also id.* ¶ 57 (“The sharing definition must identify other *existing connections* with which the new connection can

share its *bandwidth allocation*.” (emphasis added)). We credit Dr. Olivier’s testimony, which is not persuasively rebutted on this record.

We are also unpersuaded by Petitioner’s assertion that “other connections” are “not actively using” bandwidth in the ’088 patent. Pet. Supp. Br. 1 (citing Ex. 1001, col. 5, ll. 4–19). The cited passage of the ’088 patent, on which Petitioner relies for this assertion, says that “not all of these connections will actually use all of the allocated bandwidth simultaneously.” Ex. 1001, col. 5, ll. 4–19. This merely points out that “other connections” can share bandwidth not simultaneously being actively used by network traffic. A network connection can be established and be ready to transmit but not have its bandwidth fully utilized by network traffic, and therefore the bandwidth on that underutilized connection can be shared. *See* Ex. 1001, col. 5, ll. 10–13 (“[S]hared bandwidth may be allocated simultaneously to two or more connections, assuming that not all of these connections will use all of the bandwidth simultaneously.”).

Additionally, we disagree with Petitioner’s assertion that the doctrine of claim differentiation supports its interpretation of “other connections.” *See* Pet. Supp. Br. 2 (citing Ex. 1001, claims 5 and 12); Reply 8–9. Claim 5 recites “wherein the new connection and the at least one of the other connections are established to protect one another against a failure.” Ex. 1001, claim 5. Petitioner asserts that in light of this claim language, “the ‘*other connections*’ must be construed to encompass connections created in advance to protect against a failure.” Pet. Supp. Br. 2.

However, as pointed out by Patent Owner, claims 5 and 12 merely recite the *purpose* of the “other connections” as being for reciprocal protection paths for the new connection. *See* PO Supp. Br. 3. Patent

Owner's position is supported by the specification, which explains that "the new connection may be set up to protect the existing connection against failure of a node or segment along its route." Ex. 1001, col. 5, ll. 5–8. This disclosure does not support a determination that the new connection or the other connection only have bandwidth reserved but not allocated. Instead, "the new [failure protection] connection may be allowed to share its bandwidth allocation with [the] existing connection," which already has bandwidth allocated to it. Ex. 1001, col. 5, ll. 4–5. That makes sense, since the purpose of the new connection is for failure protection of an existing connection, such that the new connection's allocated shared bandwidth will not need to be used unless the existing other connection fails and the new connection needs to take over by transmitting the network traffic that was previously transmitted on the other connection. *See* Ex. 1001, col. 5, ll. 9–13. Indeed, the use of the word "established" in claims 5 and 12 indicates that both the "other connections" and the "new connection" (after it has been "establish[ed]") are activated connections capable of transmitting network traffic, further contradicting Petitioner's interpretation. Ex. 1001, claims 5, 12.

We also are not persuaded by Petitioner's assertion that "the 'other connections' have bandwidth allocated to them as a group" and "[a]n 'other connection[]' does not require bandwidth assigned for its individual use." *See* Pet. Supp. Br. 2 (emphasis omitted). Petitioner's argument does not address the relevant issue that we must decide, i.e., whether a connection must actually exist and have bandwidth allocated to it to qualify as an "other[] connection" as claimed. *See* Paper 31, 3; PO Supp. Br. 1. It also ignores that claim 1 recites that the sharing definition specifies "one or more

other connections” (such that an individual “other connection[]” would meet the claim language) and that the “one or more other connections” have “respective” bandwidths.

Finally, we are not persuaded by Petitioner’s remaining arguments alleging that the specification requires a broader interpretation of “other connections,” or that the background section’s reference to network protocols RSVP-TE (Resource ReSerVation Protocol - Traffic Engineering) and MPLS indicates “other connections” should include future reservations rather than existing established connections. Pet. Supp. Br. 2–3 (citing Ex. 1001, col. 1, ll. 19–25; col. 1, ll. 42–52 (explaining that connections can be established using the RSVP-TE and MPLS protocols), col. 4, ll. 64–67, col. 5, ll. 13–15 (“[C]onnections may be defined as being allowed to share their bandwidth allocation for any other reason or purpose”), col. 5, ll. 56–63 (disclosing that the bandwidth allocation may be made “in accordance with any allocation scheme”)). These references all describe possible ways for the connection to be established or describe why they are being established, and do not indicate that “other connections” include possible future connections that do not have allocated bandwidth. MPLS allows for the creation of network tunnels for handling network traffic instead of relying on hop-by-hop IP routing lookup tables. *See* Ex. 1003 ¶ 144 (citing Ex. 1039, 32); Ex. 1001, col. 1, ll. 19–41. RSVP-TE similarly provides for network connections to be established through signaling so that they can transmit network traffic. *See* Ex. 1001, col. 1, ll. 42–46 (“Another protocol used for setting up MPLS tunnels is RSVP-TE.”). Therefore, the mere citation to these protocols in the specification background section, or their

incorporation by reference, does not support Petitioner’s broader interpretation of “other connections.”

No other express interpretation of any claim term is necessary to rule on the issues presented in this proceeding.⁴ *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“Because we need only construe terms ‘that are in controversy, and *only to the extent necessary* to resolve the controversy,’ we need not construe [a particular claim limitation] where the construction is not ‘material to the . . . dispute.’” (emphasis added) (citation omitted)).

D. Obviousness Based on Dziong and Sathyanath

Petitioner contends that claims 1–4, 6, 8–11, 13, and 15–20 are unpatentable over Dziong and Sathyanath under 35 U.S.C. § 103(a), citing the testimony of Nader F. Mir, Ph.D., as support. Pet. 20–73 (citing Ex. 1003); Reply 15–26.

1. Dziong

Dziong discloses a “protected communication network [that] utilizes a link-based recovery strategy that includes methods for calculating and distributing link-protection parameters and calculating primary and link-detour paths based on these parameters.” Ex. 1005, code (57).

⁴ For the first time in the Reply and Sur-reply briefs, the parties also proposed competing interpretations for “new connection,” “bandwidth allocation,” and “total bandwidth allocated,” but given our finding below that Petitioner has not proven that the asserted references teach or suggest a sharing definition specifying one or more “other connections,” we do not need to interpret these terms to reach our final determination. *See* Reply 7–12; Sur-reply 2–8.

A “protected” network is “able to recover automatically from the failure of at least one node or link along paths in the network.” *Id.* ¶ 6. “Link-based recovery” is “the process of recovering from a single link/node failure by rerouting traffic around the failure using a link-detour path, without rerouting the entire path,” where “[a] link-detour path is that portion of a link-based recovery path that corresponds to the failure.”⁵ *Id.* ¶ 8. Dziong discloses that previous link-based recovery mechanisms “fail[ed] to take advantage of recovery bandwidth-sharing opportunities,” and describes various methods of sharing recovery bandwidth for the “more efficient use of network resources.” *Id.* ¶¶ 36–38.

For example, Dziong describes “a process for calculating primary paths and link-detour (LD) paths” where each network node “does bookkeeping for each of its incident links of the amount of protection bandwidth that is needed to recover service in the event of each potential link failure in the network” and “advertises to other nodes in the network the amount of protection bandwidth it currently has reserved on each of its incident links.” Ex. 1005 ¶¶ 63–64, Fig. 4 (steps 402 and 404). Then,

an LD path for each link in a set of candidate primary paths for a new demand is calculated in such a way that sharing in the network is maximized (e.g., by summing the cost of each link in each candidate LD path, where the cost is an inverse function of

⁵ “Path-based recovery,” by contrast, is “the process of recovering from a failure of one of the links or nodes in a path from a source node to a destination node by rerouting traffic for the entire path along a recovery path.” Ex. 1005 ¶ 7. Dziong refers to “link-detour paths” and “recovery paths (also known as protection paths),” depending on which method is used, but both refer to paths where traffic is rerouted in case of failure somewhere in a “primary path.” *See id.* ¶¶ 7–9, 70, 83, Fig. 5 (showing the difference between “path-based and link-based recovery paths”); Ex. 1003 ¶ 35. We refer herein to the terminology as it appears in Dziong.

the degree to which the protection bandwidth for that link can be shared with other links in the network, and by choosing the path with the lowest cost).

Id. ¶ 65, Fig. 4 (step 406). Finally, “the primary path for a new demand is selected from the set of candidate primary paths by considering not only the cost of the links in each primary path but also the cost of the LD paths for each link in the primary path.” *Id.* ¶ 66, Fig. 4 (step 408).

Figure 6(a) of Dziong is reproduced below.

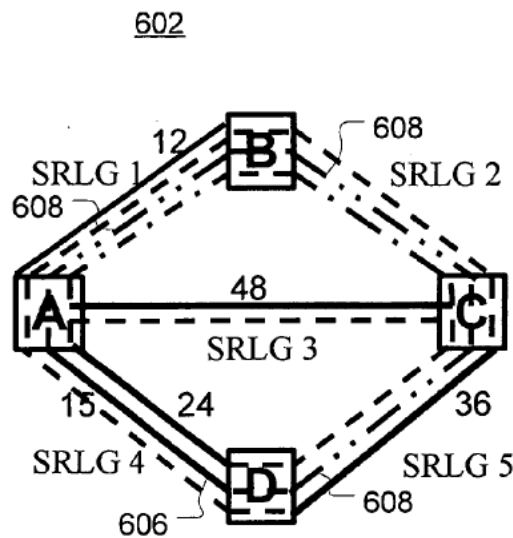


Figure 6(a) depicts exemplary network 602 with four nodes. Ex. 1005 ¶ 88. “[L]inks or the lines/ports that are likely to be affected at the same time are grouped into a shared-risk link group (SRLG).” *Id.* ¶ 70. “[E]ach solid line represents all of the demands that have the same link-detour path, which is represented by a corresponding broken line.” *Id.* ¶ 89. For example, solid line 606 “corresponds to one or more demands totaling 15 units of bandwidth between nodes A and D,” and broken lines 608 “correspond to the common link-detour path for those demands.” *Id.*

Figure 6(b) of Dziong is reproduced below.

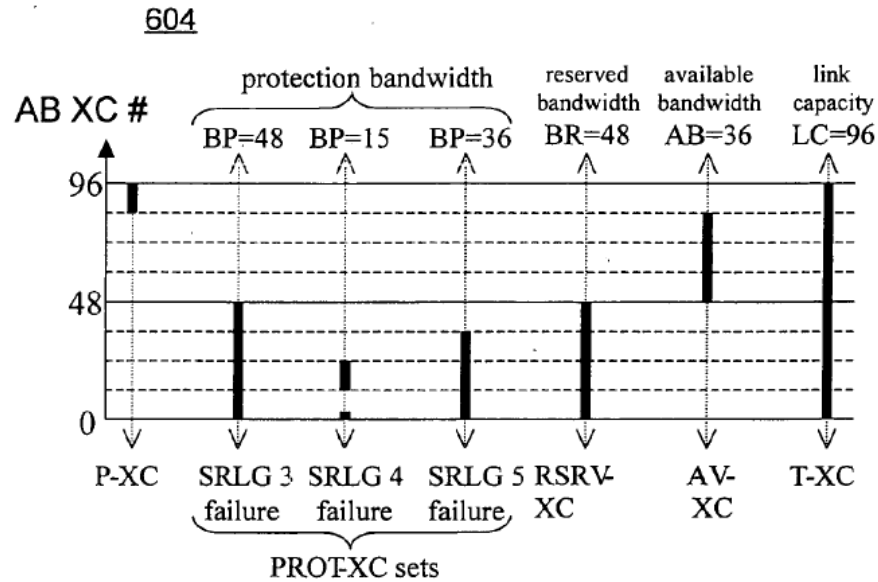


Figure 6(b) shows “[b]andwidth reservation table 604 describ[ing] the current state of the bandwidth of link A-B in terms of cross-connection (XC) units.” Ex. 1005 ¶ 90. The various parameters shown are as follows:

P-XC: “the number of XC units in link A-B that currently support demands” (12 units);

SRLG 3 failure, SRLG 4 failure, and SRLG 5 failure: “the number of XC units in link A-B that are reserved to protect demands on” SRLG 3, SRLG 4, and SRLG 5 (48, 15, and 36 units);

RSRV-XC: “the actual amount of bandwidth that needs to be reserved on link A-B to protect against any one SRLG failure in network 602,” which “corresponds to the maximum of the protection bandwidths required by each of SRLGs 3, 4, and 5 protected by link A-B,” such that “link A-B provides protection bandwidth that is shared between disjoint SRLGs 3, 4, and 5” (48 units);

AV-XC: available bandwidth (36 units); and

T-XC: total link capacity (96 units).

Id. ¶¶ 90–91.

Dziong describes path calculation as either (1) “centralized” where “path calculation is performed in a specialized server that keeps track of all

connection states” and “[w]hen a new connection demand arrives at a source node, a request is sent to the server to calculate the primary path and associated protection path(s)” and the “information is [then] sent back to the source node,” or (2) “distributed” where “paths are calculated in their respective source nodes.” Ex. 1005 ¶¶ 95–98. Dziong further discloses various methods of recovery path calculation using a “link-state database” and “link-cost function.” *Id.* ¶¶ 99–117, Fig. 7. In one approach, “a link’s detour path is calculated using link-state and link-cost functions that take into account link-sharing capabilities,” where “the reservation for a new LD path can use both a protection link’s available bandwidth and the protection link’s available shared bandwidth.” *Id.* ¶ 107. “Depending on the path calculation objective, the link-cost function can take into account several metrics,” such as “administrative weight, available bandwidth, and available shared bandwidth.” *Id.* ¶ 113.

Figure 9 of Dziong is reproduced below.

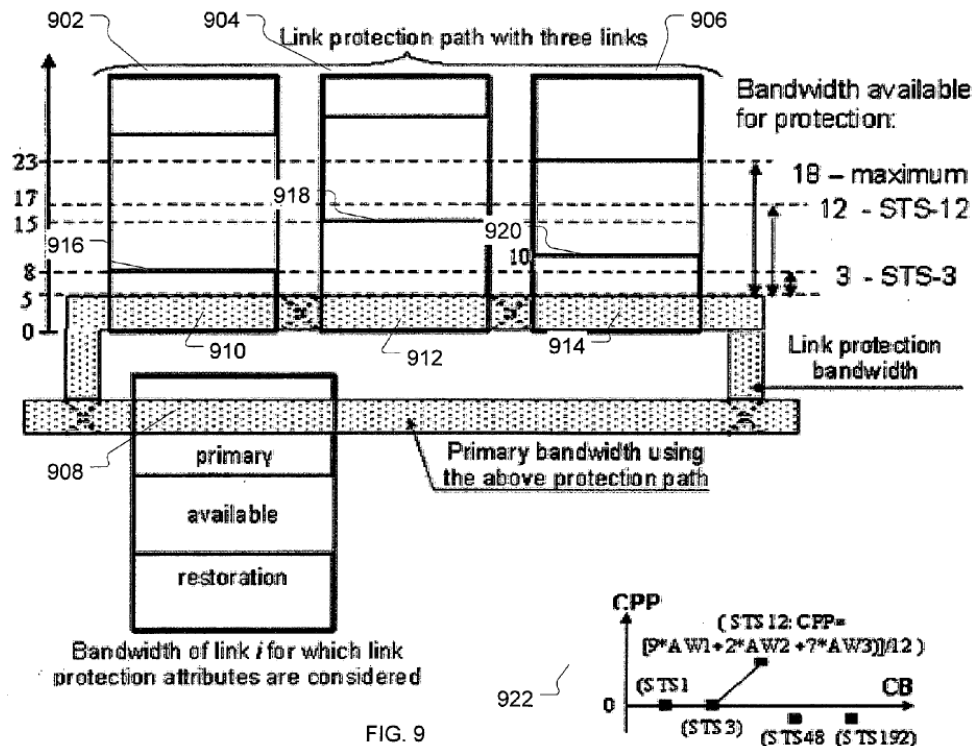


FIG. 9

Figure 9 depicts “the link protection path-cost function in a SONET network assuming a static link-cost function (e.g., $LC=f(\text{administrative weight } AW)$),” where “each different bandwidth in the hierarchy, for example, STS-3, typically has a different administrative weight AW .” Ex. 1005 ¶ 131. “[B]oxes 902, 904, and 906 represent the use of bandwidth on three links (A, B, and C) along a link detour path.” *Id.* ¶ 132. Each box has 5 STS-1 units of bandwidth “reserved for protecting the 5 STS-1 bandwidth demand 908 associated with a primary path link *i*” and shows “the use of each associated link[’s] bandwidth for primary, available, and recovery bandwidth categories” (from top to bottom). *Id.* The graph in the bottom-right corner of the figure “shows what [the protection path cost (CPP_i)] would [be] for five different sizes of a new demand on link *i*” (e.g., zero for STS-1 and STS-3). *Id.* ¶ 134.

2. Sathyanath

Sathyanath discloses “a method for determining a restoration path corresponding to a primary path for a new service in a mesh network having a plurality of nodes interconnected by a plurality of links,” where “[a] path cost is generated for each of a plurality of candidate restoration paths associated with the new service, and the restoration path for the new service is selected based on the path cost for each candidate restoration path.”

Ex. 1006 ¶ 14. Sathyanath recognizes that “[e]fficient use of restoration capacity can be achieved [by] sharing” that capacity. *Id.* ¶¶ 41–45, 63.

Figure 5 of Sathyanath is reproduced below.

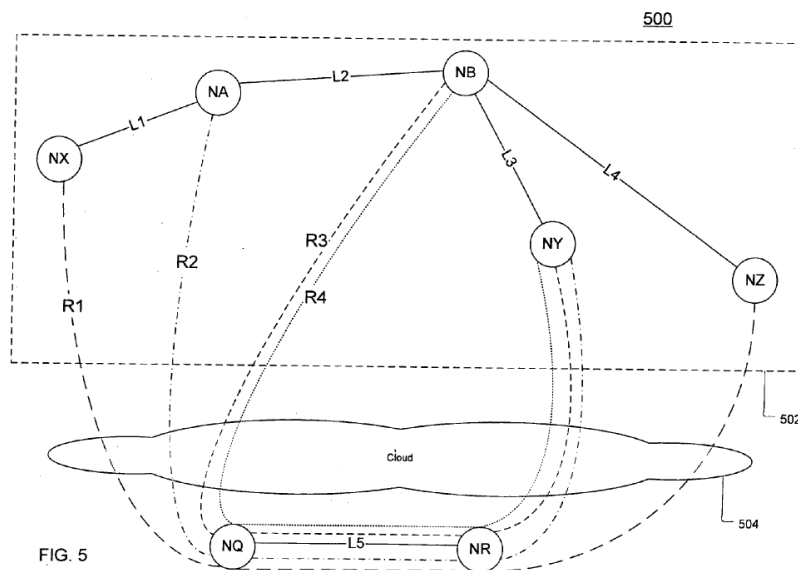


Figure 5 depicts exemplary network 500 supporting four services:

- (1) between nodes NX and NZ with a primary path along L1-L2-L4;
- (2) between nodes NA and NY with a primary path along L2-L3;
- (3) between NB and NY with a primary path along L3; and (4) between NB and NY with a different primary path along L3. Ex. 1006 ¶¶ 98–99. “The four services are protected by restoration paths R1, R2, R3, and R4,” respectively, each of which includes link L5. *Id.* ¶ 100.

Sathyanath describes sharing information for a link, such as L5, in the form of an “aggregate node-link vector representation,” which “captures minimum sufficient sharing information that is required for a link to correctly compute the amount of restoration capacity required on it to provide guaranteed restoration to an additional primary path while realizing sharing.” Ex. 1006 ¶ 102. “The value in each position of the vector represents the aggregate bandwidth that would be required on link L5 in the event of a single failure in the network of the network element that corresponds to that vector position.” *Id.* ¶ 103.

Figure 6 of Sathyanath is reproduced below.

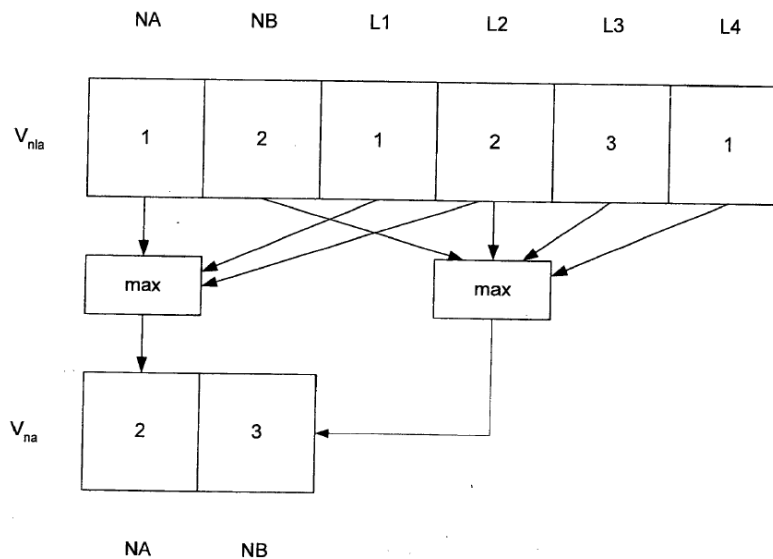


FIG. 6

Figure 6 depicts “node-aggregate vector V_{na} for link L5” as derived from “aggregate node-link vector V_{nla} .” Ex. 1006 ¶ 107. With respect to aggregate node-link vector V_{nla} , Sathyanath discloses the following:

the value of the vector in the position corresponding to node NA is 1. This indicates that, for a failure of node NA, an aggregate bandwidth demand of 1 (associated with protection path R1) will be placed on link L5 corresponding to one (unit bandwidth)

service. Similarly, the 2 in the position of V_{nla} corresponding to node NB indicates that for a failure of node NB, link L5 will be required to support two aggregate (unit bandwidth) services paths (i.e., associated with protection paths R1 and R2). Similarly, potential failures of links L1, L2, L3, and L4 correspond to aggregate bandwidth reservation values in V_{nla} of 1, 2, 3, and 1, corresponding to restoration paths R1, R1+R2, R2+R3+R4, and R1, respectively. Note that the bandwidth that is reserved on link L5 is the maximum of the bandwidth requirements associated with any single network component failure. In the example network of FIG. 5, the reservation bandwidth is thus $\max \{1, 2, 1, 2, 3, 1\}=3$.

Id. ¶ 104. “[T]o provide sharing, each node in the network keeps track of the aggregate node-link vector for all directly connected links” and “disseminates aggregate [node-link] vectors for its connected links.” *Id.* ¶ 105.

Sathyanath describes a number of other exemplary embodiments for sharing information, such as an “extended link-state database,” referred to as the “TE/Share database.” Ex. 1006 ¶ 193. The TE/Share database is maintained at a node and “contains a data structure for each link L that the node owns” with information (e.g., bandwidth) “about all the other links in the network for which link L provides restoration capacity.” *Id.* ¶ 194. Changes to the TE/Share database, such as when “a link is used as a restoration link,” are advertised to other nodes. *Id.* ¶¶ 194–196.

Figure 17 of Sathyanath is reproduced below.

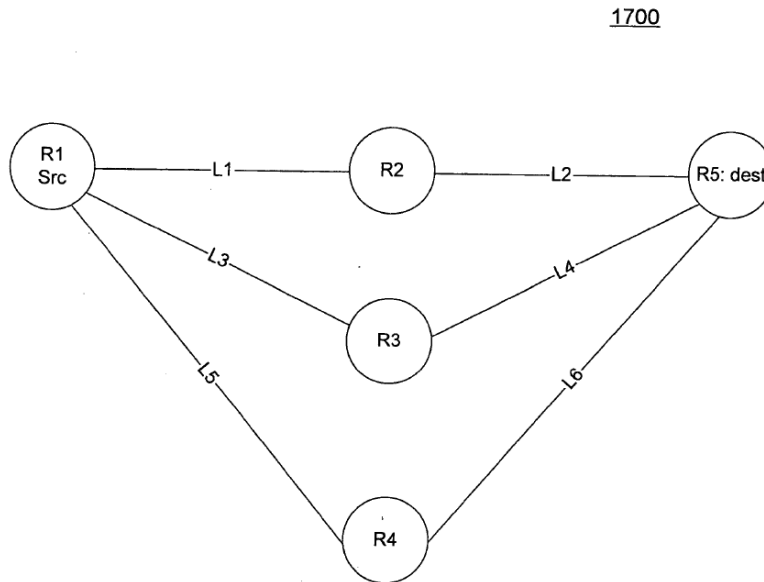


FIG. 17

Figure 17 depicts partial network 1700 having “primary path L1-L2 with four units of bandwidth” and two possible restoration paths, “route A (L3-L4) and route B (L5-L6).” Ex. 1006 ¶ 215. Sathyanath describes exemplary entries in a TE/Share database. *Id.* ¶¶ 215–219. For example, the entry for link L4 may “indicate[] that L4 needs to reserve four units of bandwidth to protect against failures on L8 and L9” (outside of the partial network shown). *Id.* ¶¶ 217, 220. Source node R1 evaluates the potential restoration paths and chooses the one with the least additional bandwidth that would need to be reserved. *Id.* ¶¶ 221–225. As part of that calculation, “no additional bandwidth would need to be reserved on L4” because 4 units already have been reserved and can be shared (given the primary path’s capacity of 4 units). *Id.* ¶ 221.

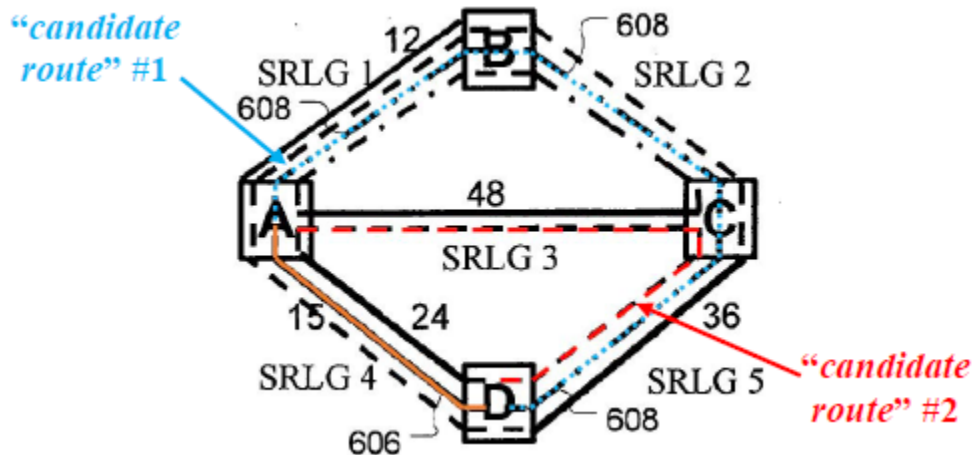
3. *Claim 1*

Petitioner argues that Dziong and Sathyanath collectively teach all of the limitations of claim 1. Pet. 20–51. With respect to the preamble of claim 1 reciting “[a] method for establishing a connection through a communication network that includes multiple segments,” Petitioner argues that Dziong teaches establishing a “recovery path,” such as the A-B-C-D recovery path shown with dotted line 608 in Figure 6(a) above. *Id.* at 23–25. Petitioner further contends that Sathyanath teaches recovery paths “in a variety of network types,” including MPLS, and “[s]ince Dziong does not specify a protocol used to establish link-detour paths, it would have been obvious to use MPLS as described by Sathyanath.” *Id.* at 25–26.

a) Limitation 1.1

Limitation 1.1 recites “identifying two or more candidate routes for a new connection having a requested bandwidth to be established through the network.” Petitioner argues that Dziong teaches that “‘a link’s detour path is calculated using link-state and link-cost functions’ to determine ‘a minimum-cost link-detour path’ that ‘takes into account link-sharing capabilities,’” and the detour paths considered in those calculations are “candidate routes.” Pet. 27 (quoting Ex. 1005 ¶¶ 104, 107).

Petitioner provides the following annotated version of Dziong's Figure 6(a) (Pet. 29):



Annotated Figure 6(a) depicts a primary path between nodes A and D (SRLG 4, shown in orange) and two potential recovery paths A-B-C-D (shown in blue) and A-C-D (shown in red) for a “new connection” between nodes A and D in the event of failure on the primary path. *Id.* at 28–29.

Petitioner argues that Dziong

describes “providing sufficient recovery bandwidth . . . to accommodate a failure” on a primary path. In other words, a recovery path needs to provide the same amount of bandwidth as the primary path it protects. Since the reserved bandwidth on the A-D primary path is 15 units, it would have been obvious for the candidate recovery paths A-B-C-D and A-C-D to have the same “requested bandwidth” (15 units) to ensure that the primary path’s traffic could be accommodated on the recovery path if needed.

Id. at 29 (citations omitted). Petitioner contends that this is confirmed by the table of Figure 6(b), which shows 15 units of bandwidth reserved on the A-B link to protect the SRLG 4 primary path. *Id.* at 29–30. Petitioner also points to the two recovery paths shown in Figure 17 of Sathyanath as “further examples of ‘identifying’ potential recovery paths.” *Id.* at 31–32 (emphasis omitted).

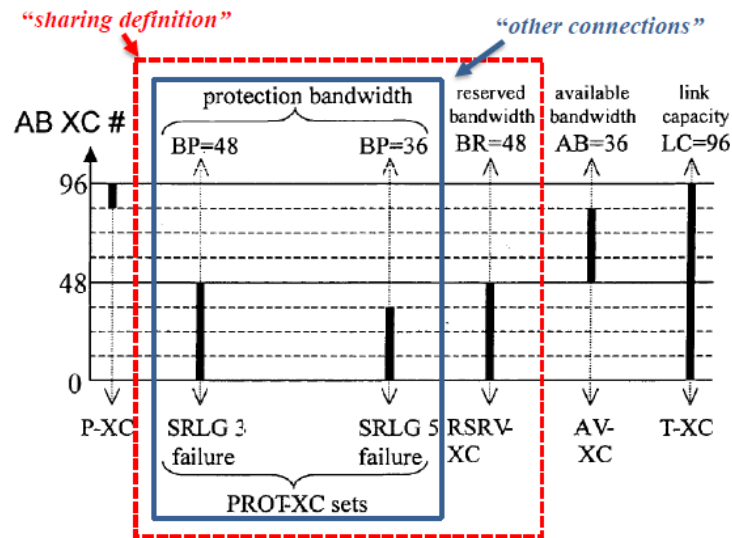
b) Limitations 1.2 and 1.3

Limitations 1.2 and 1.3 recite the following:

[1.2] providing a sharing definition specifying one or more other connections, which have respective bandwidths and which are permitted to share a bandwidth allocation with the new connection, [1.3] such that a total bandwidth allocated jointly to the new connection and to the other connections in any given segment is equal to a maximum of the requested bandwidth and of the bandwidths of the other connections in the given segment.

With respect to limitation 1.2, Petitioner argues that “Dziong teaches that information including ‘how much bandwidth can be[] shared at each link in the network’ is ‘advertis[ed], across the network,’” such that “‘each node’ in the network has ‘information about all recovery paths.’” Pet. 33 (quoting Ex. 1005 ¶ 60) (emphasis omitted); *see also* Reply 21–23. Petitioner contends that Figure 6(b) shows the information that would be advertised, where “three protection paths (each a ‘connection’) . . . traverse link A-B” and “protect SRLGs 3, 4, and 5,” with “respective bandwidths” of 48, 15, and 36 units, respectively. Pet. 33–34 (emphasis omitted). The three paths “share an overall protection bandwidth reservation of 48 units” (RSRV-XC). *Id.* at 34.

Petitioner provides the following modified and annotated version of Dziong’s Figure 6(b) (Pet. 35):



The figure above shows what the bandwidth allocation would be, in Petitioner’s view, “[p]rior to the establishment of SRLG 4,” with “other connections” (i.e., the SRLG 3 and 5 recovery paths) being permitted to “share a bandwidth allocation” with the “new connection” (i.e., a protection path for SRLG 4). *Id.* at 34–35. Petitioner argues that the information in Figure 6(b) “about the existing bandwidth allocations for link A-B” constitutes a “sharing definition” that would be “shared with all the network nodes.” *Id.* at 35.

Next, Petitioner argues that Dziong “provides limited details about the data format used for sharing th[e] information,” so a person of ordinary skill in the art would have considered Sathyanath’s “examples.” Pet. 36. Petitioner discusses two exemplary embodiments in Sathyanath.

First, Petitioner relies on Sathyanath’s “aggregate node-link vector,” which provides “information about which links can share the restoration bandwidth,” as a “sharing definition,” referencing Figures 5 and 6. Pet. 36–37 (quoting Ex. 1006 ¶ 122). Petitioner provides the following annotated version of a portion of Sathyanath’s Figure 6 (*id.* at 38):

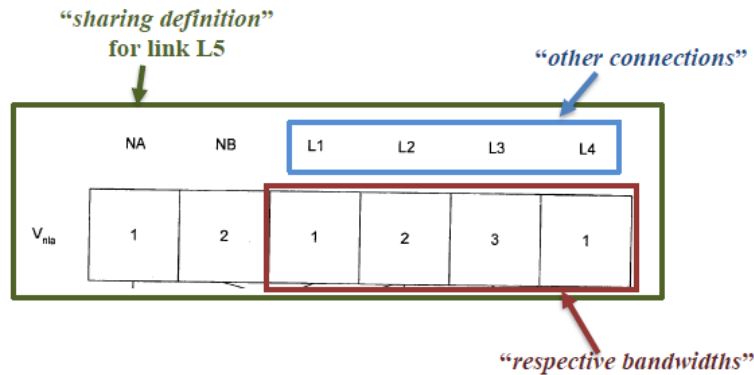
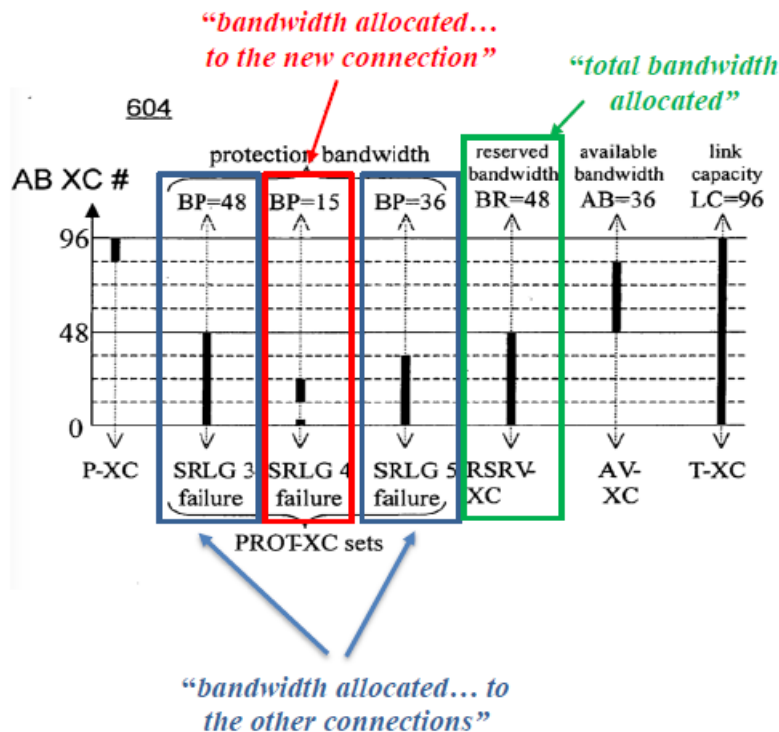


Figure 6 shows a “sharing definition” with four “other connections” (i.e., restoration paths going through link L5, shown in blue) with “respective bandwidths” (i.e., 1, 2, 3, 1, shown in red) that would “share” a bandwidth allocation with a new service, according to Petitioner. *Id.* at 37–39.

Second, Petitioner relies on Sathyanath’s “TE/Share database,” which also “contains information about bandwidth sharing that was sent to or received from other nodes,” as a “sharing definition,” referencing Figure 17. Pet. 39.

Turning to limitation 1.3, Petitioner argues that Dziong teaches a “total bandwidth allocated jointly to the new connection and to the other connections in any given segment” (i.e., RSRV-XC of 48 units for link A-B). Pet. 40–41. Petitioner provides the following second annotated version of Dziong’s Figure 6(b) (*id.* at 41):



Annotated Figure 6(b) shows, in Petitioner’s view, that the 48 units of “total bandwidth allocated” (shown in green) is “equal to a maximum of the requested bandwidth” (i.e., 15 units required to protect against failure on SRLG 4, shown in red) and “the bandwidths of the other connections in the given segment” (i.e., 48 and 36 units to recover from failure on SRLG 3 or 5, respectively, shown in blue). *Id.* at 40–42 (citing Ex. 1005 ¶¶ 63 (“The amount of bandwidth actually reserved on each incident link is the maximum of the bandwidths required to recover from any of the failures.”), 91 (“RSRV-XC represents the actual amount of bandwidth that needs to be reserved on link A-B to protect against any one SRLG failure” and “corresponds to the maximum of the protection bandwidths required by each of SRLGs 3, 4, and 5 protected by link A-B (i.e., 48 units).”)).

Again, Petitioner asserts that “Sathyanath provides further examples” of the bandwidth sharing. Pet. 42. Regarding the example of Figures 5 and 6, Sathyanath states that “the bandwidth that is reserved on link L5 is the

maximum of the bandwidth requirements associated with any single network component failure.” *Id.* at 42–43 (quoting Ex. 1006 ¶ 104). Regarding the example of Figure 17, Sathyanath discloses that when assessing recovery paths for the primary path R1-R2 having “four units of bandwidth,” “no additional bandwidth would need to be reserved on L4” because 4 units are already reserved to “protect against failures on L8 and L9” and could be shared, so the “maximum” is 4 units. Ex. 1006 ¶¶ 215, 217, 220–221; *see* Pet. 43.

c) Limitation 1.4

Limitation 1.4 recites “for each of the two or more candidate routes, calculating a cumulative additional bandwidth reservation to be allocated to the new connection in the segments along the candidate route, responsively to the sharing definition.” Petitioner argues that “[t]o calculate the cost of each link, Dziong employs a ‘link-cost function’ which considers metrics such as ‘available bandwidth’ and ‘available shared bandwidth.’” Pet. 44 (emphasis omitted) (quoting Ex. 1005 ¶ 113). Petitioner acknowledges that “Dziong provides limited examples of a link-cost function,” but points to the equation in Figure 9 for “calculating a protection path cost (CPP) that is the sum of bandwidths required on each link of a protection path, multiplied by corresponding administrative weights (AW), then divided by the new link bandwidth (12 units).” *Id.* at 44–45 (citing Ex. 1005 ¶ 132). Petitioner also notes that Dziong indicates that “the use of administrative weights is optional,” so “[w]ithout the use of administrative weights, Dziong’s Fig[ure] 9 example would include calculating the sum of the additional bandwidths required on the links.” *Id.* at 45 (citing Ex. 1005 ¶ 12).

Petitioner contends that “Sathyanath provides further details of a link-cost function,” citing the Figure 17 example where route B is chosen because less cumulative additional bandwidth would need to be reserved than for route A. *Id.* at 45–48. Also, “[b]oth Dziong and Sathyanath describe examples in which the amount of additional bandwidth to be reserved for a recovery path is zero,” which is consistent with the prosecution history of the ’088 patent according to Petitioner. *Id.* at 46 (citing Ex. 1002, 248 (“[A]ccording to the present invention, it is possible to choose a path with zero cumulative additional bandwidth reservation by virtue of bandwidth sharing”); Ex. 1005 ¶ 134; Ex. 1006 ¶¶ 204, 207, 222).

d) Limitation 1.5

Limitation 1.5 recites “selecting a preferred route having a minimum value of the cumulative additional bandwidth reservation out of the two or more candidate routes.” Petitioner argues that Dziong teaches “choosing the path with the lowest cost,” and Sathyanath similarly teaches “calculating the cost of two candidate recovery paths” and choosing the path that “would require the minimum amount of additional bandwidth to be reserved.” Pet. 48–49 (quoting Ex. 1005 ¶ 65; Ex. 1006 ¶ 200) (citing Ex. 1006 ¶¶ 205, 215, 221–222).

e) Limitation 1.6

Limitation 1.6 recites “establishing the new connection using the preferred route.” Petitioner argues that “Dziong and Sathyanath describe choosing a protection path that requires the least amount of additional bandwidth allocation.” Pet. 50. As support, Petitioner cites Dziong’s

descriptions of sending a “signal to establish the primary path and link-detour paths for the connection” and sending a “reservation setup message” to establish the link-detour path that was chosen. *Id.* (emphasis omitted) (quoting Ex. 1005 ¶¶ 58, 175). Petitioner also cites Sathyanath’s description of “pre-establishment . . . of alternative paths.” *Id.* at 50–51 (emphasis omitted) (quoting Ex. 1006 ¶ 46) (citing Ex. 1006 ¶¶ 250, 260).

f) Reasons to Combine

Petitioner argues that “Dziong expressly refers to Sathyanath by its application number (10/673,057) and incorporates Sathyanath’s contents by reference,” such that it would have been obvious to a person of ordinary skill in the art “considering Dziong to also refer to and consider Sathyanath because Dziong expressly directs and encourages this.” Pet. 22 (citing Ex. 1005 ¶ 1). Specifically, an ordinarily skilled artisan “would have found Sathyanath’s examples instructive regarding the operation of Dziong’s bandwidth-sharing concepts.” *Id.* According to Petitioner, the two references each describe “multiple examples to illustrate how their bandwidth-sharing concepts would work in various scenarios and network designs,” which a person of ordinary skill in the art would have had reason to combine. *Id.* at 22–23 (citing Ex. 1005 ¶¶ 27, 196 (stating that the described embodiments are not “mutually exclusive” and “modifications” may be made); Ex. 1006 ¶¶ 37, 295 (same)).

g) Patent Owner’s Response

Patent Owner asserts that Petitioner’s grounds fail because they focus on “reserved bandwidth that can be shared between connections in the event

of a failure rather than bandwidth sharing between existing connections that already have bandwidth allocated to them.” PO Resp. 1. Specifically, Dziong and Sathyanath fail to render obvious any of the independent claims 1, 8, 15, and 17, because they fail to teach a “sharing definition specifying one or more other connections, which have respective bandwidths and which are permitted to share a bandwidth allocation with the new connection.” *Id.* at 8 (citing Ex. 1001, limitation 1.2). According to Patent Owner, the one or more other connections specified by the sharing definition are “existing connections, rather than potential connections that can be formed to carry traffic in the event of a failure.” *Id.* at 8–9 (citing Ex. 2008 ¶¶ 57–60) (emphasis omitted). Therefore, because Dziong and Sathyanath describe using only potential connections rather than existing connections, they do not teach or suggest a sharing definition specifying “one or more other connections.” *Id.* “[T]he primary concern for both Dziong and Sathyanath is failure protection that relies on bandwidth reservation, not allocation, across links.” *Id.* at 9 (citing Ex. 2008 ¶¶ 61–62). “[T]hus, neither teach the ‘sharing definition’ as claimed by the ’088 [p]atent, which requires that ‘establishing the new connection includes sharing a bandwidth allocation in the at least one common segment between the new connection and the existing connection.’” *Id.* at 9–10 (emphasis omitted) (citing Ex. 1001, col. 3, ll. 4–10; Ex. 2008 ¶ 61).

Patent Owner states that “[i]n Dziong, the link detour paths that Petitioner points to in support of its arguments that the proposed combination discloses limitation [1.2] are not even established until there is a failure.” PO Resp. 10 (citing Ex. 1005 ¶ 60; Ex. 2008 ¶ 63). “Thus, Dziong requires there to be a failure before the path would actually be

activated.” *Id.* (citing Ex. 2008 ¶¶ 63–65). To illustrate this point, Patent Owner points to Figure 4 in Dziong, which is reproduced below.

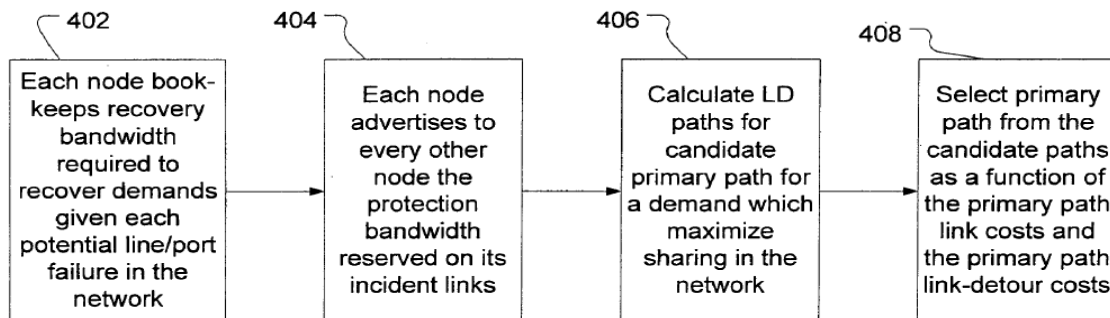


FIG. 4

Referring to Figure 4, reproduced above, Patent Owner asserts that:

Figure 4 of Dziong . . . depicts a process for calculating primary paths and link-detour (LD) paths [and] shows that “each node in the network does bookkeeping for each of its incident links of the amount of protection bandwidth that is needed to recover service in the event of each potential link failure in the network,” but does not teach any of these paths are actually established prior to link failure.

PO Resp. 10 (citing Ex. 1005 ¶ 63). “Step 404 shown in Figure 4 further highlights that the protection bandwidth is merely ‘reserved on [the] incident links.’” *Id.* (citing Ex. 2008, Fig. 4, ¶¶ 39–41).

Similarly, for Sathyanath, its “teachings draw an explicit distinction between ‘reserved bandwidth’ and ‘allocated bandwidth.’” PO Resp. 11 (citing Ex. 1006 ¶ 60). “Sathyanath explains that ‘[i]f the bandwidth [for protection paths] were allocated in advance of a failure, this would correspond, in the parlance of the field of protection and restoration for optical transport networks, to a 1:1 protection scheme.” *Id.* “Sathyanath

teaches that *allocated bandwidth cannot be shared* because it is already assigned to a path, and so, Sathyanath shows a preference for only *reserving* bandwidth so that the unallocated bandwidth can be used for other purposes.” *Id.* at 12 (citing Ex. 1006 ¶ 60). “Thus, Sathyanath teaches that sharing bandwidth between link detour paths is only an option for paths that have *reserved* and *not allocated* bandwidth.” *Id.*

h) Analysis

We agree with Patent Owner that Dziong or Sathyanath, alone or in combination, do not teach or suggest limitations 1.2 and 1.3 requiring:

providing *a sharing definition* specifying one or more *other connections*, which have respective bandwidths and which are permitted to share a bandwidth allocation with the new connection, such that a total bandwidth allocated jointly to the new connection and to the *other connections* in any given segment is equal to a maximum of the requested bandwidth and of the bandwidths of the other connections in the given segment

Ex. 1001, limitations 1.2, 1.3 (emphasis added); *see* PO Resp. 17–22; Sur-reply 4–5, 12–14. As discussed above in Section II.C.2, we interpret “other connections” to mean “existing connections in the network that already have bandwidth allocated to them.” Because the information shared in Dziong and Sathyanath, described below, relates to reserved protection paths, rather than existing connections that have bandwidth that can currently transmit network traffic, the references do not teach or suggest the “other connections” part of the sharing definition in limitations 1.2 and 1.3.

Dziong describes advertising, across the network, the amount of bandwidth reserved for recovery on each link that would be activated when a protected link fails. *See, e.g.*, Ex. 1005 ¶ 60; Pet. 36. Once activated, network traffic from a “primary path” failure is rerouted to these recovery

paths. *See* Ex. 1005 ¶¶ 7–9, 70, 83. Petitioner points to this advertising of the reserved bandwidth information as teaching the claimed “sharing definition.” Pet. 33–36 (arguing that the “protection paths [in Dziong] have bandwidth reservations” and “share an overall protection bandwidth reservation”); Reply 21–23. However, since the advertised information only contains information about the recovery paths “that would be activated” upon a primary path failure, such paths are not existing connections that already have bandwidth allocated to them, and therefore do not teach the claimed “other connections” that are part of the sharing definition. *See, e.g.*, Ex. 1005 ¶ 60.

All of Petitioner’s cited portions of Dziong for teaching the sharing definition involve “recovery paths,”⁶ indicating that those are what Petitioner asserts are the “other connections.” *See* Pet. 33–36 (citing Ex. 1005 ¶¶ 54, 60, 64, 88, 90, 91, 99, 127); Reply 20–23; *see also* Ex. 1003 ¶¶ 64–91; Ex. 2010, 64:7–72:6. For example, paragraph 60 of Dziong reads:

In embodiments of the present invention, link detour path calculation involves maximizing Sharing of link-detour bandwidth. The *recovery-path* calculation algorithm makes use of information including how much bandwidth can be shared at each link in the network. This information is obtained by advertising, across the network, *the amount of bandwidth reserved for recovery on each link* and by bookkeeping, in each node, information about all recovery paths that would be activated when a protected link fails.

Ex. 1005 ¶ 60 (emphasis added); *see* Sur-reply 4 (citing Ex. 1005 ¶ 63 and Fig. 4, and arguing that Dziong only teaches “*calculating* various protection

⁶ Paragraphs 51–56 and 99 of Dziong, for example, also describe “link-based protection” paths, which use a similar scheme and do not substantively change our analysis. Ex. 1005 ¶¶ 51–56, 99, Figs. 3, 7.

paths rather than establishing an actual connection”). “[T]he bandwidth reserved for recovery of a particular SRLG can be shared with bandwidth reserved for recovery of other disjoint SRLGs, since it is assumed that only one failure at a time will occur.” Ex. 1005 ¶ 88.

For similar reasons, we find that Sathyanath also does not teach or suggest limitations 1.2 and 1.3. Sathyanath discloses a shared database that specifies connections that share reserved bandwidth, rather than “allocated” bandwidth. Ex. 1006 ¶ 62. In the portions of Sathyanath cited by Petitioner, bandwidth is only allocated in response to a failure. *See* Pet. 36–40 (arguing that in Sathyanath, “all the restoration paths share a single bandwidth reservation”) (citing Ex. 1006 ¶¶ 21, 22, 84, 102–109, 111, 112, 114, 117, 118, 196, 215–219, 226–243, 245). “[B]ecause the protection bandwidth is only reserved and not allocated, ‘sharing’ can be supported.” Ex. 1006 ¶ 60. We agree with Patent Owner that “Sathyanath teaches that the protection paths are merely computed but not established.” *See* Sur-reply 5.

For the reasons set forth above, we determine that Petitioner has not shown by a preponderance of the evidence that claim 1 is unpatentable under 35 U.S.C. § 103(a) over the combination of Dziong and Sathyanath.

4. Claims 2–4, 6–11, and 13–20

Independent claims 8, 15, and 17 all have essentially the same “sharing definition” limitation involving the sharing of bandwidth information specifying one or more “other connections.” *See* Ex. 1001, claims 8, 15, 17. Accordingly, our analysis and conclusions for claim 1 also apply to claims 8, 15, and 17.

The remaining challenged claims are all dependent claims that depend directly or indirectly from independent claims 1, 8, 15 or 17, with Petitioner challenging claims 2–4, 6, 9–11, 13, 16, and 18–20 as obvious in view of Dziong and Sathyanath, and claims 7 and 14 as obvious in view of Dziong, Sathyanath, and Jensen. *See* Pet. 20–77. Petitioner does not rely on Jensen for the missing “other connections” limitations of parent claims 1 and 8. *See id.* at 73–77. Therefore, for the reasons described above, we determine that Petitioner has not shown by a preponderance of the evidence that claims 2–4, 6, 8–11, 13, and 15–20 are unpatentable under 35 U.S.C. § 103(a) over the combination of Dziong and Sathyanath, and has not shown by a preponderance of the evidence that claims 7 and 14 are unpatentable under 35 U.S.C. § 103(a) over the combination of Dziong, Sathyanath, and Jensen.

III. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that any of claims 1–4, 6–11, and 13–20 of the ’088 patent are unpatentable on the grounds presented.

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1–4, 6, 8–11, 13, 15–20	103(a)	Dziong, Sathyanath		1–4, 6, 8–11, 13, 15–20
7, 14	103(a)	Dziong, Sathyanath, Jensen		7, 14

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
Overall Outcome				1–4, 6–11, 13–20

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–4, 6–11, and 13–20 of the '088 patent are not determined to be 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.

IPR2024-01450
Patent 7,596,088 B2

FOR PETITIONER:

Theodore M. Foster
David L. McCombs
Eugene Goryunov
Calmann J. Clements
Mallika Dargan
HAYNES AND BOONE, LLP
ipr.theo.foster@haynesboone.com
david.mccombs.ipr@haynesboone.com
eugene.goryunov.ipr@haynesboone.com
calmann.clements.ipr@haynesboone.com
mallika.dargan.ipr@haynesboone.com

FOR PATENT OWNER:

Richard Baker
NEW ENGLAND INTELLECTUAL PROPERTY, LLC
rbaker@newenglandip.com

Yehuda Binder
ORCKIT IP LLC
yehuda@maypatents.com

James R. Nuttall
Sadaf Misbah
Katherine D. Cappaert
STEPTOE LLP
jnuttall@steptoe.com
sadaf.misbah2@gmail.com
kcappaert@steptoe.com