Trials@uspto.gov
571-272-7822

Entered: February 8, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK L.L.C., DISH TECHNOLOGIES L.L.C., and SLING TV L.L.C.,
Petitioner,

v.

SOUND VIEW INNOVATIONS, LLC,
Patent Owner.

IPR2020-01276
Patent 6,757,796 B1

Before JAMESON LEE, DEBRA K. STEPHENS, and JOHN A. HUDALLA, *Administrative Patent Judges*.

HUDALLA, *Administrative Patent Judge*.

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

DISH Network L.L.C., DISH Technologies L.L.C., and Sling TV L.L.C. (collectively, "Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 ("the challenged claims") of U.S. Patent No. 6,757,796 B1 (Ex. 1001, "the '796 patent"). Patent Owner, Sound View Innovations, LLC

("Patent Owner"), filed a preliminary response (Paper 8). With our authorization (Paper 9), Petitioner filed a preliminary reply (Paper 10) and Patent Owner filed a preliminary sur-reply (Paper 11) directed to Patent Owner's arguments regarding collateral estoppel and 35 U.S.C. § 325(d) in the Preliminary Response. Taking into account the arguments presented in these papers, we determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to at least one of the challenged claims. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on February 24, 2021, as to all challenged claims and all grounds of unpatentability. Paper 13 ("Dec. on Inst.").

During the course of trial, Patent Owner filed a Patent Owner Response (Paper 23, "PO Resp."), and Petitioner filed a Reply to the Patent Owner Response (Paper 28, "Pet. Reply"). Patent Owner also filed a Sur-reply. Paper 36 ("PO Sur-reply"). An oral hearing was held on November 18, 2021, and a transcript of the hearing is included in the record. Paper 38 ("Tr.").

Petitioner filed declarations of Dr. Kevin Negus with its Petition (Ex. 1002) and its Reply (Ex. 1021). Patent Owner filed a declaration of Mark T. Jones, Ph.D., with its Response. Ex. 2005. The parties also filed transcripts of the depositions of Dr. Negus (Exs. 2006, 2007) and Dr. Jones (Ex. 1020).

We have jurisdiction under 35 U.S.C. § 6. This decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 of the '796 patent. For the reasons discussed below, Petitioner has not demonstrated by a

preponderance of the evidence that any of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 of the '796 patent is unpatentable.

I. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies DISH Network L.L.C., DISH Technologies L.L.C., Sling TV L.L.C., Sling TV Holding L.L.C., and DISH Network Corporation as real parties-in-interest. Pet., at vi. Patent Owner identifies Sound View Innovations, LLC, and Sound View Innovation Holdings, LLC, as real parties-in-interest. Paper 5, 1.

B. Related Proceedings

The parties identify the following district court actions related to the '796 patent (Pet., at vi–vii; Paper 5, 1–2, Paper 7, 1):

Sound View Innovations, LLC v. DISH Network LLC, No. 1:19-cv-03707 (D. Colo. filed Dec. 30, 2019);

Sound View Innovations, LLC v. Sling TV LLC, No. 1:19-cv-03709 (D. Colo. filed Dec. 30, 2019);

Sound View Innovations, LLC v. Hulu, LLC, No. 2:17-cv-04146 (C.D. Cal. filed June 2, 2017) ("the California litigation");

Sound View Innovations, LLC v. AMC Networks, Inc., No. 1:19-cv-00145 (D. Del. filed Jan. 25, 2019; terminated Apr. 24, 2020);

Sound View Innovations, LLC v. HSN, Inc., No. 1:19-cv-00193 (D. Del. filed Jan. 30, 2019; terminated Apr. 16, 2020);

Sound View Innovations, LLC v. QVC, Inc., No. 1:19-cv-00194 (D. Del. filed Jan. 30, 2019; terminated Apr. 15, 2020);

Sound View Innovations, LLC v. CBS Corp., No. 1:19-cv-00146 (D. Del. filed Jan. 25, 2019; terminated Apr. 15, 2020); and

Sound View Innovations, LLC v. Twitter, Inc., No. 1:16-cv-00652 (D. Del. filed July 29, 2016; terminated Jan. 19, 2017).

C. The '796 patent

The '796 patent relates to "decreasing the playback delay at a client computer of a live streaming broadcast transmitted over a network." Ex. 1001, 1:8–11. Figure 2 of the '796 patent is reproduced below.

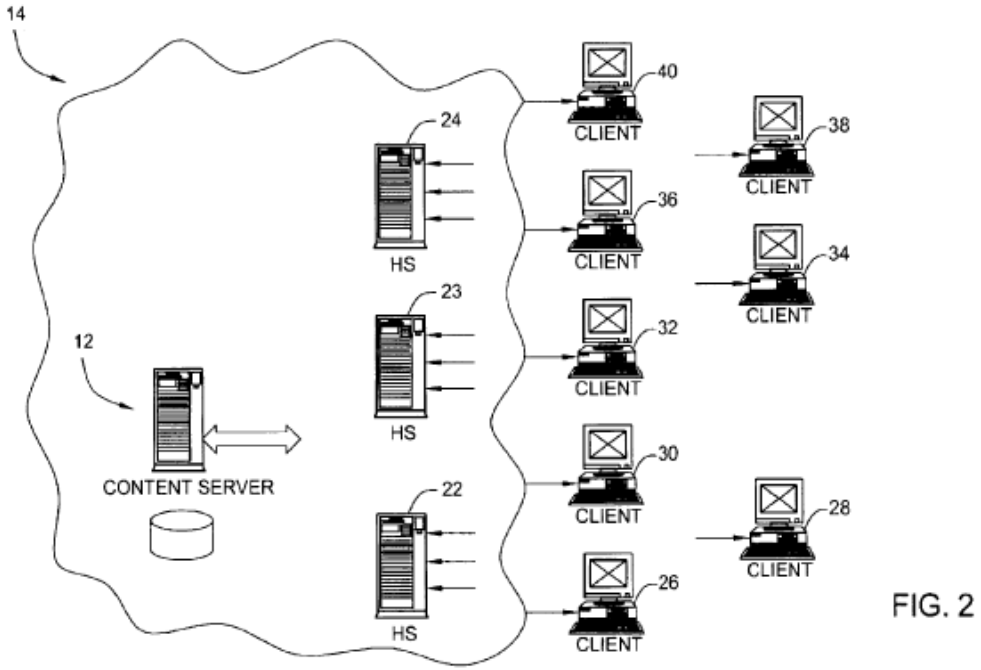


FIG. 2

Figure 2 depicts public network system (PNS) 14, which is a high-speed, high-bandwidth interactive distribution network such as the Internet. *Id.* at 3:1–2, 4:32–37. Content server 12 stores and serves content, such as text, audio, video, graphic images, and other multimedia data, over network 14 to client computers 26–40. *Id.* at 4:32–42. Network 14 also includes helper servers (HSs) 22–24, each of which is configured as a conventional server having processing capabilities, including a central processing unit (not

shown) and storage. *Id.* at 4:42–45. HSs 22–24 cache Internet resources requested by client computers 26–40 and downloaded from content server 12 to allow localized serving of those resources. *Id.* at 4:45–49. In particular, requests from client computers 26–40 for live streaming multimedia (SM) broadcasts are redirected to the client computer's local HS to be serviced therefrom. *Id.* at 5:49–51.

The '796 patent discloses the use of playout history (PH) buffers in the random access memory of each HS to reduce start-up latency associated with live SM broadcasts. *Id.* at 4:26–29, 5:18–25. Each PH buffer is a form of short-term dynamic cache for storing the last few seconds of a live SM broadcast. *Id.* at 4:29–31, 5:18–25. By redirecting client requests to HSs and servicing those requests from PH buffers maintained in a local memory associated with an HS, the streaming data rate to the client is enhanced and start-up latency is reduced. *Id.* at 5:25–29. In particular, the closer proximity between HSs and clients allows for a higher streaming data rate. *Id.* at 5:35–36. Servicing requests from the PH buffers also enhances the streaming data rate by making a number of previously stored data packets of the requested stream immediately available to be streamed to the client. *Id.* at 5:36–40.

D. Illustrative Claim

Of the challenged claims, claims 1, 15, 20, and 27 of the '796 patent are independent. Claims 2, 3, 5–7, 13, and 14 depend directly or indirectly from claim 1; claim 18 depends from claim 15; claims 21, 24, and 25 depend from claim 20; and claim 29 depends from claim 27. Claim 1 is illustrative of the challenged claims and recites the following:

> 1. In a network having a content server which hosts a plurality of live streaming multimedia (SM) broadcast objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients, a method of reducing start-up latency associated with distributing said plurality of live SM broadcast objects from said content server and said plurality of HSs to said plurality of clients, said method comprising:
>
> receiving a first request from one of said plurality of clients for one of said plurality of live SM broadcast objects at one of said plurality of HSs;
>
> determining whether said first request can be partially serviced from a pre-configured playout history (PH) buffer allocated in a memory associated with said one of said plurality of HSs; and
>
> partially servicing said first request from said pre-configured PH buffer at a first data rate, if said determining step is satisfied, the first data rate being higher than a standard data rate associated with servicing the first request from a non pre-configured PH buffer.

Ex. 1001, 12:16–35.

E. Prior Art

Petitioner relies on the following prior art:

U.S. Patent No. 6,263,371 B1, filed June 10, 1999, issued July 17, 2001 (Ex. 1009, "Geagan");

U.S. Patent No. 5,737,747, filed June 10, 1996, issued Apr. 7, 1998 (Ex. 1010, "Vishlitzky"); and

B. Zheng and M. Atiquzzaman, "Multimedia Over High Speed Networks: Reducing Network Requirement with Fast Buffer Fillup," *Proceedings of IEEE GLOBECOM 1998*, Sydney, Australia, Nov. 8–12, 1998, pp. 779–84 (Ex. 1012, "Zheng").

F. The Instituted Grounds

We instituted *inter partes* review of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 of the '796 patent on the following grounds (Dec. on Inst. 37), which are all the grounds presented in the Petition (Pet. 1):

Claims Challenged	35 U.S.C. §	References
1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29	103(a)[1]	Geagan, Vishlitzky
1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29	103(a)	Geagan, Vishlitzky, Zheng

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See 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) where in evidence, so-called secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be "considered together

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the '796 patent was filed before March 16, 2013 (the effective date of the relevant amendments), the pre-AIA versions of §§ 102 and 103 apply.

with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

B. Level of Ordinary Skill in the Art

Citing testimony from Dr. Negus, Petitioner contends a person of ordinary skill in the art ("POSITA") would have had

> at least a Bachelor of Science in at least one of Electrical Engineering, Computer Engineering, Computer Science or a related field, as well as at least three to four years of experience in implementing protocols and/or equipment for streaming multimedia data, or a Master's degree in Electrical Engineering, or an equivalent field, as well as at least two years of experience in implementing protocols and/or equipment for streaming multimedia data.

Pet. 5 (citing Ex. 1002 ¶ 29). In our Decision on Institution, we adopted Petitioner's articulation of the level of ordinary skill without the instances of the qualifier "at least." Dec. on Inst. 8–9.

After institution, neither party put forth arguments related to the level of ordinary skill. We discern no reason to change the level of ordinary skill in the art applied in this Final Written Decision. Thus, a person of ordinary skill in the art would have had either (1) a Bachelor of Science in Electrical Engineering, Computer Engineering, Computer Science, or a related field, as well as three to four years of experience in implementing protocols and/or equipment for streaming multimedia data; or (2) a Master's degree in Electrical Engineering, or an equivalent field, as well as two years of experience in implementing protocols and/or equipment for streaming multimedia data. We are satisfied that this definition comports with the

level of skill necessary to understand and implement the teachings of the '796 patent and the asserted prior art.

C. Claim Interpretation

In an *inter partes* review, we construe each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Accordingly, our claim construction standard is the same as that of a district court. *See id*. Under the standard applied by district courts, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). "There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

In our Decision on Institution, we determined that the preambles of independent claims 1, 15, 20, and 27 are limiting. Dec. on Inst. 10–11. Petitioner does not take an express position on whether the preambles of the challenged claims are limiting. *See* Pet. 21 (stating that Geagan teaches the preamble "to the extent it is limiting"). Patent Owner supports our preliminary determination that the preambles are limiting. PO Resp. 37–41. Given this posture, we discern no reason to change our initial determination that the preambles are limiting. Thus, even though the disposition of this

case does not turn on any particular limitation in the preamble, we maintain our determination that the preambles of claims 1, 15, 20, and 27 are limiting to the extent they color our analysis of Petitioner's rationale for combining various prior art references.

We determine that no terms require explicit construction.[2] *See, e.g.*, *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy' . . . ." (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Obviousness Ground Based on Geagan and Vishlitzky

Petitioner contends the subject matter of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 would have been obvious over the combination of Geagan and Vishlitzky. Pet. 21–63; Pet. Reply 3–29. Patent Owner disputes Petitioner's contentions. PO Resp. 16–54; PO Sur-reply 1–24.

1. Geagan

Geagan is a U.S. patent directed to "a scheme for merging together information from multiple input data streams to produce an output data stream that includes fewer information 'gaps' than any of the individual input data streams." Ex. 1009, 1:5–8. Geagan states that its scheme can be

[2] We note, however, that the patentee defined explicitly several terms in the '796 patent. *See* Ex. 1001, 3:38–65.

applied to live broadcasts of streaming content delivered via the Internet. *Id.* at 1:9–10. Figure 2 of Geagan is reproduced below.

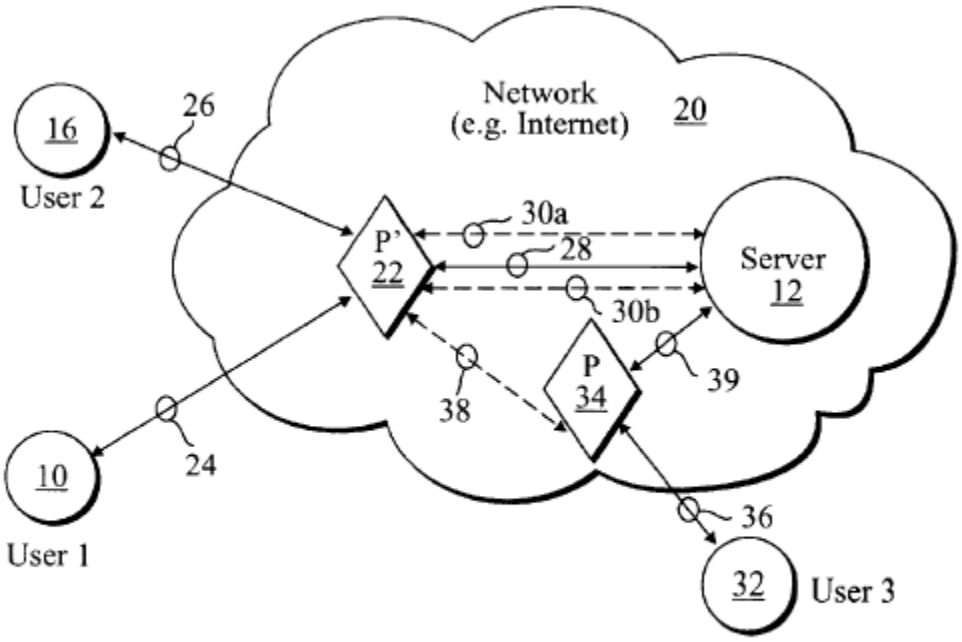


Fig. 2

Figure 2 illustrates the use of proxies disposed in communication paths between a content source and content consumers. *Id.* at 8:4–7. In the illustrated embodiment, users 10 and 16 wish to view the same live streaming content from a content source (i.e., server 12) over network 20, which may be the Internet. *Id.* at 9:32–35, 9:38–43. Proxy 22 is disposed in the connection between server 12 and users 10 and 16 as close to the last physical media link to users 10 and 16 as possible, such as where a user's dial-up Internet connection is terminated. *Id.* at 9:50–56. As such, user 10 connects to proxy 22 via connection 24, while user 16 connects to proxy 22 via connection 26. *Id.* at 9:59–61. Streams that are downloaded from server 12 may be routed over connection 28 to proxy 22 before being passed to users 10 and 16 over connections 24 and 26, respectively. *Id.* at 9:61–64.

This reduces the volume of data being downloaded from server 12. *Id.* at 9:64–67.

Geagan also describes "data seaming," which is "a counter-intuitive process by which, in the face of significant data loss, even more data than was originally being broadcast is requested." *Id.* at 10:9–11. The goal of data seaming is "to stitch together, or seam, packets from different input streams or traffic flows into an output stream that has fewer information gaps than any of the input streams." *Id.* at 10:15–21. As shown in Geagan's Figure 2, proxy 22 may open additional connections 30a and 30b to server 12 when there is significant packet loss over connection 28. *Id.* at 10:22–28. Additional connections 30a and 30b transport the same data being transported across connection 28. *Id.* at 10:28–33. Because the missing data packets are generally different across different connections, proxy 22 can "seam" (i.e., fill in missing packets from the additional connections) streams such that the streams played out to users 10 and 16 over connections 24 and 26 may include packets from connections 28, 30a, and 30b. *Id.* at 10:33–43.

Figure 5 of Geagan is reproduced below.

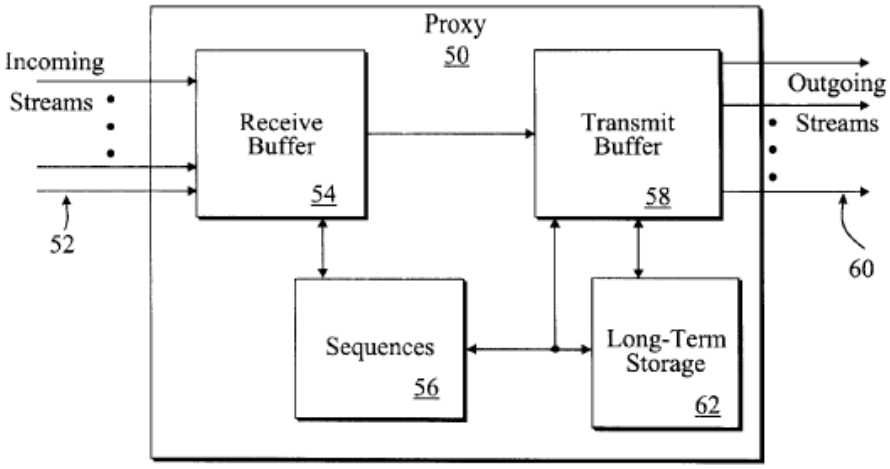


Fig. 5

Figure 5 depicts an implementation of proxy 50 configured to perform seaming operations. *Id.* at 8:16–18, 12:23–24. Multiple incoming streams 52 are applied to receive buffer 54, which is a shared memory that processes incoming streams 52 and stores data packets of incoming streams 52 in logical queues. *Id.* at 12:29–37. Sequencer 56 carries out sequencing operations by examining the various packets from incoming streams 52 and assembling seamed streams within transmit buffer 58. *Id.* at 12:42–47. The assembled streams in transmit buffer 58 are played out as seamed outgoing streams 60 at a rate optimized for a receiving client (not shown). *Id.* at 12:47–54.

2. Vishlitzky

Vishlitzky is a U.S. patent titled "Prefetching to Service Multiple Video Streams from an Integrated Cached Disk Array." Ex. 1010, code (54). Vishlitzky "relates generally to data storage subsystems, and more particularly to cached disk arrays" and "specifically relates to video servers." *Id.* at 1:25–27. Vishlitzky discloses that a "video file server includes an integrated cached disk array storage subsystem and a plurality of stream server computers linking the cached disk storage subsystem to the

data network for the transfer of video data streams." *Id.* at code (57).

Figure 2 of Vishlitzky is reproduced below.

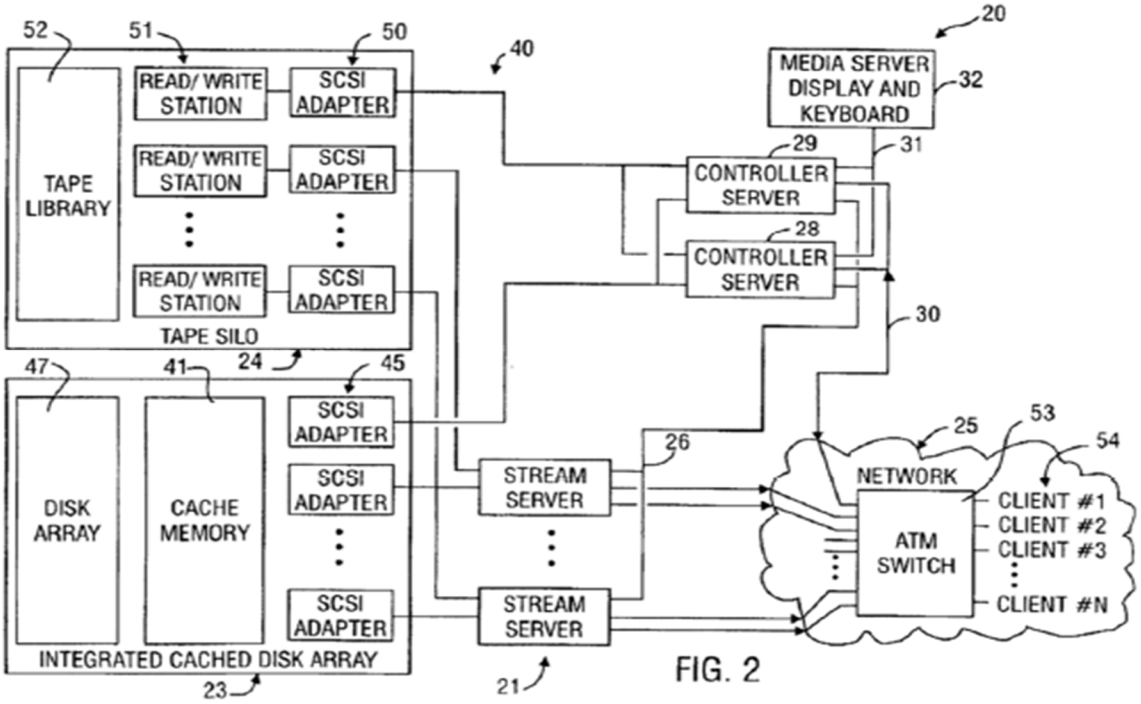


Figure 2 depicts a block diagram of a video file server and its connections to the network. *Id.* at 3:20–21. Figure 2 includes controller servers and stream servers. *Id.* at 6:9–17. Shown in Figure 2 "are dual redundant computers 28, 29, each of which is similar to each of the stream servers 21." *Id.* at 5:22–24. "Each of the dual redundant controller servers 28, 29 has a network attachment to a bidirectional link (30 in FIG. 2) in the network (25 in FIG. 2) through which each of the controller servers 28, 29 can conduct service protocols." *Id*. at 5:25–28. "For multi-media data transfer, the active one of the controller servers 28, 29 assigns one of the stream servers 21 to the network client 54 requesting multi-media service." *Id.* at 5:55–57. A software application running on the active one of controller servers 28, 29 "executes as a central control to prevent the video file server from performing conflicting operations in response to concurrent requests

from various network clients." *Id.* at 7:41–49. The software may include an admission control program, which "applies an admission control policy to determine whether a service request can be satisfied, and if so, sends the stream servers 21 appropriate control messages that invoke their real-time schedulers to schedule operations to satisfy the service request." *Id.* at 7:62–8:3.

Vishlitzky further discloses that "sharing prefetched data . . . can be further adapted to permit sharing of fetched data in the RAM [random access memory] of a stream server to support more than one video stream from the RAM of the stream server." *Id*. at 21:65–22:9. Figure 16 of Vishlitzky is reproduced below.

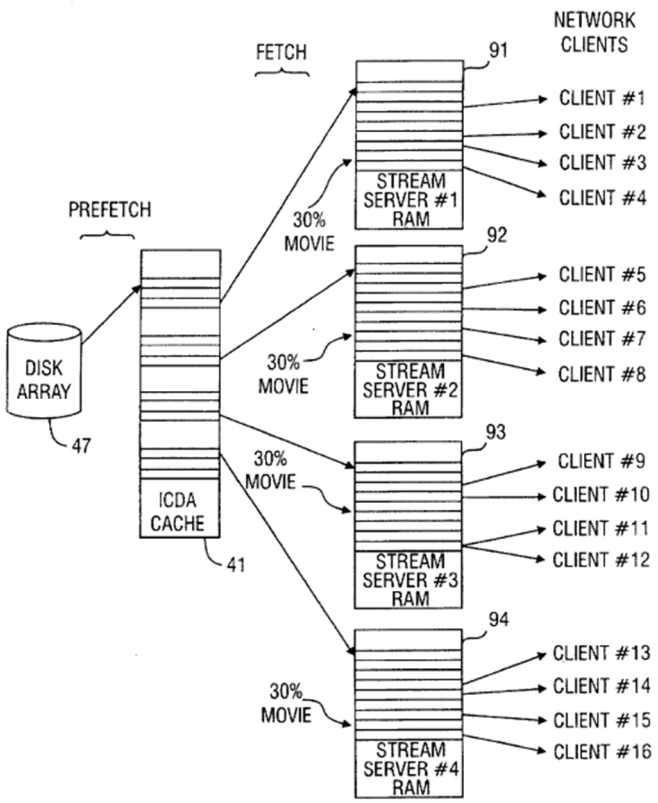


Figure 16 is a schematic diagram showing "movie-on demand" service to numerous network clients simultaneously viewing different portions of a

popular movie. *Id.* 3:60–63, 22:10–12. Vishlitzky teaches that "it is advantageous to initially allocate large amounts of random access memory of the stream servers to the popular movies." *Id.* at 22:2–5. In the example depicted in Figure 16, "a block of data for a third of a movie is stored in the RAM of each of four stream servers 91, 92, 93, and 94." *Id.* at 22:12–17. Vishlitzky teaches the following:

> Preferably the block of data in the RAM of each of the four stream servers 91, 92, 93 and 94 is a sliding "window" into the movie. New data are added to each window, and old data are removed from each window, at the rate at which data are delivered to the network clients viewing the movie. The block of data providing such a sliding window, for example, is maintained as a simple circular queue.

Id. at 22:18–23.

Figure 17 of Vishlitzky is reproduced below.

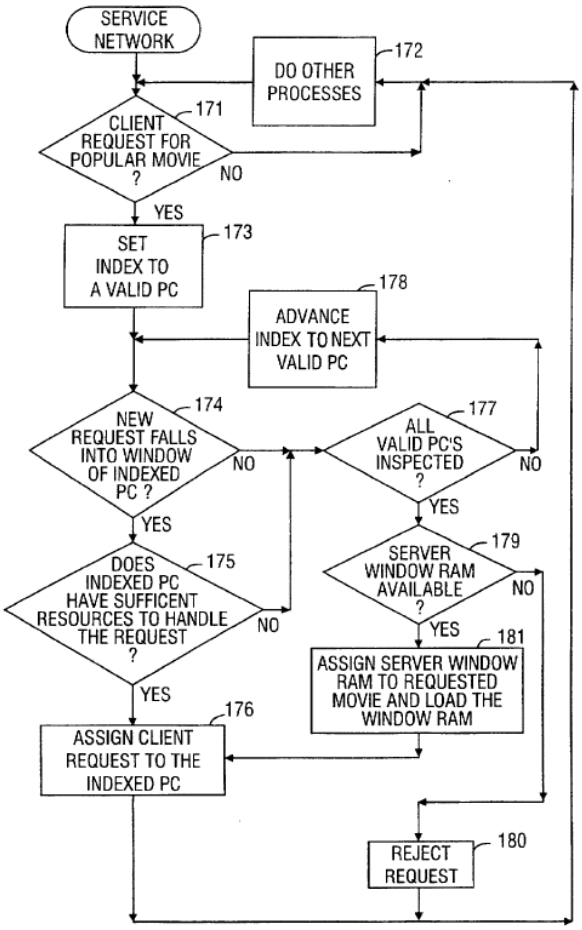


FIG. 17

Figure 17 is a flowchart of a procedure used in the admission control program for servicing client requests from a network based on whether the request is related to a popular movie. *Id.* at 23:5–8. If a client request is for a popular movie (step 171), a determination is made "whether the desired starting time or position in the movie of the new request falls in the RAM window of the requested movie in the indexed stream server PC" (step 174). *Id.* at 23:16–25. If so, and if the indexed PC has sufficient resources to handle the request (step 175), the request is assigned to the indexed stream server PC (step 176). *Id.* at 23:25–28, 23:43–46. If a client request is for an

unpopular movie (step 171), other processes are performed, such as a standard prefetching technique. *Id.* at 23:8–17.

3. Claim 1

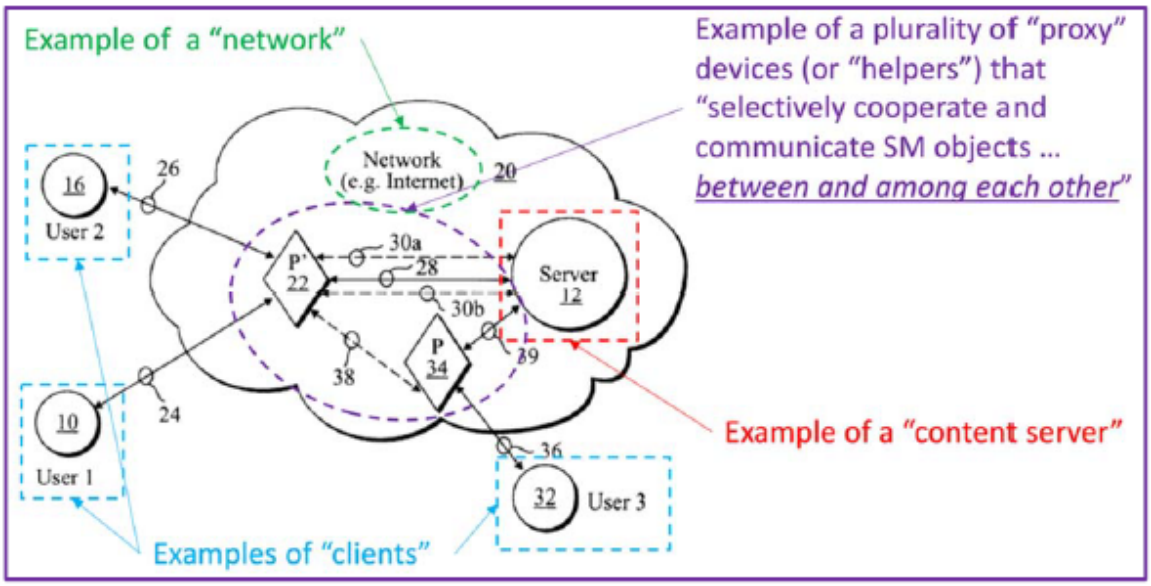
We first set forth Petitioner's unpatentability contentions for claim 1 and then turn to the parties' positions regarding Petitioner's rationale for combining Geagan and Vishlitzky, which is the dispositive issue for this ground.

a. Petitioner's Unpatentability Contentions

The preamble of claim 1 is reproduced below:

> In a network having a content server which hosts a plurality of live streaming multimedia (SM) broadcast objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients, a method of reducing start-up latency associated with distributing said plurality of live SM broadcast objects from said content server and said plurality of HSs to said plurality of clients, said method comprising[.]

Ex. 1001, 12:16–23. To explain its contentions regarding the preamble, Petitioner provides an annotated version of Figure 2 of Geagan, which is reproduced below.



Pet. 22. As shown in this annotated version of Geagan's Figure 2, Petitioner maps the recited "content server" of claim 1 to Geagan's server 12, which Petitioner has highlighted in red. *Id.* (citing Ex. 1002 ¶¶ 252–253; Ex. 1009, 9:50–56). Petitioner maps the recited "network" to Geagan's network 20, which Petitioner has highlighted in green. *Id.* Petitioner maps the recited "helper servers (HSs)" to Geagan's proxy 22 and proxy 34, which Petitioner has highlighted in purple. *Id.* Petitioner maps the recited "clients" to Geagan's users 10, 16, and 32, which Petitioner has highlighted in blue. *Id.*

> Petitioner further cites Geagan's teaching of
>
> "live broadcasts of streaming content delivered via the Internet" using "a proxy (transparent or explicit) [that] is introduced between a content source (e.g., a server) and one or more clients (e.g., Web browsers, or plugins therefor, configured to play streaming content or other multimedia viewers, other proxies, playback devices, etc.), preferably at a location that is close (e.g., physically or logically) to the clients."

Pet. 22 (quoting Ex. 1009, 1:5–10, 8:27–32) (alteration by Petitioner). Petitioner contends Geagan teaches "reducing start-up latency associated with distributing said plurality of live SM broadcast objects" by, *inter alia*, buffering streaming content at the proxy servers, which are physically or logically close to the clients. *Id.* at 26 (quoting Ex. 1009, 8:27–36) (citing Ex. 1002 ¶¶ 264–265).

Claim 1 further recites "receiving a first request from one of said plurality of clients for one of said plurality of live SM broadcast objects at one of said plurality of HSs." Ex. 1001, 12:24–26. Petitioner cites Geagan's teaching of users requesting streaming content by opening connections between a proxy and the content server. Pet. 27 (citing Ex. 1009, 9:56–61, 14:9–15). Petitioner notes that the user's connection to the content server passes through the proxy. *Id.* (citing Ex. 1009, 9:56–61). Because the connection passes through the proxy, Petitioner contends the user's request for content must be received at the proxy (i.e., one of the recited "helper servers (HSs)"). *Id.* at 28 (citing Ex. 1002 ¶ 290; Ex. 1009, 8:27–36, 9:56–61).

Claim 1 additionally recites "determining whether said first request can be partially serviced from a pre-configured playout history (PH) buffer allocated in a memory associated with said one of said plurality of HSs." Ex. 1001, 12:27–30. For the recited "pre-configured playout history (PH) buffer," Petitioner cites Geagan's teaching that proxies receive "data streams that '***can be buffered*** and any information gaps (e.g., due to packet loss) in the received streams can be filled using information from other server-source streams.'" Pet. 28–29 (quoting Ex. 1009, 8:36–42); *see also id.* at 29 (citing Geagan's receive buffer 54 as described at Ex. 1009, 12:30–32,

Fig. 5). For the buffer being "allocated in a memory associated with said one of said plurality of HSs," Petitioner cites Geagan's teaching that the buffer can be "a shared memory operated under the control of a memory controller." *Id.* at 29–30 (quoting Ex. 1009, 12:33–37). Regarding servicing requests from a buffer, Petitioner cites Geagan's teaching that the "resulting 'seamed' stream can be provided from the proxy to one or more of the clients." *Id.* at 29 (quoting Ex. 1009, 8:43–50). For the recited "determining," Petitioner contends an ordinarily skilled artisan "would have understood that such a 'determination' step would be implemented in order to match a particular 'requesting client' with a particular 'stream/connection' as 'identified' for a particular 'buffer.'" *Id.* at 30 (citing Ex. 1002 ¶ 308).

Petitioner concedes that Geagan does not teach the "pre-configured playout history (PH) buffer" under the claim construction for this limitation adopted by the court in the California litigation.[3] Pet. 30. Thus, Petitioner

[3] Petitioner purports to make this concession only "under the narrowest construction, as adopted by the District Court for the Central District of California," which is

> a buffer that acts as a form of dynamic cache of fixed size that advances with a live SM object in storing data packets that comprise the last few seconds of the live SM object, and that is manually configured before the live SM object is requested and permanently maintained in memory thereafter.

Pet. 30; Ex. 1007, 22–25. We agree with Patent Owner (PO Resp. 16–17 & n.2), however, that Petitioner does not purport to show that Geagan alone teaches this limitation implicitly, inherently, or under any other claim construction. As such, we read Petitioner's obviousness contentions in this ground as also relying necessarily on Vishlitzky for teaching the recited "pre-configured playout history (PH) buffer." And, as stated above, we need not construe this (or any other) limitation in order to dispose of the instant case. *See supra* § II.C.

cites Vishlitzky's teaching of allocating server RAM in various stream servers to service client requests for video data related to a popular movie. Pet. 31–34 (citing, *inter alia*, Ex. 1010, Abstr., 4:55–5:6, 22:10–17, Figs. 2, 16). According to Petitioner,

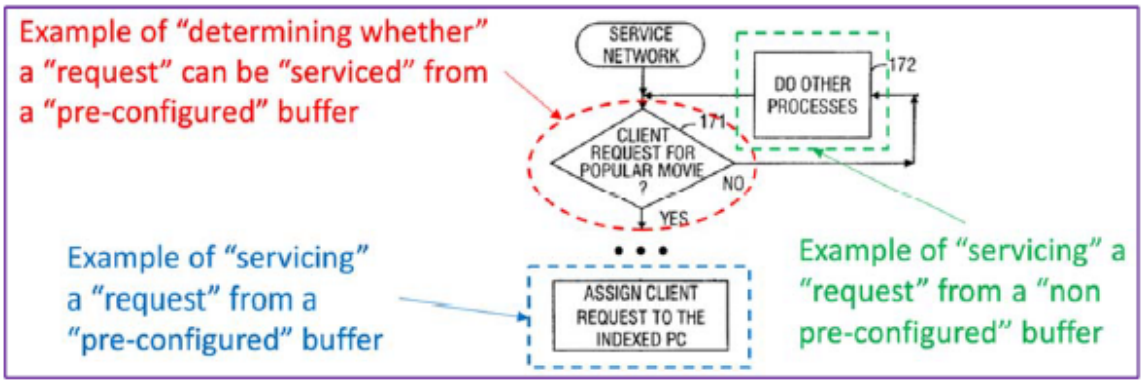
> Vishlitzky teaches that "the block of data in the RAM of each of the four stream servers . . . is a sliding 'window' into the movie" wherein "[n]ew data are added to each window, and old data are removed from each window, at the rate at which data are delivered to the network clients viewing the movie" such that "[t]he block of data providing such a sliding window, for example, is maintained as a simple circular queue."

Id. at 33 (quoting Ex. 1010, 22:18–24) (citing Ex. 1002 ¶ 316). Petitioner also notes Vishlitzky's teaching that "it is advantageous to initially allocate large amounts of random access memory of the stream servers to the popular movies" due to the likelihood that "more than one client request for the same RAM window of the movie" would be received. *Id.* at 33–34 (quoting Ex. 1010, 22:3–9, 24:47–50).

Petitioner contends an ordinarily skilled artisan would have found it obvious to implement Geagan's buffer as a "pre-configured playout history (PH) buffer" in light of Vishlitzky because "Vishlitzky teaches that it is advantageous to pre-configure a playout buffer by allocating and indefinitely maintaining sufficient random access memory at Geagan's proxy to service a popular stream such as Geagan's popular live-streaming content." Pet. 34 (citing Ex. 1002 ¶ 318).

Petitioner additionally cites Vishlitzky to teach the recitation "determining whether said first request can be partially serviced from a pre-configured playout history (PH) buffer." *See* Pet. 35–36. Applying teachings regarding Vishlitzky's admission control program, Petitioner

draws a distinction between requests for popular movies, which are "pre-configured" in a buffer, and requests for unpopular movies, which are "non pre-configured." *See id.* To explain its contentions, Petitioner provides an annotated and excerpted version of Vishlitzky's Figure 17, reproduced below.



Id. at 35. In this annotated and excerpted version of Vishlitzky's Figure 17, Petitioner has highlighted in red how it maps the recited "determining" step of claim 1 to step 171 in Vishlitzky's admission control program, where a determination is made whether the client is requesting a popular movie. Pet. 35 (citing Ex. 1010, 23:5–13, Fig. 17). If so, Petitioner notes that the procedure eventually moves to Vishlitzky's method step 176 ("Assign Client Request to the Indexed PC"), which Petitioner highlights in blue and asserts as teaching the servicing of a request from a pre-configured buffer. *Id.* If not, the procedure moves to Vishlitzky's method step 172 ("Do Other Processes"), which Petitioner highlights in green and asserts as teaching the servicing of a request from a non pre-configured buffer. *Id.* (citing Ex. 1010, 23:5–19, Fig. 17). Petitioner notes that Vishlitzky's step 172 relates to Vishlitzky's standard process for fetching a movie. *See id.* at 40–41 (citing, *inter alia*, Ex. 1010, 17:30–42, Fig. 9). In this way, Petitioner contends that a "non pre-configured PH buffer" is created at the proxy by

live-streaming content at the time of a request for an unpopular live stream. *Id.* at 42 (citing Ex. 1002 ¶ 350).

Claim 1 further recites "partially servicing said first request from said pre-configured PH buffer at a first data rate, if said determining step is satisfied, the first data rate being higher than a standard data rate associated with servicing the first request from a non pre-configured PH buffer." Ex. 1001, 12:31–35. Regarding the "standard data rate associated with servicing the first request from a non pre-configured PH buffer," Petitioner relies on Vishlitzky's teaching of servicing a "client request . . . for something other than a popular movie." *See* Pet. 40–43 (citing, *inter alia*, Ex. 1010, 23:5–19). Specifically, Petitioner references Vishlitzky's standard process for transmitting video data "'isochronously to a first network client from a buffer 91 in random access memory (RAM) in a first one of the stream servers' such that '[t]he buffer 91 is filled by data fetched from the cache 41 of the integrated cached disk array.'" *Id.* at 41 (citing Ex. 1010, 17:30–42, Fig. 9). Petitioner also cites Vishlitzky's teaching of creating "a sliding 'window' into the movie" in that RAM. *Id.* (citing Ex. 1010, 22:10–24). As such, Petitioner applies Vishlitzky's standard process related to an initial request for livestreamed content for teaching the "standard data rate" scenario. *Id.* (citing Ex. 1002 ¶ 350).

Regarding the "first data rate being higher than a standard data rate," Petitioner cites Geagan's disclosure of locating the proxy physically or logically close to the clients. Pet. 43; *see also id.* at 22 (citing Ex. 1009, 8:27–32). According to Petitioner, an ordinarily skilled artisan would have understood "that the delay between such proxy and the client would be substantially less than the delay between the content source and the client, or

similarly, would be substantially less than the delay between the content source and proxy." *Id.* at 43 (citing Ex. 1002 ¶ 354). In addition, Petitioner contends the speed with which additional or later-time users' requests are serviced (i.e., the time it takes to cause the client's playback buffer to become relatively full after a request) is faster when content is already buffered at a proxy close to a client and free from delays associated with round-trips between the content source and proxy. *Id.* at 43–45 (citing Ex. 1002 ¶¶ 355–357, 359).

Petitioner further contends that an ordinarily skilled artisan would have applied "the detailed stream server structures and functionality disclosed in Vishlitzky" with Geagan to obtain "an advantageous implementation of a buffer for storing video data streams in a sliding window that is maintained as a simple circular queue." Pet. 62–63 (citing, *inter alia*, Ex. 1002 ¶¶ 277, 321). In particular, Petitioner contends that it would have been obvious to implement the buffer of Geagan as a "pre-configured playout history (PH) buffer" based on Vishlitzky's teaching that "it is advantageous to pre-configure a playout buffer by allocating and indefinitely maintaining sufficient random access memory at Geagan's proxy to service a popular stream such as Geagan's popular live-streaming content." *Id.* at 34 (citing Ex. 1002 ¶ 318); *see also* Ex. 1010, Abstr., 22:3–27 (Vishlitzky's teachings about allocating and maintaining RAM). In support of the combination, Petitioner notes the commonalities between the architectures of the two references, including the use of a streaming server to support live streaming to multiple clients. Pet. 61–62 (citing Ex. 1002 ¶¶ 276–277). Petitioner further notes that both references use "industry-standard protocols and network architecture elements," which Petitioner

contends would support a reasonable expectation of success in combining the architectures of the two references. *Id.* at 62–63 (citing Ex. 1002 ¶ 278).

b. The Extent to Which Petitioner's Proposed Combination Relies on Central Control

Much of the effort in this trial has been devoted to determining the exact "structures and functionality" from Vishlitzky that Petitioner purports to combine with Geagan for the instant obviousness combination and, in particular, the role, if any, of Vishlitzky's central control scheme. *See* Pet. 62–63. In our Decision on Institution, we characterized Petitioner's combination as follows: "Petitioner does not rely on Vishlitzky's central control scheme and its associated teachings on how to direct requests for the same object; rather, Petitioner incorporates 'the detailed stream server structures and functionality disclosed in Vishlitzky' in Geagan's proxy." Dec. on Inst. 31 (quoting Pet. 62–63).

In its Response, Patent Owner argues that "a POSITA would not have been motivated to implement Vishlitzky's 'sliding window,' which the Petition maps to the claimed pre-configured PH buffer, in Geagan's proxy buffers without Vishlitzky's central controller servers." PO Resp. 16–30; *see also* PO Sur-reply 23. Among other things, Patent Owner notes that Petitioner's obviousness analysis relies expressly on Vishlitzky's admission control program scheme from its Figure 17, which Patent Owner associates with central control. PO Resp. 25. Based on the full record before us, we agree with Patent Owner's arguments because we now understand Petitioner's combination to include more control aspects from Vishlitzky than we previously recognized, as we will now discuss.

First, Petitioner's combination relies expressly on Vishlitzky's stream servers controlled by controller servers, which refers to Vishlitzky's stream servers 21, 26 and controller servers 28, 29 as shown in Figure 2 of Vishlitzky. Pet. 31–32, 60–62; Pet. Reply 7; Ex. 1002 ¶¶ 276–277. As acknowledged by Dr. Negus (Ex. 1002 ¶¶ 182, 275, 314), "the active one of the controller servers 28, 29 assigns one of the stream servers 21 to the network client 54 requesting multi-media service." Ex. 1010, 5:55–57. Vishlitzky further states that a "software application executing on an active one of the controller servers 28, 29" acts "as a central control to prevent the video file server from performing conflicting operations in response to concurrent requests from various network clients." Ex. 1010, 7:41–49. This supports Patent Owner's contention that Petitioner relies on a central control scheme, because the controllers assign client requests to an appropriate stream server.

Second, Petitioner cites Vishlitzky's admission control program in Figure 17 for teaching the step of determining whether a request can be partially serviced from a pre-configured PH buffer as opposed to a non pre-configured PH buffer. Pet. 35–36, 40–41; Pet. Reply 21–22; Ex. 1002 ¶¶ 325–326. According to Vishlitzky, "[t]he admission control program running on the active one of the controller servers 28, 29 applies an admission control policy to determine whether a service request can be satisfied, and if so, sends the stream servers 21 appropriate control messages that invoke their real-time schedulers to schedule operations to satisfy the service request." *Id.* at 7:65–8:3. Again, this supports the notion that Petitioner utilizes Vishlitzky's central control to route requests, which is essential to Petitioner's mapping of the "determining" step of claim 1.

Petitioner attempts to decouple these central control aspects from the functionality of sliding windows. In particular, Petitioner argues that "[t]he majority of the functionality for implementing the sliding window buffers is found in Vishlitzky's stream servers themselves" and that Patent Owner has not established "that the controller servers of Vishlitzky exercise control over the playout history, the buffers, or sliding window functionality of Vishlitzky's stream servers." Pet. Reply 8–9. Yet Petitioner expressly relies on Vishlitzky's admission control program, which runs on controller servers 28, 29, to teach the "determining" step of claim 1. Pet. 35–36, 40–41; Pet. Reply 21–22. Petitioner has not explained how the admission control program's centralized function of choosing an appropriate stream server to service a request (*see* Ex. 1010, 7:62–8:3) would be implemented in the stream servers themselves. In addition, Petitioner's analogy between Vishlitzky's controller servers and the memory controllers used with Geagan's proxy (Pet. 63; Pet. Reply 9) does not detail how and whether Petitioner proposes to modify Vishlitzky's centralized controller functions such that they might be compatible with "the distributed nature of Geagan's proxy approach," as Petitioner characterizes it. Pet. Reply 10.

At the oral hearing, Petitioner also suggested that a controller within a single proxy from Geagan could allocate incoming requests to multiple of Vishlitzky's stream servers within that same proxy. Tr. 55:1–57:21; *see also* PO Sur-reply 23–24 (discussing this potential argument). In other words, Petitioner seemed to suggest that multiple stream servers from Vishlitzky's stream server architecture in Figure 16, along with controller servers from Figure 2, could be replicated in each of Geagan's proxies.

Yet Petitioner disavows such a mapping in its Reply: "[T]he Petition does not propose that a POSITA would have bodily incorporated the entirety of Vishlitzky's hardware control structure when implementing Geagan's system using Vishlitzky's 'sliding window' to store cached streaming content." Pet. Reply 6. Nor was this the combination described in the Petition. Instead, Petitioner proposed "to implement the buffer of Geagan as a 'pre-configured playout history (PH) buffer' . . . because Vishlitzky teaches that it is advantageous to pre-configure a playout buffer." Pet. 34; *see also id.* at 62–63 ("[A] POSITA would have had a reasonable expectation of success in implementing details of the ATM-based stream server of Vishlitzky in Geagan's proxy . . . ."). Petitioner further characterizes this as "[t]he buffer of Geagan's proxy, as implemented as a pre-configured PH buffer per Vishlitzky." Pet. 39. And, importantly, Petitioner cites the creation of *another* proxy device in Geagan for teaching the recited "non pre-configured PH buffer": "Geagan in view of Vishlitzky discloses 'servicing the first request from a non pre-configured PH buffer,' such as by live-streaming content using a buffer *at the proxy device that is created at the time of the request for an unpopular live stream*." Pet. 42 (emphasis added). Finally, even if Petitioner's papers had proposed a combination where Vishlitzky's entire stream server and controller architecture is incorporated in each of Geagan's proxies, Petitioner has failed to articulate reasons with some rational underpinning why an ordinarily skilled artisan would have made this combination. Thus, we are not persuaded by Petitioner's arguments.

At the very least, Petitioner has not explained where Vishlitzky's controller servers would be disposed in the combined system and how they

would operate to control Geagan's proxies while implementing the "functionality" of Vishlitzky's admission control program. Petitioner's failure to reconcile its cited teachings from Vishlitzky regarding central routing of requests with its cited teachings of Geagan's distributed proxies represents a fatal flaw in Petitioner's rationale for combining Vishlitzky with Geagan.

c. The Applicability of Vishlitzky's Video-on-Demand Teachings to Geagan's Live Streaming System

We also have considered Patent Owner's arguments about a separate issue that undermines Petitioner's alleged reasons for combining Geagan and Vishlitzky. Specifically, Patent Owner highlights that Vishlitzky is directed to a video-on-demand system for pre-recorded video "with real-time interactions such as fast-forward and rewind." PO Resp. 26 (citing, *inter alia*, Ex. 1010, 1:44–46, 9:31–39; Ex. 2005 ¶ 65). Patent Owner contrasts video-on-demand systems, where users watch different portions of a popular movie, with live streaming systems, where viewers all watch the same point in the broadcast. *Id.* As such, Patent Owner argues that "Petitioner does not introduce a reference that uses any type of circular buffer for live broadcast, or that teaches why PH buffers are useful for live broadcast." PO Sur-reply 11. For the reasons discussed below, we agree with Patent Owner that Petitioner has not persuasively shown how certain advantages for video-on-demand systems that allegedly arise from Vishlitzky's teachings would apply to the context of Geagan's live streaming system.

Petitioner's rationale for its proposed combination is based specifically on the following statement from Vishlitzky: "For video 'on demand' service for popular movies, . . . it is advantageous to initially

allocate large amounts of random access memory of the stream servers to the popular movies." Ex. 1010, 22:2–5; *see also* Pet. 33 (quoting same), 34 (referencing the alleged advantage). Vishlitzky goes on to describe how stream server RAM is allocated to popular movies so that a large block of the movie (e.g., one-third of the movie) is "maintained as a simple circular queue" or "sliding window" at each stream server. Ex. 1010, 22:10–24. In this way, network clients may continue streaming the popular movie in uninterrupted fashion from the same stream server—thus alleviating the need to re-allocate clients to different stream servers—unless and until the client "request[s] a stop, fast-forward, or fast-reverse operation," whereupon "it may be necessary to re-allocate a network client to a different stream server PC." *Id.* at 22:24–30. By allocating and loading data for a popular movie before client requests are received, video streams can immediately be supplied to clients starting at any desired time or position in the movie. *Id.* at 24:14–23.

We agree with Patent Owner (PO Sur-reply 11–16) that Petitioner has not shown why or how the advantages from sliding windows for popular movies touted by Vishlitzky are applicable to live streaming, as taught in Geagan. As noted by Patent Owner, live streaming does not allow for pre-loading of content in RAM windows. PO Sur-reply 16 (citing Ex. 2005 ¶ 67). Thus, Vishlitzky's alleged advantages from allocating server RAM for pre-loading with popular content do not apply to live streaming because "future [live] content does not yet exist." Ex. 2005 ¶ 67. Moreover, Vishlitzky's sliding windows are used to "avoid having the user 'switch' stream servers to watch different portions of the popular movie." PO Sur-reply 12 (citing Ex. 1010, 22:18–27, 22:28–35); *see also* PO Resp. 21–

22 (citing same). But with a live broadcast, "all users watch the same portion in the broadcast—by virtue of it being live." Ex. 2005 ¶ 65. Nor is there a potential problem with switching among stream servers due to fast-forward or fast-reverse functionality that is available with movies. PO Resp. 27; PO Sur-reply 14. This functionality does not apply to live streaming. Ex. 2005 ¶¶ 65, 67.

We also have considered Petitioner's reply argument that Vishlitzky teaches allocating a new RAM window and loading it with data when "the resources of the stream server PC having the existing RAM window are used up in the servicing of prior client requests." Pet. Reply 15 (emphasis omitted) (quoting Ex. 1010, 24:21–26, 24:31–37). In light of this, Petitioner contends that "Vishlitzky teaches it is advantageous to duplicate content to reduce load on individual stream servers." *Id.* at 17 (citing Ex. 1021 ¶ 13). And, according to Petitioner, concern about finite storage space is a problem acknowledged by Vishlitzky "as being one of the reasons why the sliding windows are necessary in the first place." *Id.* at 18 (citing Ex. 1021 ¶ 16). We are not persuaded by this rationale, however. We agree with Patent Owner that Vishlitzky's teachings might have motivated an ordinarily skilled artisan to add stream servers when resources are taxed with a live stream, but they would not have motivated an ordinarily skilled artisan to implement a sliding window in Geagan's system. *See* PO Sur-reply 14–15. Indeed, Dr. Negus's supporting reply testimony (*see* Ex. 1021 ¶¶ 16–17) focuses on Vishlitzky's aim to minimize resource usage, but this does not show how or why Vishlitzky's sliding windows in particular—as opposed to any replicated resources in general—are associated with solving resource constraints.

Finally, Petitioner makes a new argument in its Reply that Geagan's proxies should be modified based on Vishlitzky "to maintain . . . the last few seconds [of a live broadcast] to account for any buffering at the client prior to playback." Pet. Reply 18 (citing Ex. 1021 ¶ 18). Patent Owner contends this is an improper reply argument based on a new theory. PO Sur-reply 17. Patent Owner also contends that nothing in the asserted references supports this argument, particularly with regard to using sliding windows to buffer live content. *Id.* We agree with Patent Owner on both accounts. Petitioner waived this argument because it was not presented in the Petition. *See Consolidated Trial Practice Guide*, 37 (Nov. 2019)[4] ("Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g. to make out a prima facie case of unpatentability."). And, even if Petitioner's argument were presented timely, nothing in either Geagan or Vishlitzky supports Petitioner's new theory about buffering live streams. Nor would the alleged need to buffer a few seconds of a live stream support the particular use of Vishlitzky's sliding window in Petitioner's combination. Thus, we are not persuaded by Petitioner's argument.

d. Conclusion Regarding Claim 1

For the reasons discussed above, Petitioner has not persuasively shown why an ordinarily skilled artisan would have found it obvious to combine Vishlitzky with Geagan in the manner proposed by Petitioner. On the entire trial record, we determine that Petitioner has not shown, by a

[4] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

preponderance of the evidence, that the subject matter of claim 1 would have been obvious over the combination of Geagan and Vishlitzky.

4. Other Claims

Petitioner's analysis for independent claims 15, 20, and 27 relies on the same rationale for combining Geagan and Vishlitzky discussed above. *See id.* at 52–55, 57–63. In addition, claims 2, 3, 5–7, 13, 14, 18, 21, 24, 25, and 29 depend from independent claims 1, 15, 20, or 27, and Petitioner's analysis for these claims also relies on the same rationale for combining Geagan and Vishlitzky discussed above. *See id.* at 46–57, 59–63. Thus, for the same reasons discussed for claim 1, we are not persuaded that an ordinarily skilled artisan would have had reasons to combine Geagan and Vishlitzky in the manner proposed by Petitioner. On the entire trial record, we determine that Petitioner has not shown, by a preponderance of the evidence, that the subject matter of any of claims 2, 3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 would have been obvious over the combination of Geagan and Vishlitzky.

E. Obviousness Ground Based on Geagan, Vishlitzky, and Zheng

Petitioner contends the subject matter of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 would have been obvious over the combination of Geagan, Vishlitzky, and Zheng. Pet. 63–68; Pet. Reply 3–29. Patent Owner disputes Petitioner's contentions. PO Resp. 16–30; PO Sur-reply 1–24.

1. Zheng

Zheng is a paper directed to "a Faster Buffer Fillup (FBF) scheme to run [Video on Demand] over [an Asynchronous Transfer Mode] network with [available bit rate] service." Ex. 1012, 10.

2. Claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29

Petitioner's analysis for all claims in this ground builds upon and incorporates the same rationale for combining Geagan and Vishlitzky discussed above. *See* Pet. 68. Thus, for the same reasons discussed for claim 1 of the Geagan–Vishlitzky ground, we are not persuaded that an ordinarily skilled artisan would have been motivated to combine Geagan, Vishlitzky, and Zheng in the manner proposed by Petitioner. On the entire trial record, we determine that Petitioner has not shown, by a preponderance of the evidence, that the subject matter of any of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 would have been obvious over the combination of Geagan, Vishlitzky, and Zheng.

III. CONCLUSION

Petitioner has not shown, by a preponderance of the evidence, that (1) the subject matter of any of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 would have been obvious over the combination of Geagan and Vishlitzky; and (2) the subject matter of any of claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 would have been obvious over the combination of Geagan, Vishlitzky, and Zheng.

IV. ORDER

Accordingly, it is

ORDERED that claims 1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, and 29 of the '796 patent are not determined to be unpatentable; and

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

In summary:

Claims	35 U.S.C. §	Reference(s) /Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29	103(a)	Geagan, Vishlitzky		1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29
1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29	103(a)	Geagan, Vishlitzky, Zheng		1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29
Overall Outcome				1–3, 5–7, 13–15, 18, 20, 21, 24, 25, 27, 29

PETITIONER:

Eliot D. Williams
G. Hopkins Guy
Ali Dhanani
Thomas B. Carter Jr.
BAKER BOTTS L.L.P.
eliot.williams@bakerbotts.com
hop.guy@bakerbotts.com
ali.dhanani@bakerbotts.com
thomas.carter@bakerbotts.com

PATENT OWNER:

Kenneth J. Weatherwax
Edward Hsieh
Parham Hendifar
Patrick Maloney
Jason C. Linger
LOWENSTEIN & WEATHERWAX LLP
weatherwax@lowensteinweatherwax.com
hsieh@lowensteinweatherwax.com
hendifar@lowensteinweatherwax.com
maloney@lowensteinweatherwax.com
linger@lowensteinweatherwax.com