

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

PORTSMOUTH NETWORK CORP.,
Patent Owner.

IPR2024-00503
U.S. Patent No. 7,035,279 B2

**PETITIONER'S NOTICE OF APPEAL TO THE
UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT**

via P-TACTS
Patent Trial and Appeal Board

via Email
Director of the United States Patent and Trademark Office
efileSO@uspto.gov

via CM/ECF
United States Court of Appeals for the Federal Circuit

Pursuant to 28 U.S.C. § 1295(a)(4)(A), 35 U.S.C. §§ 141(c), 142, and 319, and 37 C.F.R. §§ 90.2(a), 90.3, 5 U.S.C. §§ 701–706, and Federal Circuit Rule 15(a)(1), Petitioner Cisco Systems, Inc. (“Petitioner”) provides notice that it appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision of the Patent Trial and Appeal Board (“Board”) entered August 4, 2025 (Paper 24), and from all underlying and related orders, decisions, rulings, and opinions regarding U.S. Patent No. 7,035,279 B2 (“the ’279 patent”) in *Inter Partes* Review IPR2024-00503.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), the expected issues on appeal include, but are not limited to: the Board’s error(s) in determining that Petitioner has failed to demonstrate that challenged claims 1–18 of the ’279 patent are unpatentable, and any finding or determination supporting or related to those determinations, as well as all other issues decided adversely to Petitioner in any orders, decisions, rulings, or opinions in *Inter Partes* Review IPR2024-00503.

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), this Notice is being filed with the Director of the United States Patent and Trademark Office and with the Patent Trial and Appeal Board. In addition, a copy of this Notice and the required docketing fees are being filed with the Clerk’s Office for the United States Court of Appeals for the Federal Circuit via CM/ECF.

Respectfully submitted,

Dated: August 27, 2025

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CERTIFICATE OF FILING

The undersigned hereby certifies that, in addition to being electronically filed through PTAB P-TACTS, a true and correct copy of the above-captioned PETITIONER'S NOTICE OF APPEAL TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT is being filed by email with the Director on August 27, 2025, at efileSO@uspto.gov.

The undersigned also hereby certifies that a true and correct copy of the above-captioned PETITIONER'S NOTICE OF APPEAL TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT and the filing fee is being filed via CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit on August 27, 2025.

Respectfully submitted,

Dated: August 27, 2025

/Theodore M. Foster/

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, this is to certify that a true and correct copy of the foregoing "Petitioner's Notice of Appeal to the United States Court of Appeals for the Federal Circuit" was served on counsel for Patent Owner Portsmouth Network Corp. as detailed below:

Date of service August 27, 2025

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UNITED STATES PATENT AND TRADEMARK OFFICE

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Patent Owner.

IPR2024-00503
Patent 7,035,279 B2

Before ST. JOHN COURTENAY III, JUSTIN T. ARBES, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

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

I. INTRODUCTION

Cisco Systems, Inc. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–18 (“the challenged claims”) of U.S. Patent No. 7,035,279 B2 (Ex. 1001, “the ’279 patent”). Paper 2 (“Pet.”). Portsmouth Network Corp. (“Patent Owner”) filed a Preliminary Response. Paper 6. After considering the Petition, the Preliminary Response, and the evidence of record, the Board instituted an *inter partes* review of the challenged claims. Paper 7. Thereafter, Patent Owner filed a Response to the Petition (Paper 12, “PO Resp.”), Petitioner filed a Reply (Paper 15, “Reply”), and Patent Owner filed a Sur-reply (Paper 16, “Sur-reply”). We held an oral hearing in this proceeding on May 5, 2025, and a transcript of the hearing has been entered into the record. Paper 23 (“Tr.”).

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.

II. BACKGROUND

A. *Real Parties in Interest*

The parties identify themselves as the real parties in interest. Pet. 86; Paper 4, 2 (Patent Owner’s Mandatory Notices).

B. *Related Matters*

The parties indicate that the ’279 patent was previously involved in *Portsmouth Network Corp. v. Cisco Systems, Inc.*, No. 2:23-cv-441 (E.D. Tex.) (“the Cisco litigation”). Pet. 86; Paper 4, 2. Petitioner reports that the Cisco litigation was dismissed without prejudice on December 27, 2024, and

that there is no longer any active copending litigation involving the '279 patent. Reply 5.

C. The '279 Patent

The '279 patent, titled “Flow Allocation in a Ring Topology,” relates to “methods and systems for efficient allocation of resources for data flow” in communication networks. Ex. 1001, codes (54), (57), 1:6–9. The '279 patent explains that, “[i]n preferred embodiments of the present invention, a communication network comprises a plurality of nodes, which are preferably arranged in a ring topology,” and “[t]he nodes are capable of transmitting data around the ring in either a clockwise or a counterclockwise direction, or in other words, . . . over an inner or an outer ring within the network.” *Id.* at 2:19–25. “A dispatcher, preferably in the form of a process running on one of the nodes, learns the topology of the network and tracks the use of network resources by each of the nodes while the network is running.” *Id.* at 2:25–28. The '279 patent explains that the term “resources,” as used “throughout the specification and claims . . . , refers not only to bandwidth, but also to processing power used to transmit, receive, encrypt or decrypt data, as well as to any other allowable factor that may affect the ability of a network link to convey a data flow between nodes.” *Id.* at 2:12–18.

“Whenever a node needs to use network resources to carry a data flow to another node, it first determines whether it already has sufficient resources allocated to it in order to convey the data flow.” *Id.* at 2:28–32. “If the node does not have sufficient resources, it requests an allocation from the dispatcher.” *Id.* at 2:32–33. “Based on the levels of resource use on the links of the inner and outer rings, the dispatcher processes the request and determines whether to allocate the resources and, if so, on which of the rings.” *Id.* at 2:33–37. “Resources are allocated in quanta in order to limit

the frequency with which allocation and deallocation operations must be performed.” *Id.* at 5:28–30.

Figure 1 of the '279 patent is reproduced below.

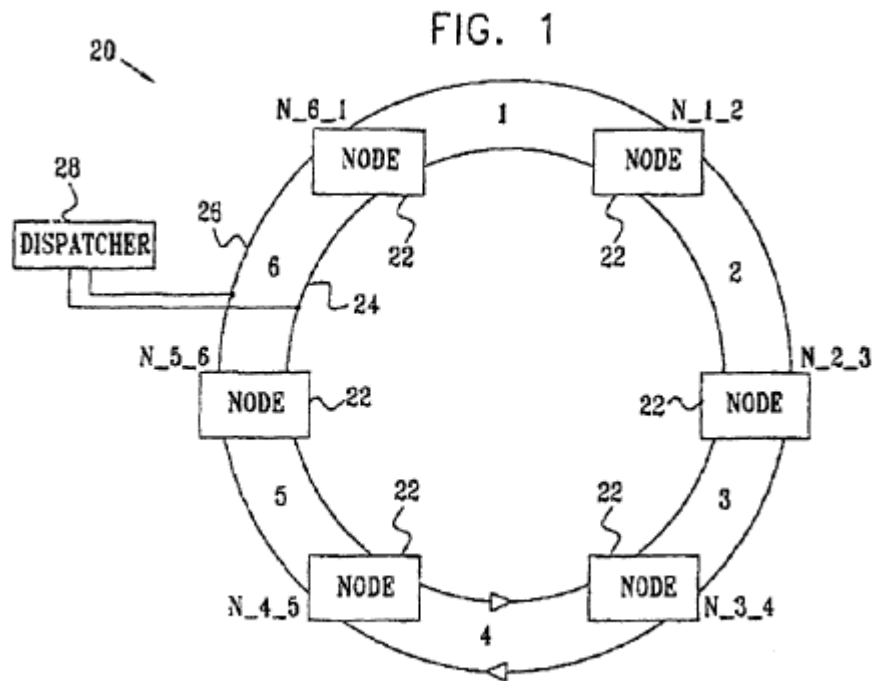


Figure 1, above, is “a block diagram that schematically illustrates a ring network with a dispatcher for controlling data flow, in accordance with a preferred embodiment” of the '279 patent. Ex. 1001, 4:3–6. With reference to Figure 1, network 20 is depicted as including nodes 22, which are connected by links 1–6. *Id.* at 4:32–38. “Each node is identified by the two links that are connected to it, i.e., N_1_2 between links 1 and 2, and so forth up to N_6_1,” and “[e]ach node can communicate with every other node over either a counterclockwise or a clockwise path around the ring.” *Id.* at 4:38–42. “Following SRP [Spatial Reuse Protocol] convention, these two paths are identified [in Figure 1] as an inner ring 24 and an outer ring 26, each of which is made up of segments corresponding to the physical links between the nodes.” *Id.* at 4:42–45. Also shown in Figure 1, dispatcher 28

“tracks the use of resources in network 20 and allocates resources to nodes 22 as required.” *Id.* at 4:46–47. Although depicted in Figure 1 “as an entity that is separate from the network nodes,” dispatcher 28 “[a]lternatively . . . may be associated with one of the nodes, typically as a software process running on the node.” *Id.* at 4:47–51.

Figure 3 of the '279 patent is reproduced below.

FIG. 3

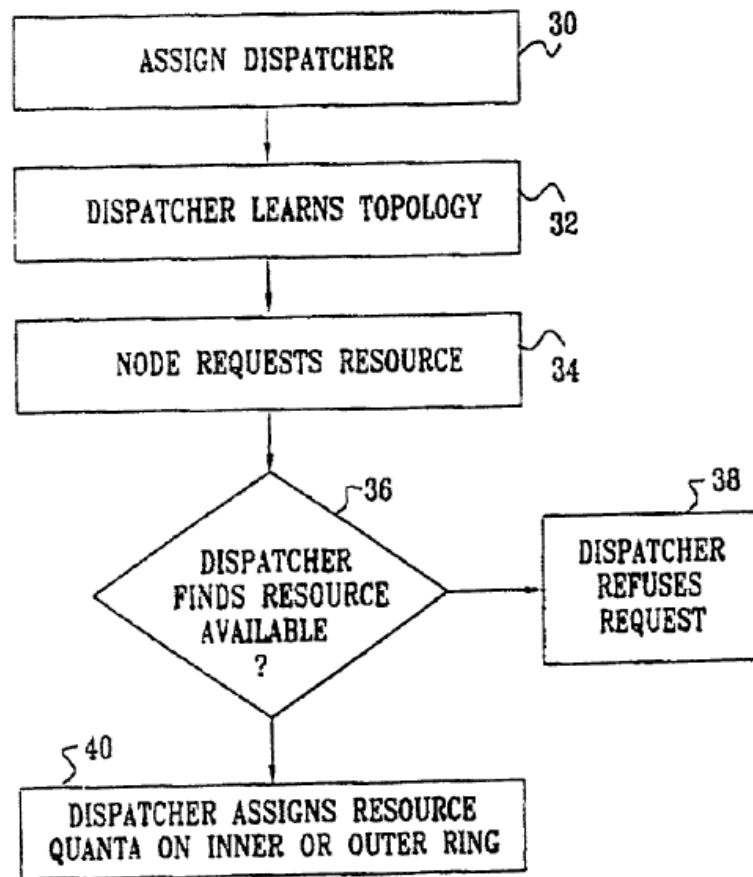


Figure 3, above, is “a flow chart that schematically illustrates a method for assigning network resources to network nodes, in accordance with a preferred embodiment” of the '279 patent. Ex. 1001, 4:9–12, 5:59–61. With reference to Figure 3, the '279 patent explains that the dispatcher entity is

chosen or assigned within network 20 in preparation for the illustrated method at assignment step 30. *Id.* at 5:61–63. In the case in which dispatcher 28 runs on one of nodes 22, as mentioned above, “the dispatcher is preferably chosen by the nodes from among themselves using a suitable network management protocol.” *Id.* at 5:64–67. “At learning step 32, dispatcher 28 learns the topology of rings 24 and 26 using methods known in the art, as specified by SRP (RFC 2892), for example, and builds . . . tables of network information to be used subsequently in flow allocations.” *Id.* at 6:6–10.

According to the ’279 patent, “[w]hen a node receives a request from one of its clients to send data to another node, the node first checks to determine whether it has sufficient resources already allocated to it in order to service the request.” Ex. 1001, 6:11–14. “If the allocated resources are inadequate, the node submits a resource request to the dispatcher, indicating the destination node, at a request step 34.” *Id.* at 6:14–17. At “availability checking step 36,” “[t]he dispatcher then checks whether there are resources available to the node on either the inner or the outer ring.” *Id.* at 6:17–19. According to the ’279 patent, “[t]here must both be sufficient unallocated resources left in the specific node budget and unused resources left on the appropriate segments of at least one of the rings in order for the dispatcher to grant the node’s resource request”; and “[i]f not, the dispatcher refuses the request, at a refusal step 38, and the node returns an appropriate error report to the client application.” *Id.* at 6:19–25. “If resources are available, however, the dispatcher determines on which of the rings to allocate the resources, at an assignment step 40,” and “allocates one or more additional quanta to the node on the selected ring,” allowing the node to carry out the data transmission. *Id.* at 6:29–34. “If both rings have sufficient resources

available on all of the relevant segments, then the dispatcher proceeds to choose the ring that has, generally speaking, the lower level of current resource allocation, . . . and to assign the requested resources on this ring at step 40.” *Id.* at 8:1–6. In one embodiment, the ’279 patent describes that relative resource “usage levels” can be compared for all relevant segments on both rings to select a path for the data flow. *Id.* at 8:9–11.

D. Illustrative Claim

Of the challenged claims, claims 1 and 15 are independent. Claim 1, reproduced below with bracketed reference numerals corresponding to those used by the parties,¹ is illustrative of the claimed subject matter.

1. [1.0] In a communication network that includes a plurality of nodes interconnected by links, the nodes including at least first and second nodes, a method for routing a data flow, comprising:

[1.1] allocating a respective number of quanta of one or more resources in the network to each of the nodes;

[1.2] receiving a request at the first node to use a portion of the resources so as to carry the data flow between the first and second nodes over one of a plurality of paths therebetween, each such path comprising a respective sequence of the links; and

[1.3] in response to the request:

if the resources already allocated to the first node on one of the paths are sufficient, directing the data flow from the first node to the second node over the one of the paths without requesting additional resources; and

[1.4] if the resources already allocated to the first node are insufficient, performing the following steps:

[1.5] requesting an increase in an allocation to the first node of the requested resources;

¹ For clarity, the placement of the bracketed reference numerals has been modified slightly from the parties’ placement.

- [1.6] determining, for the links comprised by each of the paths, respective levels of use of the requested resources due to communications in progress over the network;
- [1.7] selecting which of the paths is to carry the data flow responsive to the determined levels of use of the requested resources on the links comprised in each of the paths; and
- [1.8] increasing the allocation of the resources to the first node on the selected path by a predetermined quantum.

Ex. 1001, 9:21–53; *see* Pet. 26–50; PO Resp. 2–3.

E. Challenges to Patentability

Petitioner challenges claims 1–18 on the following grounds:

Claim(s) Challenged	35 U.S.C. §²	Reference(s)/Basis
1–5, 9–18	103(a)	Kovvali, ³ Kalman ⁴
6	103(a)	Kovvali, Kalman, Masters ⁵
7, 8	103(a)	Kovvali, Kalman, RFC 2892 ⁶

Pet. 13.

Petitioner filed a declaration of Dr. Nader F. Mir (Ex. 1003) in support of the Petition. Patent Owner filed a declaration of James Oliver,

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the filing date of the application for the ’279 patent was before that date, we refer to the pre-AIA versions of §§ 102 and 103.

³ Kovvali et al., US 6,920,113 B1, issued July 19, 2005, filed Mar. 28, 2000 (Ex. 1005).

⁴ Kalman et al., US 6,680,912 B1, issued January 20, 2004, filed Mar. 3, 2000 (Ex. 1006).

⁵ Masters et al., US 5,920,697, issued July 6, 1999, filed July 11, 1996 (Ex. 1007).

⁶ D. Tsiang & G. Suwala, *The Cisco SRP MAC Layer Protocol*, Request for Comments 2892, Network Working Group (Aug. 2000) (Ex. 1018).

Ph.D. (Ex. 2004) in support of the Patent Owner Response. The parties have entered transcripts of depositions of Dr. Mir (Ex. 2006) and Dr. Olivier (Ex. 1026) into the record.

III. 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 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. *Dynamic Drinkware*, 800 F.3d 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 patent claim is unpatentable under pre-AIA 35 U.S.C. § 103(a) if “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 to a person having ordinary skill in the art to which said subject matter pertains.” The question of obviousness is resolved based on underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when presented, objective evidence of obviousness or nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)). A patent claim “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *Id.* In particular, “[a]lthough 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) (alteration in original) (quoting *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1368 (Fed. Cir. 2012) (emphases added)). 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*, 688 F.3d at 1360); *see KSR*, 550 U.S. at 418. A petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements,” but “must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016); *see also In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (a finding of a motivation to combine “must be supported by a ‘reasoned explanation’” (citation omitted)).

B. Level of Ordinary Skill in the Art

Determining whether an invention would have been obvious under 35 U.S.C. § 103 requires resolving the level of ordinary skill in the pertinent art at the time the invention was made. *Graham*, 383 U.S. at 17. The person of ordinary skill in the art is a hypothetical person who knows the relevant art. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors to be considered in determining the level of ordinary skill in the art include the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* One or more factors may predominate. *Id.*

Petitioner contends that a person of ordinary skill in the art in the field of the '279 patent in January 2001 “would have had a working knowledge of the network communication technologies that are pertinent to the '279 patent, including network flow allocation in a ring topology.” Pet. 12. More specifically, Petitioner argues, a person of ordinary skill in the art “would have had a master’s degree in computer science, computer engineering, or an equivalent, and two years of professional experience relating to network communications and resource allocations,” where “[a]dditional work experience can substitute for specific educational background, and vice versa.” *Id.* (citing Ex. 1003 ¶ 20).

Patent Owner represents that it “does not dispute Petitioner’s definition” for the purposes of its Response. PO Resp. 5. We find Petitioner’s proposal is consistent with the evidence of record, including the asserted prior art and the '279 patent, and, therefore, we likewise adopt Petitioner’s proposed definition of the level of ordinary skill in the art for purposes of this Decision.

C. Claim Construction

In an *inter partes* review, we apply the same claim construction standard as would be used by a district court to construe a claim in a civil action involving the validity or infringement of a patent. 37 C.F.R. § 42.100(b). Under that standard, claim terms are given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc); *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012). “The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Neither party contends that any formal claim construction is necessary. *See* Pet. 12 (“Petitioner submits that, for the purposes of this proceeding and the grounds presented herein, no claim term requires express construction.”); PO Resp. 4 (“Here, at this stage in the proceeding, Patent Owner will apply the ordinary and customary meaning to the ’279 Patent’s claim terms.”). Patent Owner notes, however, that Petitioner had asserted specific constructions in the Cisco litigation for the term “predetermined,” as recited in claims 1, 10, 14–16, and 18, and for the term “quantum.” PO Resp. 4. Specifically, according to Patent Owner, Petitioner proposed that “predetermined” be construed as “determined before the data flow request” and that “quantum” be construed as “an amount of a requested resource by which to increase or decrease.” *Id.* (citing Ex. 2007). Patent Owner contends

that Petitioner has failed to address these constructions or explain how the asserted prior art combinations disclose or render obvious the challenged claims under these constructions. *Id.* Because our conclusion that Petitioner has not demonstrated that any of the challenged claims are unpatentable does not turn on the construction of either “predetermined” or “quantum,” there is no need for us to construe those terms. *See Realtime Data*, 912 F.3d at 1375.

D. Alleged Obviousness Over Kovvali and Kalman

Petitioner alleges claims 1–5 and 9–18 of the ’279 patent would have been obvious over Kovvali and Kalman. Pet. 16–67; Reply 12–27. Patent Owner contends in response that Petitioner fails to articulate a valid motivation to combine Kovvali with Kalman and that the cited references fail to render the challenged claims obvious. PO Resp. 9–18; Sur-reply 5–19. Having considered the arguments and evidence before us, we conclude that Petitioner has not established by a preponderance of the evidence that any of claims 1–5 and 9–18 are unpatentable on this ground.

1. Kovvali

Kovvali, titled “Transport of Isochronous [sic] and Bursty Data on a SONET Ring,” describes methods and apparatus for using synchronous optical network (SONET) technology to efficiently carry data and voice traffic. Ex. 1005, codes (54), (57). Kovvali discloses that “communication according to the SONET standard makes use of a ring architecture in which a number of communication nodes are connected by optical links to form a ring,” where “[e]ach of the nodes are coupled to two neighboring node[s] by optical paths.” *Id.* at 1:48–54. According to Kovvali, “[a] variety of types of SONET rings are used,” including UPSRs (unidirectional path switched rings), in which “all communication between nodes travels in one direction around the ring,” and BLSRs (bi-directional line switched rings), in which

“communication travels between nodes on the ring in both directions.” *Id.* at 2:10–16. However, while “[t]raditional SONET equipment has several desirable features,” Kovvali further explains, “the SONET framing structure, virtual tributary approach and payload mapping are not well suited to carrying data at rates that do not match the SONET signal hierarchy, or that exhibit bursty or time-varying rates.” *Id.* at 4:25–34. Accordingly, Kovvali purports to provide “a method and apparatus for using SONET technology to efficiently carry both data and voice traffic by Add/Drop Multiplexing of both isochronous traffic, such as voice and video, and nonisochronous traffic, such as data, in a SONET/SDH fiber-optic ring topology,” where “[a] portion of a SONET/SDH [(synchronous digital hierarchy)] frame structure (STS-1, STM-1 etc.) is shared by a number of nodes connected to an optical SONET/SDH ring (either directly or sitting behind a SONET/ADM [(add/drop multiplexer)]).” *Id.* at 4:35–43. “The inherent column structure of the SONET/SDH frame is used to define dynamic channels (flexible bandwidth channels) between the nodes,” and “[e]ach dynamic channel can be assigned a priority and optionally a minimum bandwidth.” *Id.* at 4:43–47. “The channel to column mapping is varied dynamically for data traffic by a centralized bandwidth manager which serves as an arbiter for requests for bandwidth,” and “[b]oth isochronous traffic and best effort data traffic may be carried in an STS-1 frame thereby allowing over-subscribing and statistical multiplexing of data channels over the unassigned portion of the STS-1 frame.” *Id.* at 4:47–54.

Figure 4 of Kovvali is reproduced below:

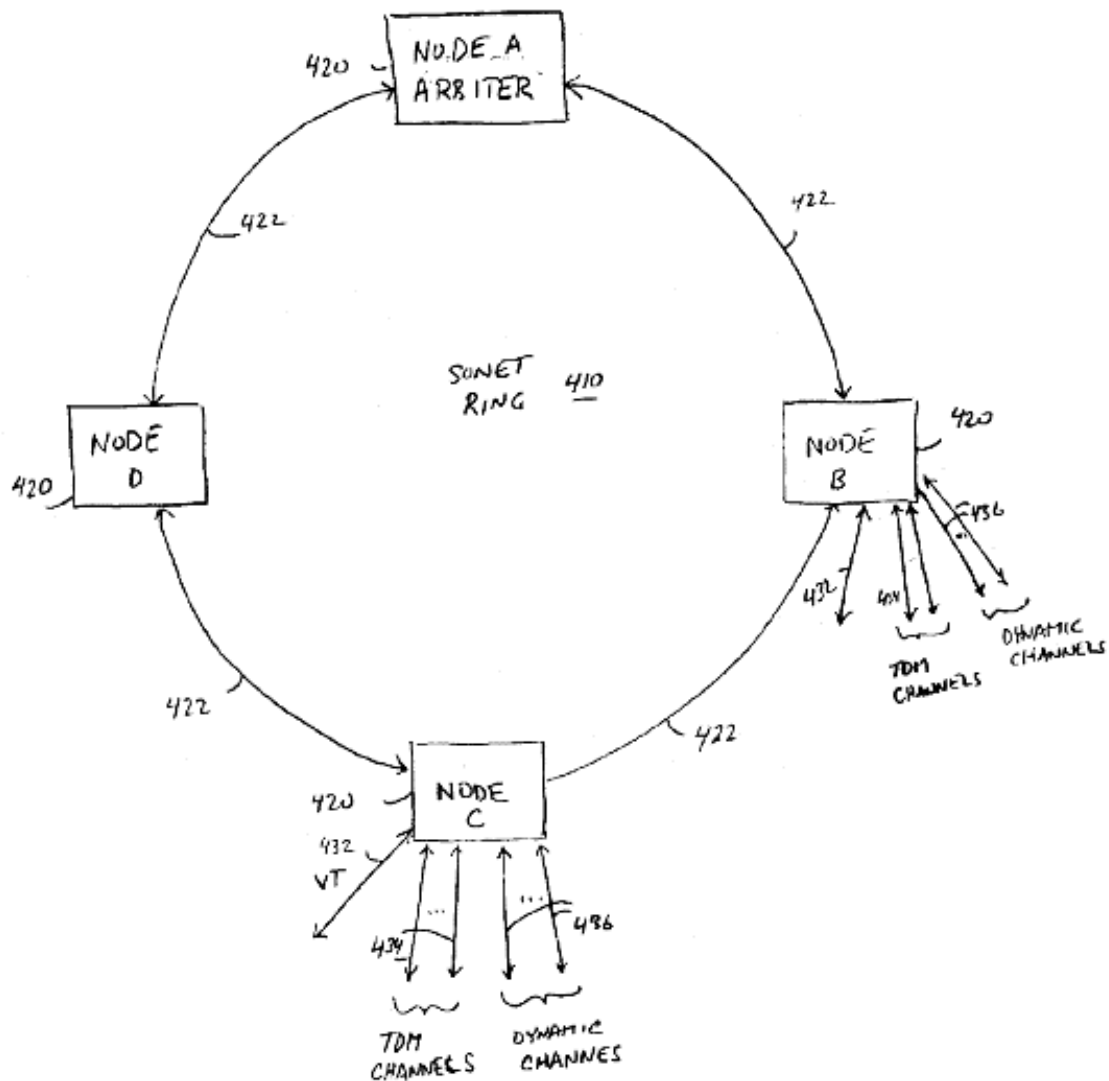


FIG. 4

Figure 4, above, is “a block diagram of a SONET ring in which bandwidth is dynamically managed by an arbiter on the ring.” Ex. 1005, 8:1–2. With reference to Figure 4, SONET nodes 420 A–D are coupled over optical links 422 in ring 410. *Id.* at 8:19–21. Kovvali explains that although ring 410 is shown in Figure 4 as a unidirectional ring, “[i]n alternative embodiments,

other types of rings, such as a BLSR (bi-directional line switched ring) in which communication between nodes on the ring travels in both clockwise and counterclockwise directions, are used.” *Id.* at 8:30–36. With continued reference to Figure 4, Kovvali explains that data may be passed not only over standard rate virtual tributaries 432 between nodes 420 but also over isochronous time division multiplexed (TDM) channels 434 and dynamic channels 436 between nodes. *Id.* at 8:37–41. Moreover, “[d]ynamic channels 436 can be repeatedly assigned to communication between different nodes after SONET ring 410 is provisioned,” and “the data rate assigned to any particular dynamic channel 436 can be dynamically changed, for example to accommodate time-varying data rate requirements of bursty communication between nodes.” *Id.* at 8:47–53. “In order to dynamically manage the TDM and dynamic channels, one node 420 is assigned to be the arbiter node at the time the ring is provisioned,” and “[t]he remaining nodes that make use of the TDM and dynamic channels are client nodes.” *Id.* at 9:1–5.

In Figure 4, “node A is the arbiter node and the remaining nodes are client nodes.” Ex. 1005, 9:5–6. “Requests to assign dynamic channels for communication between particular nodes are sent from [] client nodes to the arbiter,” which “responds to the requests by assigning dynamic channels to particular nodes, and by adjusting the allocated rates for the dynamic channels.” *Id.* at 9:6–11.

Figure 5A of Kovvali is reproduced below:

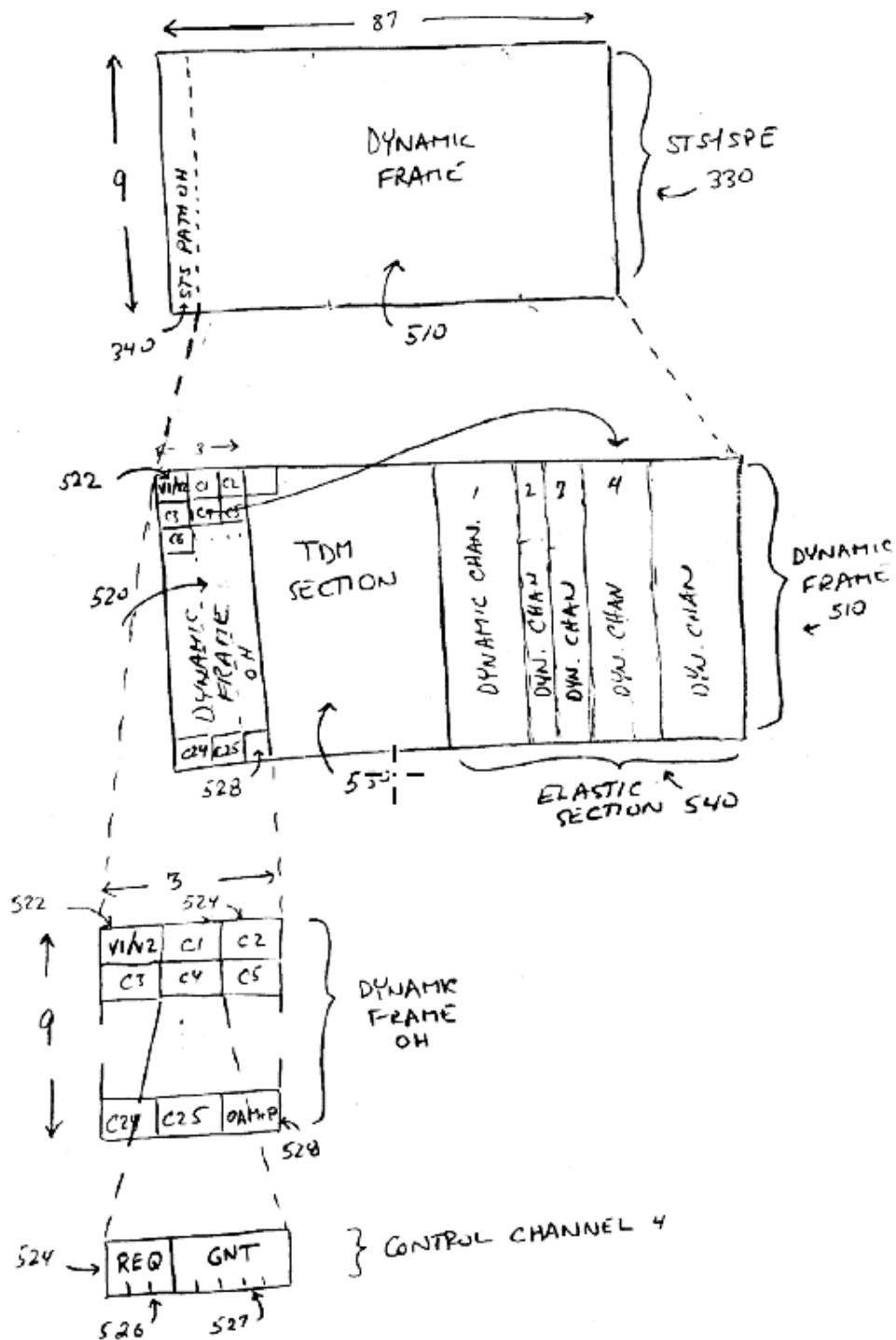


FIG. 5A

Fig. 5A, above, is a diagram illustrating a SONET STS-1 frame 510 that includes dynamically managed sections 520, 530, 540. Ex. 1005, 8:3-4,

9:48–10:5. In particular, dynamic frame overhead section 520 is “used to transport dynamic bandwidth management information between nodes 420 and the arbiter node,” TDM section 530 is “used for statically configured isochronous circuits between nodes,” and elastic section 540 “carries channels that are dynamically allocated and that typically carry bursty data.” *Id.* at 9:49–10:1. According to Kovvali, “each dynamic channel is allocated zero or more columns of elastic section 540, and is used for communication between two or more nodes 420,” and “[e]ach . . . is associated with a particular control channel in dynamic frame overhead section 520.” *Id.* at 10:3–7.

2. *Kalman*

Kalman, titled “Selecting a Routing Direction in a Communications Network Using a Cost Metric,” describes communication networks that include two or more rings, “wherein a first ring transmits data in a ‘clockwise’ direction (or direction 0), and the other ring transmits data in a ‘counterclockwise’ direction (or direction 1 opposite to direction 0).” Ex. 1006, codes (54), (57), 1:7–8, 2:61–66. “During normal operations (i.e., all spans operational and undegraded), data between nodes flows on the ring that provides the lowest-cost path to the destination node.” *Id.* at 3:1–3. “If traffic usage is uniformly distributed throughout the network the lowest-cost path is typically the minimum number of hops to the destination node,” such that “both rings are fully utilized during normal operations.” *Id.* at 3:3–7. Further, “[e]ach node determines the lowest-cost path from it to every other node on the ring,” which requires that “each node must know the network topology.” *Id.* at 3:7–9. “The nodes periodically test the bit error rate of the links (or the error rate is constantly calculated) to detect a fault in one of the links,” and “[t]he detection of such a fault sends a broadcast signal to all

nodes to reconfigure a routing table within the node so as to identify the optimum routing of source traffic to the destination node after the fault.” *Id.* at code (57). “Specific techniques are described for identifying a failed link, communicating the failed link to the other nodes, differentiating between protected and unprotected classes of traffic, and updating the routing tables.” *Id.* Further, “all nodes know the status of the network and all independently identify the optimal routing path to each destination node when there is a fault in any of the links.” *Id.* at 3:18–20.

In a preferred embodiment, a given packet/flow between two nodes is transmitted in only a single direction around that network and is removed from the ring by the destination node. *Id.* at 4:40–43. This is illustrated in Figure 3 of Kalman, reproduced below:

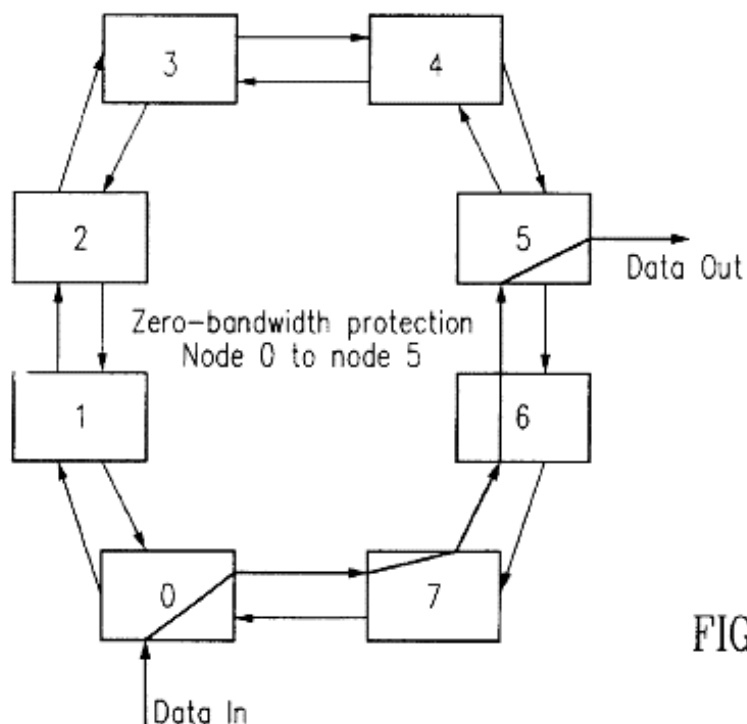


FIG. 3

Figure 3, above, illustrates a network in accordance with an embodiment of Kalman. Ex. 1006, 3:64–67. With reference to Figure 3, Kalman explains

that “node 0 transmits information to node 5 in only the direction indicated by the thick arrows,” whereas “[a] transmission from node 5 to node 0 would only go through nodes 6 and 7 in the opposition direction,” “allow[ing] for optimized ring capacity utilization.” *Id.* at 4:40–48.

Kalman further describes a mechanism which allows a node in a ring network to rapidly re-route paths that cross broken links. Ex. 1006, 7:45–11:6. Specifically, “[f]or each destination node *j*, a cost is assigned to each output direction (0 and 1) from node 0 on the ring,” where “node 0 is the source node.” *Id.* at 7:48–51. “A preferred direction for traffic from nodes 0 to *j* is selected based on the direction with the lowest cost.” *Id.* at 7:51–53. “A table is maintained at each node with the columns Destination Node, direction 0 cost, and direction 1 cost.” *Id.* at 7:64–65. An example is shown as Table 1, below:

TABLE 1

<u>Preferred direction table at node 0</u>			
Destination Node	Direction 0 cost	Direction 1 cost	Preferred Direction
1	1	7	0
2	2	6	0
3	3	5	0
4	4	4	0
5	5	3	1
6	6	2	1
7	7	1	1

Id. at 7:65–66, 8:21–33. “The computation of the cost on a direction from node 0 (assuming node 0 as the source) to node *j* may take into account a variety of factors,” including “the number of hops from source to destination in that direction, the cumulative normalized bit error rate from source to

destination in that direction, and the level of traffic congestion in that direction,” and “[b]ased on these costs, the preferred output direction for traffic from the source to any destination can be selected directly.” *Id.* at 7:66–8:7. According to Kalman, “[t]he preferred direction is that with the lower cost to reach destination node j.” *Id.* at 8:34–35. “In the event that the costs to reach node j on direction 0 and on direction 1 are equal, then either direction can be selected.” *Id.* at 8:35–37.

3. Independent Claim 1

a. Petitioner’s Contentions

- i. *Preamble [1.0]: “In a communication network that includes a plurality of nodes interconnected by links, the nodes including at least first and second nodes, a method for routing a data flow, comprising:”*

Petitioner argues that, “[t]o the extent that the preamble is limiting, Kovvali renders it obvious.” Pet. 26–27 (citing Ex. 1003 ¶¶ 57–61). In support of that contention, Petitioner quotes Kovvali’s disclosure of “a method for communicating between multiple nodes of a communication system in which a series of fixed-length frames pass between the nodes of the system,” where the nodes may be IP-based routers that route a data flow in a ring topology and are coupled over optical links. *Id.* (quoting Ex. 1005, 4:55–58) (citing Ex. 1003 ¶¶ 58–60; Ex. 1005, 4:12–14, 4:35–40, 8:19–21, Fig. 4).

- ii. *[1.1]: “allocating a respective number of quanta of one or more resources in the network to each of the nodes;”*

Petitioner contends that step [1.1] is rendered obvious by Kovvali. Pet. 27–32. In support, Petitioner first cites Kovvali’s teaching of assigning one node to be the “arbiter node” at the time the ring is provisioned, the

remaining nodes being “client nodes,” where the arbiter node “assigns dynamic channels to particular nodes,” “provid[es] . . . initial data rate allocations for each of the dynamic channels,” and “adjust[s] the allocated rates for the dynamic channel” in response to requests from client nodes. *Id.* at 27–29 (emphasis omitted) (citing Ex. 1003 ¶¶ 63–65; Ex. 1005, 9:1–11, 12:1–6).

Petitioner further argues that “Kovvali teaches that each dynamic channel is allocated zero or more columns (‘*quanta*’) in a frame structure.” Pet. 29 (citing Ex. 1003 ¶¶ 66, 71; Ex. 1005, 10:3–5); *see also id.* at 29–31 (citing Ex. 1003 ¶¶ 67–72; Ex. 1005, 2:36–39, 2:55–58, 2:66, 4:43–46, 9:48–66, 12:6–7, Figs. 3, 5A). In particular, Petitioner contends, “Kovvali’s allocation of bandwidth to dynamic channels assigned to nodes is much like the example of allocating ‘*resources*’ in the ’279 patent specification, such as ‘bandwidth’ or ‘any other allowable factor that may affect the ability of a network link to convey a data flow between nodes,’” “render[ing] obvious ‘*allocating a respective number . . . of one or more resources in the network to each of the nodes.*’” *Id.* at 31 (alteration in original) (citing Ex. 1001, 2:12–18; Ex. 1003). Further, Petitioner contends, “it would have been obvious to a [person of ordinary skill in the art] that allocating bandwidth in ‘units of columns’ is allocating bandwidth in ‘*quanta*’ because each column is the smallest discrete unit of bandwidth that can be allocated to a dynamic channel.” *Id.* (citing Ex. 1003 ¶ 74); *see also id.* at 31–32 (citing Ex. 1003 ¶¶ 62, 74–76; Ex. 1005, 2:56–58, 5:28–30).

- iii. [1.2]: “receiving a request at the first node to use a portion of the resources so as to carry the data flow between the first and second nodes over one of a plurality of paths therebetween, each such path comprising a respective sequence of the links; and”

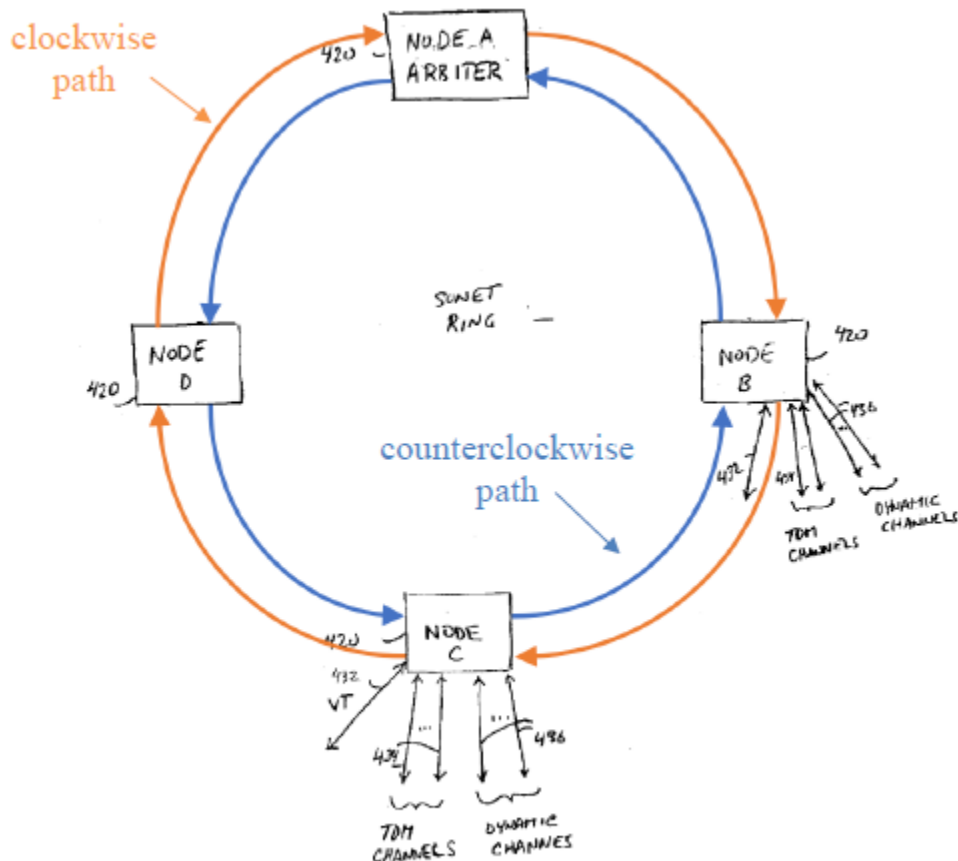
Petitioner contends that step [1.2] is rendered obvious by Kovvali. Pet. 32–36. First, Petitioner maps Kovvali’s disclosure that “each dynamic channel . . . is used for communication between two or more nodes 420” to the claim recitation “carry [the] data flow between the first and second nodes.” *Id.* at 32 (alteration in original) (quoting Ex. 1005, 10:3–5) (citing Ex. 1003 ¶ 78). Petitioner then contends, “Kovvali describes that ‘each node 420 functions as an add/drop multiplexer for the . . . dynamic channels,’” referencing Figures 4 and 6 of Kovvali as illustrating receipt by nodes 420 of data from local dynamic channels 436 for transmission. *Id.* at 32–35 (citing Ex. 1003 ¶¶ 79–82; Ex. 1005, 12:20–24, 14:27–37, Figs. 4, 6). Based on those teachings, Petitioner argues, a person of ordinary skill in the art

would have understood that the receipt of data from local dynamic channels by a node (e.g. Node B or Node C) for transmission to another node, renders obvious “receiving a request at the first node to use a portion of the resources” because it is a request for the node to process (e.g. queue, schedule, police) and multiplex the data onto the portion of network resources allocated by the arbiter (as discussed in [1.1]) to the node for the respective dynamic channels in the dynamic frame.

Id. at 35 (citing Ex. 1003 ¶ 83).

With respect to the recitation “over one of a plurality of paths therebetween, each such path comprising a respective sequence of the links,” Petitioner cites Kovvali’s disclosure that, while Figure 4 “depicts ‘a

UPSR . . . in which all communication between nodes travels in one direction,” alternative embodiments “include other types of rings such as ‘a BLSR . . . in which communication between nodes on the ring travels in both clockwise and counterclockwise directions, with two unidirectional optical links joining each pair of neighboring nodes.” Pet. 35 (quoting Ex. 1005, 2:10–16) (citing Ex. 1003 ¶ 84; Ex. 1005, 8:33–36). To illustrate, Petitioner provides the following modified version of Kovvali’s Figure 4, depicting use of a BLSR as suggested:



Ex.1005, Fig. 4 (modified and annotated); Ex.1003, ¶85.

Id. at 35–36. Modified Figure 4 above “shows each pair of nodes connected with two unidirectional optical links traveling in opposite directions” in place of the bi-directional links shown in the original figure. *Id.* “As shown in modified Figure 4, . . . the resulting network includes two paths for

transmitting data between nodes: a first path with a sequence of links in a clockwise direction (orange) and a second path with a sequence of links in a counterclockwise direction (blue).” *Id.* at 36 (citing Ex. 1003 ¶ 86).

Petitioner concludes, “Kovvali’s disclosure of a node receiving, processing, and multiplexing data from local dynamic channels onto a ring network that is connected to other nodes with two unidirectional optical links traveling in opposite directions, renders obvious this limitation.” *Id.* (citing Ex. 1003 ¶¶ 77, 87).

- iv. [1.3]: “*in response to the request: if the resources already allocated to the first node on one of the paths are sufficient, directing the data flow from the first node to the second node over the one of the paths without requesting additional resources; and*”

Referring back to its arguments with respect to steps [1.1] and [1.2] regarding Kovvali’s description of assignment of dynamic channels and data rate allocations by the arbiter node and multiplexing of outbound data by each terminating node for transmission onto the dynamic channel, respectively, Petitioner contends that a person of ordinary skill in the art

would have understood that adding (or multiplexing) data for transmission into the portion of a frame that is already allocated to a dynamic channel, renders obvious “*if the resources already allocated to the first node on one of the paths is sufficient, directing the data flow to the second node . . . without requesting additional resources*” because the data is included in only the portion of the frame that is already allocated to the dynamic channel without requesting additional resources, such as bandwidth.

Pet. 37–38.

Petitioner further contends that “Kovvali explains that a node may take action (e.g. request additional bandwidth) if the data to be transmitted

onto a dynamic channel exceeds the allocated bandwidth,” and “it would have been obvious to a [person of ordinary skill in the art], therefore, that no action would be needed or taken (e.g. the node would not request additional bandwidth) when the existing allocation is sufficient.” Pet. 38 (citing Ex. 1003 ¶ 93). With regard to the remaining recitation “over the one of the paths,” Petitioner contends that person of ordinary skill in the art “would understand that Kovvali’s disclosure of transmitting a frame ‘onto the network’ after multiplexing data for a dynamic channel into a frame” renders this limitation obvious in view of Kovvali’s disclosure that the BSLR network includes both clockwise and counterclockwise paths. *Id.* at 38–39 (citing Ex. 1003 ¶ 94). Petitioner concludes that Kovvali’s disclosure of a node receiving outbound data that was received locally for transmission onto the dynamic channel, multiplexing the outbound data for transmission into the portion of the frame that is already allocated to the dynamic channel without requesting additional resources, and transmitting the frame onto a BSLR network, renders this limitation obvious. *Id.* at 39 (citing Ex. 1003 ¶¶ 88, 95).

- v. [1.4]: “if the resources already allocated to the first node are insufficient, performing the following steps:”

As stated in the analysis of limitation [1.3] above, Petitioner contends that “Kovvali explains that a node may take action (e.g. request additional bandwidth) if the data to be transmitted onto a dynamic channel exceeds the allocated bandwidth.” Pet. 38. With respect to limitation [1.4], Petitioner argues more particularly that “Kovvali explains that data transmitted on the dynamic channels may be ‘bursty’ in nature, and thus a node may take additional steps when it has a large burst of data for transmission.” *Id.* at 39

(citing Ex. 1005, 4:30–34). Accordingly, Petitioner argues, “[i]t would have been obvious to a [person of ordinary skill in the art] that for such bursty traffic, the data to be transmitted would occasionally exceed the bandwidth allocated for it (and thus, ‘*the resources already allocated to the first node are insufficient*’),” and “[a]s explained further below, the prior art renders obvious performing the recited steps.” *Id.* at 39–40 (citing *id.* at 40–50 (discussion of steps [1.5]–[1.8]); Ex. 1003 ¶ 96).

vi. [1.5]: “*requesting an increase in an allocation to the first node of the requested resources;*”

Petitioner contends that step [1.5] is rendered obvious by “Kovvali’s description of a client node sending a request to an arbiter node for additional bandwidth to accommodate a dynamic channel with an increased data rate requirement.” Pet. 40–42 (citing Ex. 1003 ¶¶ 97–103; Ex. 1005, 4:43–34, 8:49–53, 10:35–38, Fig. 5A). In particular, Petitioner points, first, to Kovvali’s disclosure that data traffic may “exhibit bursty or time-varying rates” and that “the data rate assigned to any particular dynamic channel 436 can be dynamically changed . . . to accommodate time-varying data rate requirements of bursty communication between nodes.” Pet. 40 (quoting Ex. 1005, 4:32–34, 8:49–53) (citing Ex. 1003 ¶¶ 98–99). Further, Petitioner argues that Kovvali more particularly “describes that a client node may request an increase in bandwidth for a bursty channel by setting a ‘request section (REQ) 526’ in a control channel 524 sent to the arbiter,” which in turn “responds to the request by setting a ‘grant section (GNT) 527’ to grant bandwidth to the requested channel.” *Id.* at 40–41 (citing Ex. 1003 ¶¶ 100–101; Ex. 1005, 10:35–38, Fig. 5A). Thus, Petitioner contends,

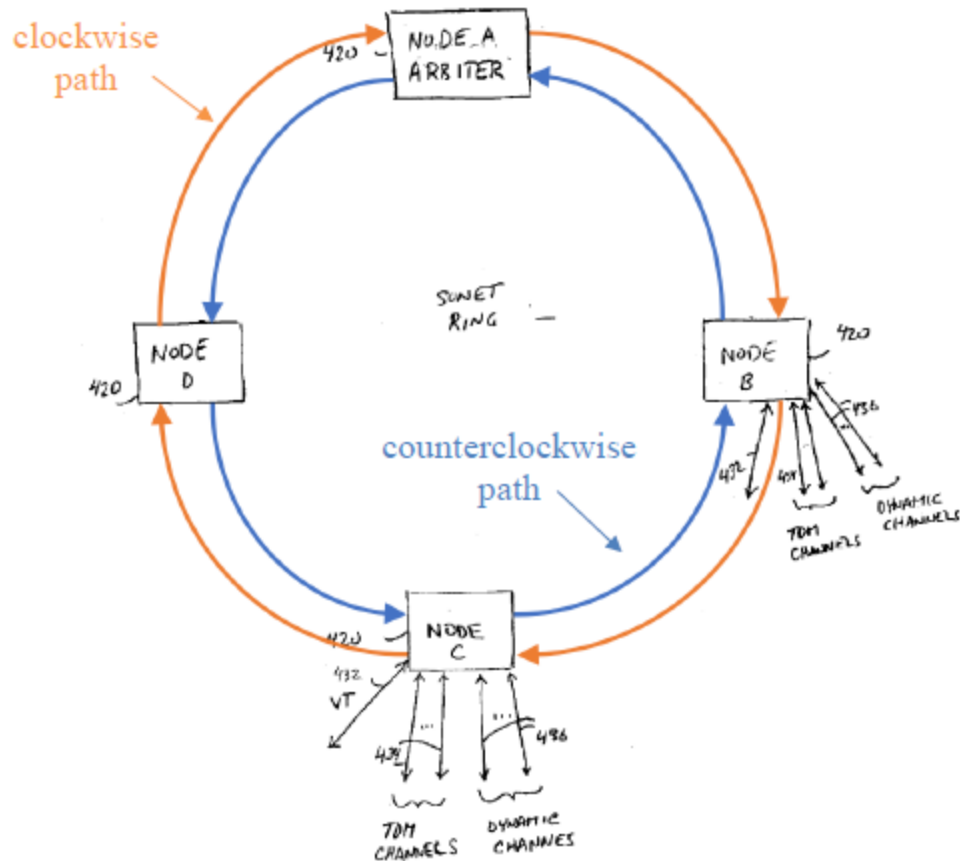
if the bandwidth of a dynamic channel already assigned to a node becomes insufficient because the data rate requirement on the dynamic channel has increased (e.g. the node has a burst of data

to be transmitted), it would have been obvious for the client node to send a request to the arbiter node for additional bandwidth.

Id. at 41–42 (citing Ex. 1003 ¶ 102).

- vii. [1.6]: “*determining, for the links comprised by each of the paths, respective levels of use of the requested resources due to communications in progress over the network*”

Petitioner contends that step [1.6] is rendered obvious by the combination of Kovvali and Kalman. Pet. 42–47. First, referring back to its arguments with respect to step [1.2], Petitioner reiterates that Kovvali’s teaching of a bi-directional ring network provides two paths for transmitting data between nodes, as illustrated by the clockwise path shown in orange and the counterclockwise path shown in blue in Petitioner’s previously presented modified version of Figure 4, reproduced again below for reference:



Ex.1005, Fig. 4 (modified and annotated); Ex.1003, ¶85.

Id. at 42–43 (citing Ex. 1005, Fig. 4). With reference to the modified Figure 4 above, Petitioner contends that it would have been obvious to a person of ordinary skill in the art that “when the arbiter receives a request to increase the bandwidth allocated for communications from a first node to a second node, the arbiter would have two path options to choose from for potentially accommodating that bandwidth increase request.” *Id.* at 42–43 (citing Ex. 1003 ¶ 105).

Second, Petitioner contends, “[l]ike Kovvali, Kalman discloses a network that ‘includes two rings, wherein a first ring transmits data in a “clockwise” direction (or direction 0), and the other ring transmits data in a “counterclockwise” direction (or direction 1 opposite of direction 0).”

Pet. 43 (quoting Ex. 1006, 2:61–63). Petitioner provides the following annotated version of Kalman’s Figure 3 to illustrate:

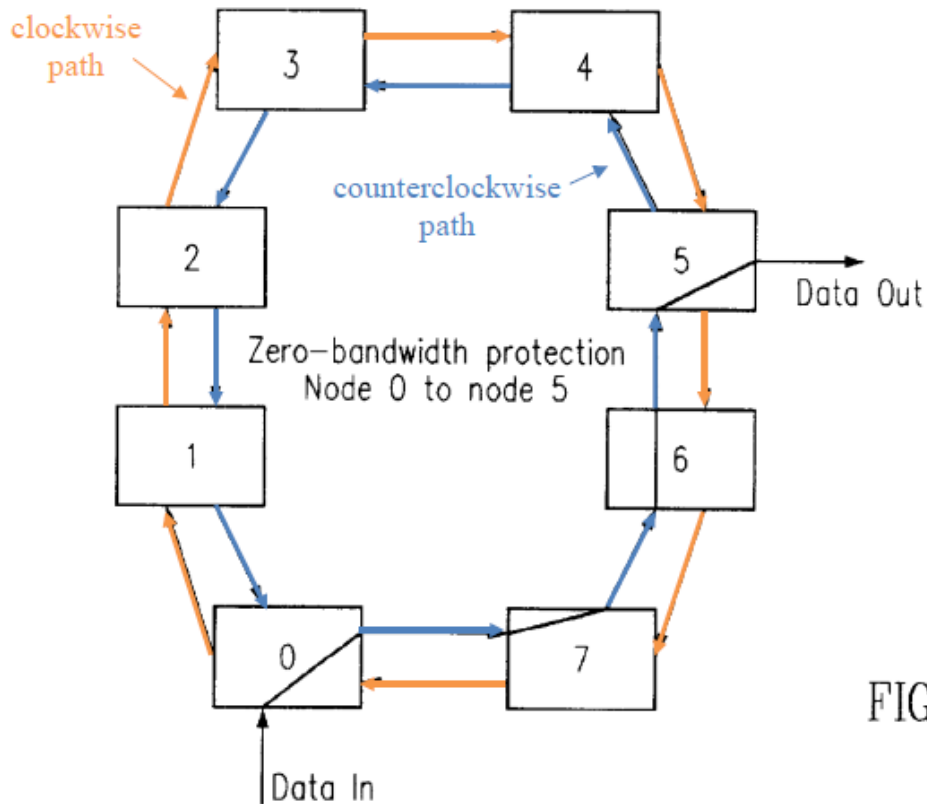


FIG. 3

Ex.1006, Fig. 3 (annotated); Ex.1003, ¶108.

Id. at 44. In the annotated version of Kalman’s Figure 3 above, Petitioner has labeled and colored the clockwise (direction 0) and counterclockwise (direction 1) paths in orange and blue, respectively. *Id.* Petitioner contends, “Kalman discloses a technique for selecting a ‘preferred direction for traffic’ between two nodes, ‘based on the direction with the lowest cost,’” and “[d]ata between nodes flows on the ring that provides the lowest-cost path to the destination node.” *Id.* at 43 (quoting Ex. 1006, 3:2–3, 7:50–53) (citing Ex. 1003 ¶¶ 106–107; Ex. 1006, 4:24–26).

Petitioner cites Kalman’s disclosure that the computation of cost on a direction from a source node to a destination node “may take into account a

variety of factors,” including “the level of traffic congestion in that direction,” as well as Kalman’s disclosure that a table may be maintained to indicate the cost of transmitting data from source to destination nodes in both directions and, hence, the preferred transmission direction from the source to any destination. Pet. 44–46 (quoting Ex. 1006, 7:66–8:5) (citing Ex. 1003 ¶¶ 110–111, 113–115; Ex. 1006, 7:64–65, 8:5–7, 8:21–33 (Table 1), 8:34–35). Additionally citing contemporaneous evidence and Dr. Mir’s testimony, Petitioner argues that a person of ordinary skill in the art “would have been familiar that ‘traffic congestion’ was a common way to refer to the level of use of link bandwidth and/or other resources in a network by the traffic being sent over the network.” *Id.* at 45 (citing Ex. 1003 ¶ 112; Ex. 1008, 8:34–36;⁷ Ex. 1009, 1:36–39). Thus, Petitioner contends, a person of ordinary skill in the art “would have found it obvious for the ‘level of traffic congestion’ disclosed by Kalman to include the level of use of link bandwidth and/or other resources by the dynamic frame resources described in Kovvali.” *Id.* (citing Ex. 1003 ¶ 112).

Petitioner further argues that a person of ordinary skill in the art would have been motivated to combine the teachings of Kovvali and Kalman. Pet. 46. Petitioner contends that Kovvali and Kalman “provide complementary ideas for the efficient transmission of data in a ring network” and that it would have been within the skill set of a person of ordinary skill in the art to combine them. *Id.* at 23 (citing Ex. 1003 ¶¶ 50–51; Ex. 1005, code (57); Ex. 1006, 4:20–23. According to Petitioner, the combination would have been obvious for several reasons. *Id.* at 23–24. First, Petitioner argues, the combination “represents merely the use of Kalman’s known

⁷ Davies et al., US 6,839,767 B1 (issued Jan. 4, 2005, filed Nov. 1, 2000).

technique for selecting a preferred path on a ring network to improve Kovvali's multi-path ring network for transmitting dynamic frames in the same way." *Id.* at 23. More specifically, "[f]aced with the choice of transmitting a dynamic frame over one of two paths (e.g. clockwise path or counterclockwise path), a [person of ordinary skill in the art] would look to Kalman for details on how to make the path selection." *Id.* (citing Ex. 1003 ¶ 51). Second, Petitioner argues, "the application of Kalman's technique (selecting a preferred path on a ring network) to improve Kovvali's method (transmitting dynamic frames on a multi-path ring) ready for improvement would yield predictable results," namely "efficient transmission of dynamic frames in a ring network using a lowest-cost path." *Id.* at 23–24 (citing Ex. 1003 ¶ 52).

Petitioner further contends, "Kovvali's multi-path ring network would also be improved because the use of a ring selection technique by a centralized bandwidth manager (i.e. Kovvali's 'arbiter' node) would allow path selection that accounts for dynamic frame transmissions among all the network nodes across the entire network." Pet. 24. "By centralizing path selection decisions at the arbiter," Petitioner argues, "more efficient utilization of available network capacity is achieved." *Id.* (citing Ex. 1003 ¶ 53). For example, Petitioner contends, "by maintaining information about the current amount of bandwidth allocation throughout the network (e.g. congestion), the centralized arbiter would make use of network capacity efficiently by selecting available paths to service multiple requests according to the particular characteristics of the data they transmit." *Id.* at 25 (citing Ex. 1003 ¶ 54). Citing evidence that it was known in the art that "[s]chemes that optimize the throughput of one user or one trunk[] do not always maximize the overall performance," Petitioner further argues that a person of

ordinary skill in the art would have been motivated to implement Kalman’s ring selection technique specifically in Kovvali’s centralized arbiter node, “to optimize the use of network resources for all dynamic channels instead of just one.” *Id.* at 25–26 (citing Ex. 1003 ¶ 55; Ex. 1009,⁸ 6:1–5).

Finally, Petitioner argues that a person of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Kovvali and Kalman, because “Kalman describes that its technique for selecting a preferred path for transmitting data on a network ring may be applied ‘to any network transmitting frames, cells, or using any other protocol,’” and “Kalman also describes that, like Kovvali, the nodes of the network ring are interconnect[ed] by fiber optic cables.” Pet. 26 (citing Ex. 1006, 3:38–41, 11:37–42). “Because Kovvali also describes a ring network transmitting dynamic frames between nodes over an optical network,” Petitioner argues, a person of ordinary skill in the art “would have understood that the path selection techniques described in Kalman are applicable to Kovvali” and “would also have had an expectation of success from the combination because of the overall similarities between the network architectures and technologies described in Kovvali and Kalman.” *Id.* (citing Ex. 1003 ¶ 56).

In the specific context of limitation [1.6], Petitioner contends that a person of ordinary skill in the art “would have appreciated that by having Kovvali’s arbiter direct data transmission toward the least-occupied or less congested portion of the ring network . . . , more efficient utilization of the available network capacity would be achieved.” Pet. 46. Petitioner contends that applying such a strategy “would depend upon Kovvali’s arbiter node

⁸ Galand et al., US 6,424,624 B1 (issued July 23, 2002, filed Oct. 7, 1998).

maintaining information about the current amount of bandwidth allocations throughout the network.” *Id.* at 47 (citing Ex. 1003 ¶ 116). Therefore, according to Petitioner, the combination of Kovvali and Kalman would have rendered this limitation obvious. *Id.* (citing Ex. 1003 ¶¶ 104, 117).

- viii. [1.7]: “*selecting which of the paths is to carry the data flow responsive to the determined levels of use of the requested resources on the links comprised in each of the paths; and*”

Referring back to its argument with regarding step [1.6] that “[t]he combination of Kovvali and Kalman teach[es] selecting a lowest-cost path where the cost accounts for the ‘level of traffic congestion’ on the links of the path,” Petitioner contends that the combination of Kovvali and Kalman likewise renders step [1.7] obvious. Pet. 47 (citing Ex. 1003 ¶¶ 118–119; Ex. 1006, 7:66–8:5).

- ix. [1.8]: “*increasing the allocation of the resources to the first node on the selected path by a predetermined quantum.*”

Petitioner contends that step [1.8] is rendered obvious by Kovvali. Pet. 48–50. Referring back to its arguments with respect to step [1.5], Petitioner contends that Kovvali teaches that a client node may request either increased or decreased bandwidth for a corresponding bursty channel from the arbiter by setting a “request section (REQ)” within the dynamic frame overhead, specifying the amount of requested bandwidth, in response to which the arbiter sets a “grant section (GNT),” specifying the amount of bandwidth granted. *Id.* at 48 (citing Ex. 1005, 10:35–38, 10:46–61; Ex. 1003 ¶¶ 121–122). In view of Kovvali’s teachings, Petitioner argues that a person of ordinary skill in the art “would have understood that when the requested bandwidth is granted by the arbiter, the bandwidth (e.g., the number of

columns) allocated to the client node would be increased (or decreased) by the requested amount (“*a predetermined quantum*”).” *Id.* at 49. More specifically, Petitioner argues, “Kovvali’s signaling mechanism for bandwidth requests and grants does not allow for allocations to be made on a per-bit or per-byte basis; instead, as discussed at [1.1], requests and allocations are made in . . . increments []corresponding to the number of bits in one dynamic frame column[].” *Id.* at 50 (citing Ex. 1003 ¶ 123).

b. Patent Owner’s Contentions

Patent Owner responds that, whereas “Petitioner identifies Kovvali’s Node B or Node C as the ‘first node’ that receives the request ‘to carry data flow between the first and second nodes’” in limitations [1.2] and [1.3], “Kovvali teaches that it is the **arbiter** node and **not** other nodes in the system (e.g., Node B or Node C) that receive a request to carry data between certain nodes.” PO Resp. 15 (citing Pet. 35; Ex. 2004 ¶ 46). According to Patent Owner:

The claim language and the specification of the ’279 patent teach[] that a node on the network system “receives a request from one of its clients to send data to another node.” Ex. 1001, 6:11–28. The ’279 Patent further teaches that after receiving this request, the node “first checks to determine whether it has sufficient resources already allocated to it in order to service the request.” *Id.*, [at] 6:11–28. Only if the “allocated resources are inadequate,” the node communicates with the dispatcher to request additional resources. *Id.*, at 6:11–28; Ex. 2004, ¶47. These steps are mapped in the claim limitations of claim 1 of the ’279 Patent.

Kovvali, on the other hand, teaches that requests for transmission from the client nodes are communicated only to the arbiter node. Specifically, as Petitioner’s expert acknowledged, Kovvali explains that “[r]equests to assign dynamic channels for communication between particular nodes are sent from a client nodes to the arbiter. The arbiter responds by assigning dynamic

channels to particular nodes.” Ex. 1005, 9:1–11; Ex. 2006 (Mir Dep. Tr.), 74:11–75:3. After the receipt of this request, the arbiter assigns a dynamic channel to handle the traffic of the requested data flow. Ex. 2004, ¶48. Thus, it is clear that Kovvali teaches that the arbiter node receives the data transmission request from the client, and that the dynamic channels are assigned prior to traffic flowing on them. Ex. 2004, ¶48, Ex. 2006 (Mir. Dep. Tr.) at 79:6–9.

Id. at 16.

Responding to Petitioner’s contention that a person of ordinary skill in the art “would have understood that the receipt of data from local dynamic channels by a node (e.g. Node B or Node C) for transmission to another node renders obvious ‘receiving a request at the first node to use a portion of the resources,’” Patent Owner contends Petitioner’s assertion is incorrect and that a person of ordinary skill in the art “would understand that merely receiving data at a node for transmission to another node is not a request to use a portion of a resource for a number of reasons.” PO Resp. 17 (citing Pet. 34; Ex. 2004 ¶¶ 49–52).

First, Patent Owner argues, “merely receiving and processing data is not a *request* to use any resource.” PO Resp. 17 (citing Ex. 2004 ¶ 50). More particularly, according to Patent Owner, a person of ordinary skill in the art “would understand that receiving, processing data and then multiplexing it to another node are operations of data transfer, not requesting resources.” *Id.* Quoting Petitioner’s argument that “[p]acket processor 644 includes buffers and other mechanisms to implement appropriate queuing, scheduling and policing processes necessary to handle outgoing packet traffic” (Pet. 34), Patent Owner contends that “Petitioner agrees that queuing, scheduling, and policing are mechanisms for receiving and processing data and handling traffic” (PO Resp. 17–18 (citing Ex. 2004 ¶ 51)). According to Patent

Owner, “handling traffic is completely different from *requesting* traffic.” PO Resp. 18 (citing Ex. 2004 ¶ 51).

Second, Patent Owner argues, “in Kovvali, if the node is processing the data, it has already been assigned by the arbiter to process that dynamic channel” and “the data flow is already passing through it.” PO Resp. 18 (citing Ex. 2004 ¶ 52). In contrast, Patent Owner argues, “[i]t is clear from claim 1 that the request to use a portion of the resource occurs prior to the data actually flowing.” *Id.* In other words, according to Patent Owner, “the node that Petitioner points to as the one ‘receiving the request . . . to use a portion of the resources . . . to carry the data flow’ does not in fact receive any such request, but rather is assigned to carry the data flow by the arbiter component in Kovvali,” and thus, “Kovvali does not disclose or render obvious limitations [1.2] [and] [1.3].” *Id.* (citing Ex. 2004 ¶ 52).

Responding to Petitioner’s alleged motivation to combine Kovvali’s and Kalman’s teachings, Patent Owner argues that Kovvali and Kalman are directed to different, incompatible methods for data routing. PO Resp. 9–13. In particular, Patent Owner contends, “Kalman teaches a distributed routing algorithm in which all nodes independently identify the optimal path,” while Kovvali teaches a centralized system featuring an arbiter that functions as a centralized bandwidth manager and assigns dynamic channels to particular nodes. *Id.* at 9–10 (citing Ex. 1005, 3:32–35, 4:25–34, 7:32–33, 9:6–11, 13:29–36; Ex. 2004 ¶¶ 40, 42).

Patent Owner contends that the differences between Kovvali’s and Kalman’s methods reflect the differing objectives of the two references. For example, according to Patent Owner, “Kalman . . . is directed to ‘ach[ie]v[ing] fast protection in a ring network while providing for efficient network capacity utilization.’” PO Resp. 10 (quoting Ex. 1006, 4:20–22).

And “[w]hile Kovvali utilizes the centralized arbiter node to manage network capacity,” Patent Owner argues, “Kalman does not suggest the use of a ‘dispatcher’ or ring-leader node, but rather teaches that each node monitors the status of each link that it’s connected to, and in the event of a link failure, broadcasts the failure to all nodes triggering a reconfiguration of path routing within each node.” *Id.* at 10–11 (citing Ex. 1006, 3:10–18). According to Patent Owner, “[t]he Kalman system thus teaches that ‘all nodes know the status of the network and all **independently identify the optimal routing path** to each destination node when there is a fault in any of the links.’” *Id.* at 11 (citing Ex. 1006, 3:17-20 (emphasis added); Ex. 2004 ¶ 41). In contrast, Patent Owner contends, “Kovvali is not concerned with maximizing the efficiency of each available path in the ring network system, but rather with creating a communication network in which resources can be dynamically managed to handle irregular streams of data.” *Id.* at 10. “By featuring an arbiter that functions as a centralized bandwidth manager,” Patent Owner asserts, “Kovvali teaches a system that can achieve ‘[s]tatistical multiplexing and over-subscription,’ and thus, can accommodate bursty data by reorganizing bandwidth as necessary.” *Id.*

Further, according to Patent Owner, “not only does Kalman not suggest using an arbiter node, using one would, in fact, interfere with Kalman’s goal of fast failure protection by adding in multiple layers of communication into the system.” PO Resp. 11 (citing Ex. 2004 ¶ 41). “Kalman’s strength is that it does not have a monitoring node slowing down transmission routing, and thus, to implement an arbiter node into this system, as suggested by Petitioner, would interfere with the purpose of this system.” *Id.* (citing Ex. 2004 ¶ 41). Notwithstanding Petitioner’s arguments that Kovvali and Kalman “provide complementary ideas” and that the

combination would provide efficiency gains, Patent Owner contends that Petitioner does not identify any disclosures in Kovvali or Kalman that would lead to a person of ordinary skill in the art combining them to arrive at the claimed invention but instead relies entirely on hindsight-based generalizations in its expert’s declaration to articulate a motivation to combine. *Id.* at 11–13 (citing Pet. 23–24; Ex. 1003 ¶ 53). Due to the fundamental differences between Kovvali and Kalman, Patent Owner argues, a person of ordinary skill in the art would not have combined them. *Id.* at 13 (citing Ex. 2004 ¶ 43). Supported by Dr. Olivier’s testimony, Patent Owner argues Kalman’s structure, in which “all nodes know the status of the network and all **independently identify the optimal routing** path to each destination node when there is a fault in any of the links,” is incompatible with Kovvali’s structure, which instead requires each node to communicate with an arbiter node that identifies the optimal path. *Id.* at 13–14 (quoting Ex. 1006, 3:18–22 (emphasis added)) (citing Ex. 2004 ¶ 43).

Still further, Patent Owner alleges, “contrary to the teaching in Kalman, which mandates that ‘each node must know the network topology,’” “Kovvali specifically teaches that ‘not all nodes on [the] SONET . . . ring need to recognize the internal structure of dynamic frame 510; only nodes that terminate particular channels in the dynamic frame, and the arbiter node, need to recognize the structure.’” PO Resp. 14 (quoting Ex. 1005, 9:39–43; Ex. 1006, 3:9). Thus, Patent Owner concludes, “the communication and network structure in Kovvali is completely different than that in Kalman, and is designed to achieve different outcomes,” and accordingly, a person of ordinary skill in the art would neither have been motivated to combine the references nor have had a reasonable expectation of success in making the combination. *Id.*

c. Analysis

Having considered the parties' arguments, we determine that Petitioner has not shown by a preponderance of the evidence that claim 1 is unpatentable under 35 U.S.C. § 103 over the combination of Kovvali and Kalman.

As set forth above, claim 1 recites “a method for routing a data flow” “[i]n a communication network that includes a plurality of nodes interconnected by links, the nodes including at least first and second nodes,” where the method includes, *inter alia*, “[1.2] receiving a request at the first node to use a portion of the resources so as to carry the data flow between the first and second nodes over one of a plurality of paths therebetween,” and “[1.3] in response to the request: if the resources already allocated to the first node on one of the paths are sufficient, directing the data flow from the first node to the second node over the one of the paths without requesting additional resources.” As also set forth above, Petitioner relies on Kovvali alone, and specifically the receipt of data from local dynamic channels by Kovvali's Node B or Node C and subsequent processing and multiplexing functions carried by Node B and Node C, as teaching or suggesting the “receiving a request” and “directing the data flow” steps quoted above. Pet. 32–39. As Patent Owner points out, however, it is the arbiter node (i.e., Node A) alone in Kovvali that receives requests for resources and directs data flow. *See* PO Resp. 15. Petitioner confirmed in its Reply, and again during oral argument, that it does not rely on Kovvali's arbiter as being the recited “first node.” *See* Reply 17 (“[T]hat is not how the Petition mapped the claim language to Kovvali's disclosure. Instead, the Petition identified ‘Node B or Node C’ as the ‘*first node*.’”); Tr. 10:19–20 (“[T]he arbiter was not what the Petition identified as the first node . . .”).

We agree with Patent Owner. We find in Kovvali no disclosure of any node other than the designated arbiter (i.e., Node A) receiving a request as recited in step [1.2] and directing data flow as recited in step [1.3]. Indeed, Kovvali expressly states that “[r]equests to assign dynamic channels for communication between particular nodes are sent from . . . client nodes to the arbiter,” which “responds to the requests by assigning dynamic channels to particular nodes, and by adjusting the allocated rates for the dynamic channels.” Ex. 1005, 9:6–11; *see also* Ex. 2006, 74:11–75:3 (Petitioner’s expert Dr. Mir confirming the same).

In the Reply, Petitioner alleges that “[t]he Petition’s mapping of an individual packet as an implicit ‘*request . . . to use . . . resources*’ is consistent with how Applicants argued the claims in prosecution,” arguing that “Applicants repeatedly distinguished the ‘Drake’ prior art (Ex. 1027) because it required a ‘reservation of facilities for each new data stream,’” whereas “[a]voiding explicit requests was Applicants’ alleged innovation.” Reply 19–20 (emphasis and alterations in original) (citing Ex. 1002, 119, 190). According to Petitioner, “[c]onsistent with that argument, Applicants amended the claims to change originally presented claim language of ‘receiving a **request to allocate** one or more resources . . .’ to the ultimately allowed language of ‘*receiving a **request . . . to use a portion of the resources.***’” *Id.* at 20 (emphases and alterations in original) (citing Ex. 1002, 112).

We are not persuaded by Petitioner’s argument. Although the cited amendment and accompanying arguments may have served to distinguish Drake’s system, in which “the nodes must request a reservation of facilities for each new data stream” (*see* Reply 21 (quoting Ex. 1002, 190)), they do not support Petitioner’s assertion that any of Kovvali’s nodes other than its

arbiter (i.e., Node A) receive requests and direct data flow, as recited in steps [1.2] and [1.3]. In this regard, we agree with Patent Owner that “[n]othing that Petitioner points to . . . suggests that in overcoming ‘Drake’ the Applicant broadened the scope of the ‘receiving a request’ limitation to include receiving and processing data,” and Petitioner does not argue otherwise. Sur-reply 15–16. As Patent Owner points out, the amendment cited by Petitioner relates to the limitation pertaining to using previously allocated resources to carry new data flow, rather than to the “request” per se. *See id.* at 16.

Petitioner also argues for the first time in the Reply that “Kovvali teaches that Node B or Node C perform various functions to process and multiplex the data received from local dynamic channels onto the ring network,” where “[t]hese functions include ‘queuing, scheduling and policing processes’ that are necessary to handle the outgoing packet traffic,” but that “performance of these steps is not guaranteed, as such packets are transmitted as ‘best effort data traffic.’” Reply 18 (citing Ex. 1005, code (57), 14:27–37). According to Petitioner, “[i]t was well-known that ‘best effort’ packets may be discarded, that is, not transmitted to their destinations.” *Id.* (citing Ex. 1005, code (57); Ex. 1025, 1:60–66; Pet. 58). In particular, Petitioner argues, “Kalman expressly notes the possibility that ‘lower priority’ traffic may be ‘dropped.’” *Id.* (citing Ex. 1006, 3:31–34). “Thus, every ‘best effort’ packet received at Kovvali’s Node B or Node C seeks to use some network resources whose availability is not guaranteed,” and “[t]ransmitting a best-effort packet will necessarily consume some resources, such as transmission processing power and communication bandwidth.” *Id.* at 18–19 (citing Ex. 1001, 2:12–18). Elaborating on this contention, Petitioner’s counsel also alleged at oral argument that “the

possibility of dropping packets on the dynamic channel, I think, . . . would correspond to a denial of the request to be transported across the network.”
Tr. 11:6–21.⁹

We again are not persuaded by Petitioner’s argument. As an initial matter, we find no argument with respect to “best effort data traffic” or dropped packets in the Petition. *See* Tr. 12:10–21 (conceding that “the phrase ‘best effort’ was not in the Petition” but arguing that it was raised in response to the Patent Owner Response). Moreover, we are unable to identify any argument in the Patent Owner Response to which this line of argument is properly responsive, and Petitioner does not identify any such line of argument. Instead, Petitioner’s argument appears to advance belatedly a new theory. *See* 37 C.F.R. § 42.23(b); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), 73–74, *available at*

⁹ The full colloquy on this point was as follows:

JUDGE ARBES: [D]oesn’t the term “request” imply something that can be granted or denied? Do you agree with that?

MR. FOSTER: I -- yes. At a high level, I think that that can be true. And as we discussed in the Petitioner Reply, the data received on a dynamic channel that seeks to be transported across the network and to use its resources -- it can be denied access, right? It -- Kalman talks about dropping packets, and Kovvali also talks about this traffic being best effort traffic. Best effort is -- as we know, is traffic that does not have a guaranteed reservation or a guaranteed allocation of bandwidth. It may or may not reach its destination. And so the possibility of dropping packets on the dynamic channel, I think, is what would correspond to a denial of the request to be transported across the network.

JUDGE ARBES: So not sending along the data then is a -- is a denial of the request in your view?

MR. FOSTER: That’s correct.
Tr. 11:6–21.

<https://www.uspto.gov/TrialPracticeGuideConsolidated> (“‘Respond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing.”); *Intelligent Bio-Sys.*, 821 F.3d at 1369–70 (concluding that the Board did not err in refusing to consider reply arguments advocating a “new theory” of unpatentability under 37 C.F.R. § 42.23(b)).

Even putting aside timeliness concerns, however, we find in the record no persuasive evidence that a person of ordinary skill in the art would understand that packets transmitted as “best effort data traffic” are dropped, discarded, or lost “in response” to a request received by Kovvali’s Node B or Node C—as opposed simply to being dropped, discarded, or lost due to network congestion.

As Patent Owner points out, the dynamic channels are assigned by the arbiter prior to traffic flowing on them, and thus, by the time data is received at Kovvali’s Nodes B and C, it has already been determined by the arbiter what portion of resources will be used to carry the data flow and over which of a plurality of paths it will be carried. *See* PO Resp. 16 (citing Ex. 2004 ¶ 48; Ex. 2006, 79:6–9), 18 (citing Ex. 2004 ¶ 52).

Indeed, unlike Kalman, which Petitioner does not rely upon for steps [1.2] and [1.3], Kovvali does not teach or suggest that any of its nodes other than the arbiter know the topology of its system. Accordingly, even assuming *arguendo* that the receipt of data at Kovvali’s Node B or Node C might be considered to constitute a “request,” Petitioner does not persuasively explain how those nodes would be instrumental in “directing the data flow . . . to [a] second node” as recited by claim 1.

We credit the supporting testimony of Dr. Olivier on the points discussed above, as it is explained sufficiently and consistent with the

disclosure of Kovvali. *See* Ex. 2004 ¶¶ 46–52. By contrast, Dr. Mir’s testimony simply mirrors the Petition and does not explain sufficiently *why* a person of ordinary skill in the art would have understood Kovvali in the manner Petitioner asserts. *See* Pet. 35; Reply 17–18; Ex. 1003 ¶ 83.

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 over the combination of Kovvali and Kalman.

4. Independent Claim 15

Independent claim 15 recites “[a] communication network comprising,” *inter alia*, “at least first and second nodes . . . wherein the first node is adapted, upon receiving a request to use a portion of . . . resources so as to carry . . . data flow between the first and second nodes over one of a plurality of paths therebetween” and “to direct the data flow from the first node to the second node over one of the paths without requesting additional resources if the resources already allocated to the first node on the one of the paths are sufficient.” Ex. 1001, 10:44–60. In arguing that claim 15 is unpatentable over Kovvali and Kalman, Petitioner relies for these limitations on its contentions with respect to preamble [1.0] and limitations [1.2] and [1.3] of claim 1, set forth above. Pet. 63–64; *see supra* § III.D.3.a. Patent Owner likewise raises the same arguments with respect to these limitations as for limitations [1.2] and [1.3]. PO Resp. 15–18.

For the reasons stated in the above discussion of claim 1, we likewise determine that Petitioner has not shown by a preponderance of the evidence that claim 15 is unpatentable over Kovvali and Kalman. *See supra* § III.D.3.c.

5. Dependent Claims 2–5, 9–14, and 16–18

Claims 2–5 and 9–14 depend directly or indirectly from independent claim 1, and claims 16–18 depend directly or indirectly from independent claim 15. *See* Ex. 1001, 9:54–67, 10:18–43, 11:8–12:10. For the reasons stated in the above discussion of claims 1 and 15, we likewise determine that Petitioner has not shown by a preponderance of the evidence that any of claims 2–5, 9–14, and 16–18 are unpatentable over Kovvali and Kalman. *See supra* §§ III.D.3, III.D.4.

E. Remaining Challenges

Claims 6–8 depend directly or indirectly from independent claim 1. *See* Ex. 1001, 10:2–17. As set forth in Section II.E. above, Petitioner challenges claim 6 as unpatentable over Kovvali, Kalman, and Masters; and claims 7 and 8 as unpatentable over Kovvali, Kalman, and RFC 2892. *See* Pet. 67–80. Because neither Masters nor RFC 2892 is relied upon by Petitioner to remedy the deficiencies of Kovvali and Kalman identified in the above analysis with respect to claim 1, we determine for the reasons discussed above that Petitioner also has not shown by a preponderance of the evidence that claim 6 is unpatentable over Kovvali, Kalman, and Masters or that claims 7 and 8 are unpatentable over Kovvali, Kalman, and RFC 2892. *See supra* § III.D.3.c; *see also* PO Resp. 18 n.1 (“As Grounds 2 and 3 challenge only dependent claims, the fact that Kovvali and Kalman fail to render obvious the claims in Ground 1 equally applies to the claims in Grounds 2 and 3.”).

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that any of claims 1–18 of the ’279 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
1–5, 9–18	103(a)	Kovvali, Kalman		1–5, 9–18
6	103(a)	Kovvali, Kalman, Masters		6
7, 8	103(a)	Kovvali, Kalman, RFC 2892		7, 8
Overall Outcome				1–18

V. ORDER

It is hereby:

ORDERED that claims 1–18 of the '279 patent have not been 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.

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