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Paper 35
Entered: September 9, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HULU, LLC
Petitioner

v.

SOUND VIEW INNOVATIONS, LLC
Patent Owner

Case IPR2018-00864
Patent 9,462,074 B2

Before DEBRA K. STEPHENS, DANIEL J. GALLIGAN, and JOHN A. HUDALLA *Administrative Patent Judges.*

STEPHENS, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a)

I. INTRODUCTION

We have authority to hear this *inter partes* review under 35 U.S.C. § 6(c), and to issue this Final Written Decision pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Hulu, LLC ("Petitioner") has shown by a preponderance of the evidence that claims 3, 5, and 9 of U.S. Patent No. 9,462,074 B2 (Ex. 1001, "the '074 Patent") are unpatentable.

A. *Procedural History*

Petitioner filed a Petition (Paper 3 ("Pet.")) requesting an *inter partes* review of claims 3, 5, and 9 of the '074 Patent (35 U.S.C. § 311).

Petitioner relies upon the following references (Pet. 5):

Reference	Patent Number	Exhibit
Wolf et al. (hereinafter "Wolf")	US 6,463,508 B1	1003
Aggarwal et al. (hereinafter "Aggarwal")	US 5,924,116	1004
Ueno et al. (hereinafter "Ueno")	US 5,991,811	1005
Dan et al. (hereinafter "Dan")	US 5,787,472	1006

Petitioner further relies on the Declaration of Dr. Henry Houh (Ex. 1002) to support its challenges.

Sound View Innovations, LLC ("Patent Owner") filed a Preliminary Response (Paper 7 ("Prelim. Resp.")) to the Petition. Pursuant to 35 U.S.C. § 314(a) and 37 C.F.R. § 42.4(a), we instituted an *inter partes* review based on our decision that Petitioner had demonstrated a reasonable likelihood of prevailing as to at least one of the challenged claims of the '074 Patent (Paper 11 ("Dec. to Inst.")). Accordingly, we instituted an *inter partes* review on all the grounds asserted in the Petition:

Ground	Claim(s)	Basis	References
1	3, 5, and 9	§ 103(a)	Wolf and Aggarwal
2	3	§ 103(a)	Ueno, Dan, and Aggarwal
3	9	§ 103(a)	Ueno and Aggarwal

Patent Owner filed a Patent Owner Response (Paper 17 ("PO Resp.")). Patent Owner relies on the Declaration of Dr. Mark T. Jones (Ex. 2018) to support its Response.

Petitioner filed a Reply to Patent Owner's Response (Paper 22 ("Pet. Reply")). Patent Owner then filed a Patent Owner's Sur-Reply (Paper 26 ("PO Sur-Reply")).

At the parties' request (Papers 29, 30), an Oral Hearing was held on June 13, 2019, a transcript of which is included in the record (Paper 34 ("Tr.")).

II. BACKGROUND

A. *Related Proceedings*

Petitioner and Patent Owner indicate the '074 Patent is at issue in the following proceedings:

Sound View Innovations, LLC v. Hulu, LLC, No. 2:17-cv-04146, which was filed in the U.S. District Court for the Central District of California;

Unified Patents Inc. v. Sound View Innovations, LLC, IPR2018-00599, which was filed at the Patent Trial and Appeal Board;

Sound View Innovations, LLC v. AMC Networks, Inc., No. 1-19-cv-00145 which was filed in the U.S. District Court for the District of Delaware;

Sound View Innovations, LLC v. HSN, Inc., No. 1-19-cv-00193 which was filed in the U.S. District Court for the District of Delaware; and

Sound View Innovations, LLC v. QVC, Inc., No. 1-19-cv-00194 which was filed in the U.S. District Court for the District of Delaware (Pet. 3; Paper 5, 1; Paper 27, 1)

For completeness, Patent Owner points out, and the Board notes, the '074 Patent is no longer at issue *Sound View Innovations, LLC v. Facebook, Inc.*, No. 2:17-cv-04275, which was filed in the U.S. District Court for the Central District of California (terminated Jan. 10, 2018) (Paper 5, 1; Paper 27, 2).

B. *Real Parties in Interest*

The Petition identifies "Hulu, LLC"[1] as the real party in interest (Pet. 3). Patent Owner states the real parties in interest are "Sound View Innovations, LLC and Sound View Innovation Holdings, LLC" (Paper 4, 1).

C. *The '074 Patent*

The '074 Patent, titled "Method and System for Caching Streaming Multimedia on the Internet," issued Oct. 4, 2016 (Ex. 1001, [45], [54]). The '074 Patent describes a technique for enhancing existing caches in a network by employing helper machines to segment streaming media into smaller units according to placement and replacement policies (*id.* at Abstract).

[1] Petitioner indicates "The Walt Disney Company, 21st Century Fox, Comcast Corporation and Time Warner Inc." own ten percent or more of stock in Hulu, LLC and, thus, may also be considered parties in interest (Pet. 3).

Figure 2 of the ’074 Patent illustrates an exemplary network system to perform the streaming media caching (*id.* at 3:31–32) and is reproduced below.

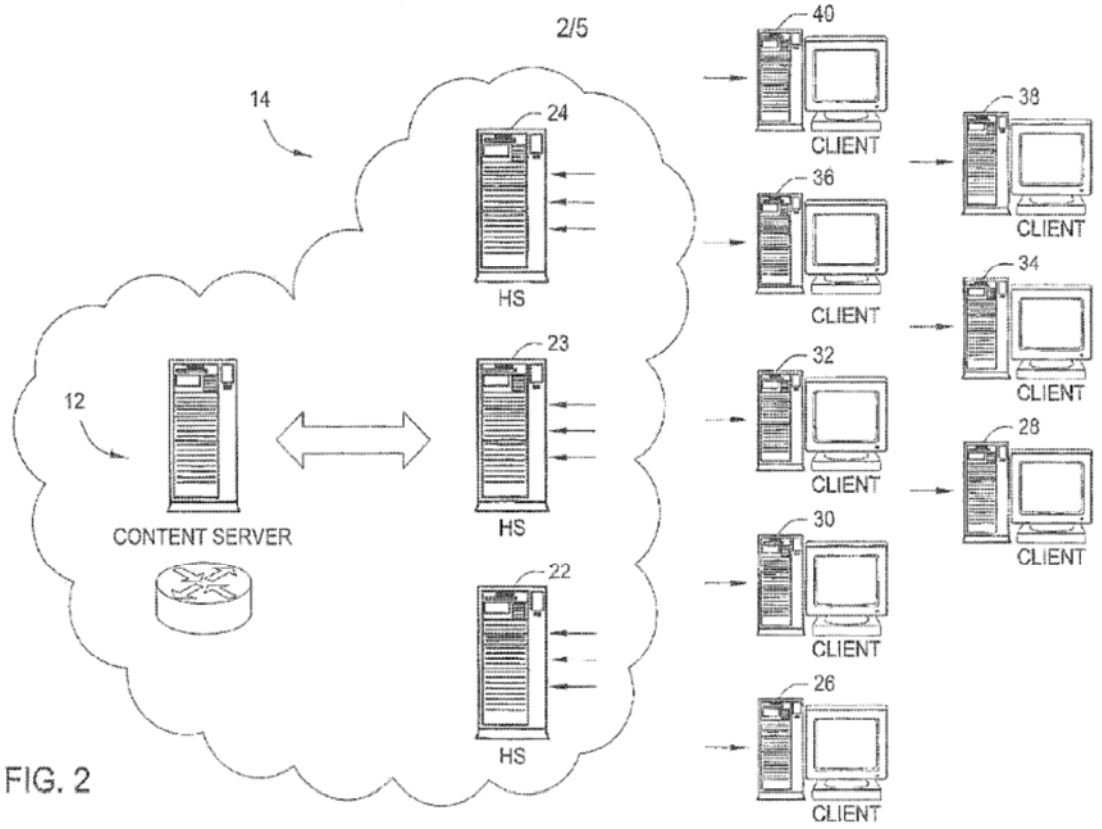

FIG. 2

Figure 2 illustrates an exemplary arrangement of a public network system (Ex. 1001, 4:62–63). Content server 12 of Figure 2 stores and serves content through network 14 (*id.* at 4:64–66). Content server 12 serves various forms of multimedia content to client computers 26–40 (*id.* at 5:1–7). Helper Servers (“HS”) are configured as conventional database servers that cache resources requested by client computers 26–40 (*id.* at 4:11–13, 5:7–14). HSs 22–24 generally segment streaming multimedia objects (“SM objects”) to better utilize their cache storages (*id.* at 3:6–12, 6:32–34). HSs

divide the SM objects into a plurality of chunks, which can be cached and replaced independently in the cache storage of each HS (*id.* at 6:37–43).

According to the '074 Patent, an advantage of dividing the cached SM objects into chunks is to significantly increase the utilization of the cache storage (*id.* at 6:40–43). This caching technique reduces a content provider's memory and processing requirements, server loads, network congestion, and high start-up latency for video requests (*id.* at 3:13–20).

D. *The Claims*

Of the challenged claims, claims 3 and 9 are independent claims, and claim 5 depends directly from claim 3 (Ex. 1001, claims 3, 5, and 9). Independent claims 3 and 9 are reproduced below:

> 3. A method for storing a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients, said SM object being comprised of a plurality of successive time-ordered chunks, wherein a chunk is further comprised of a discrete number of segments, each segment allocated to a respective disk block of said plurality of HSs, said method comprising:
>
> i) receiving said SM object;
>
> ii) determining whether there is a disk space available on said one of said plurality of HSs;
>
> iii) storing said SM object at said at least one HS if it is determined that there is sufficient disk space available; and
>
> iv) performing the following steps, if it is determined that there is insufficient disk space available:
>
> a) composing a set of SM objects from among a plurality of SM objects stored on said disk space whose access time is determined to be least recent, where said access time corresponds to a time when

said SM object was last requested; and

b) replacing a portion of each of said SM objects belonging to said composed set with chunks of said received SM object.

(Ex. 1001, claim 3).

9. A method for managing storage of a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of servers to a plurality of clients, said method comprising:

i) receiving said SM object;

ii) determining whether there is a disk space available on one of said plurality of servers;

iii) storing said SM object at said one of said plurality of servers if it is determined that there is sufficient disk space available; and

iv) if it is determined that there is insufficient disk space available to store the received SM object, for each of a plurality of SM objects stored in said disk space, deleting only a portion of said SM object, whereby the deletion of said portions of said SM objects results in sufficient disk space being available for storage of the received SM object.

(Ex. 1001, claim 9).[2]

III. ANALYSIS

A. *Level of Ordinary Skill in the Art*

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention (*Graham v. John Deere Co.*, 383 U.S. 1, 17–18

[2] Corrected in accordance with the Certificate of Correction (Ex. 3001).

(1966)). "The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry" (*Ryko Mfg. Co. v. Nu Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)). The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention (*In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995)). The level of ordinary skill in the art may be reflected by the prior art of record (*Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001)). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field (*GPAC*, 57 F.3d at 1579). In a given case, one or more factors may predominate (*id.*). Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art (*Innovention Toys, LLC v. MGA Entm't, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011) ("A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.")).

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis (*Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991))).

Petitioner asserts that a person of ordinary skill in the art at the time of the invention "would have [had] at least a Bachelor of Science degree in Electrical Engineering, Computer Science, or an equivalent field, as well as at least 2-3 years of academic or industry experience in the field of content

delivery networks or comparable industry experience(s)" (Pet. 13 (citing Ex. 1002 ¶ 32)). Patent Owner does not dispute Petitioner's assertion regarding the education or experience of an ordinarily skilled artisan at the time of the invention (*see generally* PO Resp.).

We note that the assessment appears consistent with the level of ordinary skill in the art at the time of the invention as reflected in the prior art in the instant proceeding (*see Okajima*, 261 F. 3d at 1355). Based on our review of the '074 Patent, the types of problems and solutions described in the '074 Patent and cited prior art, and the testimony of Drs. Houh and Jones (Ex. 1002 ¶ 32; Ex. 2018 ¶¶ 19–20), we determine a skilled artisan would have possessed a Bachelor of Science degree in Computer Science, Computer Engineering, Electrical Engineering, or an equivalent field, and two to three years of work experience with content delivery networks or applications or comparable education or work experience in the field.

B. *Claim Construction*

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear (*see* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012); 37 C.F.R § 42.100(b)). Here, the Petition was filed March 29, 2018 and the '074 Patent is an unexpired patent; it is set to expire March 29, 2020. Therefore, we apply the broadest reasonable construction of terms in light of the specification of the patent in which they appear.

1. Claim Terms

Claim terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the entire disclosure (*In re Translogic Tech., Inc.*, 504 F.3d 149, 1257 (Fed. Cir. 2007)). An inventor may rebut that presumption by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision (*In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994)). In the absence of such a definition, limitations are not to be read from the specification into the claims (*In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993)).

a) "helper server"

The '074 patent describes "helper server" in the following terms: "Helper Server (HS): a HS, also referred to as a helper, is one of a plurality of servers in the network that provide certain value-added services" (Ex. 1001, 4:11–13). Accordingly, we adopt this interpretation.

b) Other terms

Based on the trial record, we determine that no additional terms require explicit construction (*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)))).

2. Conditional Language

In our Decision to Institute, we determined the final two limitations of independent claims 3 and 9 were mutually exclusive (Dec. to Inst. 8–9). We stated:

> As a matter of law, therefore, we determine with respect to claims 3 and 9, *only one of the conditional limitations* needs to be satisfied in the prior art to render the claim anticipated or obvious (*see Ex Parte Schulhauser* (Appeal No. 2013-007847 (PTAB Apr. 28, 2016) (precedential), at 8–10 (holding that conditional steps in process claims need not be carried out when conditions precedent to those steps are not satisfied to be within the broadest reasonable interpretation of the claim))

(*id.* at 9).

Patent Owner contends *Schulhauser* does not support reading step (*iv*) out of the claim (PO Resp. 8). According to Patent Owner, applying *Schulhauser* "strips the heart out of the claims" (*id.* at 8–9). Moreover, according to Patent Owner, *Schulhauser* has never been applied to an *inter partes* review in a precedential decision (*id.* at 9).

In *Schulhauser*, a precedential decision from an *ex parte* appeal of an examiner's rejection, the Board considered a method claim in which certain steps were recited as contingent on different, mutually exclusive prerequisite conditions (*Schulhauser*, at 6–7). Explaining that the prerequisite conditions made the related steps mutually exclusive, the Board determined performing the claimed method required different steps, depending on which conditions were present (*id.* at 8). The Board further determined the broadest reasonable interpretation of the claim included at least two different sets of method steps, one requiring those steps triggered by a first condition and another requiring those steps triggered by a second condition. The Board

held that under the broadest reasonable interpretation, conditional steps in method claims do not need to be performed when conditions precedent to those steps are not satisfied (*id.*). Once one of the mutually-exclusive conditional method steps was shown to be obvious (including both the condition and the triggered step), evidence of the obviousness of the remaining mutually-exclusive conditional method steps did not need to be presented (*id.* at 9–10 (citing *Applera Corp. v. Illumina, Inc.*, 375 F. App'x 12, 21 (Fed. Cir. 2010) (unpublished) (affirming a district court's interpretation of a method claim as including a step that need not be practiced if the condition for practicing the step is not met); *Cybersettle, Inc. v. Nat'l Arbitration Forum, Inc.*, 243 F. App'x 603, 607 (Fed. Cir. 2007) (unpublished) ("It is of course true that method steps may be contingent. If the condition for performing a contingent step is not satisfied, the performance recited by the step need not be carried out in order for the claimed method to be performed"))).

a) Argument – Petitioner did not present a case for unpatentability under Schulhauser

Patent Owner argues Petitioner "never suggested step (*iv*) was immaterial or mentioned *Schulhauser*" (PO Resp. 9). Thus, according to Patent Owner, Petitioner did not "preserve[] the argument that *Schulhauser* requires that step iv of both claims be disregarded" (*id.* at 9–10). Therefore, Patent Owner indicates a finding of waiver is warranted (*id.* at 10).

Claim construction presents a question of law (*Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1455 (Fed. Circ. 1998); *see also Exxon Chem. Patents, Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1556 (Fed. Cir. 1995) ("[T]he judge's task is not to decide which of the adversaries[' constructions] is

correct. Instead the judge must independently assess the claims, the specification, . . . and declare the meaning of the claims.")). In this case, we previously set forth the preliminary claim construction in our Decision to Institute (Dec. to Inst. 8–9), thus putting both parties on notice of our initial conclusion of claim interpretation. Patent Owner was able to brief the issue in both its Response and in its Sur-Reply, proffer evidence, and argue the issue in the Oral Hearing (PO Resp. 8–21; PO Sur-Reply 10–11; *see generally* Tr.; *see also* Tr. 38:21–24 (Patent Owner's counsel stating that, "[i]f it were appropriate for the Board to impose a new preliminary construction in both [IPR2018-00599 and IPR2018-00864], then, yes, we would say that we were put on notice from a due process prospective.")). Therefore, we disagree with Patent Owner that our approach to claim construction in this case is impermissible.

b) Argument – Schulhauser should not apply to issued claims

Patent Owner contends the Board has not applied *Schulhauser* to issued claims in a precedential decision and should not apply it here (PO Resp. 10). Patent Owner asserts unlike in *Schulhauser* "in which the applicant could freely . . . amend[] its claims," "[l]ess than 5 percent of motions to amend in IPR[s] have been granted, and only narrowing amendments are permitted," thus barring Patent Owner from removing one of the conditional statements (PO Resp. 10).

We do not agree. The precedential holding of *Schulhauser* governs the construction of conditional limitations such as those in the instant case, and we do not agree that the circumstances of this case warrant deviation from Board precedent. In addition, the Board has a procedure to amend claims in an *inter partes* review, so the distinction Patent Owner attempts to

make is not apt. We also note that although unpublished, the Federal Circuit's decisions in *Applera* and *Cybersettle* involved issued patents under the *Phillips* claim construction standard, yet the panels reached the same result that we do here (*see Applera*, 375 F. App'x, at 21; *Cybersettle,* 243 F. App'x at 607).

c) Argument – the Board should not apply Schulhauser based on broadest reasonable interpretation

Patent Owner next argues that *Schulhauser* relied on "broadest reasonable interpretation" ("BRI") and "[t]he Board should not resolve these cases on that basis" because "these cases will not ultimately be decided under BRI" (PO Resp. 11; Tr. 53–55). Patent Owner contends we should instead apply the construction articulated in *Phillips v. AWH Corp.* 415 F.3d 1303 (Fed. Circ. 2005) (PO Resp. 11–12; Tr. 53–55). Specifically, Patent Owner contends "BRI no longer applies in [*inter partes* review]," and that the Board is only applying that standard in this case because the Petition was filed before the rules changed (PO Resp. 11). However, Patent Owner asserts because the '074 Patent will expire during any forthcoming appeal to the U.S. Court of Appeals for the Federal Circuit, the Federal Circuit would apply the *Phillips* claim construction standard (*id.*; Tr. 53–55). More specifically, Patent Owner argues that, "when the Federal Circuit decides these cases, it will apply *Phillips*," not BRI (PO Resp. 11). Thus, according to Patent Owner, because the '074 Patent will have expired and BRI will cease to apply before this case might be decided on appeal, the Board should not apply BRI but, rather, should apply *Phillips* (*id.* at 11–12). Therefore, Patent Owner asserts "[u]nless the Board holds *Schulhauser* applies under *Phillips*, it should not decide this case under *Schulhauser*" (*id.* at 12).

We do not agree with Patent Owner's assertions. Patent Owner has cited no authority that allows us to ignore the standard under which this case is to be decided according to our Rules. Nor are we inclined to abandon our Rules based on the mere possibility of an appeal.

d) Argument – Ignoring step (iv) contradicts the claim language, written description, and prosecution history

According to Patent Owner, the preambles of claims 3 and 9 require that step (*iv*) must occur (PO Resp. 13–16). Patent Owner contrasts the preamble claim language of claims 3 and 9 with the preamble of claim 1 in *Schulhauser*, which recites a "method for ***monitoring of*** cardiac conditions incorporating an implantable medical device in a subject" but does not mention the comparing, determining, or triggering steps recited in the claims (*id.* at 13–14).

We disagree with Patent Owner's assessment of the preambles of claims 3 and 9. The preamble of claim 3 recites:

> A method for storing a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients, said SM object being comprised of a plurality of successive time-ordered chunks, wherein a chunk is further comprised of a discrete number of segments, each segment allocated to a respective disk block of said plurality of HSs,

and the preamble of claim 9 recites:

> A method for managing storage of a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of servers to a plurality of clients

('074 Patent, Claims). Neither of the preambles recites that storage depends on the availability of disk space.

Patent Owner additionally points to *Reactive Surfaces Ltd., LLP v. Toyota Motor Corp.*, IPR2016-01914, Paper 64 at 11–14 (PTAB Mar. 1, 2018) (PO Resp. 14). Claim 1 of *Reactive Surfaces* recites:

> 1. A method of facilitating the removal of a fingerprint on a substrate or a coating comprising:
>
> a) providing a substrate or a coating;
>
> b) associating a lipase with said substrate or said coating such that said lipase is capable of enzymatically degrading a component of a fingerprint, and
>
> c) facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint

(*Reactive Surfaces,* at 5). In *Reactive Surfaces*, the preamble is directed to *removal* of a fingerprint and because the claim is directed to removal of a fingerprint, a fingerprint must exist. In contrast, the preambles in claims 3 and 9 of the ’074 Patent are directed to storing a streaming media object. Neither of the preambles requires different types of storage based on whether there is sufficient disk space available. Therefore, performing step (*iii*) in claims 3 and 9 satisfies the preamble in each of those claims. Moreover, unlike steps (*iii*) and (*iv*) of claims 3 and 9 of the ’074 Patent, the limitation at issue in *Reactive Surfaces* is not mutually exclusive of another step.

Patent Owner further contends that ignoring step (*iv*) would render the recited “*storing* a streaming media (SM) object in a network” in the preamble of claim 3 and “*managing storage* of a streaming media (SM) object in a network” in the preamble of claim 9 meaningless (PO Resp. 16). Step (*iii*) in claims 3 and 9 of the ’074 Patent specifically recites storing the

SM object. The combination of steps (*i*), (*ii*), and (iii) satisfies "managing storage of a streaming media." Thus, we are not persuaded the recitations of the preambles require performance of step (*iv*).

Patent Owner argues the Specification requires step (*iv*) and "makes it clear the inventors regarded the 'insufficient disk space' step as their contribution to the art" (*id.*). This does not change the fact that each of claims 3 and 9 contains mutually exclusive conditions that cannot both be met in one iteration of the method. Indeed, Patent Owner admits that, under its claim interpretation, practicing the invention would require *two* iterations of the method (Tr. 55–56). Patent Owner has not directed us to any authority stating that more than one iteration of a method may be required to meet a method claim, and we are aware of none (*see id.* at 56).

Patent Owner additionally contends "[t]he written description confirms the inventors regarded their invention as a 'cache placement ***and replacement*** policy'" (PO Resp. 17 (quoting Ex. 1001, 10:5)). Claims 3 and 9, however, do not recite "a method for cache placement and replacement policy."

Patent Owner next contends "[t]he prosecution history confirms step iv may not be ignored. This step was emphasized during prosecution and was a basis for allowance" (PO Resp. 18). In addition, Patent Owner asserts step (*iv*) is "integral to the claims" and an ordinarily skilled artisan who read the description of the '074 Patent "would have understood the second conditional limitation is the heart of the invention" (*id.* at 19). These arguments do not change that *Schulhauser* applies to the claims as written.

e) Argument – Schulhauser is incorrectly decided

Patent Owner further contends *Schulhauser* was incorrectly decided (PO Resp. 20–21). We need not address Patent Owner's contention because "[a] precedential decision is binding Board authority in subsequent matters involving similar facts or issues" (Patent Trial and Appeals Board, Standard Operating Procedure 2, 11).

C. *Principles of Law*

"A petitioner in an inter partes review may request to cancel as unpatentable 1 or more claims of a patent only on a ground that could be raised under section 102 or 103 and *only on the basis of prior art consisting of patents or printed publications*" (35 U.S.C. § 311(b) (emphasis added); *see also* 37 C.F.R. § 42.104(b)(2)); *In re Wyer*, 655 F.2d 221, 227 (CCPA 1981) ("[W]hether information is printed, handwritten, or on microfilm or a magnetic disc or tape, etc., *the one who wishes to characterize the information, in whatever form it may be, as a 'printed publication' . . .* should produce sufficient proof of its dissemination or that it has otherwise been available and accessible to persons concerned with the art to which the document relates and thus most likely to avail themselves of its contents" (emphasis added)).

The ultimate determination of obviousness under 35 U.S.C. § 103 is a question of law based on underlying factual findings (*In re Baxter Int'l, Inc.*, 678 F.3d 1357, 1362 (Fed. Cir. 2012) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1996))). These underlying factual considerations include: (1) the "level of ordinary skill in the pertinent art," (2) the "scope and content of the prior art," (3) the "differences between the prior art and the claims at issue," and (4) "secondary considerations" of non-obviousness

such as "commercial success, long-felt but unsolved needs, failure of other, etc."[3] (*KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting *Graham*, 338 U.S. at 17–18)).

"To satisfy its burden of proving obviousness, a petitioner cannot employ merely conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness" (*Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016) (citing *KSR*, 550 U.S. at 418)). The "factual inquiry" into the reasons for "combin[ing] references must be thorough and searching, and the need for specificity pervades" (*In re NuVasive, Inc.*, 842 F.3d 1376, 1381–82 (Fed. Cir. 2016) (internal quotations and citations omitted)). A determination of obviousness cannot be reached where the record lacks "explanation as to *how* or *why* the references would be combined to produce the claimed invention" (*TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016)(citation omitted); *see NuVasive*, 842 F.3d at 1382–85; *Magnum Oil*, 829 F.3d at 1380–81). We analyze the asserted grounds based on obviousness with the principles identified above in mind.

D. *Alleged Obviousness over Wolf and Aggarwal: claims 3, 5, and 9*

Petitioner contends claims 3, 5, and 9 of the '074 Patent would have been obvious over Wolf in view of Aggarwal (Pet. 27–50). Patent Owner

[3] Patent Owner does not put forth any arguments or evidence related to secondary considerations of nonobviousness.

asserts Petitioner has failed to show the prior art renders obvious claims 3, 5, and 9 (PO Resp. 26–29, 30–45).

1. Overview of Wolf

Wolf, a U.S. Patent titled "Method and Apparatus for Caching a Media Stream," discloses a system for caching at proxy servers, where cache admission and replacement policies give preferential treatment for certain segments and prefetching certain segments (Ex. 1003, [54], [57]).

Figure 1 of Wolf, reproduced below, illustrates an Internet environment for implementing the invention:

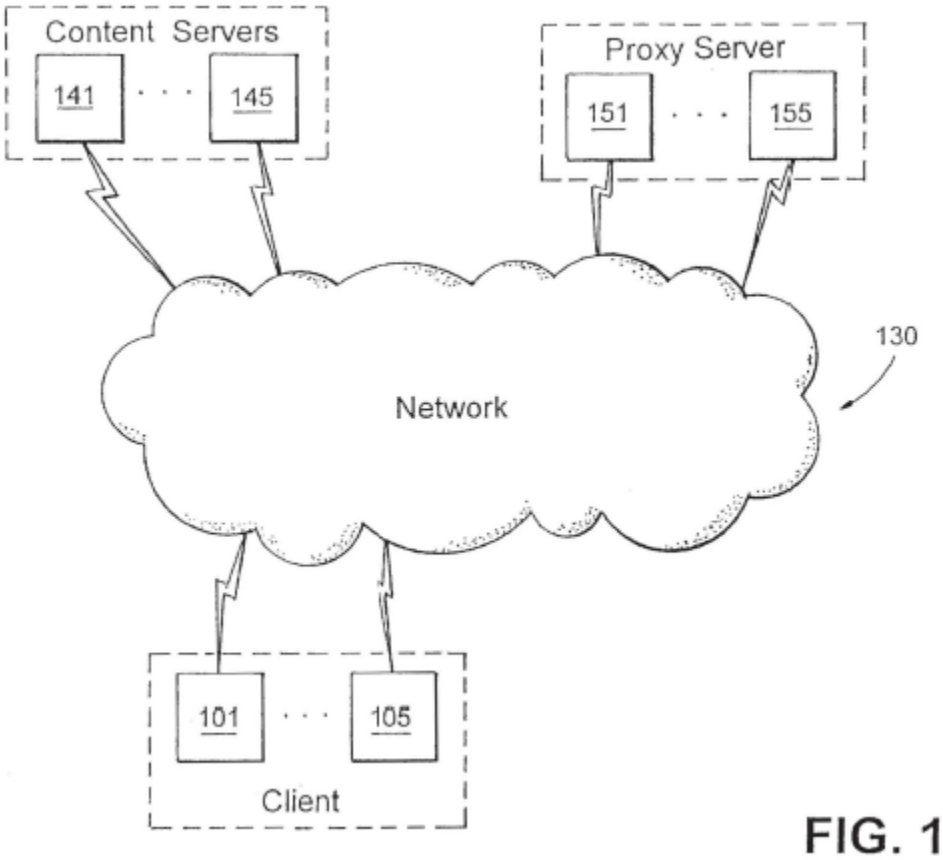

FIG. 1

(*id.* at 1:63–64). As shown in Figure 1, Internet content servers 141, . . . , 145 provide requested media objects or files to clients 101, . . . , 105 through

network 130 (*id.* at 3:18–25). Proxy servers 151, . . . , 155 facilitate delivery of requested content through caching (*id.*). A segment is the unit of media object caching at the proxy server (*id.* at 4:6–8). According to Wolf, the caching policies employed by the proxy servers improve the caching efficiency of the segmented media through admission and replacement policies (*id.* at 2:25–56).

2. Overview of Aggarwal

Aggarwal, a U.S. Patent titled "Collaborative Caching of a Requested Object by a Lower Level Node as a Function of the Caching Status of the Object at a Higher Level Node," discloses a system for collaborative caching information at proxy servers, where decisions to cache or replace objects are made according to a hierarchy and selection policies (Ex. 1004, [54], [57]).

Figure 1 of Aggarwal, reproduced below, illustrates the high-level client-server hierarchical architecture for implementing the invention:

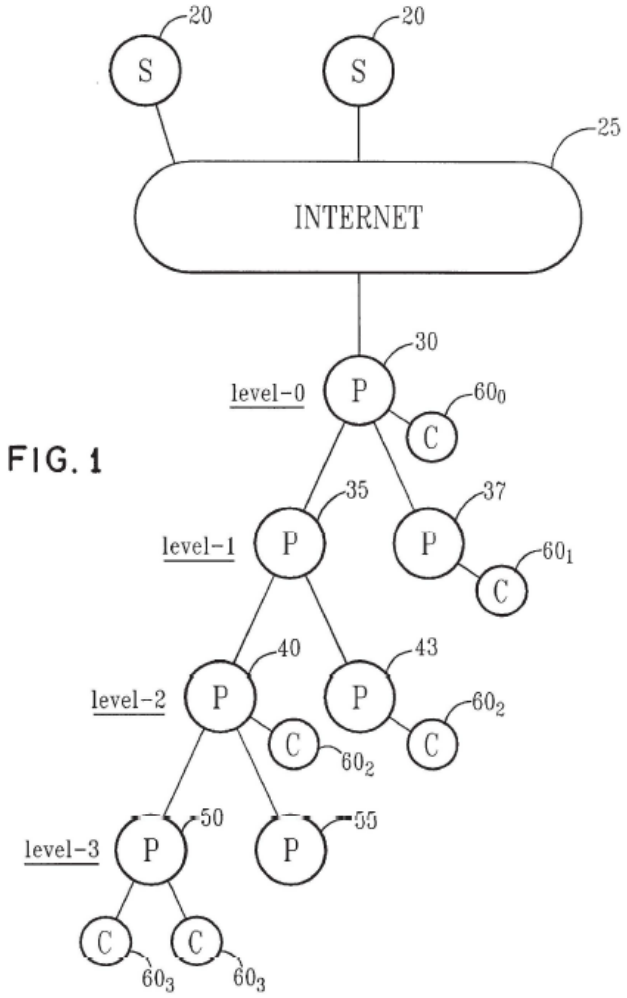

FIG. 1

(*id.* at 4:44–46). As shown in Figure 1, clients 60_0 . . . 60_3 are connected to proxy servers 30 . . . 55 through a hierarchy, illustrated having level-0 . . . level-3 (*id.* at 5:1–3). Clients access the Internet 25 and various websites 20 through any number of levels of proxy servers (*id.* at 5:5–14). According to Aggarwal, the caching hierarchy and policies employed by the proxy servers improve the caching efficiency of media by reducing access times through the knowledge of the caching status of objects located within the hierarchy (*id.* at 9:50–67).

1. Analysis

As discussed *supra*, we need not determine whether the combination of Wolf and Aggarwal teaches both conditional limitations, step (*iii*) and step (*iv*), of independent claims 3 and 9. Of the mutually-exclusive conditional limitations, Petitioner only needs to show that the combination of Wolf and Aggarwal teaches either step (*iii*) *or* step (*iv*). Petitioner contends the features of independent claim 3 are taught by the combination of Wolf and Aggarwal (Pet. 27–47).

a) Preamble

The preamble of claim 3 recites, in part, "[a] method for storing a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients," and the preamble of claim 9 recites "[a] method for managing storage of a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of servers to a plurality of clients" (Ex. 1001, claims 3, 9). To the extent the preambles of claims 3 and 9 are limiting, Petitioner asserts "*Wolf* discloses this limitation because its media objects are 'media streams at one or more proxy servers,' which include 'video and audio streams'" (Pet. 32 (citing Ex. 1003, 2:26–33, 3:22–23; Ex. 1002 ¶ 96), 49). Further, Petitioner asserts that Wolf discloses client stations that "can 'request the playout of media objects or files'" (*id.* (citing Ex. 1003, 3:20–21)) and that Wolf discloses that "proxy servers 'facilitate [] content delivery through caching,' deliver media objects, and issue prefetch requests to the content server or a next level proxy server" to deliver the

media objects to the client stations (*id.* at 32 (citing Ex. 1003, 3:22–25, 4:67–5:3, 5:15–17; Ex. 1002 ¶ 96)).

We are persuaded Wolf teaches the claimed subject matter quoted above, particularly the network shown in Wolf's Figure 1, which has a content server (141–145) hosting media objects for distribution to proxy servers (151–155) ("helper servers") and then to clients (Ex. 1003, 3:19–25, Fig. 1).

Additionally, Petitioner asserts Wolf discloses "said SM object being comprised of a plurality of successive time-ordered chunks," as recited in claim 3 because "*Wolf* discloses that a media object is divided into segments, and that the segments correspond to different time distances from the start of the media object" (Pet. 32 (citing Ex. 1003, 4:1–14; Ex. 1002 ¶ 98)). Petitioner asserts Wolf discloses "the media object is divided into 'segments' which are further subdivided into 'blocks,'" and an ordinarily skilled artisan would have understood "that *Wolf* discloses that each distributed media object is comprised of a plurality of successive time-ordered chunks" (*id.* at 33–34 (citing Ex. 1003, 4:1–14, 8:27–48; Ex. 1002 ¶ 100)).

Based on the trial record, we agree Wolf's division of the media object into segments and blocks corresponds to the '074 Patent's division of the SM object into chunks and segments (Ex. 1003, 4:1–14, Fig. 3; Ex. 1002 ¶ 98) and thus, teaches "said SM object being comprised of a plurality of . . . chunks," as recited in claim 3. We further agree Wolf's disclosure illustrates "an example where Segment 1 is closest in time to the start of the media object, Segment 2 is next closest in time, Segment 3 is third in time, and Segment 4 is fourth in time" (Pet. 32 (citing Wolf, Fig. 3)). We credit

Dr. Houh's testimony that an ordinarily skilled artisan "would have understood, or at least would have found obvious, that *Wolf* discloses that each distributed media object is comprised of a plurality of successive time-ordered chunks" (Ex. 1002 ¶¶ 98, 100) because it is consistent with the teachings of Wolf. Therefore, based on the trial record, we agree Wolf teaches "said SM object being comprised of a plurality of successive time-ordered chunks," as recited in claim 3.

Petitioner asserts Wolf's grouping of the blocks into segments teaches "wherein a chunk is further comprised of a discrete number of segments" as recited in the preamble of claim 3 (Pet. 34–35 (citing Ex. 1003, 4:2–4, 4:12–14, 8:27–48; Ex. 1002 ¶¶ 104–105)). Petitioner further asserts Wolf discloses "each segment allocated to a respective disk block of said plurality of HSs" because "[w]hen a proxy server receives a media block, 'the object block is cached in the receiving buffer to be handled subsequently by the streaming routine'" (*id.* at 35 (citing Ex. 1003, 4:43–47)). According to Petitioner, "[a] person of ordinary skill in the art would have understood that the object blocks in *Wolf* that are cached in the local storage of proxy servers would be allocated to a disk block" (*id.* at 37 (citing Ex. 1003, 4:2–4; Ex. 1002 ¶ 110)).

Based on the trial record, we agree Wolf's segments are divided into a discrete number of blocks (Ex. 1003, 4:2–4, 4:12–14, 8:27–48, Fig. 3) thus teaching the recited "wherein a chunk is further comprised of a discrete number of segments," as recited in claim 3.

We further credit Dr. Houh's testimony that

> [a] person of ordinary skill in the art would have understood that the object blocks in *Wolf* that are cached in the local storage of proxy servers would be allocated to a disk block. (*Wolf,* 4:2-4 (EX1003)).

> Such a person would have understood that storage systems divide disk memory into disk blocks, and that file operations read and write data to those disk blocks. ([Dominic] Giampaolo, [*Practical File System Design with the Be File System* 6 (Morgan Kaufmann Publishers, Inc. 1999)] (EX1011) ("Block: The smallest unit writable by a disk or file system. Everything a file system does is composed of operations done on blocks. A file system block is always the same size as or larger (in integer multiples) than the disk block size.")

(Ex. 1002 ¶ 110). Dr. Houh's testimony is consistent with the evidence of record. Indeed, Wolf teaches blocks are grouped into segments and a segment is the unit of media object caching at the proxy server (Ex. 1003, 4:2–8). Thus, we find Wolf teaches "each segment allocated to a respective disk block of said plurality of HSs," as recited in claim 3.

Accordingly, based on the trial record, Petitioner has established Acharya teaches the preambles of claims 3 and 9.

b) "receiving said SM object"

Petitioner contends "*Wolf* discloses that the proxy server invokes a 'media object request handler' when the proxy server receives a media object request" (Pet. 38 (citing Ex. 1003, 4:31–35), 49). If the requested media object is not already cached, Petitioner asserts "the proxy server forwards the object request to the content server or a next level proxy having the requested media object, and then waits for the starting blocks of the requested media object to arrive" (*id.* (citing Ex. 1003, 4:58–63; Ex. 1002 ¶ 113)). Thus, Petitioner contends, Wolf discloses "i) receiving said SM object" (*id.*).

Based on the trial record, we agree Wolf teaches a proxy server receives a request for a media object (Fig. 4, steps 410, 415) and forwards the request to the content server (Fig. 5, step 515) which then forwards the

media object (Fig. 5, step 520) (Ex. 1003, 4:31–35, 58–62, Figs. 4, 5). Accordingly, based on the trial record, Petitioner has established Wolf teaches "receiving said SM object," as recited in claims 3 and 9.

c) "determining whether there is a disk space available on one of said plurality of HSs"

Petitioner further contends Wolf teaches "determining whether there is a disk space available on one of said plurality of HSs," as recited in claim 3, and "determining whether there is a disk space available on said one of said plurality of servers," as recited in claim 9 (Pet. 39–40, 49). Petitioner asserts that Wolf "shows that the proxy server 'determine[s] whether there is enough buffer space to cache segment j of [media] object O'" (*id.* at 39 (citing Ex. 1003, 7:24–25)). Petitioner further contends step 945 ("Enough free buffer space?") illustrates the determination limitation (*id.* at 38–39 (citing Ex. 1003, Figure 9; Ex. 1002 ¶ 116)). Thus, Petitioner contends, Wolf discloses "determining whether there is a disk space available on said one of said plurality of HSs," as recited in claim 3 (*id.*).

Based on the trial record, we agree with Petitioner that Wolf teaches the "determining" limitation. Specifically, we agree that step 945 in Figure 9 of Wolf determines if enough free buffer space exists (Ex. 1003, Fig. 9). Wolf explains "[a]t step 945, it is determined whether there is enough buffer space to cache segment j of object O" (Ex. 1003, 7:24–28).

Patent Owner argues for the first time in its Sur-Reply that Wolf fails to disclose the "determining" step (PO Sur-Reply 19–21; Tr. 94–98). According to Patent Owner, this new argument is "because the first time the [petitioner] raised *Schulhauser* was in the reply, so we responded to it in the

sur-reply" (Tr. 95). However, as acknowledged by Patent Owner, we set forth that *Schulhauser* applied in our Decision to Institute, but Patent Owner did not raise its "determining" step argument in Patent Owner's Response (Dec. to Inst. 8–9; Tr. 95–96).

Moreover, this "determining" step is performed regardless of whether *Schulhauser* applies, and Petitioner set forth how Wolf teaches this limitation in the Petition (*see* Pet. 39–40). Thus, Patent Owner's argument at the oral hearing that its Response only needed to be responsive to the Petition, not to the Decision to Institute (*see* Tr. 95–96), does not excuse its late argument in any event.

Patent Owner admits "Wolf may ultimately store the entire object if there's sufficient space," but contends "there is no determination in Wolf on whether you have sufficient space for the SM object" (Tr. 98). This, however, is an untimely argument brought up for the first time during oral argument. Moreover, we note that Wolf "determin[es] whether there is a disk space available on said one of said plurality of HSs," as recited in claim 3 and commensurately recited in claim 9. Patent Owner is attempting to read limitations into the claim. Specifically, the claim does not recite "determine whether there is a disk space available on one of said plurality of HSs *for the SM object*" (*see* Tr. 98).

Thus, based on the trial record, Petitioner has established Wolf discloses "determining whether there is a disk space available on said one of said plurality of HSs," as recited in claim 3 and "determining whether there is a disk space available on one of said plurality of servers," as recited in claim 9.

d) "storing said SM object at said at least one HS if it is determined that there is sufficient disk space available"

Petitioner contends Wolf teaches "storing said SM object at said at least one HS if it is determined that there is sufficient disk space available," as recited in claim 3, and "storing said SM object at said [ ] one of said plurality of server[s], if it is determined that there is sufficient disk space available" as recited in claim 9 (Pet. 40, 49). Petitioner asserts "*Wolf* discloses that '[i]f there is enough buffer space to cache segment j of object O, then the process proceeds to step 925 to cache the segment j of object O'" (*id.* at 40 (citing Ex. 1003, 7:25–28)). Petitioner contends step 945 "determines whether there is enough free buffer space to cache segment j of object O, and, if so, then proceeds to step 925 to cache the segment on the proxy server" (*id.* (citing Ex. 1003, Figure 9; Ex. 1002 ¶ 118)). Thus, Petitioner contends, Wolf discloses "storing said SM object at said at least one HS if it is determined that there is sufficient disk space available," as recited in claim 3 (*id.* at 40–42).

As discussed above, we find that step 945 of Wolf's Figure 9 discloses determining if sufficient buffer space exists to cache segment j of object O (Ex. 1003, 7:24–25, Fig. 9). In addition, Wolf states: "If there is enough buffer space to cache segment j of object O, then the process proceeds to step 925 to cache the segment j of object O" (*id.* at 7:25–28).

Accordingly, based on the trial record, Petitioner has established Wolf discloses "storing said SM object at said at least one HS if it is determined that there is sufficient disk space available," as recited in claim 3 and "storing said SM object at said one of said plurality of servers if it is

determined that there is sufficient disk space available," as recited in claim 9.

e) Remaining limitations

Patent Owner's arguments are directed to the limitations of step (*iv*) (PO Resp. 1–5, 21–45). In light of the claim construction adopted *supra* and Petitioner's establishing Wolf teaches step (*iii*) as discussed above, we need not determine whether the asserted prior art teaches the subject matter recited in step (*iv*) of claims 3 and 9.

f) Reason to combine

Petitioner contends an ordinarily skilled artisan would have found it obvious to combine Wolf with Aggarwal to teach claims 3 and 9 (Pet. 27–30). More specifically, Petitioner contends "*Wolf* and *Aggarwal* both disclose methods of caching objects on proxy servers, including cache replacement routines for when the available server cache memory is not large enough to accommodate a new object" (Pet. 27 (citing Ex. 1003, 2:27–40, 7:24–28; Ex. 1004, 3:38–44, 4:25–36; Ex. 1002 ¶ 85)). Petitioner further asserts

> It would have been obvious to a person of ordinary skill in the art, and such a person would have been motivated, to modify the cache replacement routine of *Wolf* with the set creation methods of *Aggarwal,* at least because of the benefits of determining in advance the set of objects for which portions will be deleted, and because such a combination would have a reasonable likelihood of success

(Pet. 29 (citing Ex. 1002 ¶ 88)).

Patent Owner argues "Petitioner's proffered motivation to combine is nowhere to be found in the record — in any of its references, or in any competent evidence of any other prior art teaching" (PO Resp. 38). Patent

Owner further argues "even if Petitioner's lone proffered reason to combine Aggarwal with its primary references were proper or supported by the record, it would be inapposite to the system[of Wolf]" (*id.* at 39).

Petitioner relies on Wolf to teach the preamble and steps (*i*)–(*iii*) (Pet. 30–42, 49). For the reasons discussed above, we are persuaded Wolf alone teaches these limitations. As a matter of claim construction (and as a matter of law), step (*iv*) is non-limiting when Petitioner has established that Wolf teaches step (*iii*), because steps (*iii*) and (*iv*) are mutually exclusive (*see supra* § III.B.2). Accordingly, we need not make any finding regarding a motivation to combine given Petitioner's reliance on Wolf alone for teaching steps (*i*)–(*iii*) (*cf. Realtime Data, LLC v. Iancu,* 912 F.3d 1368, 1373 (Fed. Cir. 2019) ("[T]he Board [is] not required to make any finding regarding a motivation to combine" references when a challenge does not rely on one of the references "for the disclosure of a particular element or teaching")). Nevertheless, based on the entire trial record, we are persuaded by the rationale set forth by Petitioner to the extent the rationale would have been necessary to render obvious steps (*i*)–(*iii*). Therefore, Petitioner has established that the combination of Wolf and Aggarwal teaches or suggests claims 3 and 9.

g) Claim 5

With respect to claim 5, Petitioner contends the features of claimed invention are taught by the combination of Wolf and Aggarwal (Pet. 47–48). Specifically, Petitioner contends Wolf discloses "said composed set is formed by including only SM objects having a helper hotness rating below a pre-defined threshold" because the replacement algorithm in Wolf "may use alternative criteria to assign a value to each media object, such as 'the object

access frequency, its time since last reference, its access time, and the object size'" (*id.* at 48 (citing Ex. 1003, 7:43–51; Ex. 1002 ¶ 134). Based on the combination of Wolf and Aggarwal, Petitioner asserts "it would have been obvious to a person of ordinary skill in the art to compose a set of objects to be deleted, as described in *Aggarwal*, based on the objects' 'helper hotness rating' (*i.e.*, access frequency) as described in *Wolf*" (*id.* (citing Ex. 1002 ¶ 135; Pet. 42–46)).

Claim 5 depends from claim 3 and as recited, the subject matter of claim 5 is only implicated by the performance of step (*iv*) of claim 3. In particular, step (*iv*) recites in part "composing a set of SM objects" (Ex. 1001, Claim 3). Thus, the limitation of claim 5, which further details how that composed set is formed, i.e., how step (*iv*) is performed, does not occur unless step (*iv*) is performed. Accordingly, based on the claim construction adopted *supra*, we need not determine whether the combination of Wolf and Aggarwal discloses the subject matter recited in claim 5.

h) Conclusion

Based on the trial record, we determine Petitioner has established by a preponderance of the evidence, claims 3, 5, and 9 of the '074 Patent are unpatentable over Wolf and Aggarwal.

E. *Alleged Obviousness over Ueno, Dan, and Aggarwal: claim 3*

Petitioner contends claim 3 of the '074 Patent would have been obvious over Ueno in view of Dan and Aggarwal (Pet. 50–71). Patent Owner asserts Petitioner has failed to show the prior art discloses all of the features of the claimed invention (PO Resp. 1–5, 25–26, 30–31, 51).

1. Overview of Ueno

Ueno, a U.S. Patent titled "Information Transmission System Utilizing Both Real-Time Data Transmitted in a Normal-in-Time Direction and in a Retrospective-in-Time Direction," discloses a system for transmitting information having a guaranteed quality for real-time information, where the system monitors time stamps associated with real-time information to switch between communication elements (Ex. 1005, [54], [57]).

Figure 10 of Ueno, reproduced below, illustrates the schematic view of the preferred environment for implementing the patented invention:

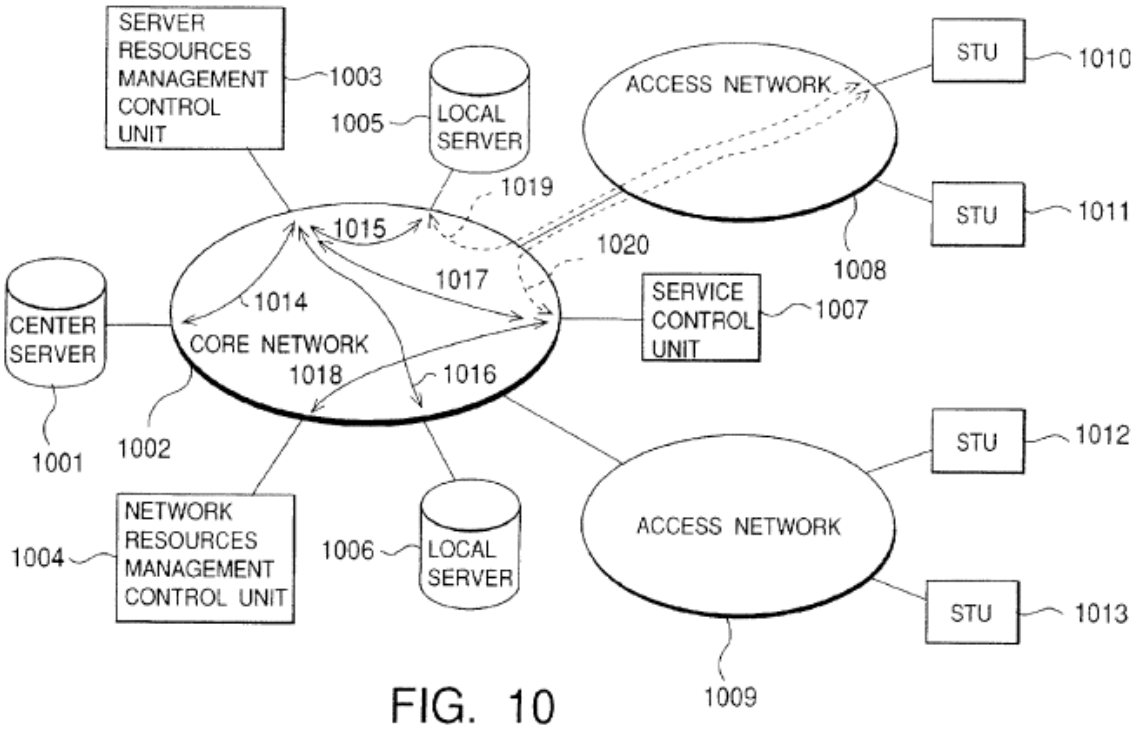

FIG. 10

(*id.* at 7:53–54). As shown in Figure 10, center server 1001 is connected to local servers 1005 and 1006 by a core network 1002 (*id.* at 1:8–10, 18:18–27). Central server 1001 stores infrequently accessed video sources, while

local servers 1005 and 1006 store more frequently accessed video sources, and core network 1002 informs a server resources management control unit 1003 of resource conditions for the connected servers (*id.* at 18:20–27). Based on directions from the server resources management control unit 1003, videos are transmitted through channels 1019 to requesting user terminals, set-top units ("STUs") 1010, 1011, 1012, 1013 (*id.* at 9:24–25, 18:27–30). When a user requests a video from STU 1010, the request is sent to network management control unit 1004, which establishes a channel 1020 between the STU and service control unit 1007 (*id.* at 18:55–60). Subsequently, the service control unit 1007 determines which server offers the selection and directs the network resources management control unit 1004 to establish channel 1019 for transmission from local server 1005 to STU 1010 (*id.* at 19:31–40). Once channel 1019 is established, service control unit 1007 directs server resources management control unit to start transmission of the requested video from local server 1005 to STU 1010 via channel 1019 (*id.* at 19:40–46). According to Ueno, this information relay and transmission system improves efficiency of real-time communication while reducing service costs (*id.* at 3:35–40, 7:11–16).

2. Overview of Dan

Dan, a U.S. Patent titled "Disk Caching System for Selectively Providing Interval Caching or Segment Caching of Vide[o] Data," discloses a system for caching sequential data streams, where a consumption process determines whether data blocks of the stream should be discarded or cached according to an interval caching algorithm (Ex. 1006, [54], [57]).

Figure 2 of Dan, reproduced below, illustrates the front-end cache manager for implementing the patented invention:

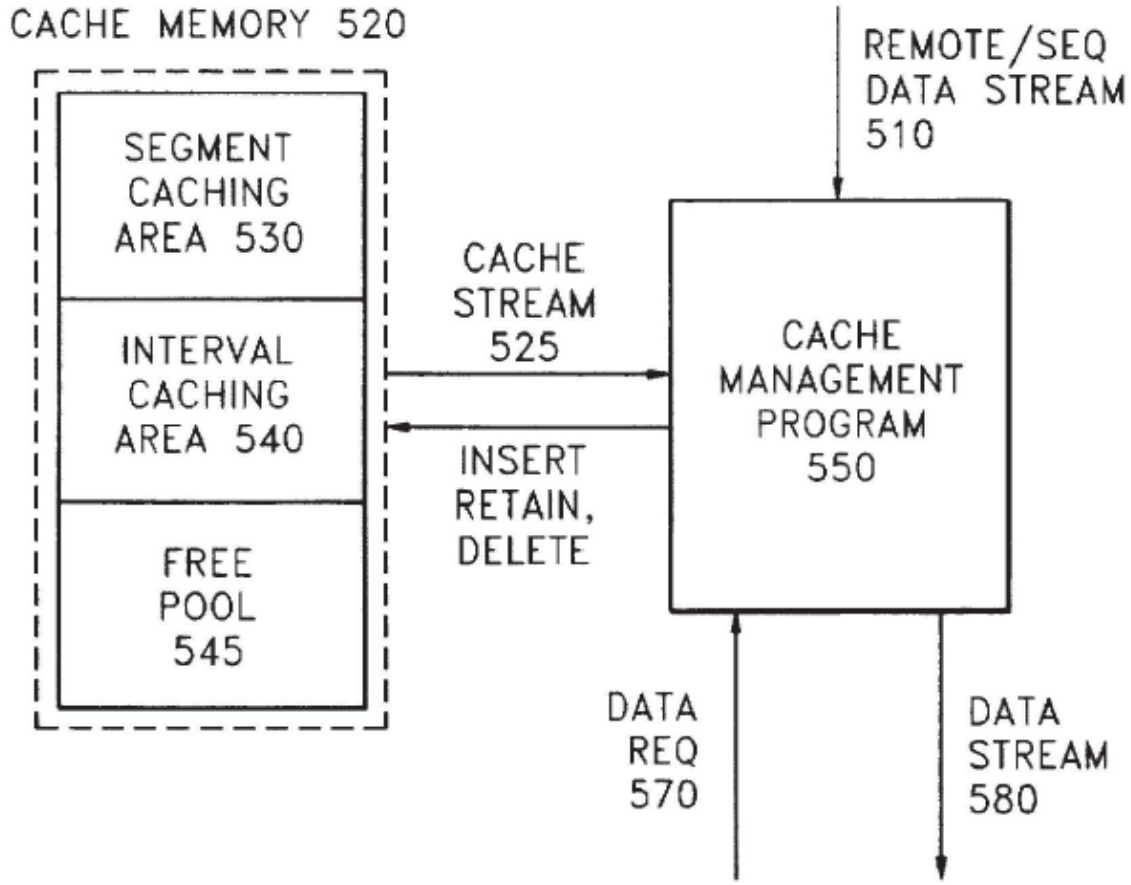

FIG.2

(*id.* at 1:51–52). As shown in Figure 2, the cache manager contains a disk group or cache memory 520, which is divided into three parts: segment caching area 530, interval caching area 540, and free pool 545 (*id.* at 2:33–40). Segment caching area 530 contains blocks of video segments that are or will be completely cached, interval caching area 540 contains video

blocks of segments that are partially cached, and the free pool 545 are blocks that do not contain any video (*id.*). Cache management program 550 receives data requests 570 from users, retrieves and transmits the requested data stream 580, and then chooses whether to insert remotely obtained blocks into the cache, retain blocks retrieved from the cache, or discard blocks retrieved from the cache (*id.* at 2:40–48). According to Dan, employing a segment caching algorithm at the cache manager allows for efficient provision of requested video, while also reducing costs by using cache disks instead of server memory (*id.* at 1:11–27, 1:42–46).

3. Analysis

As discussed *supra*, we need not determine whether both conditional limitations, steps (*iii*) and (*iv*), of independent claim 3 are met. Of the mutually-exclusive conditional limitations, Petitioner only needs to show sufficiently that either step (*iii*) *or* that step (*iv*) is met by the combination of Ueno, Dan, and Aggarwal.

a) Preamble

Petitioner contends the features of independent claim 3 are taught by the combination of Ueno, Dan, and Aggarwal (Pet. 50–71). To the extent the preamble of claim 3 is limiting, Petitioner asserts "*Ueno* teaches the preamble" because "*Ueno* discloses a center server ("content server") which stores video content, local servers ("helper servers") which store frequently accessed video, and set-top units ("clients") which receive video ("streaming media object") from either the center server or the local server over a network and display the content for a user" (Pet. 55 (citing Ex. 1005, 17:61–18:9; Ex. 1002 ¶ 147)). Further, Petitioner contends Figure 9 of Ueno shows a plurality of helper servers, having storage and connected to a plurality of

users (*id.* at 55–57 (citing Ex. 1005, Figure 9, 17:55–60, 18:1–9; Ex. 1002 ¶ 149)). Thus, Petitioner contends, to the extent the preamble of claim 3 is limiting, Ueno discloses "a method for storing a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients" (*id.* at 57 (citing Ex. 1002 ¶ 151)).

We find Petitioner has established Ueno teaches "[a] method for storing a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of helper servers (HSs) to a plurality of clients," as recited in claim 3. In particular, we find that Ueno teaches a network comprising a content server storing video content (SM objects) for distribution to set-top units (clients) through local servers (helper servers) (Ex. 1005, 17:61–65, Fig. 9).

Further, Petitioner contends Ueno discloses "said SM object being comprised of a plurality of successive time-ordered chunks" (Pet. 57–59). Petitioner asserts the real-time data transferred over the network in Ueno is "divided 'into a plurality of data segments' where each segment represents a 'reproduction period of time from the head of the real-time data'" (*id.* at 58 (citing Ex. 1005, 6:60–7:2, 17:45–48, Figure 11)). Petitioner further asserts "Figure 11 of *Ueno* shows four video sources 'divided into a plurality of segments,' that are successively ordered on the T-axis labeled 'Required Reproduction Time Period From Head'" (*id.* at 59 (citing Ex. 1005, 6:60–7:2, Figure 11)). Thus, Petitioner contends, to the extent the preamble of claim 3 is limiting, "*Ueno* discloses the 'SM object being comprised of a plurality of successive time-ordered chunks' because the data in *Ueno* are

segmented in successive order by 'time information such as a time stamp' based on the 'required reproduction period of time from the head of the real-time data'" (*id.* (citing Ex. 1005, 6:60–7:2, 17:45–48, Fig. 11; Ex. 1002 ¶ 158)).

We find Petitioner has established Ueno teaches this subject matter. Specifically, we find Ueno describes its "real-time data storing means divides the real-time data into a plurality of data segments to be managed" and "the present invention is directed to a system for data such as managed in time series" (Ex. 1005, 6:61–7:2, 17:44–48). We further find Ueno's Figure 11 illustrates a video source (SM object) divided into successive time ordered segments (chunks) (*id.* at Fig. 11).

Petitioner also contends the combination of Ueno and Dan discloses the claim features "wherein a chunk is further comprised of a discrete number of segments" and "each segment allocated to a respective disk block of said plurality of HSs," as recited in the preamble of independent claim 3 (Pet. 60–63). Petitioner asserts the cache memory disclosed in Dan is divided into data blocks, and "[e]ach video segment and interval occupies a discrete number of cache blocks" (*id.* at 60 (citing Ex. 1006, 2:33–40, 3:3–7, 3:12–15; Ex. 1002 ¶ 160)). Further, Petitioner asserts that each video source in Dan is divided into data segments stored in a cache memory, and when the cache manager disclosed in Dan "receives data requests from users, the 'needed data are retrieved either from the back-end nodes,' or 'a cache data stream[] from the cache'" (*id.* at 61 (citing Ex. 1006, 2:33–40, 2:40–44, 3:12–17; Ex. 1002 ¶ 163)). Petitioner additionally asserts it would have been obvious to a person of ordinary skill in the art to "further divide the plurality of video segments in *Ueno* to correspond to a cache disk's data

blocks, as that taught by *Dan*," and thus, Petitioner contends modifying Ueno with Dan discloses "wherein a chunk is further comprised of a discrete number of segments" and "each segment allocated to a respective disk block of said plurality of HSs," as recited in the preamble of independent claim 3 (*id.* at 62–63 (citing Pet. 50–54; Ex. 1002 ¶ 167)).

Based on the trial record, Petitioner has established the combination of Ueno and Dan teaches "wherein a chunk is further comprised of a discrete number of segments, each segment allocated to a respective disk block of said plurality of HSs," as recited in claim 3. As noted above, Ueno teaches each video source is divided into segments (Ex. 1005, 17:44–48). Dan describes that each video source is "made up of segments" (chunks) (Ex. 1006, 2:7–8) and "blocks belonging to video segments" (*id.* at 2:33–40, 3:13–15). Thus, we find Dan teaches "wherein a chunk is further comprised of a discrete number of segments," as recited in claim 3. We credit Dr. Houh's statement that

> [i]t would have been obvious to a person of ordinary skill to modify the video segments of *Ueno* to comprise a discrete number of blocks that correspond to cache disk blocks, such as that taught by *Dan*. Such a person would have recognized, for example, that storage systems often allocate storage in discrete blocks. (Giampaolo [at 6] (EX1011) ("Block: The smallest unit writable by a disk or file system. Everything a file system does is composed of operations done on blocks. A file system block is always the same size as or larger (in integer multiples) than the disk block size.")

(Ex. 1002 ¶ 161). Dr. Houh's testimony is consistent with the teachings of Ueno and Dan.

Additionally, based on the trial record, Petitioner has established the combination of Ueno and Dan teaches "each segment allocated to a respective disk block of said plurality of HSs," as recited in claim 3. In

particular, we find Dan teaches "the cache manager allocates cache from the free pool 545" (Ex. 1006, 3:58–59, Fig. 2; Ex. 1002 ¶ 163).

We further credit Dr. Houh's statement that "[i]t would have been obvious to a person of ordinary skill to further divide the plurality of video segments in *Ueno* to correspond to a cache disk's data blocks, as that taught by *Dan*" because "storage systems often allocate storage in discrete blocks" and an ordinarily skilled artisan would have been motivated "to ensure that the storage space is most efficiently used without leaving part of any block empty" (Ex. 1002 ¶ 164). Dr. Houh's testimony is consistent with the testimony and evidence of record. Thus, we are persuaded and we find that Petitioner has articulated reasoning with a rational underpinning why a person of ordinary skill in the art would have combined the teachings of Ueno and Dan in the manner asserted.

Accordingly, based on the trial record, Petitioner has established the combination of Ueno and Dan teaches the preamble of claim 3.

b) "receiving said SM object"

Petitioner contends "*Ueno* discloses that when a user selects a desired video source, the video is transmitted to the user via the channel of the local server" (Pet. 63 (citing Ex. 1005, 19:41–46; Ex. 1002 ¶ 168)). Petitioner then asserts high frequency video sources are stored in local servers near users, and "[t]he service control unit 'determines a server . . . to which the video source selected by the user is to be offered,' and establishes the 'transmission of the video between the local server 1005 and the user 1010'" (*id.* (citing Ex. 1005, 19:31–40; Ex. 1002 ¶ 168)). Thus, Petitioner contends, Ueno discloses "receiving said SM object" (*id.*).

Based on the trial record, Petitioner has established Ueno teaches this limitation. More specifically, Ueno teaches a user selects a desired video source and informs the service control unit (Ex. 1005, 19:31–34). The service control unit then determines a server, such as a local server, and then transmits the video to the user via the local server (*id.* at 19:34–46). Accordingly, we find, based on the trial record, Petitioner has established Ueno teaches "receiving said SM object," as recited in claim 3.

c) "determining whether there is a disk space available on said one of said plurality of HSs"

Petitioner further contends Ueno teaches "determining whether there is a disk space available on said one of said plurality of HSs" (Pet. 64). Petitioner asserts that "*Ueno* discloses storing video in a cache, and further discloses that the 'storage capacity of the video data storage unit is limited,' and that 'when the storage capacity is saturated, it is required to erase old video data in order to store new video data'" (*id.* (citing Ex. 1005, 21:52–55; Ex. 1002 ¶ 170)). Petitioner takes the position that "[d]etermining if storage capacity is 'saturated' is simply another way of stating that the system determines if storage space is available" (*id.* (citing Ex. 1002 ¶ 170)). Thus, Petitioner contends, Ueno discloses "determining whether there is a disk space available on said one of said plurality of HSs," as recited in claim 3 (*id.*).

Patent Owner contends:

> The Petition relies on Ueno's local servers to allege disclosure of the claimed helper servers. . . . However, Ueno does not disclose any cache placement or replacement policies for its local servers. Rather, Petitioner relies on processes in Ueno's 'headend' for the alleged disclosure of steps (ii)–(iv) of the Claims

(PO Resp. 46). Patent Owner does not identify where Petitioner relies on the headend (*see id.* at 46–48), but rather relies on Dr. Jones's declaration testimony that "Ueno does not disclose any cache placement or replacement policies for its local servers" (*id.* at 48) According to Patent Owner, "the alleged cache placement and replacement process that Petitioner relies on for the alleged disclosure of claimed steps (ii)–(iv) occurs not in Ueno's local servers, but at Ueno's headends" (*id.*). Thus, Patent Owner argues "[t]he Petition never explains why Ueno's local servers would need to perform the methods that are meant for Ueno's headends, or conversely, why Ueno's headends may disclose the Claimed helper servers" (*id.* at 46).

In response, Petitioner asserts the "determining" step does not recite a specific element to perform this step and has not provided any citation to the '074 Patent to support Patent Owner's more narrow interpretation (Pet. 19–20). Petitioner further asserts Patent Owner "conflates two separate system architectures in Ueno" in its arguments (*id.* at 20 (citing PO Resp. 47)).

Based on the trial record, Petitioner has established Ueno teaches "determining whether there is a disk space available on said one of said plurality of HSs," as recited in claim 3. Initially, as set forth in our Decision to Institute (Dec. to Inst. 28), we determine this step does not specify where the "determining" must occur. Based on this claim construction, we agree with Petitioner that Ueno's disclosure of the storage capacity being limited and Ueno's determination of whether the storage capacity is saturated (Ex. 1005, 21:52–53) teaches the "determining" limitation. We credit Dr. Houh's statement that "[d]etermining if storage capacity is 'saturated' is simply another way of stating that the system determines if storage space is available" (Ex. 1002 ¶ 170).

Accordingly, Petitioner has established Ueno teaches "determining whether there is a disk space available on said one of said plurality of HSs," as recited in claim 3.

d) storing said SM object at said at least one HS if it is determined that there is sufficient disk space available

Petitioner contends Ueno teaches the step reciting "storing said SM object at said at least one HS if it is determined that there is sufficient disk space available" (Pet. 64–65). Petitioner asserts that "*Ueno* discloses storing video in a cache and that when the capacity of a video server is saturated, 'it is required to erase old video data in order to store new video data'" (*id.* at 64 (citing Ex. 1005, 21:52–55; Ex. 1002 ¶ 172)). Petitioner asserts "[a] person of ordinary skill in the art would understand that if there is sufficient storage capacity, the local server store[s] the video in the cache without having to erase old video data" (*id.* at 64–65 (citing Ex. 1003, 17:56–60; Ex. 1002 ¶ 172)). Thus, Petitioner contends, Ueno discloses "storing said SM object at said at least one HS if it is determined that there is sufficient disk space available" (*id.* at 64 (citing Ex. 1002 ¶ 171)).

Patent Owner argues this step must be performed at the headend (PO Resp. 45–51). Initially, we note the "storing" step does not specify what performs the "storing" step. Patent Owner points to specific embodiments disclosed by Ueno but not those relied on by Petitioner (Pet. Reply 18–23). In particular, Patent Owner points to an embodiment described by Figure 2 (PO Resp. 50–51). However, Petitioner does not rely on this embodiment to teach the "storing" step. Furthermore, Patent Owner does not identify any disclosure in Ueno that states that the "storing" must be performed by the

headend (*see generally* PO Resp.). Rather, the disclosures in Ueno do not specifically identify where the storing step is performed.

Based on the trial record, Petitioner has established Ueno teaches this limitation. Specifically, as discussed above, we find Ueno teaches determining if the storage capacity is saturated (Ex. 1005, 21:52–53) and thus, determining if the storage capacity is not saturated (Ex. 1002 ¶ 173). We credit, as consistent with Ueno's teaching, Dr. Houh's statement that "[a] person of ordinary skill in the art would understand that if there is sufficient storage capacity to store the video in the cache, then the local server will store the video in the cache without having to erase old video data" (Ex. 1002 ¶ 172 (citing Ex. 1005, 17:56–60)).

e) Remaining limitations

In light of the claim construction adopted *supra* and Petitioner's establishing the combination of Ueno teaches step (*iii*) as discussed above, we need not determine whether the asserted prior art teaches the subject matter recited in step (*iv*) of claim 3. Thus, we need not consider the parties' arguments directed to step (*iv*).

f) Reason to Combine

Petitioner contends an ordinarily skilled artisan would have found it obvious to combine Ueno, Dan, and Aggarwal (Pet. 50–55). As set forth above in our discussion of the preamble, Petitioner has established an ordinarily skilled artisan would have been motivated to combine the teachings of Ueno and Dan. Petitioner further argues

> It would have been obvious to a person of ordinary skill in the art, and such a person would have been motivated, to modify the cache storage and video delivery method and system of *Ueno* with the set creation methods of *Aggarwal,* at least because of the benefits of

> determining in advance the set of video data to be erased, and because such a combination would have a reasonable likelihood of success

(Pet. 54 (citing Ex. 1002 ¶ 146)).

Patent Owner argues an ordinarily skilled artisan would not have been motivated to modify Ueno based on Aggarwal (PO Resp. 35–45, 47–51). Petitioner relies on the combination of Ueno and Dan to teach the preamble and on Ueno alone to teach steps (*i*)–(*iii*) (Pet. 55–65). Based on the entire trial record, we determine Petitioner has established the combination of Ueno and Dan teaches the preamble and steps (*i*)–(*iii*) and has provided articulated reasoning with a rational underpinning as to why an ordinarily skilled artisan would have been motivated to combine the teachings of Ueno and Dan. As a matter of claim construction (and as a matter of law), step (*iv*) is non-limiting. Accordingly, we need not make any finding regarding a motivation to combine Ueno, Dan, and Aggarwal given the reliance on Ueno and Dan (*cf. Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019)).

g) Conclusion

For the reasons set forth above, Petitioner has established that the combinations of Ueno, Dan, and Aggarwal teaches the preamble and steps (*i*)–(*iii*) of claim 3. Based on the entire trial record, we determine Petitioner has established by a preponderance of the evidence that the subject matter of claim 3 would have been obvious under 35 U.S.C. § 103 over Ueno, Dan, and Aggarwal.

F. *Alleged Obviousness over Ueno and Aggarwal: claim 9*

Petitioner contends claim 9 of the ’074 Patent would have been obvious over Ueno in view of Aggarwal (Pet. 71–73). Petitioner asserts the

combination of Ueno and Aggarwal teaches the claim features for the same reasons stated with regards to claim 3 (*id.* (citing Pet. 55–57, 63–64; Ex. 1002 ¶ 189)). Based on our reasoning set forth above, we find Petitioner has established Ueno teaches "[a] method for managing storage of a streaming media (SM) object in a network having a content server which hosts SM objects for distribution over said network through a plurality of servers to a plurality of clients," as recited in claim 9. In particular, we find that Ueno teaches a network comprising a content server storing video content (SM objects) for distribution to set-top units (clients) through local servers (helper servers) (Ex. 1005, 17:61–65, Fig. 9).

We further find, for the reasons set forth above with respect to claim 3, Petitioner has established Ueno teaches "receiving said SM object," "determining whether there is a disk space available on one of said plurality of servers," and "storing said SM object at said one of said plurality of servers if it is determined that there is sufficient disk space available," as recited in claim 9.

Petitioner contends an ordinarily skilled artisan would have found it obvious to combine Ueno and Aggarwal for the reasons set forth with respect to claim 3 (Pet. 71). Petitioner further argues

> It would have been obvious to a person of ordinary skill in the art, and such a person would have been motivated, to modify the cache storage and video delivery method and system of *Ueno* with the set creation methods of *Aggarwal,* at least because of the benefits of determining in advance the set of video data to be erased, and because such a combination would have a reasonable likelihood of success

(Pet. 54 (citing Ex. 1002 ¶ 146)).

Patent Owner argues an ordinarily skilled artisan would not have been motivated to modify Ueno based on Aggarwal (PO Resp. 35–45, 47–51).

Petitioner relies on Ueno alone to teach steps (*i*)–(*iii*) (Pet. 55–65, 71–72). Based on the entire trial record, Petitioner has established Ueno teaches the preamble and steps (*i*)–(*iii*). As a matter of claim construction (and as a matter of law), step (*iv*) is non-limiting. Accordingly, we need not make any finding regarding a motivation to combine given the reliance on Ueno alone (*cf. Realtime Data, LLC v. Iancu,* 912 F.3d 1368, 1373 (Fed. Cir. 2019)). Therefore, we determine Petitioner has established by a preponderance of the evidence that the subject matter of claim 9 would have been obvious under 35 U.S.C. § 103 over Ueno and Aggarwal.

IV. CONCLUSION

For the foregoing reasons, we determine that the trial record establishes by a preponderance of the evidence that claims 3, 5, and 9 are unpatentable.

V. ORDER

Based on the foregoing, it is hereby:

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 3, 5, and 9 of the ’074 Patent are unpatentable under 35 U.S.C. § 103; and

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

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