

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,

Petitioner,

v.

NETSOCKET, INC.,

Patent Owner.

Patent No. 7,190,698

Filing Date: April 6, 2001

Issue Date: March 13, 2007

Inventors: Emil Svanberg, Joachim Johansson, Anders Torger,
Joakim Norrgard, and Anders Larsson

Title: NETWORK OPTIMISATION METHOD

PATENT OWNER'S NOTICE OF APPEAL

Case No. IPR2023-00607

Notice is hereby given, pursuant to 35 U.S.C. §§ 141(c), 142, 319; and 37 C.F.R. §§ 90.2(a), 90.3(a), that NetSocket Inc. (“Patent Owner”) appeals from the Patent Trial and Appeal Board’s Final Written Decision entered on September 13, 2024 (Paper No. 29) in the above-captioned *inter partes* review of U.S. Patent No. 7,190,698 (the “’698 Patent”) to the United States Court of Appeals for the Federal Circuit. This notice is timely filed within 63 days of the Board’s Final Written Decision. 37 C.F.R. § 90.3(a)(1). Patent Owner’s appeal includes any underlying orders, decisions, rulings, and opinions, as well as any issues raised during these proceedings. In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Patent Owner further indicates that the issues on appeal include, without limitation: (i) the Board’s determination that all challenged claims are unpatentable over the art of record in this proceeding; (ii) the Board’s claim constructions; (iii) the Board’s disposition and evidentiary rulings relating to Patent Owner’s objections to certain of Petitioner’s arguments and evidence; (iv) the Board’s disposition and evidentiary rulings relating to Petitioner’s objections to certain of Patent Owner’s arguments and evidence; (v) the Board’s obviousness analysis; (vi) the Board’s determination to institute this proceeding; (vii) the Board’s decision not to dismiss this proceeding; and (viii) any finding or determination supporting or related to the above-mentioned issues, as well as all other issues decided adversely to Patent Owner including in any orders, decisions, dispositions, rulings, and/or opinions.

Simultaneous with this submission, a copy of this Notice of Appeal is being filed with the Clerk of the United States Court of Appeals for the Federal Circuit and is being submitted electronically through the Court's CM/ECF system, together with the requisite fee in the amount of \$600.00. In addition, a copy of this Notice of Appeal is being filed with the Patent Trial and Appeal Board and served upon counsel of record for Cisco Systems, Inc.

Respectfully submitted,

Dated: October 1, 2024

By: /Vincent J. Rubino, III /
Vincent J. Rubino, III (Reg. No. 68,594)
Lead Counsel for Patent Owner
FABRICANT LLP
411 Theodore Fremd Avenue
Suite 206 South
Rye, New York 10580
Tel. 212-257-5797
Fax. 212-257-5796
Email: vrubino@fabricantllp.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC.,
Petitioner,

v.

NETSOCKET, INC.,
Patent Owner.

IPR2023-00607
Patent 7,190,698 B2

Before RICHARD M. LEBOVITZ, STACEY G. WHITE, and
GARTH D. BAER, *Administrative Patent Judges*.

LEBOVITZ, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Cisco Systems, Inc. (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–8 of U.S. Patent No 7,190,698 B2 (Ex. 1001, “the ’698 patent”). Paper 2 (“Pet.”). NetSocket, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 8. Petitioner, with our authorization, filed a one-page Preliminary Reply limited to the impact of the Joint Motion to Amend the Docket Control Order (Ex. 1043) on *Fintiv*¹ Factors 2 and 3 (Paper 9). Patent Owner, also with our authorization, filed a Preliminary Sur-reply (Paper 10).

We determined that the Petition established a reasonable likelihood that Petitioner would prevail with respect to at least one claim, and we instituted *inter partes* review as to all challenged claims of the ’698 patent and all grounds of unpatentability asserted in the Petition. Paper 11 (“Institution Dec.”).

Following institution of the trial, Patent Owner filed a Response. (Paper 17, “PO Resp.”). Petitioner filed a Reply (Paper 21, “Pet. Reply”). Patent Owner responded by filing a Sur-reply (Paper 24, “PO Sur-reply”).

An oral hearing was held on June 25, 2024 by video. A transcript of the hearing is part of the record. Paper 28 (“Hearing Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision issued pursuant to 35 U.S.C. § 318(a). For the reasons we discuss below, we determine that Petitioner has proven by a preponderance of the evidence that claims 1–8 of the ’698 patent are unpatentable.

¹ *Apple, Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”).

B. Real Parties in Interest

Petitioner and Patent Owner identify only themselves as real parties in interest. Pet. 86; Paper 16, 1.

C. Related Matters

The parties identify *NetSocket, Inc. v. Cisco Systems, Inc.*, Case No. 2-22-cv-00172 (E.D. Tex.), as a related district court proceeding. Paper 16, 1; Paper 3, 1.

D. The '698 Patent

The '698 patent is titled "Network Optimisation Method." The patent issued on March 13, 2007. The '698 patent claims priority to U.S. Provisional Patent Application No. 60/197,006, filed on April 13, 2000 ("the '006 provisional"). Ex. 1001, code (60). The patent also claims priority to PCT/EP01/04062 ("PCT application"), which was filed April 6, 2001. *Id.* at codes (22), (86).

The '698 patent describes its invention as establishing a virtual leased line ("VLL") between a source ("SRC") and destination ("DST") in different domains to achieve packet transfer between a source in one domain and a destination in another domain. Ex. 1001, 1:5–10. The '698 patent describes this as a "packet based communication network." *Id.*

One of the network domains described in the '698 patent is the prior art multiprotocol label switching ("MPLS") network domain. Ex. 1001, 1:21–22. The '698 patent explains that a primary objective of MPLS network domains is to maintain Quality of Service ("QoS"), which involves "control[ling] the path from ingress node to egress node to optimize utilisation of network resources and enhance performance." *Id.* at 2:10–14. An MPLS network domain associates labels with specific data streams, distributes the labels across the network domain to establish a Label

Switched Path (“LSP”), assigns labels to packets when entering the domain, and finally forwards packets through the domain based on the labels. *Id.* at 1:37–51.

The ’698 patent teaches the prior art “Routing and Traffic Engineering Server (RATES)” which is “an MPLS traffic-engineering server.” Ex. 1001, 3:49–51. According to the ’698 patent, RATES finds a path in the domain that can accommodate requests for service subject to bandwidth constraints. *Id.* at 3:59–61. RATES also implements admission control in the MPLS domain, determining which requests for bandwidth usage are admitted. *Id.* at 4:4–20.

The ’698 patent also describes another prior art network domain, Differentiated Services (“DiffServ”), which is a type of network domain that also provides admission control and QoS. Ex. 1001, 2:56–63.

The ’698 patent teaches that “[b]y introducing a Bandwidth Broker (BB) into the network[,] QoS policy management can be handled in a more flexible way.” Ex. 1001, 2:45–47. A bandwidth broker is described in the ’698 patent as “an entity in a network domain that manages policies for bandwidth resources.” *Id.* at 2:48–49. The ’698 patent explains that “[b]y maintaining a database of the domains resources,” the bandwidth broker “provides admission control decisions on QoS service requests.” *Id.* at 2:49–51. The ’698 patent further discloses that bandwidth broker “may be able to communicate with bandwidth brokers in neighbouring domains, allowing QoS services spanning several domains.” *Id.* at 2:53–55.

The ’698 patent discloses that bandwidth brokers were known in the art to operate in both DiffServ (BB_{OLOV} described in a thesis by Olov Schelén and MPLS (RATES) networks. Ex. 1001, 3:64–4:5 (referencing Figure 1 of Exhibit 1001, the ’698 patent). The ’698 patent discloses that an important

property of both BB_{OLOV} and RATES “is the implementation of path sensitive admission control.” *Id.* at 4:6–17. The ’698 patent discloses that “[t]he present invention relates to a method using an inventive combination of the ideas in [OLOV] and [RATES].” *Id.* at 5:57–58. In the “Summary of the Invention,” the ’698 patent explains that its invention “makes use of a concept of admission control to achieve services across domain borders.” *Id.* at 5:65–67. The ’698 patent further discloses:

The key merits of the invention are:

Deployment. Network operators all over the world are using different solutions for their networks. For any type of global service, Support for heterogeneous networking technologies is very important. This invention makes it possible to deploy bandwidth guaranteed end-to-end VLL services across the two of the most commonly used QoS models [(i.e., MPLS and DiffServ)].

Network utilisation. The use of admission control in advance allows network resources to be more efficiently utilised [OLOV]. This invention makes previously unknown use of this powerful tool in MPLS networks.

Id. at 6:1–13.

As indicated above, the ’698 patent describes a method for providing a virtual leased line (“VLL”) “between a source (SRC) and a destination (DST) in different domains to achieve packet transfer between the source and destination. Ex. 1001, 1:5–10. Each network domain has a bandwidth broker responsible for managing resources. *Id.* at 7:10–12.

The ’698 patent discloses an example of a VLL spanning two domains, A and B, where domain A is a DiffServ network and domain B is an MPLS network. Figure 4 of the ’698 patent, reproduced below, shows a VLL spanning two domains:

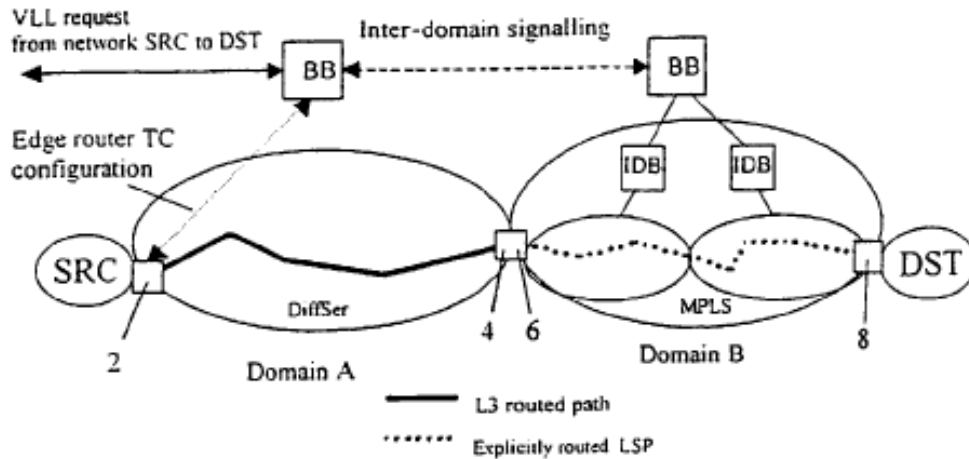


Figure 4 of the '698 patent, shown above, depicts an example of a virtual leased line spanning two domains, where domain A is configured as a DiffServ network and domain B is configured as a MPLS network. *Id.* at 7:19–20. “SRC” in domain A is the source and “DST” in domain B is the destination. Domain A comprises an ingress router 2 and an egress router 4. *Id.* at 7:20–21. The egress router 4 of domain A is connected to, or is equivalent to an ingress router 6 of domain B. *Id.* at 7:21–23. Domain B also comprises an egress router 8. *Id.* at 7:23–24. “BB” is the bandwidth broker. Each domain is shown as having one bandwidth broker. “IDB” is an intra-domain broker which is shown as only being present in the MPLS domain B. “[T]he central BB is responsible for passing resource requests to the intra-domain brokers.” *Id.* at 7:14–16. Domain A, the DiffServ network, is shown as having L3 routed path. L3 is the routed path through domain A. Domain B, the MPLS network, is shown as having two IDBs and LSP routed paths. The LSPs are “virtual traffic trunks that carry flow aggregates generated by classifying the packets arriving at the edge or ingress routers of an MPLS network.” *Id.* at 2:21–24.

With reference to Figure 4 shown above, the '698 patent describes, step-by-step, a method in which a VLL is set up between source SRC and

destination DST to achieve packet transfer. The first step is a request for a VLL of a specific rate or bandwidth R. Ex. 1001, 7:26–36. The request is applied to the BB_A (bandwidth broker A) of domain A associated with the source network. *Id.* at 7:35–36. BB_A performs path sensitive admission control “by looking up the path through domain A and evaluating the resource availability on each link in the path.” *Id.* at 7:45–50. The ’698 patent explains that the admission control “is achieved by looking up the path through domain A and evaluating the resource availability on each link in the path.” *Id.* at 7:47–50.

BB_A passes the request to a bandwidth broker in domain B regarding a VLL of rate R from the domain ingress in domain B to DST. *Id.* at 7:37–39. Upon receiving the request from domain A, the bandwidth broker for domain B passes the request to the appropriate IDB in its domain, the latter which performs admission control and LSP setup in its area of domain B. Ex. 1001, 7:51–61. These steps are accomplished for each IDB in domain B. *Id.* The results of the admission control (the “answers”) are passed back to the BB in domain B. *Id.* at 7:62–64. Next, “[t]he BB in domain A receives the response from domain B and passes it back to the requesting party.” *Id.* at 7:65–66. When the request was admitted successfully along all pieces of the path, “there is now a VLL of rate R from SRC to DST.” *Id.* at 8:3–4.

E. Challenged Claims

Petitioner challenges the patentability of claims 1–8. Claim 1, the sole independent claim, is reproduced below as annotated with bracketed numbers and reformatted by Petitioner:

[1.0.1] 1. Method in a packet based communication network including network domains, wherein at least one domain is a Multiprotocol Label Switching MPLS domain,

[1.0.2] to establish a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST),

[1.0.3] wherein the bandwidth broker (BB) is associated to each network domain and the

[1.0.4] bandwidth broker (BB) is configured to control a hierarchical routing domain, the method comprises the following steps:

[1.1.1] i) generate a request from an entity^[2] for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network (SRC) to a destination network (DST) and,

[1.1.2] apply the request to a Bandwidth Broker (BB) of a domain A, BB_A, associated to the source network;

[1.2] ii) BB_A establishes the different domains involved to reach the destination network (DST);

[1.3] iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;

[1.4] iv) each involved bandwidth broker (BB) performs admission control in its domain;

[1.5.1] v) each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity and

[1.5.2] if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted,

² The original amended claim recited “an entity.” Ex. 1002, 84. Step v) [1.5.1] of the claim refers to “the requesting entity.” Consequently, we assume “en equity” is an error and that it should read “an entity.” It is not clear when the error was introduced into the claim.

[1.6.1] characterized in that step iv) comprises the following step: performing [LSP] Label Switched Path, LSP.^[3] setup and

[1.6.2] passing resource requests from the Bandwidth Broker (BB) to at least one intra-domain (1DB),^[4]

[1.7.1] wherein each intra-domain broker (1DB) is responsible for admission control and

[1.7.2] wherein each intra-domain broker (1DB) is responsible for admission control the Label Switched Path, LSP, setup.

Ex. 1001, 9:60–10:31.

F. Prior Art and Asserted Grounds

Petitioner raises the following grounds of unpatentability with respect to challenged claims 1–8:

³ The period mark is a typographical error appearing in the issued claim. A period did not appear in the original amended claim.

⁴ The original claim, as amended during prosecution of the application which led to the '698 patent, abbreviated the intra-domain broker as "IDB." The abbreviation "1DB" in the issued claim therefore appears to be an error in transcribing the "I" as "1."

Claim(s) Challenged	35 U.S.C. § ⁵	Reference(s)/Basis
1–5, 7, 8	103	Xiao, ⁶ Schelen-1, ⁷ Gibson ⁸
4–8	103	Xiao, Schelen-1, Gibson, Schelen-2 ⁹

Pet. 12.

In addition to these references, Petitioner relies on first (Ex. 1003) and second Declarations (Ex. 1046) by Henry H. Houh, Ph.D. Patent Owner relies on a Declaration by Paul Congdon, Ph.D. (Ex. 2004). Deposition testimony by Dr. Houh (Ex. 2003) and Dr. Congdon (Ex. 1045) also was submitted.

II. ANALYSIS

A. *Legal Standards*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent

⁵ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103. We apply the pre-AIA version of 35 U.S.C. § 103 because it appears the claims at issue have an effective filing date prior to March 16, 2013, the effective date of the AIA. *See* Ex. 1001, codes (22), (60).

⁶ Xiao et al., Internet QoS: A Big Picture, March/April 1999, *IEEE Network*, 13(2):8–18 (Ex. 1005, “Xiao”).

⁷ Schelén et al., An Agent-based Architecture for Advance Reservations, 1997, *Proceedings of the IEEE Conference on Computer Networks*, 451–459 (Ex. 1032, “Schelen-1”).

⁸ Gibson, U.S. Pat. No. 6,678,264 B1, issued Jan. 13, 2004 (Ex. 1006, “Gibson”).

⁹ Schelén et al., Resource sharing in advance reservation agents, 1998, *J. High Speed Networks*, 7:2103–228 (Ex. 1007, “Schelen-2”).

Owner. *See Dynamic*, 800 F.3d at 1378 (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–1327 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, 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 under 35 U.S.C. § 103 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. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when presented, objective indicia relating to obviousness.¹⁰ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, 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*, 550 U.S. at 418 (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”)). Petitioner cannot satisfy its burden of proving obviousness

¹⁰ The record at this point contains no contentions of objective indicia relating to 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).

B. Level of Ordinary Skill in the Art

Petitioner argues that:

A Person of Ordinary Skill in The Art (“POSITA”) on April 13, 2000 [the filing dated of the ’006 provisional application], would have been knowledgeable and familiar with packet-based communication network techniques available at the time. Such a POSITA would have had a bachelor’s degree in computer science, computer engineering, electrical engineering, or equivalent training, and approximately two years of experience working in the field of network communications. Additional work experience can substitute for specific educational background, and vice versa. Ex. 1003. ¶¶27–29.

Pet. 10.

Patent Owner utilizes Petitioner’s proposed level of skill in the art. PO Resp. 4–5.

For purpose of this Decision, we adopt Petitioner’s definition of the level of ordinary skill in the art, which is also consistent with the level of skill reflected in the Specification of the ’698 patent and in the asserted prior art references. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

C. Claim Construction

“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner proposes a construction of the claim term “bandwidth broker.” Pet. 11. In the Decision to Institute, we stated it is unnecessary to construe “bandwidth broker” to determine whether to institute *inter partes* review. Institution Dec. 12–13. Consequently, we declined to address Petitioner’s construction of “bandwidth broker.”

Patent Owner “agrees with the Board that Petitioner’s construction for ‘bandwidth broker’ is not necessary.” PO Resp. 8.

Patent Owner states that “the Board would benefit from expressly construing the preamble of Claim 1 as limiting to make clear Claim 1’s bounds in the context of Petitioner’s arguments.” PO Resp. 5. Patent Owner’s main point, as we understand it, is that the preamble’s recitation of “wherein the bandwidth broker (BB) is associated to each network domain” is limiting because subsequent limitations in the claim, and dependent claims 2 and 3, “refer[] to the preamble’s statement that there is a bandwidth broker associated with each of the network domains involved in the path from source to destination networks.” *Id.* at 6–7.

Petitioner responds that “[r]egardless of whether the preamble is limiting, the prior art renders obvious the preamble.” Pet. Reply 7.

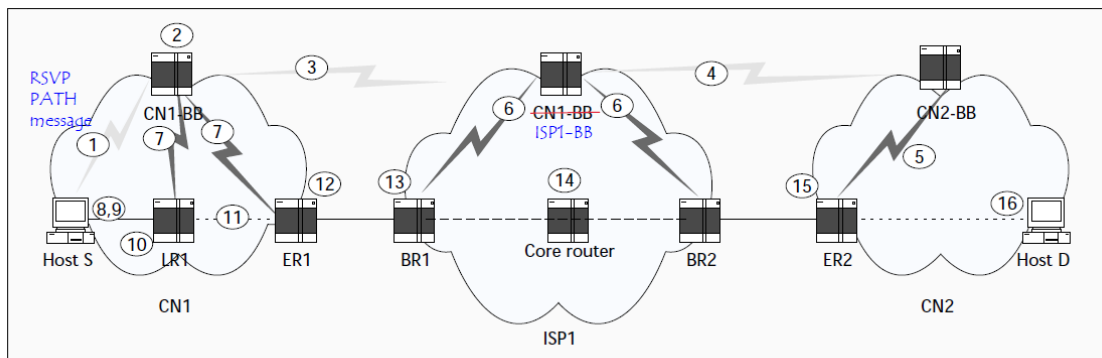
We agree with Patent Owner that the preamble to the claim is limiting, and treat it as such in this Decision.

D. Overview of Asserted Prior Art

1. Xiao

Xiao describes a framework for the Internet quality of service (QoS), which includes differentiated services (DiffServ) and multiprotocol label switching (MPLS). Ex. 1005, 8.

Xiao describes a “premium service” in differentiated services that can be used to create virtual leased lines of low-delay and low-jitter. Ex. 1005, 10, 11. Xiao discloses an example, with reference to Figure 4, in which host S in customer network 1 (“CN1”) wants to use premium service to send data to host D in customer network 2 (“CN2”). *Id.* at 12. Internet service provider 1 (“ISP1”) is between CN1 and CN2. *Id.* (Example 2). Figure 4, reproduced below, shows the process for delivering premium service across CN1, ISP1, and CN2.



■ Figure 4. The delivery process of premium service with a dynamic SLA.

Figure 4 of Xiao, reproduced above (with annotations added), shows the delivery process for delivering premium service comprising setting up paths and reserving resources from host S in CN1 to ISP1, and then from ISP1 to host D in CN2. The figure shows that each network has its own local BB. Each of the networks also has routers through which packets are received and forwarded. *Id.* at 10.

The host S in CN1 sends an RSVP PATH message (annotated above) to CN1-BB, the local bandwidth broker of CN1. Ex. 1005, 12 (step 1). RSVP stands for Resource Reservation Protocol, which is “a signaling protocol for setting up paths and reserving resources.” *Id.* at 8.

CN1-BB makes an admission control decision in CN1 for a request for resources by host S. Ex. 1005, 12 (step 2). Xiao defines “admission

control” as a “decision process of whether to accept a request for resources (link bandwidth plus buffer space).” *Id.* at 9 (Table 1). When the request is accepted by CN1-BB, the PATH message is sent to the bandwidth broker of ISP1, ISP1-BB,¹¹ which also makes an admission control decision. *Id.* at 12 (steps 3, 4). When the request is accepted by ISP1-BB, the PATH message is sent to the bandwidth broker of CN2, CN2-BB, which makes an admission control decision. *Id.* (step 4, 5). Upon acceptance of the request, CN2-BB sends a RSVP RESV message to ISP1-BB, which passes it back to CN1-BB, and in turn to host S. *Id.* (steps 5–7). “When host S receives the RESV message, it can start transmitting data.” *Id.* at 13 (step 8).

Xiao discloses that there may be multiple ISPs between CN1 and CN2. Ex. 1005, 15. Xiao teaches that “MPLS can be used together with differentiated services to provide QoS.” *Id.* at 14. Xiao discloses that while BBs are in each customer domain, “BBs may not be needed in MPLS-based ISP networks.” *Id.* Xiao explains “[a]t the ISP side, admission control decisions can be made in a distributed manner by the boundary routers, or centrally by a BB.” *Id.* at 12. But Xiao teaches “it is technically better to have a BB to allocate resources.” *Id.* at 11.

2. Schelen-1

Schelen-1 describes “an architecture where clients can make advance reservations through agents.” Ex. 1032, 451. Schelen-1 teaches that “[f]or each routing domain in the network there will be an agent responsible for admission control on behalf of the routers in the domain.” *Id.* Figure 1 of

¹¹ Figure 4 of Xiao shows ISP1 as having bandwidth broker “CN1-BB,” but the text refers to it as “ISP1-BB.” We annotated Figure 4 by crossing out “CN1-BB” and replacing it with “ISP1-BB” as the bandwidth broker for ISP1, consistent with the text of Xiao.

Schelen-1 shows three routing domains (“AS”), each with a reservation agent (“A”). *Id.* at 452. “A reservation agent is a host that is responsible for reserving resources on a part of the Internet.” *Id.* “Each reservation agent must know the topology of its routing domain to perform admission control on behalf of that domain.” *Id.* Each reservation agent must also be able “to detect topology changes that require re-computation of forwarding state setup in routers, or renegotiation with adjacent reservation agents.” *Id.*

Schelen-1 describes its approach as advantageous because “advance reservations can be provided with little support from routers and without having to maintain reservation state in routers through periods when reservations have no effect on packet forwarding.” Ex. 1032, 452.

Schelen-1 further discloses:

Typically there is one reservation agent responsible for each autonomous system (AS) in the Internet (an AS is an administrative domain containing a number of routers running a routing protocol internally) . . . Inside an AS there may be backup agents as well as a hierarchy of agents, e.g., different agents for different areas of the AS.

Ex. 1032, 452.

Schelen-1 further teaches that “[a]gents can interoperate to support end-to-end advance reservation requests in the global network.” Ex. 1032, 453.

3. Gibson

Gibson describes its invention as relating to “a method of establishing a connection between two endpoints in a communications network such that the connection provides a pre-specified quality of service [QoS] for a specified communication session.” Ex. 1006, 1:9–16. Gibson teaches that

although the communication network is not limited to an MPLS network, the MPLS network is exemplified. *Id.* at 3:7–8; 6:11–16.

The system comprises admission managers, connection managers, and administrative server 35, each of which can serve a MPLS network. Ex. 1006, 6:11–16; Fig. 1. “The admission managers, connection managers and administrative server can be though[t] of as a ‘management layer’ of the communications network.” *Id.*

Gibson discloses that the admission manager (AM) in the network “is responsible for maintaining network topology information and using this to select a route across the network.” Ex. 1006, 7:26–28.

A connection manager (CM) is associated with each abstract node (“AN,” including AN1 and AN2) of the network which “monitors the bandwidth used in each of the label switch paths that emanate from the label switch router (or group of label switch routers).” Ex. 1006, 7:60–8:3 (see Fig. 1, which contains multiple connection managers). The abstract nodes represent one or more label switch routers (“LSR”). *Id.* at 6:40–42.

Gibson’s system also comprises an administrative server “used to provision paths in the communications network upon initialisation.” Ex. 1006, 8:17–18. The administrative server “has a much more detailed view of the topology of the intermediate MPLS network than the endpoints attached to it.” *Id.* at 8:32–34. “By pre-provisioning label switch paths of high capacity the administrative server constrains the number of possible routes between two end points for a proposed communication session of a given capacity.” *Id.* at 8:36–40. Gibson discloses that “an administrative server 35 may take the form of multiple servers that administer their local area.” *Id.* at 8:22–24. “An Administrative Server may also add new paths or

change the characteristics of an existing path during the operation of the network.” *Id.* at 8:42–44.

Gibson further explains that endpoint 10 or admission manager 30¹² issues a request for a new route between two abstract nodes AN1, 12 and AN2, 13 in the MPLS network. Ex. 1006, 8:55–58 (referencing Fig. 2). Administrative server 35 accepts a request and signals to one of the specified abstract nodes AN1, 12 that it should set-up a path to the other abstract node AN2, 13. *Id.* at 8:58–62. “The first abstract node 12 then registers the requested new path and its characteristics with its Connection Manager 32.” *Id.* at 8:66–67.

Gibson also describes a messaging protocol, SIP++. Ex. 1006, 5:13–25. SIP++ uses INVITE messages sent from the admission manager to a connection manager, which examines information about the session requirements and then “makes a temporary reservation for the session and forwards the INVITE message to the next abstract node in the path description.” *Id.* at 10:25–27.

E. Ground 1 based on Xiao, Schelen-1, and Gibson

Petitioner argues that claims 1–5, 7, and 8 are unpatentable under 35 U.S.C. § 103 as obvious over the combination of Xiao, Schelen-1, and Gibson. Pet. 12–71.

¹² Gibson’s Figure 2 shows Admission Manager 30 and Administrative Server 35. Consistently, the Specification at column 7, line 25 refers to Admission Managers 30, 21. However, the Specification at column 8:56 appears to erroneously refer to Admission Manager 35.

1. *Independent Claim 1*

Preamble

The preamble of claim 1 recites:

Method in a packet based communication network including network domains, wherein at least one domain is a Multiprotocol Label Switching MPLS domain, to establish a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST), wherein the bandwidth broker (BB) is associated to each network domain and the bandwidth broker (BB) is configured to control a hierarchical routing domain, the method comprises the following steps.

Patent Owner complains that Petitioner has not taken a position on whether the preamble of claim 1 is limiting. PO Sur-reply 6. Patent Owner contends that a person of ordinary skill in the art would understand the preamble of Claim 1 to be limiting. *Id.*

We agree with Patent Owner that the claim preamble is limiting. It was treated as such in the Decision to Institute. Institution Dec. 28–31. As indicated by Patent Owner, the parties also agreed the preamble is limiting in the related litigation. Ex. 2006, 55. The preamble is addressed below, as it was in the Decision to Institute.

[1.0.1] *Method in a packet based communication network including network domains, wherein at least one domain is a Multiprotocol Label Switching MPLS domain*

Petitioner provides evidence that Xiao describes “a ‘process of premium service’ for delivering ‘packets’ in a communication network including multiple network domains, as illustrated at Figure 4. Ex. 1005, 12–13 (Example 2).” Pet. 19 (Xiao’s Fig. 4 is reproduced above under the

discussion of Xiao as prior art). Petitioner identifies Xiao's teaching in Figure 4 as showing a source "corporate network 1" (CN1), a destination "corporate network 2" (CN2), and an internet service provider network "ISP1." Pet. 20 (citing Ex. 1005, 10, 12–13, Fig. 4). The source corporate network CN1 and the destination corporate network CN2 are two different "customer domains" that are separated by at least ISP1, an ISP (internet service provider) "domain." Ex. 1005, 13. Petitioner acknowledges that Figure 4 illustrates only one ISP, but cites Xiao's disclosure that "'there are multiple ISPs between CN1 [corporate network 1] and CN 2 [corporate network 2]'" Pet. 20 (citing Ex. 1005, 13). Petitioner also cites to teachings in Xiao of using MPLS and DiffServ networks, arguing it would have been obvious to a POSITA "to implement multiple ISPs in the communications network of Figure 4, including ISPs that support different QoS protocols such as DiffServ and MPLS, since Xiao itself suggests this modification." Pet. 19–20 (e.g., citing Ex. 1005, 14 ("MPLS can be used together with differentiated services to provide QoS"); Ex. 1003 ¶¶ 126–129). Petitioner provides an annotated drawing of Xiao's Figure 4 showing an MPLS domain added to the existing network domains in the original Figure 4. Pet. 21.

Patent Owner contends that Petitioner's allegation that Xiao discloses the claim preamble is "entirely misleading because it relies on simply labeling a modified version of Fig. 4 with 'MPLS domain' (see Pet. at 23, 27) despite the fact that Fig. 4 is obviously under Xiao's heading of 'Differentiated Services,' also known as DiffServ." PO Resp. 12. Patent Owner points to the deposition testimony of Petitioner's Expert Henry Hough, Ph.D. (Ex. 2003) as acknowledging that Figure 4 is directed to a DiffServ system, not an MPLS system, and that the description of DiffServ is under a separate heading. *Id.* at 12–13 (citing Ex. 2003, 38:6–40:2).

Petitioner responds that Patent Owner ignores the reasons articulated in its Petition to modify Xiao's Figure 4 by adding the MPLS domain described by Xiao. Pet. Reply 8–9. Petitioner argues that Patent Owner's attack on Xiao's disclosure is improper, when the Petition presented a rejection based on Xiao's MPLS and DiffServ combined teachings and articulated numerous reasons for combining the two domain types. *Id.* at 9.

Petitioner's reasoning is supported by a preponderance of the evidence in the record before us. It is true that Xiao's Figure 4, depicting a DiffServ domain, appears in a section of Xiao titled "Differentiated Services" and that Xiao has a separate section titled "MPLS" in which Figure 5, depicting a MPLS domain, appears. Ex. 1005, 10, 13. But Xiao specifically discloses that "MPLS can be used together with differentiated services to provide QoS." *Id.* at 14. Xiao also discloses that "the DS-field based and MPLS-based architectures can easily interoperate" (*id.*), consistent with the obviousness of using the two network architectures together.

Dr. Houh provides further explanation on the use of DiffServ and MPLS domains to provide service between senders and receivers:

Xiao's teaching is consistent with the understanding of a skilled artisan; namely, that "[i]n real-world use, it is unlikely that [DiffServ and MPLS] QoS protocols will be used independently, and in fact they are designed for use with other QoS technologies to provide top-to-bottom and end-to-end QoS between senders and receivers." Ex. 1017, 16.

Ex. 1003 ¶ 129 (alteration in original).

Petitioner further explains in the Petition that it would have been obvious to use multiple IPSs in parallel or in series, i.e., DiffServ and MPLS domains, because "if one ISP is unavailable, the customer would still be able

to obtain service through the parallel ISP. Another reason is to reduce the chance of exceeding peak rates and thereby avoid dropping excess traffic.” Pet. 22. Thus, Petitioner provides cogent reasons for using multiple domains, including domains in parallel.

In sum, we agree with Petitioner’s allegation that limitation [1.0.1] of the claim preamble is suggested by the combination of Xiao, Schelen-1, and Gibson, which is supported by a preponderance of the evidence.

[1.0.2] to establish a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST),

Petitioner contends that hosts S and D of Xiao, in corporate networks CN1 and CN2, respectively, represent, respectively, the claimed source (SRC) and destination (DST) in different domains. Pet. 25 (citing Ex. 1005, 11–15, Fig. 4; Ex. 1003 ¶¶ 145–146). The different domains, Petitioner contends, could be a DiffServ domain ISP1 and an MPLS domain ISP2. Pet. 26.

Petitioner further cites Xiao’s disclosure that “[p]remium service is suitable . . . for creating virtual lease lines,’ between the source and the destination” as rendering obvious the limitation of “establish[ing] a virtual leased line, VLL, between a source (SRC) and a destination (DST) in different domains.” Pet 25 (citing Ex. 1005, 11; Ex. 1003 ¶ 147) (alteration in original, emphasis omitted); see also Pet. 27. Petitioner contends that it would have been obvious to a POSITA in view of Xiao’s teaching “to use premium service to establish a virtual lease line between the source Host S and the destination Host D to “sav[e] the cost of building and maintaining a

separate network.” Pet. 26 (citing Ex. 1033,¹³ 2; Ex. 1003 ¶ 151; Ex. 1005, 10, 12, 14 (premium services to send data and in MPLS-architecture)) (alteration in original).

Patent Owner in the Sur-reply acknowledges that “even the ’698 Patent states that DiffServ and MPLS networks can interoperate. See ’698 Patent, 4:54–56 (‘possibly a mix of DiffServ and MPLS networks’).” PO Sur-reply 8. However, Patent Owner further argues “Xiao does not show any details or results of the interoperation beyond the paltry two sentences that describe the possibility of interoperation.” *Id.* Patent Owner contends in the Sur-reply:

Xiao cannot disclose such a VLL because “with such schemes [in Xiao], the MPLS effect is confined within the ISPs that use MPLS.” Ex. 1005, 14. In other words, Xiao discloses, at best, a separate VLL that would be applied within each type of domain, where there is an interoperation of MPLS and DiffServ domains. It cannot disclose the claimed one “VLL between a source and destination in different domains.”

Id. at 9.

This argument is new because it was not made in on pages 11–14 of the Patent Owner Response where the claim preamble was addressed by Patent Owner. On page 16 of the Patent Owner Response, Patent Owner cites the same sentence that “the MPLS effect is confined within the ISPs that use MPLS,” but Patent Owner does not argue that this disclosure excludes a VLL “between a source (SRC) and a destination (DST) in different domains in order to achieve packet transfer between the source (SRC) and the destination (DST)” as required by the claim, but instead

¹³ Nichols et al., “A Two-bit Differentiated Services Architecture for the Internet,” July 1999 (no publication source is listed).

asserts that this characteristic “has consequences as to whether bandwidth brokers are required in Xiao’s ISPs that use MPLS.” PO Resp. 16.

Specifically, Patent Owner has not identified where in the Patent Owner Response it was argued that *separate* VLLs would be applied within each domain type “at best.”

Patent Owner also does not provide adequate explanation about how the confinement of the MPLS effect impacts the claimed VLL between an MPLS and DiffServ domains. The statement that the MPLS effect is confined to the ISP in which it is used does not indicate the MPLS cannot interoperate with the DiffServ network architecture to form a VLL. Patent Owner conflates this statement in Xiao to be an “explicit limitation on interoperation between MPLS and DiffServ networks,” but does not explain why. PO Sur-reply 8. Moreover, the argument is problematic because Patent Owner admits that “that DiffServ and MPLS networks can interoperate.” *Id.* To the contrary, confining the MPLS effect to the MPLS domain is significant because the “effect” allows the MPLS domain to operate with the DiffServ architecture without interfering with it. Ex. 1005, 14 (“Therefore, the DS-field based and MPLS-based architectures can easily interoperate.”).

In sum, based on the preponderance of the evidence, we find Petitioner’s reasoning sufficient to establish the obviousness of limitation [1.0.2].

[1.0.3] *wherein the bandwidth broker (BB) is associated to each network domain and*

As evidence of limitation [1.0.3], Petitioner cites Xiao’s disclosure of bandwidth brokers associated with customer domains and DiffServ ISP1 domain. Pet. 28–29 (Ex. 1005, 12–14). Petitioner contends that based on

these disclosures “it would have been obvious to a POSITA to associate a bandwidth broker with MPLS domain ISP2 in modified Figure 4, since it is better to have a bandwidth broker to allocate resources.” Pet. 29 (citing Ex. 1005, 11 (“it is technically better to have a [bandwidth broker] to allocate resources”); Ex. 1003 ¶ 61). Because original Figure 4 had only one ISP1 domain, Petitioner annotated the figure to add a second ISP2 domain and provided reasons why a POSITA would have added a second domain. See Pet. 21–24, 30. We do not find it necessary in this Decision to rely on Petitioner’s annotation because of the explicit disclosure in Xiao of DiffServ and MPLS domains interoperating with each other. Ex. 1005, 14.

As further evidence of a bandwidth broker associated with each network domain, Petitioner cites Schelen-1’s teaching of routing domain with a reservation agent. Pet. 29 (citing Ex. 1032, 451–452); *see, e.g.*, Ex. 1032, Fig. 1 (showing each routing domain with a reservation agent, the latter which Petitioner contends is a bandwidth broker). Neither Schelen-1 nor Petitioner identify the domain type in Schelen-1.

Gibson is also cited by Petitioner as evidence of the claim limitation. Gibson discloses that its network is an “MPLS network.” Gibson, Abstract; Ex. 1003 ¶ 163. Petitioner cites the teaching in Gibson of an “admission manager” as part of its management layer, which Petitioner contends corresponds to a bandwidth broker, providing additional evidence of the obviousness of having a bandwidth broker associated with an MPLS domain, despite the lack of one in Figure 5 of Xiao. Pet. 29 (citing Ex. 1006, 6:11–16, 7:1–28, 7:46–48, Fig. 1; Ex. 1003 ¶¶ 162–163).

Petitioner argues it would have been obvious to a POSITA to associate a bandwidth broker with Xiao’s MPLS domain “to provide

admission control” and “scaling benefits” within the network domain. Pet. 31; *see also* Ex. 1003, ¶¶ 78–80, 118, 166, 167.

Patent Owner argues that Xiao’s Figure 5, illustrating the MPLS domain, does not show it having bandwidth brokers in each network domain in contravention of Claim 1, and therefore “cannot render Claim 1 obvious.” PO Resp. 14.

Patent Owner argues that Xiao does not disclose a bandwidth broker associated with an MPLS domain, a fact allegedly confirmed with Dr. Houh in his deposition testimony. PO Resp. 15 (citing Ex. 2003, 37:6–14). Patent Owner further argues that Xiao “teaches away” from a bandwidth broker in MPLS as required by claim 1 because it discloses that ““BBs may not be needed in MPLS-based ISP networks.”” *Id.* at 16 (citing Ex. 1005, 14). Patent Owner states that Xiao expressed a “preference for . . . an embodiment with no bandwidth broker” by choosing “exemplary Fig. 5 of an MPLS-based architecture” without it. *Id.* at 17. Patent Owner raises some of these same issues in the PO Sur-reply (10–12). But these arguments are either redundant to those already made or non-responsive to Petitioner’s arguments.

With regard to Schelen-1 and Gibson, Patent Owner argues that Schelen-1 does not mention “MPLS-based architecture” and that Gibson “does not disclose any relationship between its “admission managers” and their association with network domains. *See generally* Ex. 1032 and Ex. 1006; Ex. 2004, ¶ 44.” PO Resp. 17.

Patent Owner’s arguments are not supported by persuasive evidence.

While Xiao indicates that a bandwidth broker “may not be needed in MPLS-based ISP networks,” Xiao does not disparage or discredit its presence in such a network. “[T]he fact that there may be reasons a skilled

artisan would prefer one over the other does not amount to a teaching away from the lesser preferred but still workable option.” *Bayer Pharma AG v. Watson Labs, Inc.*, 874 F.3d 1316, 1327 (Fed. Cir. 2017); *see also Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (“A reference that ‘merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into’ the claimed invention does not teach away.” (quoting *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013))). Here, Patent Owner has not provided evidence that Xiao “criticize[s], discredit[s], or otherwise discourage[s]” the use of a bandwidth broker in an MPLS network.

Patent Owner has also not established that a bandwidth broker would be inoperable when used in an MPLS-based network. “[A] reference may teach away from a use when that use would render the result inoperable.” *In re ICON Health and Fitness, Inc.*, 496 F.3d 1374, 1381 (Fed. Cir. 2007). To the contrary, the evidence of record points to the opposite. First, Xiao’s statement that bandwidth brokers might not be needed in an MPLS network, is also an indication that, on the other hand, they may be included in an MPLS network and therefore would be expected to be operable when combined. Indeed, the ’698 patent discloses that RATES in the MPLS domain performs admission control for a flat link state-domain, a characteristic of a bandwidth broker. Ex. 1001, 4:11–21.

Second, Gibson describes an MPLS network that includes an “admission manager,” which Dr. Houh testifies in his declaration maintains network topology information and performs admission control to the communication network, functions provided by a bandwidth broker. Ex. 1003 ¶ 163. For these reasons, Dr. Houh concludes that the “admission

manager” described in Gibson corresponds to a bandwidth broker in an MPLS domain. *Id.*

Dr. Houh also explains that adding a bandwidth broker to an MPLS network would have been obvious for its ability to confer “scaling benefits” and minimize reservation state and admission control overhead, providing the motivation to apply the teachings in Schelen-1 and Gibson to Xiao. Ex. 1003 ¶¶ 166, 167.

Patent Owner, however, argues that “the major difference between MPLS-based architectures and DiffServ-based architectures” described by Xiao “is that ‘the MPLS effect is confined within the ISPs that use MPLS.’” PO Resp. 16 (citing Ex. 1005, 14). Patent Owner contends that Xiao discloses that these differences in the ISPs have consequences as to whether bandwidth brokers are required in Xiao’s ISPs that use MPLS.” *Id.* at 16 (citing Ex. 1005, 14).

We copy the complete text from Xiao below:

Note that, with such schemes, the MPLS effect is confined within the ISPs that use MPLS. Whether a particular ISP’s architecture is DS-field-based or MPLS-based is transparent to other ISPs. Therefore, the DS-field based and MPLS-based architectures can easily interoperate.

Ex. 1005, 14.

The “MPLS-effect” is apparently a reference to the differences in processing a packet between the MPLS and DS architectures as described in the paragraph above it. We understand the disclosure that the “effect” is confined to the MPLS domain to mean that the processing that happens in the MPLS domain is not visible to other domains and “[t]herefore, the DS-field based and MPLS-based architectures can easily interoperate.” Ex. 1005, 14. In other words, what happens in the MPLS domain in terms of

packet processing is kept in the MPLS domain, and does not extend outside of it, allowing it to interoperate with the DiffServ domain. Patent Owner does not adequately explain how this disclosure would indicate that a bandwidth broker cannot or should not operate in an MPLS domain.

Limitation [1.0.3] recites that “the bandwidth broker (BB) is associated to each network domain.” Patent Owner asserts that Gibson does not disclose the recited relationship between the admission manager and a network domain. PO Resp. 17. Dr. Congdon testifies that a person of ordinary skill in the art would not have combined Schelen-1 and Gibson with Xiao because “Schelen-1 does not even mention an MPLS-based architecture while Gibson does not disclose any relationship between its ‘admission managers’ and their associations with network domains.” Ex. 2004 ¶ 44.

Patent Owner’s assertion is not supported by the facts before us in this record. Gibson exemplifies in its Figure 1, and states, that the admission manager is part of the “management layer” of the “communications network,” making an explicit association between the admission manager/bandwidth broker and the network. Ex. 1006, 6:11–16. We have not been directed to any other way of interpreting this statement. Gibson also teaches that the admission manager performs the admission control role of a broadband broker across the network:

Each admission manager [30, 31] responsible for maintaining network topology information and using this to select a route across the network. When an admission manager receives a request for a communication session from an endpoint 10, 11 it issues a plurality of path requests . . . These path requests are control messages whose function is to request and determine possible paths between the required endpoints.

Id. at 7:25–35.

Moreover, Petitioner’s challenge is not based on Gibson, alone, but on the combination of Gibson with Xiao and Schelen-1. “Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.” *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *see also Soft Gel Techs., Inc. v. Jarrow Formulas, Inc.*, 864 F.3d 1334, 1341 (Fed. Cir. 2017) (quoting *In re Merck*). Citing Gibson’s teaching of an admission manager that performs admission control in an MPLS domain, Dr. Houh testified that it would have been obvious to one of ordinary skill in the art “to associate a bandwidth broker with Xiao’s MPLS network, to provide admission control for incoming requests for a new communication session. Ex.1006, 7:26–32, 7:54-57.” Ex. 1003 ¶ 113. Dr. Houh’s statement is not conclusory, but provides a cogent reason for combining Xiao and Gibson. In *KSR*, 550 U.S. at 418, the Supreme Court emphasized the importance of determining “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.”

While Patent Owner did not challenge the correspondence between the bandwidth broker and Gibson’s admission manager in this section, in addressing limitation [1.5.1] “v”), Patent Owner asserts that admission managers are not a bandwidth brokers because “they do not perform any of the exemplary activities of a bandwidth broker described in the ’698 Patent, such as ‘configuring the network to meet [] granted policies.’ [Pet. 54] (citing ’698 Patent, 2:48–54).” PO Resp. 23 (alteration in original). (See Ex. 2004 ¶ 59 for same statement.)

In response to Patent Owner, Petitioner cites the disclosure in the ’698 patent that a “bandwidth broker is an entity” that performs activities such as “maintaining a database of the domain’s resources” and “provid[ing]

admission control,” among other management activities. *See* Ex. 1001, 2:27–55 (cited at PO Resp. 23). Dr. Houh identifies admission control as part of a bandwidth broker’s exemplary activities, a function played by Gibson’s admission manager. Ex. 1046 ¶ 20; Ex. 1003 ¶ 49; *see also* Ex. 1045, 40:1–7. We further note that Petitioner’s challenge is based on the combination of Gibson with Xiao, and Dr. Houh testifies that the bandwidth broker in Xiao “will configure the classification and policing rules on router BR1, and the policing and reshaping rules on router BR2” (Ex. 1003 ¶ 241) (emphasis omitted), indicating that the latter is another function of a bandwidth broker.

Patent Owner’s arguments in the PO Sur-reply (Section B) relating to the bandwidth broker in an MPLS domain are largely the same as the arguments in Patent Owner’s Response. Patent Owner contends that Xiao “[a]t best, it shows the possibility of a BB in an MPLS system (*i.e.*, where *all* the network domains are MPLS),” but provides no support for the allegation that a BB is only suggested when all the network domains are MPLS. PO Sur-reply 11 (emphasis added).

In sum, Petitioner’s allegation that limitation [1.0.3] “wherein the bandwidth broker (BB) is associated to each network domain” is suggested by the combination of Xiao, Schelen-1, and Gibson is supported by a preponderance of the evidence.

[1.0.4] *the bandwidth broker (BB) is configured to control a hierarchical routing domain, the method comprises the following steps:*

The preamble of the claim further recites that “bandwidth broker (BB) is configured to control a hierarchical routing domain.” Petitioner cites Xiao’s disclosure of the bandwidth broker as a “resource controller,” which is configured to “to allocate resources,” and the role of the BB in making

“admission control decisions” as teaching a bandwidth broker that is configured to control a routing domain. Pet. 32 (citing Ex. 1005, 11, 12; Ex. 1003 ¶¶ 170–173). For hierarchical routing, Petitioner cites Schelen-1’s teaching of a “hierarchy of routing domains” and a “corresponding hierarchy of reservation agents [bandwidth brokers] that aggregate reservations and register with the next highest level” in which “an agent cannot have knowledge about the internals of remote autonomous systems and therefore can only provide admission control for [its] own routing domain.” Ex. 1032, 452, 454 (cited by Pet. 32–33). Petitioner contends it would have been obvious to use hierarchical routing when implementing Xiao to “support scaling and accommodate a network with a large topology.” Pet. 33.

Patent Owner does not challenge Petitioner’s assertions regarding the limitation “the bandwidth broker (BB) is configured to control a hierarchical routing domain,” which we find to be supported by a preponderance of the evidence.

[1.1.1] *i) generate a request from [an entity] for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network (SRC) to a destination network (DST)*

Petitioner, in reference to Figure 4 of Xiao, contends that Xiao’s disclosure that “[h]ost S sends a RSVP message to the local BB, CN1-BB” in a process in which “host S in CN1 wants to use premium service to send data to host D in CN2” (Ex. 1005, 12), describes the claimed requirement of limitation [1.1.1] of generating a request for a virtual leased line between source and destination networks. Pet. 34–35 (*see also* limitation [1.0.2] discussed above for the virtual leased line).

With respect to the recitation that the VLL has a “predefined Quality of Service,” Petitioner references the description in Xiao that “[p]remium service provides low-delay and low-jitter service for customers that generate fixed peak bit rate traffic” and that the “ISP guarantees that the contracted bandwidth will be available when traffic is sent” as evidence of predefined QoS. Ex. 1005, 11 (*see* Pet. 35–36).

Petitioner also argues that Gibson would have rendered obvious the recited limitation. Pet. 36–37 (citing Ex. 1003 ¶ 187). Gibson discloses “a method of establishing a connection between two endpoints in a communications network, such that the connection provides a pre-specified quality of service.” Ex. 1006, 2:6–12; *see also id.* at 20:53–56 (“A method of establishing a connection between two endpoints in a communications network such that a specified level of quality of service is given for a specified communication session using the established connection.”). Petitioner contends that, in view of Gibson, it would have been obvious to a POSITA to allow a user in Xiao to interact with the endpoint of host S “to generate a request for a communication session having a pre-specified QoS, because this would allow the user [to] initiate an immediate session or schedule in advance a session for Internet telephony and videoconferencing, which have predefined QoS.” Pet. 37.

Petitioner contends that Schelen-1’s teaching of “generating a ‘reservation request[]’ from a user for service, with the request being ‘parameter-based’ with predefined ‘traffic descriptions’ used to ‘setup resources along the path’ and ‘perform QoS routing’ between source and destination” further would have made limitation [1.1.1] obvious in combination with Xiao because it would have allowed Xiao to schedule resources more effectively and “avoid undue signaling and scalability

problems.” Pet. 37–38 (citing Ex. 1032, 451, 453; Ex. 1034, 29;¹⁴ Ex. 1003 ¶¶ 81–82, 114–115, 192, 193, 194–195) (emphasis omitted).

Patent Owner does not challenge Petitioner’s assertions regarding the limitation “[1.1.1] i) generate a request from [an entity] for a Virtual Leased Line, VLL, having a predefined Quality of Service, QoS, from a source network (SRC) to a destination network (DST),” which we find to be supported by a preponderance of the evidence.

[1.1.2] i) *apply the request to a Bandwidth Broker (BB) of a domain A, BB_A, associated to the source network*

Petitioner cites the teaching in Xiao of CN1-BB, associated with corporate network CN1, accepting a PATH message from host S, as making the claim limitation obvious. Pet. 39 (citing Ex. 1005, 12; Ex. 1003 ¶¶ 196–199). Petitioner also cites Schelen-1, for the same limitation, referencing the disclosure in Schelen-1 that “requests are forwarded to the agent [bandwidth broker] responsible for the routing domain.” *Id.* (quoting Ex. 1032, 451) (alteration in original).

Petitioner contends that it would have been obvious “for Xiao’s CN1-BB to receive the generated PATH message request, per Schelen-1 and Gibson, to perform admission control so that premium service is set up based on the request. Ex. 1005, 12; Ex. 1003, ¶¶ 202–203.” Pet. 40.

Patent Owner does not challenge Petitioner’s assertions regarding the limitation “[1.1.2] i) apply the request to a Bandwidth Broker (BB) of a

¹⁴ Schelén et al., “Aggregating Resource Reservations over Multiple Routing Domains,” 1998, *1998 Sixth International Workshop on Quality of Service (IWQoS’98)*, 29–32.

domain A, BB_A, associated to the source network,” which we find to be supported by a preponderance of the evidence.

[1.2] ii) BB_A establishes the different domains involved to reach the destination network (DST)

For limitation [1.2], Petitioner provides evidence that Xiao teaches or suggests “different domains” in a communication network involved in reaching a destination network, including a DiffServ domain ISP1 and an MPLS domain ISP2. Pet. 40 (citing its discussion of limitation [1.0.1]).

Discussing the additional requirement that the different domains are “involved to reach the destination network,” Petitioner further cites the disclosure in Xiao that “[c]ustomers will have SLAs [service level agreements] with their ISPs” to obtain premium service. Ex. 1005, 10–11 (cited at Pet. 40; Ex. 1003 ¶ 206). Dr. Houh testifies, as cited in the Petition, a person of ordinary skill in the art “would have understood that the SLA is an agreement that “specifies the forwarding service a customer should receive from its ISPs.” Ex. 1003 ¶ 207 (citing Ex. 1005, 9; “Ex. 1021, 4 ([I]nitial resource agreements among neighboring domains are bootstrapped via some configuration . . . [for example] install some initial resource agreements among neighboring domains.’)” (alterations in original)).

Dr. Houh testifies that Xiao teaches that “the bandwidth broker CN1-BB signals its ISP domain to request services for external communications,” based on the SLA, when the destination is outside the CN1. Ex. 1003 ¶ 208. Xiao further discloses that the bandwidth broker in the customer domain uses a signaling protocol to request services from the ISP domain. Ex. 1005, 12 (“In Fig. 4, host S in CN1 wants to use premium service to send data to host D in CN2. CN1 has a dynamic SLA [service license agreement] with

ISP . . . Host S [a customer domain] sends an RSVP PATH message to the local BB, CN1-BB . . . CN1-BB sends the PATH message to ISP1-BB.”); Pet. 41.

Petitioner contends that it would have been obvious to a POSITA that the bandwidth broker CN1–BB would have determined that “the ISP1 domain was *involved to reach* the domain of the destination corporate network CN2” when sending “the PATH message to the bandwidth broker ISP1-BB of the ISP1 domain.” Pet. 41 (*italics added*) (citing Ex. 1003 ¶¶ 208–209).

Petitioner further cites Schelen-1 for its disclosure of “a bandwidth broker [that] listens to a well-known multicast address where all other bandwidth brokers ‘giv[e] their identity and which routing domain (AS) they are responsible for,’ thereby allowing the bandwidth broker to establish the existence of all other bandwidth brokers and their domains.” Pet. 43 (citing Ex. 1032, 452) (*emphasis omitted*) (*second alteration in original*). Petitioner contends it would have been obvious to a POSITA to apply Schelen-1’s teaching to Xiao for a message to be sent to the destination network CN2 with awareness of the bandwidth brokers and domains to reserve resources for the request. Pet. 44 (citing Ex. 1003 ¶¶ 83–84, 116, 216–217).

In response, Patent Owner argues that “a person of ordinary skill in the art would understand that Schelen-1 does not describe that one bandwidth broker, BB_A ‘establishes the different domains involved to reach the destination network (DST)’ but that every reservation agent in Schelen-1 must work **together**.” PO Resp. 18 (citing Ex. 1032, 542); *see also* Ex. 2004 ¶¶ 46–47.

Patent Owner contends that Petitioner’s expert Dr Houh understood that “Schelen-1’s disclosure of the knowledge of other bandwidth brokers’

existence does not mean any bandwidth broker ‘establishes the different domains involved to reach the destination network (DST).’” PO Resp. 18. Patent Owner contends that the “the claim language explicitly recites that **one BB**, BB_A, establishes **all the different domains** required to reach the destination network.” PO Sur-reply 3. Patent Owner also complains that Petitioner’s Reply raises a new construction of the claim:

Petitioner also relies on a construction of the claim limitation that contradicts the explicit claim language. Specifically, Petitioner argues that “Patent Owner does not identify a claim limitation that precludes a bandwidth broker from communicating with other bandwidth brokers on a multicast address to establish the different domains involved.” Reply, 16. This construction is wrong in view of the explicit claim language requiring one BB to establish all domains.

Id. at 13.

Patent Owner’s expert Dr. Congdon also testifies that “a person of ordinary skill in the art would understand that Schelen-1’s disclosure of the knowledge of other bandwidth brokers’ existence does not mean any bandwidth broker ‘establishes the different domains involved to reach the destination network (DST).’” Ex. 2004 ¶ 48 (citing Ex. 2003, 51:18–52:15 which is deposition testimony by Dr. Houh).

We now address Patent Owner’s arguments. A review of Dr. Houh’s declaration indicates that he originally construed the disputed limitation in the same way as Patent Owner, i.e., that one bandwidth broker “establishes the different domains involved to reach the destination network.” The statement that other bandwidth brokers communicate with each other via multicast address was part of Dr. Houh’s analysis of the disputed limitation, not a separate construction of the claim. Ex. 1003 ¶¶ 84, 213, 215–217. In other words, the other bandwidth brokers communicate with each other, but

this does not exclude one bandwidth broker from performing the function recited in the claim. In addition, in the PO Sur-reply, Patent Owner makes the same erroneous statements about claim construction., i.e., confusing the description of bandwidth brokers communicating with each other as a claim construction issue. PO Sur-reply 13.

Dr. Houh testified in his declaration that Schelen-1's "reservation agent" would be understood to be a "bandwidth broker," citing an additional publication by Schelen as evidence of the correspondence between the two. Ex. 1003 ¶ 67. Dr. Houh further testifies that Schelen-1 further discloses that "a bandwidth broker listens to a well-known multicast address to establish the existence of bandwidth brokers of all other domains." Ex. 1003 ¶ 213. To support this testimony, Dr. Houh cites (at Ex. 1003 ¶ 213) the following disclosure from Schelen-1:

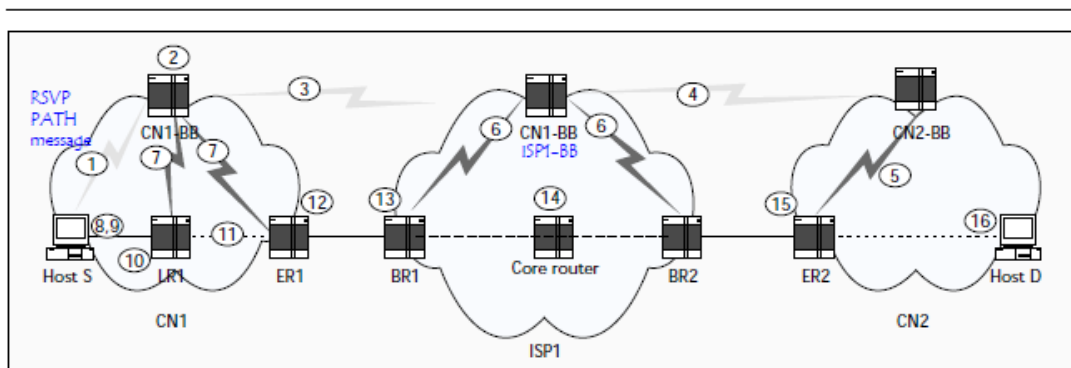
A reservation agent is a host that is responsible for reserving resources on a part of the Internet. Typically there is one reservation agent responsible for each autonomous system (AS) in the Internet (an AS is an administrative domain containing a number of routers running a routing protocol internally). Such reservation agents advertize themselves periodically on a well known multicast address, giving their identity and which routing domain (AS) they are responsible for. By listening to this well known multicast address, each top level agent will know the existence of all other top level agents. Ex. 1032, 452.

Dr. Houh identified the "reservation agents" and "top level agents" as the bandwidth brokers. Ex. 1003 ¶ 213. Dr. Houh further explained that "[t]his information about bandwidth brokers of all other domains" advertised on the multicast address "is used to reserve bandwidth toward the destination. *Id.* ¶ 214. Dr. Houh makes this conclusion based on the following disclosure in Schelen-1's abstract:

We propose an architecture where clients can make advance reservations through agents. For each routing domain in the network there will be an agent responsible for admission control on behalf of the routers in the domain. *Requests involving several routing domains are forwarded for admission control with agents along the path for the requested service.*

Ex. 1032 (Abstract) (emphasis added).

Dr. Houh testifies that it would have been obvious to a person of ordinary skill in the art “for each of the bandwidth brokers associated with Xiao’s domains . . . to communicate via a multicast address” to allow “each bandwidth broker to establish the existence of all other bandwidth brokers and their respective domains.” Ex. 1003 ¶ 216 (based on the disclosure in Schelen-1, 452). Dr. Houh explains, with reference to an annotation of Xiao’s Figure 4, in which an additional ISP (“ISP2”) has been introduced in parallel. *See, e.g., id.* ¶ 198. Dr. Houh explains the obviousness of using both added ISPs in series (*id.* ¶¶ 139–140) and in parallel (*id.* ¶¶ 133, 135), and testifies “whether multiple ISPs are implemented in Xiao’s Figure 4 in parallel or series (or both) is a mere design choice that would have been obvious to a POSITA, since these and combinations thereof are the only possible implementations.” *Id.* ¶ 142. For reference, Figure 4 of Xiao is reproduced below:



■ Figure 4. The delivery process of premium service with a dynamic SLA.

Figure 4 of Xiao shows CN1, ISP1, and CN2, each having a bandwidth broker (“BB”). Adding an additional ISP2, Dr. Houh describes the ““real-world use”” where multiple IPS would be involved, and having both DiffServ and MPLS domains. Ex. 1003 ¶ 49.

Dr. Houh testifies that “the customer domain bandwidth broker CN1-BB would become aware of the involved bandwidth brokers (ISP1-BB, ISP2-BB, and CN2-BB [ISP2 and ISP2-BB do not appear in the unannotated figure]) and which ISP domains they are responsible for (DiffServ domain ISP1, MPLS domain ISP2, and destination customer domain CN2)” because of the communication via the multicast address. Ex. 1003 ¶ 216. Dr. Houh states that the “CN1-BB would become aware of the involved bandwidth brokers [via the multicast] . . . so a PATH message request may be sent to reserve ISP resources toward the destination network.”¹⁵ *Id.*

Dr. Houh also states that “where there are multiple ISPs and the bandwidth broker CN1-BB has an SLA with each, it would have been obvious to a POSITA that bandwidth broker CN1-BB establishes that multiple ISP domains are involved to reach the domain of the destination corporate network CN2. Ex.1005, 14–15, Ex.1025, 2, 3.” Ex. 1003 ¶ 210. As further evidence of a customer domain having contracts with multiple

¹⁵ Dr. Houh’s testimony about inter-domain signaling appears to be consistent with the disclosure in the ’698 patent. *See* Ex. 1001, 8:22–32 (“In the example illustrated with references to FIG. 4 only two BB were involved. In a more generalised implementation a much higher number is involved. As indicated above a BB is arranged to communicate with BBs in neighbouring domains, allowing QoS spanning several domains. Generally a BB communicates with BBs one domain hop away only (i.e. with neighbours). This is related to the way inter-domain routing is done in the Internet. For each destination outside a BBs own domain, it knows the next domain hop on the path.”).

ISPs that enable the single customer domain bandwidth broker to establish a path to reach the destination source, Dr. Houh further cites (*id.* ¶ 211) the following disclosures from Reichmeyer: “[A] campus contracts one ISP (or a few for redundancy) to deliver its traffic.” (Ex. 1025, 2); “That is, the campus contracts one or a few ISPs for its data delivery services to *all* destinations.” (*Id.* at 3). A campus is shown as a collection of computers. *See Id.* at Figs. 4, 5.

Thus, Dr. Houh in his initial declaration explained why the combination of Xiao and Schelen-1 would have made obvious a BB_A which “establishes ***all the different domains*** required to reach the destination network” (PO Sur-reply 13). Patent Owner does not identify an interpretation assigned to the limitation by Dr. Houh that differs from Patent Owner’s. Nor does Patent Owner point to a defect in Dr. Houh’s reasoned analysis, supported by a preponderance of the evidence, that the limitation would have been made obvious by the combination of Xiao and Schelen-1.

Patent Owner’s Response only addresses the portion of Schelen-1 in which the reservation agents advertise themselves, but does not address the disclosure in Xiao described above, nor the combination of Xiao and Schelen-1. PO Resp. 18–19. Non-obviousness cannot be persuasively established by addressing only a single reference, when the challenge is based on a combination of references. *Soft Gel*, 864 F.3d at 1341; *In re Merck & Co.*, 800 F.2d at 1097).

Dr. Houh further explained:

With this information [from the multicast], in the present example, the customer domain bandwidth broker CN1-BB would become aware of the involved bandwidth brokers (ISP1-BB, ISP2-BB, CN2-BB) and which ISP domains they are responsible for (DiffServ domain ISP1, MPLS domain ISP2,

and destination customer domain CN2), so a PATH message request may be sent to reserve ISP resources toward the destination network. Ex. 1005, 12 (“[T]he BB in the customer domain must also use some signaling protocol to request resources on demand from its ISP.” “CN1-BB sends the PATH message to ISP1-BB.” “ISP1-BB sends the PATH message to CN2-BB.”);

Ex. 1003 ¶ 216.

In other words, the combination of Xiao and Schelen-1 reasonably suggests that the information obtained by the bandwidth broker from the multicast address described in Schelen-1 would be used to determine where to route the messages as specifically described by Xiao. Thus, contrary to Patent Owner’s arguments, the information obtained from the multicast, when combined with Xiao, would have made the claim limitation obvious.

We have considered the testimony by Dr. Congdon, but find it to be conclusory and limited to the discussion of Schelen-1, when the challenge is based on a combination of Xiao, Gibson, and Schelen-1. Ex. 2004 ¶¶ 46–49.

Dr. Congdon, for example, quotes from Dr. Houh’s deposition testimony¹⁶ that “the ability for the reservation agents or bandwidth brokers to know and find out about all the other domains and the bandwidth brokers . . . is different than actually passing a request to bandwidth brokers of the involved domains regarding, you know, any sort of setup request.” Ex. 2003, 52:4–12 (cited in Ex. 2004 ¶ 48). But this statement by Dr. Houh is preceded by his testimony that “in view of what Schelen-1 is disclosing, it would have been obvious to a POSITA for each of the bandwidth brokers associated with Xiao’s domains to communicate via multicast address” to establish

¹⁶ Dr. Houh was deposed by Counsel for Petitioner on Jan. 3, 2024.

their “existence.” *Id.* at 49:19–25. Dr. Houh explains further in his declaration:

It would have been obvious to a POSITA, in view of Schelen-1, for each of Xiao’s bandwidth brokers to communicate via a multicast address. This would allow for each bandwidth broker to establish the existence of all other bandwidth brokers and their respective domains. With this information, the bandwidth brokers would be able to cooperate and forward request messages to other bandwidth brokers for admission control to reserve resources along the path toward the destination network.

Ex. 1003 ¶ 84.

Thus, Dr. Congdon’s testimony cites to an isolated statement by Dr. Houh who was responding to questions by Petitioner’s counsel.

In sum, Petitioner’s allegation that limitation [1.2] “ii) BB_A establishes the different domains involved to reach the destination network (DST)” is suggested by the combination of Xiao, Schelen-1, and Gibson is supported by a preponderance of the evidence.

[1.3] *iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain;*

Petitioner cites Xiao’s Example 2, “Delivery of Premium Service” as evidence that limitation [1.3] would have been obvious to one of ordinary skill in the art. Specifically, Petitioner cites the disclosure in “Phase 1: Signaling” that “CN1-BB [directly] sends the PATH message to ISP1-BB” and that indirectly, when the request is accepted, CN1-BB “sends the PATH message to CN2-BB.” Pet. 45 (citing Ex. 1005, 12, steps “3” and “4”). Petitioner further cites Xiao’s disclosure that, when multiple domains between CN1 and CN2 are present, the bandwidth broker would forward

messages directly or indirectly to the involved ISP domains. *Id.* (citing Ex. 1005, 13). Petitioner also contends that in a parallel ISP implementation, the message would be sent “directly” to both ISPs because if one ISP is not available, the redundant ISP could still provide services. *Id.* But, if the ISPs were implemented in series, the PATH message would be passed serially to downstream ISPs to reserve resources, corresponding to “indirectly” passing the request. Pet. 45–46.

Petitioner cites additional disclosure from Schelen-1 (Ex. 1032, Abstract, 453) for rendering the claim limitation “BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains” obvious in combination with Xiao. Pet. 46. Specifically, citing declaration testimony by Dr. Houh (Ex. 1003 ¶¶ 223–224), Petitioner contends that a “POSITA would have understood that . . . Schelen-1 generally teaches forwarding the request to the bandwidth broker of the involved routing domain to support end-to-end reservations.” *Id.* Petitioner concludes that it would have been obvious “for Xiao’s customer domain bandwidth broker CN1-BB to pass PATH message requests directly (for parallel ISPs) or indirectly (for series ISPs) to bandwidth brokers ISP1-BB, ISP2-BB, CN2-BB of the involved domains, so that end-to-end reservations may be made for the requested service.” *Id.*

Limitation [1.3] further recites the requests are “regarding a VLL of the predefined QoS from ingress to egress of each domain.” Petitioner cites Xiao’s teaching, as discussed for limitations [1.0.2] and [1.1.1], of premium service comprising a VLL having predefined QoS in which requests for service are forwarded to each domain, having made the claimed limitation obvious to a POSITA. Pet. 46–47. With regard to the claim requiring both DiffServ and MPLS domains, Petitioner refers to Xiao’s disclosure that

“MPLS can be used together with differentiated services to provide QoS.”
Ex. 1005, 14.

Petitioner also argues that to the extent “Xiao is insufficient to show that the request is regarding ‘from ingress to egress of each domain,’” Schelen-1 teaches “end-to-end reservations,” which would have been understood by a POSITA to mean “from ingress to egress of each domain involved, per the request.” Pet. 48 (citing Ex. 1032, Abstract, 453; Ex. 1003, ¶ 226) (emphasis omitted). Petitioner explains it would have been obvious in view of Schelen-1, “for Xiao’s PATH message request, to regard reserving end-to-end resources (from ingress to egress) of each involved domain so that resources would be reserved and available to establish the VLL per the original request from source Host S.” Pet. 49.

Patent Owner’s only argument is that because Petitioner did not establish that “wherein the bandwidth broker (BB) is associated to each network domain” would have been made obvious by the combination of Xia-1, Schelen-1, and Gibson, “it therefore cannot disclose, teach, or suggest” limitation [1.3]. PO Resp. 19; *see* Ex. 2004 ¶ 50.

In sum, Petitioner’s allegation that limitation “[1.3] iii) BB_A directly or indirectly passes requests to all Bandwidth Brokers (BB) of the involved domains regarding a VLL of the predefined QoS from ingress to egress of each domain” is suggested by the combination of Xiao, Schelen-1, and Gibson is supported by a preponderance of the evidence.

[1.4] iv) *each involved bandwidth broker (BB) performs admission control in its domain;*

Petitioner cites evidence that Xiao discloses that each involved domain has a bandwidth broker. Pet. 49 (citing Ex. 1005, 12 (“Phase 1:

Signaling”; Fig. 4). Petitioner cites further evidence that Xiao also discloses that each bandwidth broker “makes an admission control decision.” *Id.* (citing Ex. 1005, 12, steps 2, 4, 5 (each of CN1-BB (bandwidth broker), ISP1-BB, and CN2-BB “makes an admission control decision”)).

Petitioner also contends that each of Schelen-1 and Gibson teaches the claimed limitation. Pet. 50 (citing Ex. 1032, 451 (for “each routing domain in the network, there will be a reservation agent [bandwidth broker] responsible for admission control”); Pet. 50–51 (citing Ex. 1006, 7:42–48 (“enables the admission manager to build up a map of all the reachable nodes on the MPLS network and their availability over time. An admission manager also monitors the bandwidth of connections”))).

Petitioner contends that it would have been obvious to the POSITA in view of Schelen-1 and Gibson, “for the involved bandwidth brokers ISP1-BB, ISP2-BB, and CN2-BB [of a modified Xiao Fig. 4 where there are two ISPs, ISP1 and ISP2] to perform admission control, so that end-to-end reservations may be made for the requested service if resources are available such that Xiao’s source and destination would be able to communicate.” Pet. 51.

In response, Patent Owner argues that because Petitioner did not establish that “wherein the bandwidth broker (BB) is associated to each network domain” would have been made obvious by the combination of Xiao, Schelen-1, and Gibson, “it therefore cannot disclose, teach, or suggest” limitation [1.4]. PO Resp. 20.

To support this argument, Patent Owner provides the following testimony from Dr. Congdon:

Xiao teaches that, for its MPLS-architecture, its bandwidth brokers are differentiated from its ingress and egress routers,

because it simultaneously discloses that “[a]dmission control is done in a distributed fashion by the ingress and egress routers” and that “BBs may not be needed.” Ex. 1005, at 14. Therefore, a person of ordinary skill in the art would have understood that Xiao does not disclose “each involved bandwidth broker (BB)” performing admission control.

Ex. 2004 ¶ 53 (footnote omitted).

It is true that Xiao teaches that bandwidth brokers may not be needed in MPLS-based ISP networks because resource requests can be tunneled in a distributed fashion from the ingress routes to the egress routers. Ex. 1005, 14. But as explained above, Xiao does not state a bandwidth broker would be inoperable in an MPLS-based network, but instead discloses that they “may not be needed,” indicating to one of ordinary skill in the art that bandwidth brokers could alternatively be used. *Id.* A general preference for one embodiment over another is not a teaching away. *See Bayer Pharma AG*, 874 F.3d at 1327; *Galderma Labs*, 737 F.3d at 738.

Gibson discloses an admission manager in an MPLS network, which Petitioner provides evidence of its correspondence to the claimed bandwidth broker. *See* Ex. 1003 ¶¶ 110 (“Gibson discloses performing admission control with an ‘admission manager’ (which corresponds to a bandwidth broker) in the context of an MPLS network and is therefore analogous art to the ’698 patent which also performs admission control in an MPLS network.”), 113. Gibson also discloses the admission manager as part of an MPLS network which includes label switch routers. Ex. 1006, 6:40–49. Thus, Gibson describes a bandwidth broker in an MPLS network, consistent with Xiao’s suggestion that, even if not preferred, a bandwidth broker could be employed in MPLS architecture.

We further note that, as explained by Dr. Houh, Schelen-2 describes the benefit of “having the bandwidth broker perform admission control for all links” because “it frees up the routers from related computations. Ex.1032, 457 (‘Our goal has been to relieve the routers from computation concerned with QoS contracts and put it in agents instead.’).” Ex. 1003 ¶90. Thus, while Xiao discloses that “admission control decisions can be made in a distributed manner by the boundary routers” (Ex. 1005, 12,¹⁷ 14), Schelen-2 provides a benefit for making admission control decisions “centrally by a BB.” Thus, Petitioner provides an additional fact-based reason to use a bandwidth broker in Xiao’s MPLS network.

Dr. Congdon’s testimony (Ex. 2004 ¶53) explains why a bandwidth broker may not be needed in an MPLS domain (e.g., because admission control is accomplished by the routers), but Dr. Houh—as explained above—gives a fact-based reason for including such a bandwidth broker in an MPLS domain, a finding consistent with Gibson’s teaching of admission control performed by a management layer, including an admission manager and administrative server.

In sum, Petitioner’s allegation that limitation [1.4] “iv) each involved bandwidth broker (BB) performs admission control in its domain” is suggested by the combination of Xiao, Schelen-1, and Gibson is supported by a preponderance of the evidence.

¹⁷ “At the ISP side, admission control decisions can be made in a distributed manner by the boundary routers, or centrally by a BB.”

[1.5.1] *v) each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity and*

As evidence that limitation [1.5.1] is described by Xiao, Petitioner cites Xiao's disclosure in Example 2 that the bandwidth broker "of the involved ISP domain [ISP1-BB], and destination customer domain [CN2-BB] 'makes an admission control decision' and returns a result (e.g., 'an error message' if the request is denied or 'an RSVP RESV message' if admitted) to CN1-BB, which passes the result to Host S." Pet. 51 (citing Ex. 1005, 12–13 (steps 2, 4, 5–8 of Example 2); Ex. 1003 ¶¶ 238–241) (emphasis omitted).

Patent Owner does not provide a separate argument for limitation [1.5.1], but instead argues that because Petitioner fails to show other limitations in the claim, it "cannot disclose, teach, or suggest 'each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity and if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted.'" PO Resp. 22.

We find that Petitioner's allegation that limitation "[1.5.1] *v) each involved bandwidth broker (BB) returns a result of the admission control to BB_A that passes it back to the requesting entity*" is suggested by the combination of Xiao, Schelen-1, and Gibson is supported by a preponderance of the evidence.

[1.5.2] *if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted,*

Petitioner provides evidence that Xiao describes a customer having a service level agreement ("SLA") with its ISP for providing a premium

service of “virtual lease lines.” Ex. 1005, 11 (“Premium service provides low-delay and low-jitter service for customers that generate fixed peak bit rate traffic. Each customer will have an SLA with its ISP”; “The ISP guarantees that the contracted bandwidth will be available when traffic is sent. Premium service is suitable for Internet telephony, videoconferencing, or for creating virtual lease lines for virtual private networks (VPNs).”).

Petitioner further points to the disclosure in Xiao of the receipt of an RESV (reservation message) by the bandwidth brokers, subsequent rule setting, and transmission of data by host S along the path. Pet. 52–53 (citing Ex. 1005, 12–13, disclosing that bandwidth brokers receive the RESV (reservation) message that resource are reserved; the bandwidth brokers “configure the classification and policing rules on router”; CN1-BB “will set the classification and shaping rules on router LR1”, “policing and reshaping rules on router ER1, “send the RESV message to host S”; “[w]hen host S receives the RESV message, it can start transmitting data.”).

Based on these disclosures, Petitioner contends that the “POSITA would have understood that configuring boundary routers with classification, policing, and shaping rules for premium service establishes the VLL” and that because “Host-S is able to start transmitting, it would have been understood that the requested premium service for VLL of the predefined QoS was granted.” Pet. 53 (further citing the supporting expert testimony Ex. 1003 ¶ 248).

Patent Owner argues that because Petitioner failed to show how the combination of Xiao, Schelen-1, and Gibson discloses, teaches, or suggests the limitations of “wherein the bandwidth broker (BB) is associated to each network domain,” or “iv) each involved bandwidth broker (BB) performs

admission control in its domain,” the combination cannot disclose or have made obvious limitations [1.5.1] and [1.5.2]. PO Resp. 22–23.

Patent Owner does not identify a defect in Petitioner’s reasoning or facts for the obviousness of limitation [1.5.2] “if the request was admitted along all domains between the source (SRC) and the destination (DST) a VLL of the predefined QoS is granted” based on Xiao, Gibson, and Schelen-1, which we find to be supported by a preponderance of the evidence.

[1.6.1] *characterized in that step iv) comprises the following step:*

performing [LSP] Label Switched Path, LSP, setup and

[1.6.2] *passing resource requests from the Bandwidth Broker (BB) to at least one intra-domain [broker] (1DB),*

[1.7.1] *wherein each intra-domain broker (1DB) is responsible for admission control and*

[1.7.2] *the Label Switched Path, LSP, setup.*

In the Petition, each of the numbered limitations were addressed separately. However, we group them together here because limitation [1.6.1] is only understood in the context of the limitations that follow it. Similarly, [1.6.2] intra-domain broker is defined by limitations [1.7.1] and [1.7.2] and thus is also understood in light of the limitations that follow. Specifically, these limitations require [1.6.2] “resource requests” to be passed from the bandwidth broker to at least one intra-domain broker, where each intra-domain broker is responsible for [1.7.1] “admission control” and [1.7.2] “the Label Switched Path, LSP, setup. The intra-domain broker is therefore

defined by its function to receive resource requests from the bandwidth broker, to perform admission control, and to perform LSP setup.

We begin with the intra-domain bandwidth broker. Petitioner contends that Gibson's administrative server 35 and connection managers 32, 33, 34 ("CM") correspond to the claimed intra-domain bandwidth broker (IDB). Pet. 57–58 (see Ex. 1006, Fig. 1, 7:25–8:46). For convenience, Gibson's Figure 1 is copied below:

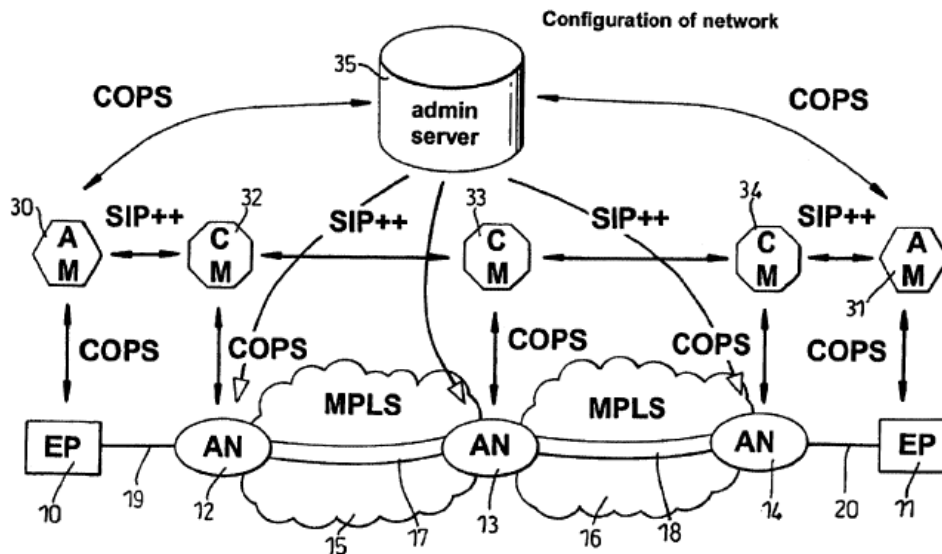


Figure 1 shows the admission managers 30, 31 ("AM"), administrative server 35, and connection managers 32, 33, and 34. "AN" is an abstract node. The abstract node represents a label switch router (LSR). Ex. 1006, 6:40–42. "COPS" is the messaging protocol "Common Open Policy Service." *Id.* at 5:15–16. "SIP" is another messaging protocol, "Session Initiation Protocol." *Id.* at 5:17–18. Clouds 17, 18 "represent parts of the communications network which in one embodiment is an MPLS network." *Id.* at 4:44–46.

Petitioner contends that the claimed intradomain broker is represented by the administrative server and connection manager described by Gibson. Pet. 57. Petitioner bases this contention on the teaching in Gibson that the administrative server and connection manager work together in Gibson's system "to setup LSPs and perform admission control within different areas of the MPLS network," two of the three functions of the intra-domain broker recited in claim 1 (see limitations [1.7.1] and [1.7.2]). *Id.* (citing Ex. 1006, 8:11–14).

As explained in the Petition, Gibson's administrative server performs admission control by using "standard CR-LDP (Constraint-based Routing Label Distribution Protocol) protocol" to "allow traffic engineering methods to be applied to an MPLS network such that specific paths can be established through a set of chosen nodes with a particular Quality of Service." Ex. 1006, 17:45–55. *See* Pet. 57. The administrative server is also described in Gibson as having "a much more detailed view of the topology of the intermediate MPLS network." Ex. 1006, 8:32–34; Ex. 1003 ¶ 264.

The Petition contends that Gibson's connection manager "also performs admission control, including determining if it has resources to allow a new session (Ex. 1006, 10:11-24) and, if so, making a temporary reservation for the session (Ex. 1006, 10:24-30), else denying the session and sending 'error message' (Ex. 1006, 10:30-34)." Pet. 57–58. The Petition further points to Gibson's disclosure that "[i]f all of the connection managers along a path have sufficient resources, then the connection manager 'converts its temporary reservation for the requested communication session into a permanent reservation.'" Ex. 1006, 10:66-11:6; Ex. 1003, ¶ 266." Pet. 58.

Petitioner further argues that a POSITA “would have understood that the administrative server and the connection manager may be readily implemented together as a centralized entity, to the extent that is required” to serve as the claimed intra-domain broker. Pet. 59 (citing Ex. 1005, 12; Ex. 1016, 2; Ex. 1025, 5; Ex. 1003 ¶ 273).

The claim further requires that resource requests are passed to the intra-domain broker by the bandwidth broker. We understand the “resource request” to mean the requests made by devices to provide service to the client device, such as a request for bandwidth. Ex. 1001, 4:11–14. Petitioner identifies Gibson’s admission managers 30, 31 as the bandwidth brokers. Pet. 54 (citing Ex. 1006, Fig. 1, 6:14–16; Ex. 1003 ¶¶ 254–255). Further citing Figure 2 of Gibson, Petitioner contends that the admission manager 30 (i.e., the bandwidth broker) sends a request to the administrative server 35 to set up an LSP and that the admission server 35 works with the connection manager 32 to accomplish this function (acting as the intra-domain broker). Pet. 54–55 (Ex. 1006, Fig. 2 (“New LSP AN1 to AN2”). Figure 2 of Gibson is reproduced below:

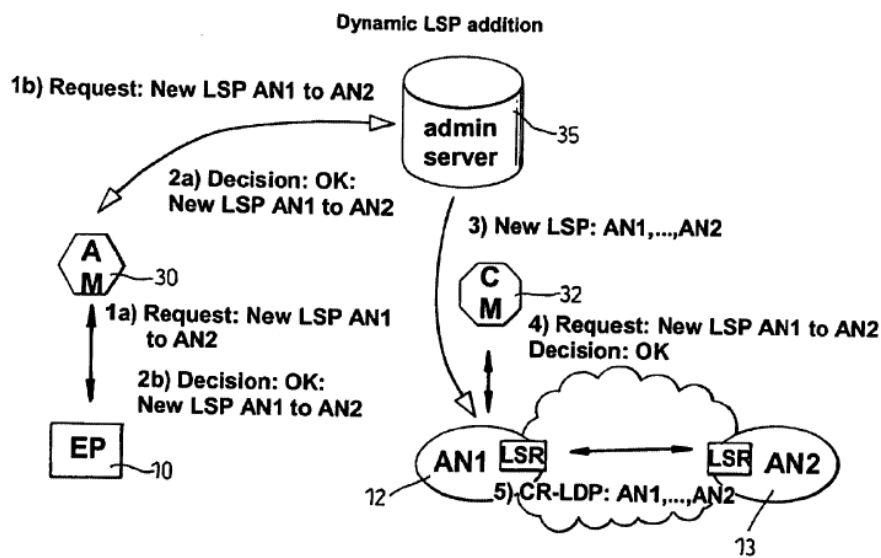


Fig. 2

Figure 2, reproduced above, shows administrative server 35, admission manager 30, and connection manager 32. A path is shown between node AN1 12 and node AN2 13.

FIG.2 shows the process of requesting a new LSP. Either an Endpoint 10 or an *Admission Manager 35* [sic, 30] *issues a Request for a new route between two Abstract Nodes 12, 13 in the MPLS network. This is responded to by the Administrative Server*, with the acceptance situation being illustrated in FIG. 2. The Administrative Server now signals to one of the specified abstract nodes AN1, 12 that it should set-up a path to the other abstract node AN2, 13.

Ex. 1006, 8:55–62 (emphasis added).

Gibson teaches that each connection manager “is associated with an abstract node and as described above an abstract node may comprise one or more Label Switch Routers LSRS.” Ex. 1006, 7:60–63.

Petitioner contends that Gibson’s admission manager’s requests for new LSPs sent to the administrative server correspond to the claimed “resource requests” passed from the bandwidth broker to the intra-domain broker as required by limitation [1.6.2]. Pet. 61. As evidence, Petitioner cites Gibson’s disclosure that the administrative manager (the asserted claimed bandwidth broker) “request[s]” from the administrative server (the asserted intra-domain broker) “new high capacity label switch paths [LSP’s] across the MPLS Network.” Ex. 1006, 8:49–53 (cited at Pet. 61). That is, as required by the claim, Gibson’s admission manager/bandwidth broker passes a request for bandwidth to the administrative server/intra-domain broker. *See also* description of Fig. 2 copied above (*id.* at 8:55–62).

Gibson, explains in the disclosure cited by Petitioner, that the administrative server 35 signals to the nodes to set-up paths and the nodes register the paths and characteristics with the connection manager 32. Ex.

1006, 8:55–67 (cited at Pet. 61–62; *see also* Ex. 1006, Fig. 2 (showing LSP resource requests being passed from the admission manager 30 to the administrative server 35); Ex. 1003 ¶¶ 275–276). Gibson further discloses that abstract node “registers the requested new path and its characteristics with its Connection Manager 32,” providing evidence that the connection manager receives the LSP request, as well. Ex. 1006, 8: 49–67. Thus, both the administrative server and connection manager are involved in admission control and LSP setup.

Once the bandwidth requests are received by the administrative server from the admission manager, Gibson discloses that the administrative server uses “standard CR-LDP (Constraint-based Routing Label Distribution Protocol) protocol . . . to establish labelled flows in MPLS networks.” Ex. 1006, 17:47–50 (cited at Pet. 57). The protocol, according to the disclosure in Gibson cited by Petitioner, “is designed to allow traffic engineering methods to be applied to an MPLS network such that specific paths can be established through a set of chosen nodes with a particular Quality of Service.” *Id.* at 17:50–53. Gibson further teaches that the administrative server “uses CR-LDP . . . to provision high capacity label switch paths [LSPs] between these label switch routers via any number of intermediate label switch routers.” *Id.* at 8:25–29.

Petitioner cites Gibson’s teaching that the administrative server “may take the form of multiple servers that administer their local area” as evidence that Gibson teaches multiple administrative servers/connection managers, and therefore multiple IDBs. Pet. 59 (citing Ex. 1006, 8:22–24).

Petitioner further cites Gibson’s INVITE message sent from the admission manager (the bandwidth broker) to the connection manager as the claimed request for resources. Pet. 63–65 (citing Ex. 1006, 9:51–10:34).

Gibson specifically discloses that each INVITE message is sent to the connection manager associated with the reachable abstract node and this is “is repeated for each INVITE message issued by the admission manager.” Ex. 1006, 10:6–12.

Patent Owner does not identify a deficiency in Petitioner’s contentions that Gibson teaches or would have made obvious limitation [1.6.2] of passing requests to from the bandwidth broker to the intra-domain broker. See PO Resp. 26. We find Petitioner’s contentions to be supported by a preponderance of the evidence before us.

Limitation [1.7.1] recites that each “each intra-domain broker (1DB) is responsible for admission control.”

As already explained in detail above, Petitioner contends that Gibson “renders obvious passing requests (for new LSPs and INVITE messages for resources) from the bandwidth broker ISP2-BB to a connection manager.” Pet. 65 (citing Ex. 1003 ¶¶ 286–287).

Petitioner provides evidence that “Gibson’s disclosure of the connection manager deciding whether to accept the resource request (for a new LSP) discloses that the ‘intra-domain broker (1DB) is responsible for admission control.’” Pet. 65 (citing Ex. 1006, 8:55–9:10; *see also id.* at 8:11–14; Ex. 1003 ¶ 288) (emphasis omitted).

Petitioner further cites Gibson’s teaching that “[w]hen a connection manager receives an INVITE message, it examines the information about the session requirements and next abstract node to see if it has a path to that abstract node and if it can accommodate the new session.” Ex. 1006, 10:12–16 (cited at Pet. 66). Gibson further teaches, in the disclosure cited by Petitioner, that the connection manager “makes a temporary reservation for the session and forwards the INVITE message to the next abstract node in

the path description.” *Id.* at 10:25–34 (cited at Pet. 66). These functions are asserted to be those of the intra-domain broker responsible for admission control. Pet. 65–66.

Petitioner argues it would have been obvious to implement the connection manager in Xiao because “[the] connection manager has visibility of the MPLS network that it manages (Ex.1006, 7:66–8:15) so it would be well positioned to decide whether to accept or deny the request for a new LSP” and “is able to determine if there are sufficient resources for a newly requested communication session defined by the INVITE message.” Pet. 66–67.

Patent Owner does not identify a deficiency in Petitioner’s allegations about the obviousness of limitation [1.7.1]. PO Resp. 26. We find Petitioner’s allegations regarding limitation [1.7.1] to be supported by a preponderance of the evidence.

The claim further requires [1.7.2] that the intra-domain broker is responsible for “Label Switched Path, LSP setup.”

As explained above, Petitioner provides evidence that Gibson’s administrative server in combination with the connection manager meets the limitations of the claimed intra-domain bandwidth broker. Petitioner references Gibson’s disclosure “that the administrative server initially provisions LSPs and sets up new LSPs via a request mechanism” as evidence that the latter is responsible for the LSP setup as recited in the claim. Pet. 67 (citing Ex.1006, 8:16–9:10; Ex.1003, ¶¶ 293–295). Petitioner also cites Figure 2 of Gibson as showing that “connection manager is responsible for the LSP setup since it sends an ‘OK’ decision message to the abstract node 12 to set up the LSP.” Pet. 68–69 (citing Ex. 1006, 8:55–9:10).

Petitioner further argues that it would have been obvious, “when setting up an LSP in Xiao’s MPLS network domain ISP2 (*see* limitation [1.6.1]), for the administrative server and each connection manager along the path [forward] to cooperate to set up the LSP within its MPLS area, to thereby provide ‘new high capacity label switch paths across the MPLS network.’” Pet. 70 (citing Ex. 1006, 8:49–54; Ex. 1003 ¶¶ 118, 300–301).

Petitioner contends that it would have been obvious to apply Gibson’s teachings with respect to the administrative server and connection manager to Xiao “to facilitate setting up LSPs in Xiao’s MPLS network domain ISP2.” Pet. 60. Petitioner explains “the admission manager (‘bandwidth broker’) would be free to manage communications with neighboring bandwidth brokers while the internal management elements (administrative server and connection manager) handle internal resource reservations and admission control” to allow for scaling and fine-grained resource allocation. *Id.* (emphasis omitted).

In response, Patent Owner asserts that Gibson’s admission manager “does not perform LSP setup or requests LSPs across the MPLS network,” but rather this activity is performed by the Administrative Server. PO Resp. 23–24 (citing Ex. 1006, 8:49–54; 8:55–65). Patent Owner asserts that Dr. Houh confirms this fact in his deposition. *Id.* at 24 (citing Ex. 2003, 62:5–13). Patent Owner asserts that the failure of Gibson’s admission manager to perform LSP setup “contradicts” the claim limitation. *Id.* at 24–25 (citing Ex. 2004 ¶ 61).

This argument is not persuasive. The claim requires the intra-bandwidth broker to perform LSP setup (“wherein each intra-domain broker (1DB) is responsible for admission control and the Label Switched Path,

LSP setup.”). Patent Owner’s own expert testified that “the intradomain broker is ultimately performing the setup.” Ex. 1045, 68:14–24.

As explained above, Gibson’s administrative server provisions LSPs and sets up new LSPs. Pet. 67 (citing Ex. 1006, 8:16–9:10; Ex. 1003 ¶¶ 293–295). Figure 2 of Gibson shows that the connection manager is also responsible for the LSP setup. Both these software components are the intradomain broker. Thus, there is no contradiction between what is disclosed by Gibson and the limitation recited in the claim.

Gibson teaches that its admission manager “is responsible for maintaining network topology information and using this to select a route across the network.” Ex. 1006, 7:26–28. The bandwidth broker in the ’698 patent also maintains network topology information. Ex. 1001, 4:11–17.¹⁸ Petitioner’s allegation that the admission manager is a bandwidth broker is therefore supported by a preponderance of the evidence because Gibson’s admission manager has some of the same functions of the bandwidth broker described in the ’698 patent.

As to Patent Owner’s assertion that Dr. Houh confirmed, in his deposition, that the admission manager does not perform LSP set up (PO Resp. 24), it is true that the admission manager does not perform the actual LSP setup, but rather makes requests that the administrative server do so. Ex. 1006, 8:49–62. Gibson explains that the admission manager “request[s] new high capacity label switch paths [LSP] across the MPLS network, or to

¹⁸ “An important property of both RATES and BB_{OLOV} is the implementation of path sensitive admission control. Both systems make sure that all links on a path have enough forwarding resources to keep up with the service request. Path sensitive admission control (by a centralized entity) requires detailed knowledge of the network topology, or rather, the routing topology.”

request a change in the capacity of an existing LSP,” which is responded to by the administrative server. *Id.* The administrative server is a component of the intradomain broker and is required by the claim to perform the LSP setup. Gibson’s admission manager essentially delegates LSP setup to the administrative server and the connection manager. *Id.* at 8:55–62 (“an Admission Manager 35 issues a Request for a new route between two Abstract Nodes 12, 13 in the MPLS network. This is responded to by the Administrative Server, with the acceptance situation being illustrated in FIG. 2.”).

Patent Owner states that “Petitioner’s expert [Houh] confirms that either an endpoint or Gibson’s admission server issues a request for a new route between abstract nodes but Gibson’s administrative server responds to set up paths.” PO Resp. 24.

Patent Owner’s reference to the “admission server” is an error. The subsequent quote from the Houh Deposition (Ex. 2003, 62:5–13) refers to the “admission manager,” explaining that the “admission manager” (the claimed bandwidth broker) issues a request which is responded to by the “administrative server” to set up LSP paths, the latter of which is a software component of the claimed intra-domain broker and the requirement of claim 1. *See* Ex. 1006, 8:25–29. Thus, Dr. Houh’s testimony is consistent with the Gibson and the claim.

Patent Owner asserts that a person of ordinary skill in the art would “not be motivated to combine Gibson with any other reference to reach this claim limitation [“wherein each intra-domain broker (1DB) is responsible for . . . the Label Switched Path, LSP setup”] of Claim 1 of the ’698 Patent because Gibson’s description of pre-determined high capacity paths contradicts the LSP path set up of the ’698 Patent.” PO Resp. 24 (citing Ex.

2004 ¶ 61). Patent Owner also asserts that a person of ordinary skill the art would have understand Gibson’s disclosure of “pre-determined high capacity paths” are inconsistent with the limitation in claim 1 which requires LSP setup. *Id.* at 25.

This argument is not persuasive. As discussed in the Petition:

Gibson discloses that the “request **new high capacity label switch paths** across the MPLS network” from an “Administrative Server 35.” Ex.1006, 8:16–54. Gibson’s process for LSP set up is shown at Figure 2

In the context of the above figure [2], Gibson discloses that the administrative server works with a connection manager to set up “**a new LSP**,” in response to the admission manager’s request. Ex.1006, 8:55-9:10; *see also* Ex.1006, 8:11–14 (“...registration of **new label switch paths**...”); Ex.1003, ¶257.

Pet. 54–55.

Patent Owner’s Response ignores this explicit disclosure in Gibson regarding “new” LSP setup by the administrative server, which corresponds to the intra-domain broker, as required by claim 1.

In the PO Sur-reply, Patent Owner contends that “Petitioner is unable to definitively state what components of Gibson disclose the intra-domain broker that perform the LSP set up.” PO Sur-reply 18.

Patent Owner’s statement is inconsistent with the record before us. As explained above, Petitioner describes the role of the admission manager, administrative server, and connection manager in LSP setup, citing, for example, Gibson’s Figure 2 which shows the process of requesting a new LSP and subsequent setup by the administrative server and connection manager. Patent Owner’s complaint that Petitioner cited a combination of components to meet the claimed intra-domain broker (PO Sur-reply 18) is a new argument and does not factually substantiate that the claimed intra-

domain broker could not be a combination of Gibson's administrative server and connection manager software components.

Intra-domain broker

Patent Owner acknowledges Petitioner's contention that the administrative server with one or more connection managers correspond to the claimed intra-domain broker. PO Resp. 26. Patent Owner argues:

Gibson's administrative server cannot be an intra-domain broker since "[t]he Administrative Server 35 has a COPS interface to all the admission managers at the edge of the network." Ex. 1006, 8:49–50; Ex. 2004, ¶ 66. *A person of ordinary skill in the art would understand Gibson's administrative server to correspond to multiple domains. Id.* However, a person of ordinary skill in the art, including Petitioner's expert, would also understand that the claimed "intra-domain" to "be understood in the plain and ordinary meaning of that term, where "intra" refers to within."; *Id.* (citing Ex. 2003, 65:2–8). Therefore, Gibson's administrative server cannot be an intra-domain broker since it corresponds to multiple domains. *Id.*

Id. at 26–27 (emphasis added, alteration in original).

Petitioner responds that Patent Owner provides no explanation or evidence that using a COPS interface to communicate would make Gibson's administrative server incapable of performing as an intra-domain broker. To the contrary, Petitioner asserts, based on Dr. Houh's testimony, that the intra-domain broker disclosed in the Specification is RATES¹⁹ and that

¹⁹ RATES is admitted to be prior art in the '698 patent. Ex. 1001, 3:49–54. Dr. Houh identifies RATES as an example of an intra-domain domain bandwidth broker. Ex. 1003 ¶¶ 262, 270. Thus, to the extent Patent Owner denies that Gibson discloses an intra-domain bandwidth broker, we remind Patent Owner that the '689 patent discloses the such bandwidth brokers were known in the prior art to be present in an MPLS network.

RATES performs LSP setup using COPS. Pet. Reply 24 (citing Ex. 1046 ¶ 25). Petitioner argues that it is improper to construe a claim to exclude a preferred embodiment. *Id.* at 25.

Patent Owner does not identify a persuasive defect in Petitioner’s argument that the administrative server and connection manager correspond to a domain broker. PO Sur-reply 17.²⁰

Patent Owner’s argument that the *administrative server* cannot be an intra-domain broker because it operates within multiple domains was addressed in the Petition and Decision to Institute. Institution Dec. 47–49. As part of this argument, Patent Owner contends that Figure 1 of Gibson shows the administrative server as an “inter-domain broker” having “a COPS interface ***to all the admission managers at the edge of the network.***” Ex. 1006, 8:49-50 (emphasis added).” PO Sur-reply 16.

As discussed in the Decision to Institute, Petitioner provided evidence that the network depicted in Gibson’s Figure 1 is a single domain. Institution Dec. 48–49. Dr. Houh testified in his first declaration that clouds 15, 16 are sub-areas of the same domain. Ex. 1003 ¶¶ 72, 267, 298.²¹ Patent Owner has not adequately explained why these should be recognized as different domains. For example, Gibson’s Figure 1 shows the same communication protocols (SIP, COPS) throughout the network, reasonably suggesting that a

²⁰ Patent Owner contends that Petitioner’s argument about RATES using COPS is a “brand new argument.” Sur-Reply 17 n.2. However, Petitioner was responding to Patent Owner’s argument that COPS communication precluded the administrative server from being an intra-domain broker. PO Resp. 26–27.

²¹ Consistently, the ’698 patent discloses that each RATES is limited to “one flat state-domain,” but a BB for Diff-Serve architecture controls an entire routing domain. Ex. 1001, 4:31–35.

single network domain is depicted. The admission managers at the “edge” of the communication network indicate that each one is the gatekeeper for ingress and egress from the same network domain. Patent Owner repeats these arguments in the PO Sur-reply at pages 16–18.

Gibson, in the same column referenced by Patent Owner, states that “[a]lthough pictured as a single entity in FIG. 1, an administrative server 35 may take the form of multiple servers that administer their local area” (Ex. 1006, 8:22–24), reasonably suggesting to one of ordinary skill in the art that the clouds depicted in Figure 1 are local areas of a single domain.

Patent Owner also has not explained why having an admission manager at both edges of the same network domain serviced by the same administrative server would be interpreted by one of ordinary skill in the art to indicate that the administrative server (the intra-domain broker) is acting across multiple domains. Dr. Congdon makes the same allegations made in Patent Owner’s Response, but his statements are conclusory without sufficient explanation. Thus, we find them unpersuasive. *See Xerox Corp. v. ByteMark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential) (“We have reviewed this excerpt from Dr. Jones’ declaration and note that it merely repeats, verbatim, the conclusory assertion for which it is offered to support. Dr. Jones does not cite to any additional supporting evidence or provide any technical reasoning to support his statement. Thus, the cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.” (citing 37 C.F.R. § 42.65(a); internal citations omitted)).

Patent Owner contends that new arguments were added in the second declaration by Dr. Houh. PO Sur-reply 2. Patent Owner explains:

Changing arguments and attempting to recharacterize earlier deposition testimony rises to the level of a “newly raised rationale to combine the prior art references that was not expressed in the petition” that is barred by the Board. See Trial Practice Guide, at 74 (citing *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369–70 (Fed. Cir. 2016)).

PO Sur-reply 3.

Specifically, Patent Owner points to the recitation in claim 1 that each intra-domain broker is “responsible for admission control and the Label Switched Path, LSP, setup.” With respect to this limitation, Patent Owner states that the Petition argued that the administrative server with the connection manager, which Petitioner argued correspond to the intra-domain broker, work together to set up LSPs and perform admission control. PO Sur-reply 3 (citing Pet. 57).

Patent Owner contends that, in Dr. Houh’s new declaration (Ex. 1046), Dr. Houh newly argues “Gibson’s *coordination* among the admission manager and the administrative server is consistent with the claimed approach to LSP setup.” Ex. 1046 ¶ 20 (cited in PO Sur-reply 4) (emphasis added). Patent Owner asserts that this argument is new because it switches from saying the administrative server and connection manager work together to setup the LSP to arguing that there is “coordination between the admission manager and the administrative manager” to accomplish LSP setup. PO Sur-reply 3–4 (emphasis omitted).

We do not agree that this is a new argument.

In the Decision, we preliminarily adopted Petitioner’s proposal that Gibson’s admission manager is a bandwidth broker. Institution Dec. 39 (citing Pet. 54 (citing Ex. 1006, 6:14–16; Ex. 1003 ¶¶ 254–255)).

The Decision also preliminarily adopted Petitioner’s proposal that Gibson’s administrative server and connection manager correspond to the claimed intra-domain broker. Institution Dec. 39 (citing Pet. 57–58).

The Decision to Institute, summarizing Petitioner’s argument, explained that the admission manager (bandwidth broker) requests label paths from the administrative server (intra-domain broker), and that the administrative server works with the connection manager to register paths. Decision to Institute 40–41. *See* Ex. 1003 ¶¶ 274 (“Gibson discloses that the admission manager (*‘bandwidth broker’*) passes various resource requests to the administrative server and the connection manager (*‘at least one intra-domain (1DB)’*), which renders obvious *‘passing resource requests from the Bandwidth Broker (BB).’*”); 277 (“As shown below at Gibson’s Figure 2, a ‘Request’ for a new LSP is passed from the admission manager (*‘bandwidth broker’*) to both the administrative server and also to the connection manager (collectively *‘at least one intra-domain (1DB)’*).”).

The statement by Dr. Houh in his second declaration “that Gibson’s coordination among the admission manager [BB] and the administrative server [IDB] is consistent with the claimed approach to LSP setup” reflects the original argument in the Petition that the admission manager (bandwidth broker) requests label paths from the administrative server (intra-domain broker). Institution Dec. 40–41. The argument has not changed and, in light of the complete record, we come to the same determination that we made in the Decision to Institute. The admission manager was described by Dr. Houh as requesting paths from the administrative server and the server working with the connection manager. Ex. 1003 ¶¶ 274–277. Thus, there is “coordination” between the admission manager, and administrative server

because they work together, along with connection manager, to accomplish LSP setup.

2. *Dependent claims 2–5, 7, and 8*

Petitioner asserts that dependent claims 2–5, 7, and 8 are unpatentable under 35 U.S.C. § 103 as obvious over Xiao, Schelen-1, and Gibson.

Pet. 71–76. Patent Owner states that claims 2–5, 7, and 8 are not obvious for the same unpersuasive reasons as for claim 1. PO Resp. 27.

We have reviewed Petitioner’s arguments and evidence for claims 2–5, 7, and 8. Based on the evidence in this present record, we are persuaded that Petitioner has shown sufficiently that the combination of Xiao, Schelen-1, and Gibson teaches or suggests all of the limitations recited in claims 2–5, 7 and 8, and has articulated sufficient reasoning to combine these references.

F. *Ground 2 based on Xiao, Schelen-1, Gibson, and Schelen-2*

Petitioner asserts that dependent claims 4, 5, 7, and 8 are unpatentable under 35 U.S.C. § 103 as obvious over Xiao, Schelen-1, Gibson, and Schelen-2. Pet. 76–82. 76. Patent Owner states that claims 4, 5, 7, and 8 are not obvious for the same unpersuasive reasons as for claim 1. PO Resp. 27.

We have reviewed Petitioner’s arguments and evidence and we find them to be persuasive. Based on the evidence in this present record, we are persuaded that Petitioner has shown that the combination of Xiao, Schelen-1, Gibson, and Schelen-2 teaches or suggests all of the limitations recited in claims 4, 5, 7, and 8, and has articulated sufficient reasoning to combine these references.

Claim 6

Schelen-2 is asserted by Petitioner to describe the claim limitations of claim 6. Pet. 78. Patent Owner separately addresses claim 6 in the Patent Owner Response. PO Resp. 28.

Claim 6 is reproduced below, along with claim 4 on which it depends:

4. Method according to claim 1, characterized in that said predefined QoS is a rate, R.

6. Method according to claim 4, characterized in that the bandwidth broker (BB) comprises a data structure which keeps resource usage information over time for each link in the topology which enables ability to plan ahead of time.

Patent Owner contends argues that Schelen-2's information about "reserved resources" "does not imply or correlate to 'resource *usage* information'" as required in claim 6. PO Resp. 28 (citing Ex. 2004 ¶ 71 (citing Ex. 2003, 74:9–75:25)). Patent Owner argues:

A person of ordinary skill in the art would have understood that the only data structures disclosed in Schelen-2 are "data structures that manage reservations efficiently and allow quick admission control," "[a] data structure keeps exact starting times and finishing times for each admission request," and "[a] data structure has fixed size and depends only on the maximum bookahead time allowed and the slot length." Ex. 2004, ¶ 72 (citing Ex. 1007, 221). None of these disclosed data structures in Schelen-2 *store resource usage information* over a period of time for each link in the topology, as Claim 6 requires. *Id.*

Id. at 29–30 (emphasis added, alterations in original).

Patent Owner asserts that claim 6 requires "a bandwidth broker [that] comprises a database (*i.e.*, data structure) that keeps historical (*i.e.*, "over time") usage information for each resource (*i.e.*, resource usage information)." PO Sur-reply 19. Patent Owner contends that Petitioner's construction of "resource usage information over time" to "include

‘information about resources (e.g., bandwidth) currently reserved and used and information about resources (e.g., bandwidth) reserved for future use’” is reading “new meaning” into the claim limitation.” *Id.* at 19–20.

Patent Owner complains that “Petitioner did not propose any construction for this claim limitation that would expand its meaning beyond the explicit language that ‘resource usage information [is kept] over time.’”

PO Sur-reply 20 (alteration in original). Patent Owner asserts:

If Petitioner believed that any claim terms required construction, it had a duty to identify “how the challenged claim is to be construed” in its Petition. 37 C.F.R. § 42.104(3). Petitioner did not do so, and its belated attempt to read new meaning into this claim limitation should be rejected.

Id.

Patent Owner therefore contends that the claimed limitation, “a data structure which keeps resource usage information over time for each link in the topology which enables ability to plan ahead of time,” must be construed to mean the usage information is “historical” usage over time. Petitioner, on the other hand, construes the same limitation to mean at least “future” usage over time. Pet. Reply 27.

We first begin by addressing Petitioner’s interpretation of the claim.

The disclosure from Schelen-2 was initially cited in the Petition as describing the subject matter recited in claim 6. Specifically, Petitioner cites Schelen-2’s disclosure of “data structures that manage reservations,” including “information about the current reserved aggregate bandwidth” as well as “the aggregated bandwidth reserved in advance over time.” Ex. 1007, 221 (cited in Pet. 78). Petitioner also references the teaching in Schelen-2 of a bandwidth broker that “maintains information about reserved resources on each link in its domain” per a “topology map of the domain.”

Id. at 215 (cited in Pet. 78). Petitioner reproduces Figure 5 of Ex. 1007 labeled a “Snap-shot of reservations,” showing “immediately reserved bandwidth” and advance reservations in the “lookahead.” Pet. 79 (referencing Ex. 1007, 220 (3.4 Admission control criteria)).

Dr. Houh explains that “[b]ecause in the combination Xiao’s bandwidth broker has resource usage information, scheduling for advance reservations can take place while also servicing immediate reservations when resources allow (based on a lookahead time), which may improve utilization. Ex. 1007, 223.” Ex. 1003 ¶ 102; *see also id.* ¶ 351.

Petitioner states that it would have been obvious to one of ordinary skill in the art, in view of Schelen-2:

for Xiao’s bandwidth broker to comprise a data structure to keep resource usage information over time for each link in the network domain as defined by the topology map (*see* [5.1]) so that it can plan ahead over time and determine whether there are sufficient resources available when making immediate and advanced reservations and to also reduce the risk over allocating resources.

Pet. 79 (citing Ex. 1007, 213, 220–222, 224, Fig. 5; Ex. 1020, 23; Ex. 1031, 268; *see also* Reasons to Combine; Ex. 1003 ¶¶ 100–102, 351).

From this disclosure, citing Schelen-2’s description of a data structure that manages current and reserved bandwidth information in advance over time, we understand Petitioner to have initially interpreted the claim limitation “a data structure which keeps resource usage information over time” to include immediate and advance usage of bandwidth usage over time. In other words, one of ordinary skill in the art would have understood that Petitioner interprets the disputed limitation of claim 6 to include at least “future” usage.

In the Patent Owner’s Response, Patent Owner argues that

a person of ordinary skill in the art, and Petitioner’s expert, would understand that Schelen-2’s “maintain[ed] information about **reserved** resources” does not imply or correlate to “resource **usage** information” or “**used** resource information”

PO Resp. 28 (alteration in original).

Patent Owner therefore would have reasonably understood that Petitioner’s initial position is that the claim limitation covers future reserved bandwidth.

Petitioner, on the other hand, argues that “resource usage . . . over time . . . which enables ability to plan ahead” is limited to historical usage only, and excludes usage reserved ahead of time. Pet. Reply 26–27. Dr. Houh explained in his first declaration how monitoring immediate and future usage enabled Schelen-2 to “plan ahead”:

It would have been obvious to a POSITA, in view of Schelen-2, for Xiao’s bandwidth broker to comprise a data structure to keep resource usage information over time for each link in the network domain as defined by the topology map (see analysis at element [5.1]) so that it can plan ahead over time. The resource usage information would allow the bandwidth broker to determine how much resources are available so that a new reservation would not exceed the available bandwidth. See e.g., Ex.1007, 220–221 (“When a new admission request arrives, admission is granted if the new reservation would not cause the aggregate bandwidth to exceed the link bandwidth...The conditions are checked at all points...”), Fig. 5; Ex.1020, 23, (“Each BB must keep track of all resources that are active, or allocated to a specific service. The status of resources must be updated.”) On the other hand, if resource usage information was not maintained by the bandwidth broker, then there would be a risk of over-allocating resources. See e.g., Ex.1031, 268 (“When immediate reservations and advance reservations share resources and the duration of each immediate reservation is unknown, there is a risk of over-allocation.”).

Ex. 1003 ¶ 101.

Patent Owner does not dispute that Schelen-2 teaches reserving future bandwidth. Patent Owner's sole argument is that claim 6 is limited to historical usage. Patent Owner however, has not guided us to sufficient evidence that one of ordinary skill in the art would have read the claim limitation so restrictively when the plain language "keeps resource usage information over time" does not specify that the usage is historical or future. We acknowledge that the '698 patent discloses "persistent storage, where it stores records of all its granted requests." Ex. 1001, 9:18–20. However, we do not import disclosure in the Specification into the claims, when the claims do not recite it. *See CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1231 (Fed. Cir. 2005) (holding that "[i]n examining the specification for proper context" it is improper to "import limitations from the specification into the claims"). Claim 6 does not recite "granted requests" or granted "resource usage." Thus, we decline to interpret the claim so narrowly to avoid the teaching in Schelen-2.

Patent Owner also argues that "the new Houh declaration attempts to correct Dr. Houh's prior deposition testimony." PO Sur-reply 4.

We do not agree. Patent Owner asserts that Dr. Houh agreed in his deposition testimony "that the "reserved resource" of Schelen-2 **does not** 'necessarily imply that a resource is used' (*i.e.*, the claimed 'resource usage information')." PO Sur-reply 4. However, the quoted language is from the question asked by Patent Owner's counsel to Dr. Houh. Ex. 2003, 74:9–11. We do not see clear testimony by Dr. Houh that he agrees with counsel nor does Patent Owner point to it.

The claim is broad enough to include keeping resource usage information about reserved future usage. Based on the current record, we find that Petitioner's allegation that Claim 6 is suggested by the combination

of Xiao, Schelen-1, Gibson, and Schelen-2 is supported by a preponderance of the evidence.

CONCLUSION

Accordingly, for the reasons explained above and weighing all of the evidence together, we find that Petitioner has shown by a preponderance of the evidence that claims 1–5, 7, and 8 would have been obvious over the combination of Xiao, Schelen-1, and Gibson, and claims 4–8 over the combination of Xiao, Schelen-1, Gibson, and Schelen-2.

III. ORDER

Upon consideration of the record before us, for the foregoing reasons, it is:

ORDERED that claims 1–8 of the '698 patent are not patentable; 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. § 90.2.²²

²² Should Patent Owner wish to amend the challenged claims in a reissue or reexamination proceeding, we draw Patent Owner's attention to the *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner files a reissue application or request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

FOR PETITIONER:

Theodore Foster
David McCombs
Gregory Huh
HAYNES AND BOONE, LLP
Ipr.theo.foster@haynesboone.com
David.mccombs.ipr@haynesboone.com
Gregory.huh.ipr@haynesboone.com

FOR PATENT OWNER:

Vincent Rubino
Peter Lambrianakos
FABRICANT LLP
vrubino@fabricantllp.com
plambrianakos@fabricantllp.com

Shaun Gregory
Jason Houdek
TAFT STETTINIUS & HOLLISTER LLP
sgregory@taftlaw.com
jhoudek@taftlaw.com

CERTIFICATE OF SERVICE

A copy of Patent Owner's Notice of Appeal is being served via email on Petitioner's attorneys of record on the 1st day of October, 2024, the same day as the filing of the above-identified document in the United States Patent and Trademark Office/Patent Trial and Appeal Board, by serving Petitioner's correspondence address of record with the USPTO as follows:

Theodore M. Foster
Email: ipr.theo.foster@haynesboone.com
David L. McCombs
Email: david.mccombs.ipr@haynesboone.com
Gregory P. Huh
Email: gregory.huh.ipr@haynesboone.com
HAYNES AND BOONE, LLP
2323 Victory Avenue, Suite 700
Dallas, Texas 75219

Attorneys for Cisco Systems, Inc.

October 1, 2024

By: /Vincent J. Rubino, III /
Vincent J. Rubino, III (Reg. No. 68,594)
Lead Counsel for Patent Owner
FABRICANT LLP
411 Theodore Fremd Avenue,
Suite 206 South
Rye, New York 10580
Tel. 212-257-5797
Fax. 212-257-5796
Email: vrubino@fabricantllp.com