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Paper 15
Date: November 25, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner,

v.

SANDPIPER CDN, LLC,
Patent Owner.

IPR2025-00860
Patent 10,924,573 B2

Before MITCHELL G. WEATHERLY, SHEILA F. McSHANE, and MICHAEL T. CYGAN, *Administrative Patent Judges*.

McSHANE, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Google LLC ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–20 (the "challenged claims") of U.S. Patent 10,924,573 B2 (Ex. 1001, "the '573 patent"), along with the Declaration of Todd Mowry, Ph.D. (Ex. 1006). Sandpiper CDN, LLC ("Patent Owner") filed a Preliminary Response, along with the Declaration of Dr. Prashant Shenoy (Ex. 2015).[1] Paper 8 ("Prelim. Resp.").

The Board has authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the petition and the preliminary response "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

For the reasons stated below, we determine that Petitioner has established a reasonable likelihood that it would prevail with respect to at least one claim. We therefore institute *inter partes* review as to all of the challenged claims of the '573 patent and all of the asserted grounds of unpatentability in the Petition.

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[1] The parties also filed briefs directed to discretionary denial issues. *See* Papers 6, 9, 11, 12. The Acting Chief Administrative Patent Judge, as delegated by the Acting Director, denied Patent Owner's request for discretionary denial and referred the Petition to the Board. *See* Paper 14. We do not address discretionary denial issues here. *See* https://www.uspto.gov/patents/ptab/interim-director-discretionary-processes, Section I.C, Briefing ("The petitioner and patent owner should not present discretionary considerations in the petition or the Patent Owner Preliminary Response (POPR), respectively.").

II. BACKGROUND

A. Related Matters

The parties identify *Sandpiper CDN, LLC v. Google LLC*, No. 2:24-cv-03951 (C.D. Cal., May 10, 2024) as a related matter. Pet. 89–90; Paper 4, 1.

B. Real Parties in Interest

Petitioner identifies itself, Google LLC, as the sole real party in interest. Pet. 89. Petitioner states that Google LLC is a subsidiary of XXVI Holdings Inc., which is a subsidiary of Alphabet Inc. XXVI Holdings Inc. and Alphabet Inc. *Id*. at 89 n.6. Patent Owner identifies itself, Sandpiper CDN, LLC, as the sole real party in interest. Paper 4, 1.

C. The '573 Patent (Ex. 1001)

The '573 patent, titled "Handling Long-Tail Content in a Content Delivery Network (CDN)," issued February 16, 2021. Ex. 1001, codes (45), (54).

The '573 patent relates to a content delivery network with tiers of servers. Ex. 1001, code (57). Figure 3, reproduced below, depicts the content delivery framework for the content delivery network. *Id*. at 2:9–10.

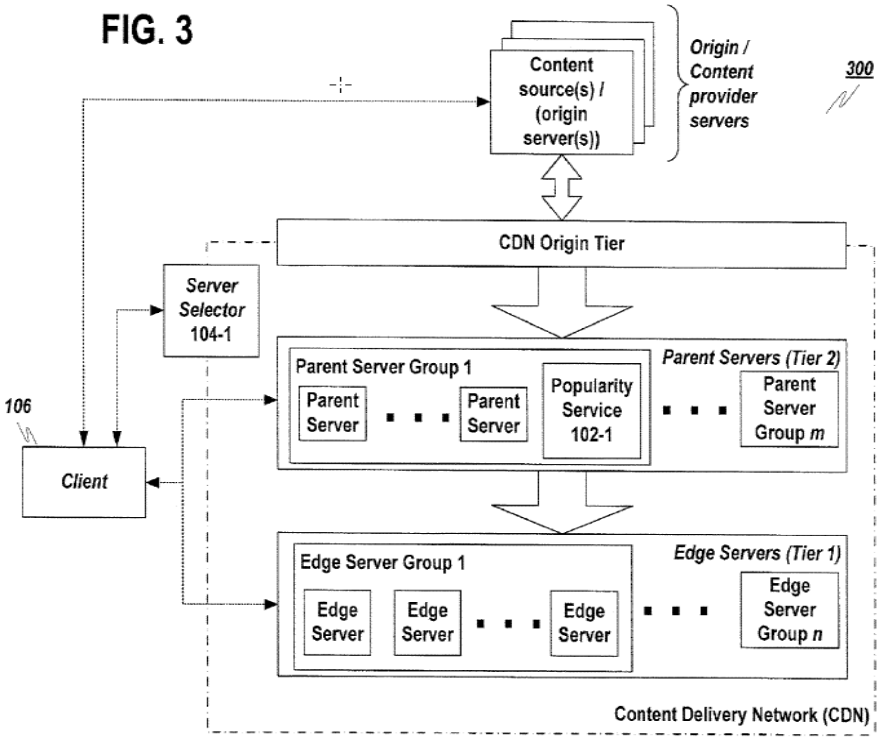


Figure 3, above, shows a hierarchical structure of content delivery network, showing a tier of edge servers and a tier of parent servers. Ex. 1001, 5:27–29. Figure 5, reproduced below, is a flowchart showing the popularity services of the content delivery network. *Id*. at 2:13–14.

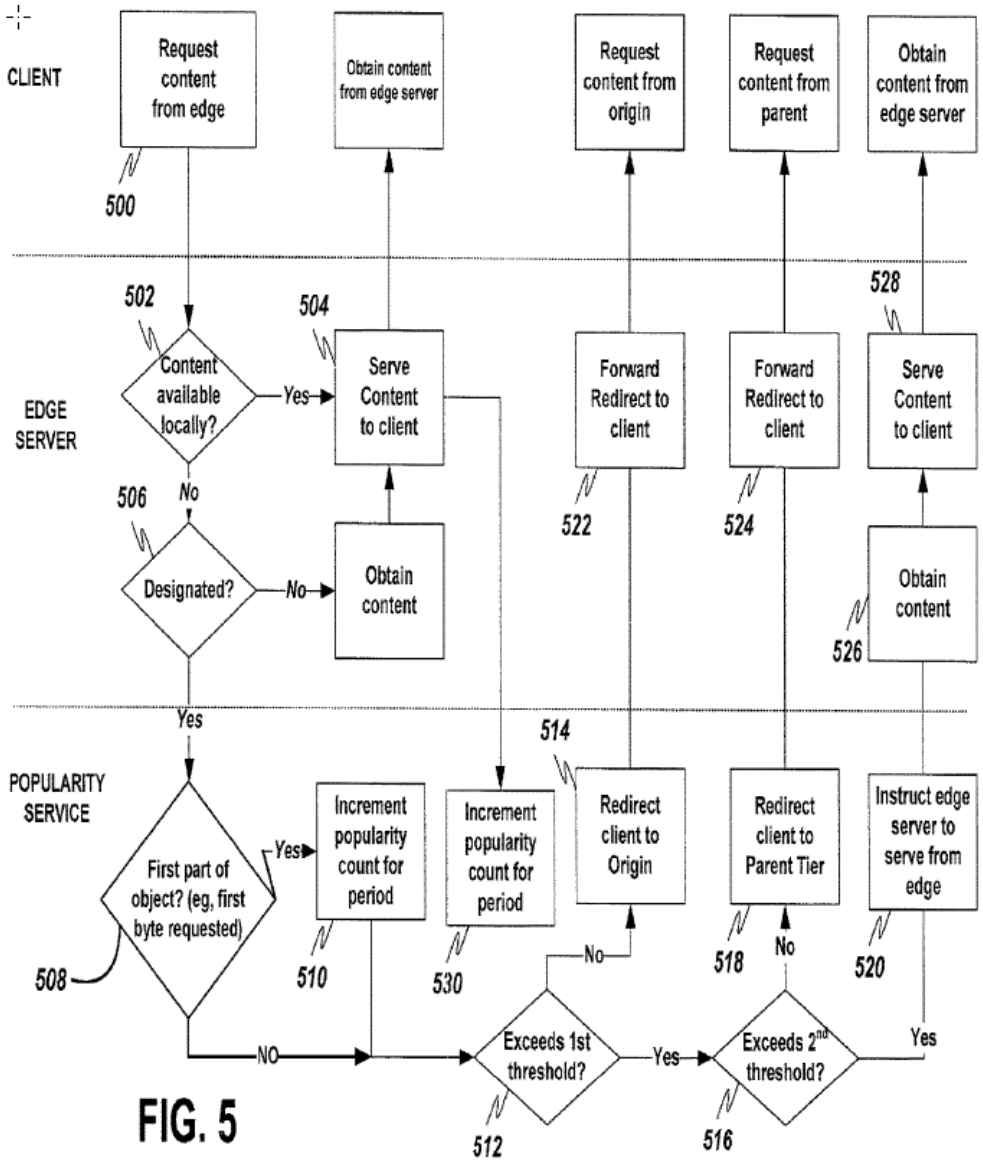


FIG. 5

As shown in Figure 5, above, client 104 requests content from edge server 108, which checks to see if the requested object is present locally or on a peer, and serves the object if present. Ex. 1001, 6:11–17. If the object is not available on the edge server or peer, the request is sent to popularity service 102 associated with the edge server. *Id*. at 6:27–34. Popularity service 102 makes determinations on the popularity of the object, and has three possible responses. *Id*. at 6:53–64. If a first level of popularity has not been reached,

the popularity service sends instruction to the edge server to redirect the client's request to the origin server or cache. *Id*. at 6:65–7:2. If the object's popularity exceeds a first level but not a second level, the popularity service sends instruction to the edge server to redirect the client's request to a parent server. *Id*. at 7:3–8. If the object's popularity exceeds a second level, the popularity service sends instruction to the edge server to serve the content itself, wherein the popularity service may send the edge server a redirect with a "follow me" flag set to the origin server or to the parent tier. *Id*. at 7:18–24. If the edge server receives a redirect from the popularity service without the "follow me" flag, the edge server forwards the redirect to client 104, but if there is a "follow me" redirect, the edge server obtains and caches the resource and serves it to the client. *Id*. at 7:25–30.

D. The Challenged Claims

Petitioner challenges claims 1–20 of the '573 patent. Pet. 1. Claims 1, 11, and 19 are independent claims. Claim 1 is illustrative of the claimed subject matter and is reproduced below, with bracketed designations added for reference purposes.

> 1(preamble) A method of content delivery in a content delivery network comprising:
>
> > 1(a) receiving, at a first server of a first tier of servers of the content delivery network, a request from a requesting device for a resource available from the content delivery network;
> >
> > 1(b) accessing a popularity service associated with the content delivery network to determine a popularity designation associated with the requested resource;
> >
> > 1(c) requesting the resource from a second server of the content delivery network;
> >
> > 1(d) processing, at the first server of the first tier of servers, a redirect instruction from the second server of the content

delivery network to obtain the resource from a content server of the content delivery network;

1(e) receiving an instruction to not cache the portion of the resource at the first server of the first tier of servers when the portion of the resource is obtained from the content server of the content delivery network; and

1(f) providing the obtained resource to the requesting device.

Ex. 1001, 13:35–54.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following challenges to patentability:

Claims Challenged	**35 U.S.C. §**[2]	**Reference(s)/Basis**
1–20	102(a)	Newton-471[3]
1–20	103(a)	Dilley,[4] Pai,[5] Wang[6]

Pet. 1.

The priority date of the ’573 patent is discussed in more detail below.

[2] The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, effective March 16, 2013. As discussed further below, there is a dispute related to the priority date of the ’573 patent, but, on the preliminary record, we determine that the patent is entitled to the filing date of its related provisional application of April 8, 2008, so we refer to the pre-AIA versions of §§ 102, 103. *See* Pet. 8–11; Prelim. Resp. 14–17.

[3] US 2016/0094471 A1, published March 31, 2016 (Ex. 1002).

[4] US Patent 7,133,905 B2, filed April 9, 2002, issued November 7, 2006 (Ex. 1003).

[5] US 2006/0271972 A1, published November 30, 2006 (Ex. 1004).

[6] US 2005/0198250 A1, published September 8, 2005 (Ex. 1005).

III. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art:

> would have had at least a bachelor's degree in computer science, electrical engineering, or a related field, and at least two years of work or research experience in the field of content delivery management or networks. Work experience can substitute for formal education and additional formal education can substitute for work experience.

Pet. 12 (citing Ex. 1006 ¶ 70). Patent Owner asserts that "the Board does not need to resolve the appropriate level of skill for a POSA [person of ordinary skill in the art] for purposes of deciding institution because the Petition fails under any articulation of a POSA." Prelim Resp. 10.

For the purposes of this Decision, we adopt the assessment offered by Petitioner as it is consistent with the '573 patent and the prior art before us. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

B. Claim Construction

In this *inter partes* review, claims are construed using the same claim construction standard that would be used to construe the claims in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (2022). Under the principles set forth by our reviewing court, the "words of a claim 'are generally given their ordinary and customary meaning,'" as would be understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution

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

Petitioner asserts that no claim terms need to be expressly construed by the Board and all terms should be given their ordinary meaning. Pet. 12. Patent Owner agrees that the *Phillips* standard applies. Prelim. Resp. 10.

We determine that we need not expressly construe any claim terms at this juncture. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those 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))).

C. Principles of Law

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses each and every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995); *see MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999) ("To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention"; any limitation not explicitly taught must be inherently taught and would be so understood by a person experienced in the field); *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991) (the dispositive question is "whether one skilled in the art would reasonably understand or infer" that a reference teaches or discloses all of the limitations of the claimed invention).

A patent 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. *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 ordinary skill in the art; and (4) when in evidence, objective indicia of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).[7]

D. Priority Date of the '573 Patent

The filing date of the application, Application No. 16/284,791 ("the '791 application"), that led to the '573 patent is February 25, 2019. Ex. 1001, codes (21), (22). The '573 patent's related priority applications are:

> Continuation of application No. 15/645,584, filed on Jul. 10, 2017, now Pat. No. 10,218,806, which is a continuation of application No. 12/880,324, filed on Sep. 13, 2010, now Pat. No. 9,762,692, which is a continuation-in-part of application No. 12/408,681, filed on Mar. 21, 2009, now Pat. No. 8,930,538.

Ex. 1001, code (63). The '573 patent also claims priority to the April 4, 2008, Provisional Application No. 61/042,412 ("Provisional Application"). *Id.*, code (60).

Petitioner asserts that Newton-471 is Section 102(a)(1) prior art to the '573 patent because the earliest priority date for the '573 patent is February 25, 2019, the filing date of the '791 application. Pet. 8–11. Petitioner contends that new matter, that is the "instruction to not cache" limitation,

[7] No evidence of objective indicia of nonobviousness is presented by Patent Owner. *See generally* Prelim. Resp.

was first introduced on that date, and there is no support for that limitation in any application to which the ’573 patent claims priority. *Id*. at 8 (citing Ex. 1006 ¶¶ 54–56). Petitioner argues that “[t]he written description of the ’573 patent has no support for an ‘instruction to not cache’; the limitation appears only in the claims” of the ’573 patent. *Id*. at 9 (citing Ex. 1001; Ex. 1006 ¶ 56). Petitioner also contends that the ’573 patent’s immediate parent applications also fail to disclose an “instruction to not cache,” where each shares a specification with the ’573 patent. *Id*. (citing Ex. 1008; Ex. 1009 (patents with applications that the ’573 patent continues from)). Petitioner refers to the Provisional Application and its discussion of a determination of whether to cache content at the first server, but alleges that “the specification is silent as to sending or receiving instructions to not cache a resource.” *Id*. at 10 (citing Ex. 1011 ¶¶ 12, 44). Petitioner contends that none of the priority documents provides written description for the “instruction not to cache” in the claims, and under the priority date of February 25, 2019, all of the references are prior art under 35 U.S.C. § 102(a)(1). *Id*. at 11. Petitioner adds that “even if the ’573 patent were entitled to its claimed priority date of April 4, 2008, the Ground 2 references remain prior art under pre-AIA 35 U.S.C. §102(b).” *Id*.

Patent Owner contends that the “instruction to not cache” limitation is supported by the disclosures of the ’573 patent, the Provisional Application, and the disclosures of all the patents in the priority chain of the ’573 patent. Prelim. Resp. 14. Patent Owner refers to disclosures in the ’573 patent and the Provisional Application (*id*.), which state:

> If the edge server 108 receives a redirect from the popularity service 102 without the “follow me” flag set (cases 1 and 2 above), it simply forwards the redirect to the client 104 (S4a, 522,

> 524). If the edge server 108 receives a "follow me" redirect, it obtains and caches the resource (at 526) and serves it to the client (at 528).

Ex. 1001, 7:25–30; Ex. 1011 ¶ 44. Patent Owner argues that the disclosures of the '573 patent and the Provisional Application "teach two alternate instructions that lead to two corresponding actions," where "[a] redirect from the popularity service without the follow-me tag is an instruction to not cache and to forward the redirect" and "[a]lternatively, a redirect with the follow-me tag is an instruction to cache the resource and serve it to the client." Prelim. Resp. 14–15 (citing Ex. 1001, 7:25–30; Ex. 1011 ¶ 44; Ex. 2014 ¶ 52). Patent Owner also points to several technical disclosures in the '573 patent and Provisional Application that address reasons to not cache unpopular resources in an edge server. *Id*. at 15–16. Patent Owner further asserts that "[t]he fact that the words 'instruction to not cache' are not literally present in the '573 patent and the '412 application specifications does not matter" because caching and not caching are alternative options. *Id*. at 17 (citing *In re Johnson*, 558 F.2d 1008, 1019 (CCPA 1977); M.P.E.P. § 2173.05(i) ("If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims.")). Patent Owner alleges that, in view of the alternative options and the technical reasons taught, those disclosures reasonably convey to a person of ordinary skill in the art that Patent Owner had possession of an edge server receiving an instruction not to cache the resource and when forwarding the redirect. *Id*. at 17 (citing Ex. 1001, 7:25–30, 10:17–41; Ex. 1011 ¶¶ 44, 68, 69; Ex. 2104 ¶ 56).

"[T]o gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earlier

application must comply with the written description requirement of 35 U.S.C. § 112." *Zenon Envtl., Inc. v. U.S. Filter Corp.*, 506 F.3d 1370, 1378 (Fed. Cir. 2007) (quoting *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571 (Fed. Cir. 1997)); *see also In re Hogan*, 559 F.2d 595, 609 (CCPA 1977). To comply with the "written description" requirement of 35 U.S.C. § 112, first paragraph, an applicant must "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. The invention is, for purposes of the 'written description' inquiry, whatever is now claimed." *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991) (emphasis omitted). The invention claimed does not have to be described in *ipsis verbis* to satisfy the written description requirement. *Union Oil Co. v. Atlantic Richfield* Co., 208 F.3d 989, 1000 (Fed. Cir. 2000). "A specification that 'reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date' has adequate written description of the claimed invention." *Novartis Pharm. Corp. v. Accord Healthcare, Inc.*, 38 F.4th 1013, 1021 (Fed. Cir. 2022) (*quoting Ariad Pharm. Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010)).

We consider the disclosures of the Provisional Application, which refer to cases 1 and 2, in which requests are redirected to an origin server for lower popularity content and to a parent server for medium popularity content at steps 522 and 524 as shown in Figure 5, respectively, wherein the edge server receives a redirect from the popularity service *without* a "follow-me" flag. *See* Ex. 1011 ¶¶ 43, 44. The Provisional Application also discloses that, by comparison, if there is a "follow-me" redirect sent to the edge server, it obtains and caches a resource as shown at step 528 for higher

popularity content. *Id*. ¶ 44. On this record, as Patent Owner asserts, these disclosures are consistent with technical reasons provided in the Provisional Application for instructing the edge server not to cache unpopular resources. *See* Ex. 1011 ¶¶ 68–69. In light of these disclosures, we preliminarily find support for Dr. Shenoy's testimony that, even with the words "instruction to not cache" are not literally recited in the Provisional Application, caching and not caching are alternative options that indicate the instruction to the edge server that will be implemented for each option. *See* Ex. 2014 ¶ 56. Further, these disclosures provide support for Dr. Shenoy's testimony that the disclosures "reasonably convey to those skilled in the art that Patent Owner had possession of the edge server receiving an instruction to not cache the resource (and instead simply forward the redirect)." *Id*.

In re Johnson states that "it is not true that the factual context out of which the question under § 112 arises is immaterial. Quite the contrary. Here, . . . the 'written description' in the [] specification supported the claims in the absence of the limitation, and that specification, having described the whole, necessarily described the part remaining." *See Johnson*, 558 F.2d at 1019. This is consistent with M.P.E.P. § 2173.05(i) which states, "[i]f alternative elements are positively recited in the specification, they may be explicitly excluded in the claims." M.P.E.P. § 2173.05(i). Further, "the failure of the specification to specifically mention a limitation that later appears in the claims is not a fatal one when one skilled in the art would recognize upon reading the specification that the new language reflects what the specification shows has been invented." *All Dental Prodx, LLC v. Advantage Dental Prod., Inc*., 309 F.3d 774, 779 (Fed. Cir. 2002). Even though we do not discern that the Provisional Application

explicitly discloses an "instruction to not cache," at least on this preliminary record, and for the purposes of this Decision, there is positive recital of instructions to cache in the Provisional Application and Petitioner has provided sufficient supporting evidence that caching and not caching are alternative options. Further, there is sufficient evidence, in the context of the disclosures of written description support in the Provisional Application, providing support for Dr. Shenoy's testimony that Patent Owner had possession of an edge server receiving an instruction to not cache the resource. Nonetheless, we invite additional briefing on these issues, including issues relating to alternative options of caching and not caching.

On this preliminary record, we find that the '573 patent has a priority date of April 2, 2008, which predates the earliest possible date on which Newton-471 could be effective as prior art, September 30, 2014 (the date on which the earliest application in the priority chain of Newton-471 was filed). Accordingly, we preliminarily find that Newton-471 is not prior art to the challenged claims. Thus, on the present record, Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claims 1–20 are anticipated by Newton-471.

E. Obviousness of Claims 1–20 Over Dilley, Pai, and Wang

Petitioner contends that claims 1–20 would have been obvious over the combination of Dilley, Pai, and Wang. Pet. 34–86. To support its contentions, Petitioner provides explanations as to how the combination of the prior art discloses each claim limitation. *Id*. Petitioner also relies upon the Declaration of Dr. Mowry (Ex. 1006) to support its positions. Patent Owner asserts that the prior art fails to teach certain limitations of claims 1, 11, and 19, and Petitioner fails to demonstrate sufficient rationale to

combine the prior art. Prelim. Resp. 18–29. Patent Owner also relies upon the Declaration of Dr. Shenoy (Ex. 2014) to support its positions.

We begin our discussion with a brief summary of Dilley, Pai, and Wang, and then address the evidence and arguments presented.

1. Dilley (Ex. 1003)

Dilley discloses a content delivery network ("CDN") using a tiered distribution service arranged in a hierarchy structure. Ex. 1003, code (57). Figure 3 of Dilley, showing its tiered distribution structure, is reproduced below. *Id*. at 3:24–25.

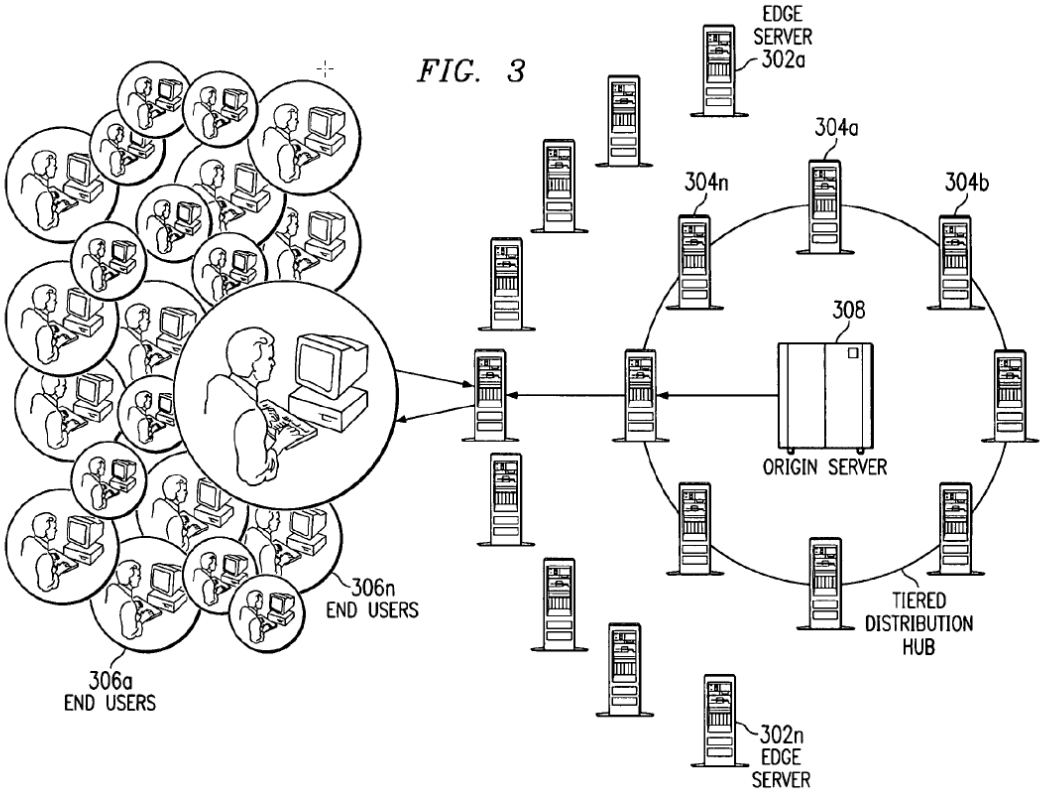
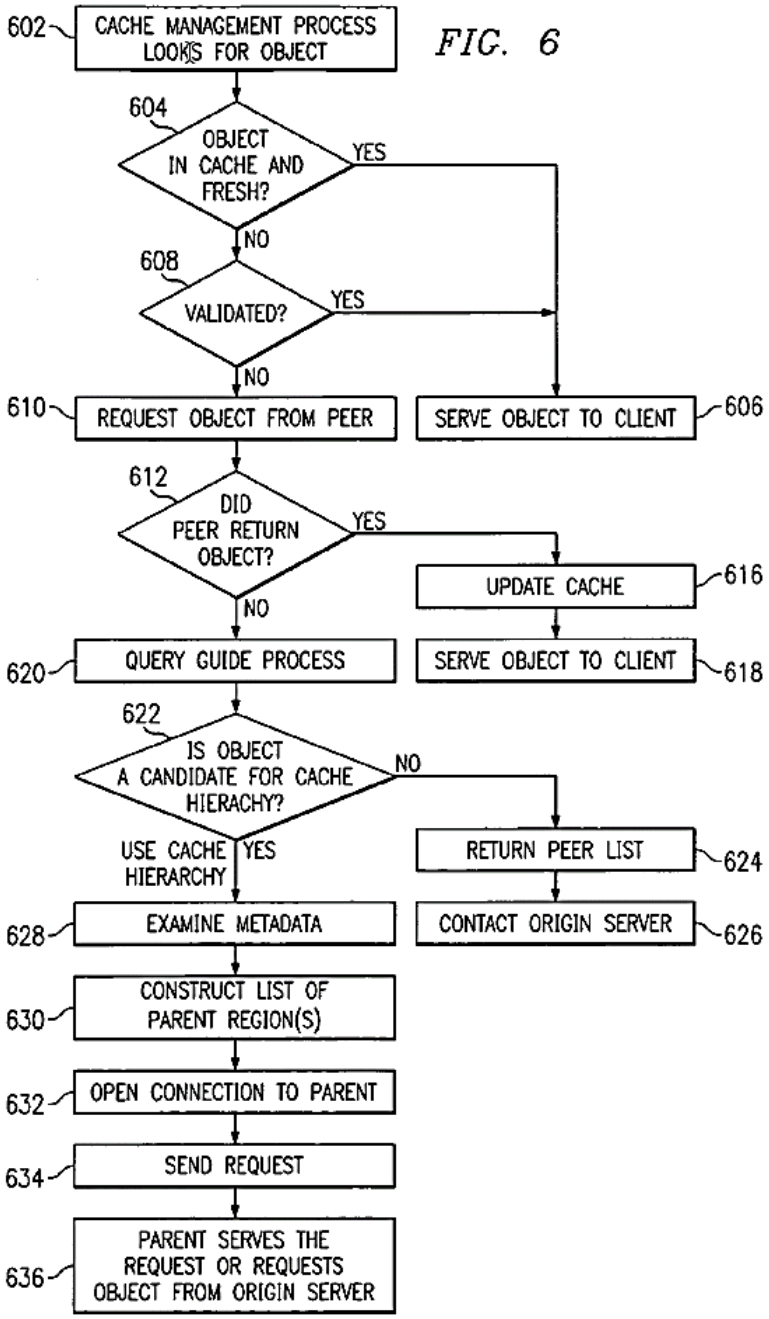


Figure 1 of Dilley, above, depicts end users $306_{a\text{-}n}$, edge servers $302_{a\text{-}n}$, tiered distribution hubs $304_{a\text{–}n}$, and origin server 308. Ex. 1003, 5:2–6.

Figure 6, reproduced at right, is a flow chart illustrating how a content server implements the cache server functionality. *Id*. at 3:33–35. As shown in the flow chart, the system operation includes the system receiving a request and routing it to the nearest edge server. Ex. 1003, 8:3–5. If the edge server has the requested content, it will serve that content to the requesting user. *Id*. at 8:7–10. If the edge server does not have the requested content, the edge server will request the content from other servers, that is, peer servers, parent servers, or the origin server. *Id*. at 8:11–48.



2. Pai (Ex. 1004)

Pai is directed to popularity-based distribution of media content. Ex. 1004, code (57). Pai assigns popularity values to content items and updates those values. *Id.* ¶ 26. Figure 6 of Pai, reproduced at right, is a flow diagram illustrating a method for dynamic redistribution of media content in the popularity-based system. *Id.* ¶ 9. Pai discloses dynamic redistribution of content between different storage levels (levels 1, 2, and 3) in the network based on popularity thresholds. Ex. 1004 ¶¶ 38–45. In Pai, media sources associated with level 1 may be configured to serve more popular media content and may be located physically closer to client devices and, in contrast, level 3 may be configured to serve less popular media content and may be further away in order to enable a greater likelihood of timely access to the most popular media content by client devices. *Id.* ¶¶ 17, 20.

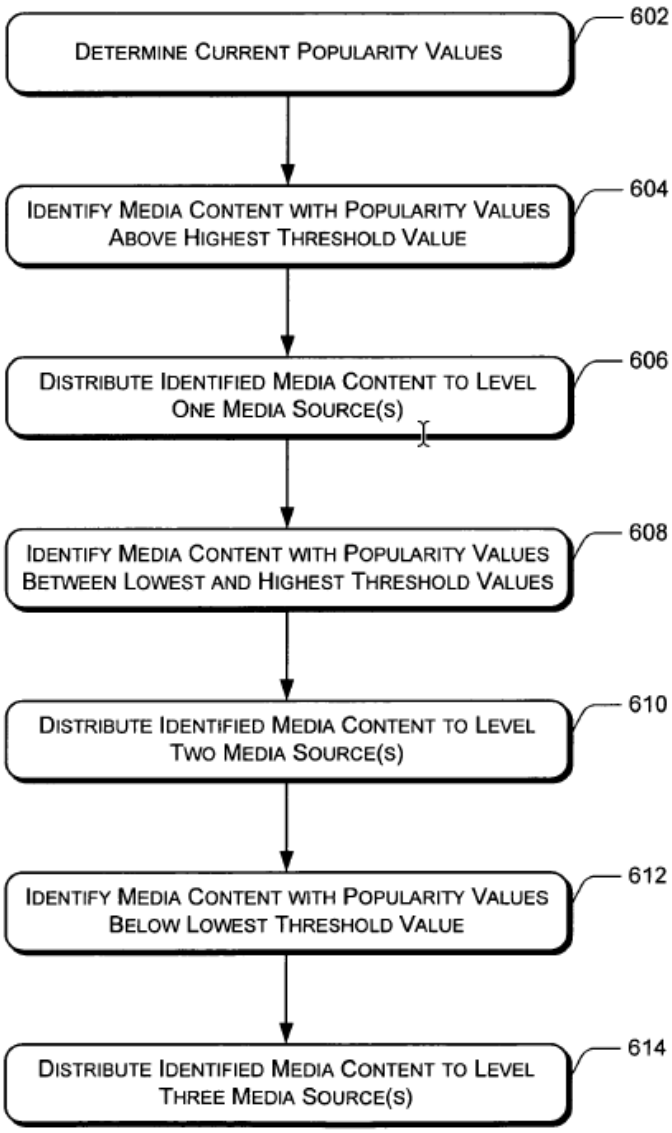


Figure 6

3. Wang (Ex. 1005)

Wang is directed to a tiered service network for content distribution. Ex. 1005, code (57). In Wang, when a request is received, the system will check the first level cache to determine if the content is available, and if the content is not found, the request will be escalated up the hierarchy from level 1 to level 2 to level 3 (if the content is not available at level 2). *Id*. ¶ 123. If items are not cached based on cache control attributes, the caching engine redirects (http-redirect) the subscriber to the origin server. *Id*.

4. Discussion

a. Claims 1, 11, and 19

Independent claims 1, 11, and 19 have similar claim limitations and Petitioner relies upon similar arguments and evidence in support of the challenges and also provides with some additional argument and evidence for claim 19. *Compare* Pet. 36–55, *with id*. at 77–85. Patent Owner generally relies on common arguments for claims 1, 11, and 19, with additional arguments presented for claim 19. Prelim. Resp. 18–29. We first address the common arguments for the independent claims.

Petitioner relies upon the combination of Dilley and Pai for the teaching of the preamble of claim 1 and limitations 1(a)–1(c). Pet. 41–50. Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine Pai and Dilley "to provide an improved and dynamic tiered CDN with a popularity service." *Id*. at 37 (citing Ex. 1006 ¶¶ 195–198). Petitioner contends that Dilley's teachings, which disclose storing more frequently accessed content closer to the requesting clients and less frequently requested content in further caches, serves to improve content retrieval time for popular content while providing cost effective storage

options for the content provider. *Id*. (citing Ex. 1003, 2:12–17, 2:23–25, 2:63–3:2, 5:65–6:10). Petitioner points to Pai which describes a popularity-based system., which teaches "how to distribute more and less popular content between different cache tiers and how to determine popularity and dynamically redistribute content." *Id*. at 37–38 (citing Ex. 1004 ¶¶ 3, 13, 29; Ex. 1006 ¶¶ 202–207). Petitioner asserts that a person of skill in the art would have been motivated to implement Pai's teachings in Dilley, and that "[c]ombining Dilley's tiered cache architecture with Pai's dynamic popularity distribution would have led to a more efficient, scalable, and cost effective CDN." *Id*. at 38 (citing Ex. 1003, 1:30–32, 2:26–31; Ex. 1006 ¶¶ 196, 201, 206–209). Dr. Mowry testifies that the supplementation of Dilley's functionality with Pai's dynamic popularity server "would have improved Dilley's ability to handle high volumes of requests for different levels of popular content without overloading the origin servers and would have been able to balance the request across the hierarchy of servers" wherein "the tiered cache hierarchy of Dilley would benefit from the real-time popularity calculations and dynamically adjusted content placement provided in Pai, resulting in better performance and more efficient use of resources." Ex. 1006 ¶ 209.

For teaching of the preamble, Petitioner asserts that Dilley discloses a tiered distribution service in a content delivery network. Pet. 41 (citing Ex. 1003, 1:12–40, Fig. 3). Petitioner asserts that for the teaching of limitation 1(a), Dilley discloses the use of a tiered distribution structure, where an end user (requesting device) makes a request that is received by an edge server (a first server), where the edge server "serves this content" from its cache "if it can do so," or otherwise attempts to obtain the resource from the content

delivery network, confirming the requested resources are available from the network. *Id*. at 42–43 (citing Ex.1003, 4:63–5:21, 7:50–53, 8:3–21, Figs. 3, 6; Ex. 1006 ¶¶ 224–230).

For limitation 1(b), Petitioner asserts that Pai discloses that its "popularity service monitors and calculates a content's popularity and, based on this calculated popularity value, dynamically adjusts the content's storage location to improve content delivery to users while efficiently managing the system's limited storage capacity," and with the tracking of request made by users, it "updates popularity values for requested content, potentially triggering a redistribution to another level." Pet. 44 (citing Ex. 1004 ¶¶ 13, 20, 39, 47; Ex. 1006 ¶¶ 231–236). Petitioner argues that "content in Pai is appropriately distributed throughout the system based on popularity such that when a user requests a resource, the system retrieves that resource from the relevant media source based on the content's current storage location (which is selected based on current popularity)." *Id*. at 45–46 (citing Ex. 1004 ¶¶ 39–45; Ex. 1006 ¶¶ 237–241). Dr. Mowry testifies that "Pai explains that as media content is consumed by users, its popularity can change over time" and that in Pai "[f]or instance, . . . when a media item has been ordered by a user, its popularity value is updated accordingly, potentially triggering a redistribution to a lower level." Ex. 1006 ¶ 239 (citing Ex. 1004 ¶¶ 3, 13, 29, 39, 47).

Patent Owner does not present any arguments relating to Petitioner's showing for the preamble or limitation 1(a), and we find that the evidence supporting the showing is sufficient at this juncture. *See generally* Prelim. Resp. For limitation 1(b), Patent Owner contends that Petitioner relies on Pai alone for this teaching, but fails to point to any disclosure in Pai that

teaches the limitation. *Id*. at 18. Patent Owner argues that Pai only discloses determining popularity values associated with currently maintained media content and the claimed requested resource is not Pai's currently maintained media content. *Id*. (citing Ex. 1004 ¶¶ 39, 47; Ex. 2014 ¶ 58). Patent Owner states "[i]n other words, the claim requires determining a 'popularity designation,' which can then be used to 'determine where [the requested resource] will be served from'" where "the popularity of the requested resource (e.g., the resource's 'popularity count') is compared with different thresholds to determine where to serve the requested resource." *Id*. at 18–19 (citing Ex. 1001, 6:27–31, 6:53–7:24, 13:55–64, Fig. 5). Patent Owner contrasts this with Pai, which is alleged to use "currently known popular value to distribute or redistribute currently maintained media content . . . , *before* any of the content is requested by a user." *Id*. at 19 (citing Ex. 1004 ¶ 13; Ex. 2014 ¶ 59). Patent Owner argues that "Pai's popular values of currently *maintained media content* are not used to determine the claimed where the *requested content* will be served from." *Id*. (citing Ex. 1004 ¶ 13; Ex. 2014 ¶ 59).

At this juncture, we are not persuaded by Patent Owner's arguments on the teaching of the limitation 1(b). As Petitioner asserts, Pai's popularity service monitors and calculates a content's popularity and, based on this calculated popularity value, it dynamically adjusts the content's storage location. *See* Pet. 44; Ex. 1004 ¶¶ 13, 20, 39, 46–47. In light of dynamic adjustments taught by Pai, this supports that upon the receipt of a request from a requesting device for a resource (limitation 1(a)), then "when a media item has been ordered by a user" such as a request as claimed, "its popularity value is updated accordingly, potentially triggering a redistribution to a

lower level," as Dr. Mowry testifies. *See id.*; Ex. 1006 ¶ 239. Patent Owner refers to the popularity values associated with the "currently maintained media content" disclosed in Pai as being limiting, but if a request made is for certain content, Pai's teachings allow that the requested content could be used in the recalculation and redistribution, where the requested content would then be part of the "currently maintained media content." Accordingly, at this juncture, we find Petitioner has presented sufficient evidence that the combination of Dilley and Pai teaches limitation 1(b).

Patent Owner also disputes Petitioner's rationale to combine Dilley and Pai. Prelim. Resp. 22–24. Patent Owner contends that, contrary to Petitioner's representations, Dilley's metadata is used to determine where to fetch content, not to determine where to cache content. *Id*. at 22 (citing Pet. 37; Ex. 1003, 7:14–17). Patent Owner further asserts that Dilley uses object specific metadata, which are domain names or IP addresses, to fetch requested objects, and this metadata is "completely different" than Pai's "popularity of the media content," which is a counting number. *Id*. at 22–23 (citing Ex. 1003, 6:43–63, 7:14–17; Ex. 1004 ¶¶ 13, 29). Patent Owner argues that a person of skill would not have been motivated to use Pai's content popularity as Dilley's "object specific metadata" for facilitating control over a tiered distribution of content. *Id*. at 23–24 (citing Pet. 37; Ex. 2014 ¶ 82). Patent Owner also asserts that a person of ordinary skill in the art would not have been motivated to "implement Pai's more specific teachings by providing dynamic popularity-based media distribution in Dilley" because Pai's popularity-based media distribution is different from Dilley's tiered distribution. *Id*. at 24 (citing Ex. 2014 ¶ 84).

At this juncture, we find that Petitioner has provided sufficient rationale to combine Dilley and Pai. While we agree with Patent Owner that Dilley's metadata is used to determine where to fetch content, Petitioner also asserts that Dilley considers popularity of content in storing more frequently accessed content closer to the requesting clients and less frequently requested content in further caches, which addresses popularity-based content issues, as Pai's disclosures also address. *See* Pet. 37. Petitioner also contends that "the tiered cache hierarchy of Dilley would benefit from the real-time popularity calculations and dynamically adjusted content placement provided in Pai," which would improve Dilley's ability to handle high volumes of request without overloading the origin servers and balance the requests over the hierarchy of servers. Ex. 1006 ¶ 209. Although Patent Owner argues incompatibilities of Dilley's and Pai's fetching and popularity features, Petitioner asserts that Dilley's functionality would be *supplemented* with Pai's dynamic popularity service where Pai's popularity service would be used for content placement in the tiered cache hierarchy of Dilley. *See id*. Accordingly, we are not persuaded by Patent Owner's arguments which are based on bodily incorporation; instead Petitioner is relying on the inclusion of Pai's popularity service features in Dilley in the manner proposed by Petitioner. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Thus, at this juncture, we find that Petitioner has provided sufficient rationale to combine Dilley and Pai.

For the teaching of limitation 1(d), Petitioner asserts that Dilley teaches that if an edge server does not have the requested content, it will request it from another server, a peer or a parent server, and the second server will either serve the content from its cache or request it from a higher

server in the hierarchy, such as an origin server. Pet. 50 (citing Ex. 1003, 5:4–21, 7:31–40, 8:53–58). Dr. Mowry testifies that the second server will instruct the first server to request the content from a server higher on the hierarchy, such as a parent or origin server. Ex. 1006 ¶ 251 (citing Ex. 1003, 7:31–40, 8:53–58). Dr. Mowry testifies that "[w]hile Dilley discloses that the content can be retrieved from the origin server when it is unavailable at the edge and parent servers, it does not provide specifics on how that retrieval happens." *Id*. ¶ 252 (citing Ex. 1003, 7:15–30). Dr. Mowry testifies that a person of skill would have been motivated to implement the redirect instruction, as Wang describes. *Id*. ¶ 253 (citing Ex. 1005 ¶¶ 123–130). Petitioner asserts that Wang discloses a CDN managed hierarchically into three tiers (levels 1, 2, and 3), where each level supports content caching and where information is distributed from lower levels to higher levels to promote efficiency and avoid conflicts. Pet. 50 (citing Ex. 1005 ¶¶ 47–49). Petitioner contends that Wang teaches that if the content is not found at lowest level 1, the request escalates from level 1 to level 2 and to level 3 to find the content, with level 1 processing the redirect instruction. *Id*. at 51 (citing Ex. 1005 ¶¶ 123–124). Petitioner asserts that Wang's redirect procedure adds benefits because it decreases latency as it would remove the parent server as a "middleman," and would allow the edge server to communicate with and receive content directly from the origin server and, further, the redirect would allow the parent server to remain available to service other requests. *Id*. (citing Ex. 1006 ¶¶ 255–257).

Patent Owner argues that Petitioner's understanding of Dilley is incorrect and a person of skill in the art would not have been motivated to combine Wang and Dilley. Prelim. Resp. 24–27. Patent Owner argues that

Dilley does not disclose that the second server would send redirect instructions to the edge server to obtain the resource from the origin server because it instead teaches that if an object request cannot be serviced, the request is provided to a parent region. *Id*. at 25 (citing Ex. 1003, code (57), 2:46–52, 7:15–30; Ex. 2014 ¶ 66). Patent Owner contends that Dilley discloses that metadata is used to funnel to fetch or validate the object being requested, where the edge server determines where to obtain the object, that is, at the parent server, and the parent server may serve the request from cache or makes the request from the origin server. *Id*. at 25–26 (citing Ex. 1003, 7:15–18; 8:22–28, 8:53–55; Ex. 2014 ¶ 68). Patent Owner alleges that Dilley's second server does not send a redirect to the edge server, and instead the parent server obtains the object from the origin server and serves it to the edge server. *Id*. (citing Ex. 2014 ¶ 68).

Patent Owner also argues that a person of skill would not have been motivated to combine Dilley and Wang because the references use different methods to achieve the goal of obtaining the requested content. Prelim. Resp. 26–27 (citing Ex. 2014 ¶ 69). Patent Owner contends that Dilley uses its distribution hubs to act as buffers to keep the internal infrastructure from being overwhelmed with requests and using Wang, as Petitioner proposes, in combination with Dilley to communicate with and receive content from the origin server would be against "the fundamental design philosophy of Dilley." *Id*. at 27 (citing Ex. 1003, 5:16–21; Ex. 2014 ¶¶ 70–72).

At this juncture, we do not find the Patent Owner's arguments to be persuasive and instead find that Petitioner has provided sufficient evidence of the teaching of limitation 1(d), as well as demonstrating sufficient rationale to combine Dilley and Wang. Patent Owner asserts that in Dilley it

is the parent server that obtains the object from the origin server, if it does not have it, and sends it to the edge server. Prelim. Resp. 26. Petitioner, however, relies upon portions of Dilley that disclose that the edge server may contact the origin server for objects directly. *See* Ex. 1003, 7:15–30. Further, the evidence in the preliminary record indicates a motivation to use Wang's redirect method in combination with Dilley to decrease latency and allow the parent server to remain available to service other requests. *See* Pet. 51. Patent Owner's arguments on the differences in the methods of Dilley and Wang to obtain the requested content, where the proposed combination is alleged to be against the fundamental design philosophy of Dilley, appear to be a teaching away argument. On this preliminary record, we do not find that the cited evidence rises to the level of teaching away for Wang's proposed modification to Dilley. *See In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) ("A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the [inventor].")

For independent claim 19, Patent Owner additionally asserts that Petitioner fails to demonstrate that the combination of Dilley, Pai, and Wang teaches the limitation of "requesting the resource from a second server of the content delivery network based at least on the popularity designation associated with the requested resource" (limitation 19(d)). Prelim. Resp. 28–29. For this limitation, Petitioner asserts that the combination discloses this limitation for the reasons discussed for limitation 1(c), and further adds that Dilley's tier structure considers the popularity of content. Pet. 83–84. Petitioner further refers to Pai and its dynamic management and distribution

based on popularity values, where media may be distributed in one tier or may be distributed and managed in other tiers of media sources, depending on the popularity determined. *Id*. at 84. Petitioner asserts a person of skill would be motivated to dynamically distribute content, in accordance with Pai in Dilley, with popular content at edges and least popular content furthest away from the requesting user. *Id*. at 84–85.

Patent Owner asserts that neither Dilley nor Pai discloses limitation 19(d). Prelim. Resp. 28–29. Patent Owner contends that in Dilley its edge server fetches data in accordance with its metadata, but it does not use a popularity designation. *Id*. Patent Owner argues that Pai does not teach the limitation either because it does not disclose "requesting the resource from a second server of the content delivery network." *Id*. at 29. We do not find these arguments persuasive because they argue the references separately instead of in combination, as asserted by Petitioner. Instead, we find that Petitioner has sufficiently demonstrated the teaching of limitation 19(d).

Patent Owner does not present additional arguments for limitations 1(c), 1(e), and 1(f). *See generally* Prelim. Resp. We have reviewed the argument and evidence presented by Petitioner and find it sufficient at this juncture. Accordingly, we find that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing that independent claims 1, 11, and 19 are unpatentable under 35 U.S.C. § 103(a) as obvious over Dilley, Pai, and Wang.

b. Dependent Claims 2–10, 12–18, and 20

Petitioner also provides evidence and argument in support of teaching of dependent claims 2–10, 12–18, and 20 by the combination of Dilley, Pai, and Wang. *See* Pet. 55–76, 82, 85–86. Patent Owner does not present any

arguments specific to these claims. *See generally* Prelim. Resp. We have reviewed the argument and evidence and, at this juncture, Petitioner has presented sufficient evidence that the combination of Dilley, Pai, and Wang teaches dependent claims 2–10, 12–18, and 20. Accordingly, after consideration of the contentions and evidence of record at this preliminary phase, we conclude that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing that claims 2–10, 12–18, and 20 are unpatentable under 35 U.S.C. § 103(a) as obvious over Dilley, Pai, and Wang.

III. CONCLUSION

For the foregoing reasons, we have determined that there is a reasonable likelihood that the Petitioner would prevail with respect to at least one of the claims challenged in the Petition. We therefore institute trial as to all challenged claims on all grounds stated in the Petition.

IV. ORDER

Upon consideration of the record before us, it is:

ORDERED that *inter partes* review of claims 1–20 of the ’573 patent is instituted on all grounds in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

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