

NOTE: This disposition is nonprecedential.

**United States Court of Appeals
for the Federal Circuit**

INTELLECTUAL VENTURES I LLC,
Appellant

v.

**EMC CORPORATION, LENOVO (UNITED STATES)
INC., NET APP, INC.,**
Appellees

2018-2289, 2018-2290

Appeals from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in Nos. IPR2017-
00374, IPR2017-00439.

Decided: September 25, 2019

WILLIAM H. MILLIKEN, Sterne Kessler Goldstein & Fox,
PLLC, Washington, DC, argued for appellant. Also repre-
sented by BYRON LEROY PICKARD, DANIEL S. BLOCK.

CYNTHIA D. VREELAND, Wilmer Cutler Pickering Hale
and Dorr LLP, Boston, MA, argued for all appellees. Ap-
pellee EMC Corporation also represented by DANA OLCOTT
BURWELL, PETER M. DICHIARA, MARK CHRISTOPHER
FLEMING; MICHAEL H. SMITH, Washington, DC; THOMAS A.

BROWN, Dell Inc., Hopkington, MA.

BENJAMIN EDWARD WEED, K&L Gates LLP, Chicago, IL, for appellees Lenovo (United States) Inc., Net App, Inc. Also represented by CHRISTOPHER CENTURELLI, Boston, MA.

Before TARANTO, CHEN, and STOLL, *Circuit Judges*.

TARANTO, *Circuit Judge*.

Intellectual Ventures I, LLC owns U.S. Patent No. 8,275,827, which describes and claims methods and systems for using storage available on network-attached devices. After IV filed suits alleging infringement of the '827 patent, EMC Corp., Lenovo (United States) Inc., and NetApp, Inc. (collectively, EMC) filed two petitions in the Patent and Trademark Office (PTO) for inter partes reviews of certain claims of the '827 patent under 35 U.S.C. §§ 311–319. The PTO's Patent Trial and Appeal Board, acting as delegee of the PTO's Director, 37 C.F.R. §§ 42.4, 42.108, instituted both reviews. The Board ultimately determined that several claims of the '827 patent are unpatentable.

IV appeals. It argues that the Board erred in its claim construction of one claim limitation and that, under a proper construction, that claim limitation is not taught by the cited references. IV also argues that EMC, in its petitions, did not adequately set forth the basis for its challenge regarding another claim limitation. Finally, IV argues that the Board improperly relied on its own filling of gaps left by EMC's evidence.

We conclude that the Board properly found the first claim limitation met for two reasons: for both IPRs, IV's proposed claim construction is incorrect; for one IPR, even under IV's construction, the cited reference discloses what the limitation requires. We also reject EMC's challenge to

the sufficiency of EMC's petitions regarding the second claim limitation at issue. And we determine that the Board did not rely on improper gap filling in its obviousness analysis. We therefore affirm the Board's decisions.

I

A

The '827 patent is titled "Software-Based Network Attached Storage Services Hosted on Massively Distributed Parallel Computing Networks." A "network attached storage (NAS) device" is a device that is connected to a network to provide storage capacity to network-connected users. '827 patent, col. 2, lines 18–20. Traditionally, the patent says, NAS devices were "stand-alone devices or systems that contain[ed] their own storage, processing, connectivity and management resources." *Id.*, col. 2, lines 12–14. A "dedicated NAS device" is one "whose primary operational purpose is for providing NAS service." *Id.*, col. 2, lines 34–35. The patent asserts that traditional dedicated NAS devices often had inferior hardware components compared to increasingly cheap and increasingly ubiquitous desktop computers, *id.*, col. 2, lines 46–55, and that the invention takes advantage of the storage resources on those desktop computers, which often sat idle, *id.*

Because the patent contemplates provision of NAS services by devices (such as desktop computers) that are not *dedicated* to providing NAS functionality, the specification states that the term "NAS device," as used in the patent, "broadly refers to a device that makes data storage resources available to network-connected user devices." *Id.*, col. 2, lines 31–35. It describes creating non-dedicated NAS devices through installation of a client agent program on a multiplicity of networked, distributed computers, many of which are used for non-NAS purposes. *Id.*, col. 2, line 59, through col. 3, line 17. This program takes advantage of unused resources on the distributed computers

and provides NAS services to connected user devices. *Id.*, col. 3, lines 6–21.

The patent states that “a large number of desktop” computers “can each act as a[n] NAS device by running a client agent program and NAS component that brings its resources to the network with the appearance of a dedicated NAS device or as part of an integrated system that appears as a single or dedicated NAS device.” *Id.*, col. 42, lines 59–65. The patent goes on to describe at least three embodiments of the NAS system claimed in the ’827 patent: (1) a system in which the NAS devices function as “stand-alone” devices, each directly accessed by user devices; (2) an “NAS fabric” system in which some NAS devices maintain storage-location information about other NAS devices, with the information used to direct users to the particular devices storing requested data; and (3) a “server assisted” system in which a server receives storage and access requests from user devices and plays a role in directing user devices to the distributed device storing requested data. *Id.*, col. 43, line 34 through col. 44, line 46; *see also id.*, fig. 21.

The patent includes two independent claims, claims 1 and 13, both at issue in this appeal. Claim 1 recites:

1. A computer-implemented method comprising:

configuring a distributed processing system of a plurality of distributed devices coupled to a network, wherein the plurality of distributed devices include respective client agents configured to process respective portions of a workload for the distributed processing system,

wherein the respective client agents for particular distributed devices of the plurality of distributed devices have corresponding software-based network attached storage (NAS) components configured to

assess unused or under-utilized storage resources in selected distributed devices of the plurality of distributed devices;

representing with the corresponding software-based NAS component that the selected distributed devices respectively comprise NAS devices having an available amount of storage resources related to the unused and under-utilized storage resources for the selected distributed devices;

processing one or more of data storage or access workloads for the distributed processing system by accessing data from or storing data to at least a portion of the available amount of storage resources to provide NAS service to a client device coupled to the network; and

enabling at least one of the selected distributed devices to function as a location distributed device to store location information associated with data stored by the selected distributed devices through use of the respective client agents for the particular distributed device.

Id., col. 46, lines 28–56. Claim 13 parallels claim 1, except that, *first*, the subject of claim 13 is a system, rather than a method, and, *second*, it adds a requirement that the NAS component is configured to “allocate respective available amount of unused storage resources in selected distributed devices of the plurality of distributed devices.” *Id.*, col. 47, lines 38–40.

B

In December 2016, EMC petitioned for an inter partes review of certain claims of the '827 patent, relying for its primary reference on John Kubiawicz et al., *OceanStore: An Architecture for Global-Scale Persistent Storage*, 35 ACM SIGPLAN NOTICES 190 (2000) (OceanStore). Later that month, EMC petitioned for another inter partes

review of a slightly different set of the '827 patent's claims, this time invoking as its primary reference a patent application naming Carter and others as inventors, Patent Cooperation Treaty publication WO 98/22881 (Carter).

On the first petition, the Board instituted a review of claims 1, 2–9, 13, and 15–21—the OceanStore IPR. That IPR came to include three grounds: anticipation by OceanStore; obviousness over OceanStore; and obviousness over OceanStore combined with another reference (Condor). In its final written decision, the Board held claims 1, 3–9, 13, 15, 16, and 18–21 unpatentable for obviousness over OceanStore. *EMC Corp. v. Intellectual Ventures I LLC*, No. IPR2017-00374, 2018 WL 3089864, at *11–21 (P.T.A.B. June 20, 2018) (*OceanStore Decision*).

On the second petition, the Board instituted a review of claims 1, 3–6, 8, 9, 13, 15–18, 20, and 21—the Carter IPR. That IPR came to include two grounds: anticipation by Carter of all but claims 5 and 17; and obviousness of claims 5 and 17 over Carter and another reference (Pitzel). In its final written decision, the Board held claims 1, 3, 4, 6, 8, 9, 13, 15, 16, 18, 20, and 21 unpatentable as anticipated by Carter and claims 5 and 17 unpatentable for obviousness over Carter and Pitzel. *EMC Corp. v. Intellectual Ventures I LLC*, No. IPR2017-00439, 2018 WL 3089250, at *8–21 (P.T.A.B. June 20, 2018) (*Carter Decision*). Claim 17 was addressed only in the Carter IPR, whereas claims 7 and 19 were addressed only in the OceanStore IPR.

In both the OceanStore IPR and the Carter IPR, the parties proposed competing constructions of the claim limitation, “representing with the corresponding software-based NAS component that the selected distributed devices respectively comprise NAS devices.” EMC proposed that the phrase means “using the corresponding software-based NAS components of the selected distributed devices to mimic dedicated NAS devices,” whereas IV proposed that

the phrase means “using the corresponding software-based NAS components of the selected distributed devices to cause each selected distributed device to separately appear to network-connected user devices as a dedicated NAS device.” *OceanStore Decision* at *4; *Carter Decision* at *4. The Board rejected IV’s construction as unduly narrow. *OceanStore Decision* at *5–6; *Carter Decision* at *5–6. It also concluded that, even under IV’s construction, both OceanStore and Carter disclose “representing” as required by this claim limitation. *OceanStore Decision* at *6, *14; *Carter Decision* at *6, *15–16.

In each proceeding, IV sought leave to file a motion to strike EMC’s reply. The Board allowed IV to file a two-page paper in each proceeding that identified the arguments in EMC’s replies that IV deemed improper. In those papers, IV argued that EMC, in its replies, had improperly presented arguments for unpatentability not contained in EMC’s petitions. The Board disagreed, reasoning that EMC’s arguments and evidence fairly responded to arguments raised in IV’s responses. *OceanStore Decision* at *25; *Carter Decision* at *25–26.

IV timely appealed the Board’s decisions. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

We review claim constructions de novo in a case like this, in which the relevant issue turns only on intrinsic evidence. *Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 840–41 (2015); *Hamilton Beach Brands, Inc. v. f’real Foods, LLC*, 908 F.3d 1328, 1339 (Fed. Cir. 2018). It is not disputed that, in this case, the Board was required by regulation to adopt the broadest reasonable interpretation when construing the claims.

Anticipation is a question of fact, whose resolution by the Board we review for substantial evidence. *In re Rambus, Inc.*, 753 F.3d 1253, 1256 (Fed. Cir. 2014). We review the Board’s determination of obviousness de novo and its underlying factual findings for substantial-evidence

support. *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 991 (Fed. Cir. 2017). Factual determinations include “findings as to the scope and content of the prior art, the differences between the prior art and the claimed invention, the level of ordinary skill in the art, the presence or absence of a motivation to combine or modify with a reasonable expectation of success, and objective indicia of non-obviousness.” *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1364 (Fed. Cir. 2015). “Substantial evidence review asks ‘whether a reasonable fact finder could have arrived at the agency’s decision’ and requires examination of the ‘record as a whole, taking into account evidence that both justifies and detracts from an agency’s decision.’” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1366 (Fed. Cir. 2016) (quoting *In re Gartside*, 203 F.3d 1305, 1312 (Fed. Cir. 2000)).

We review the Board’s procedural decisions for abuse of discretion. *Ericsson Inc. v. Intellectual Ventures I LLC*, 901 F.3d 1374, 1379 (Fed. Cir. 2018).

II

IV challenges the Board’s construction of the “representing” limitation. According to IV, the Board’s construction omitted both parts of what IV says is a dual requirement of the limitation—that (1) *each distributed device* must represent (2) “*to the user device*” that it includes its own NAS device. Appellant’s Brief at 22. Under a proper construction of the term, IV contends, neither OceanStore nor Carter discloses a process that meets the “representing” limitation.

A

We conclude first that IV’s claim construction is incorrect in demanding that the representation required by the “representing” limitation be made “to the user device” (the device of a user requesting storage). IV has made no substantial argument that, if there is no such requirement, the

Board was wrong to find that both OceanStore and Carter meet the “representing” limitation. In both IPRs, we therefore affirm the Board’s finding that this limitation is met.

1

We reject IV’s argument that the “representing” limitation requires the representation to be made to the user device. We find nothing in the claim language or specification that supports IV’s position under the broadest-reasonable-interpretation standard.

The claim language does not say to whom the required representation must be made. In particular, it does not narrow the recipient class for the required representation to the user device. The claims at issue do not recite user devices at all. ’827 patent, col. 46, lines 28–56.

We also see inadequate support for IV’s “to the user device” requirement in the specification, either in the two specification statements to which IV has pointed or elsewhere. The first statement reads, “[A] client agent program is configured to run on the network-connected client devices that are part of the distributed computing system to provide what appears to user devices as dedicated NAS functionality” ’827 patent, col. 2, lines 61–66. The second reads, “Through the client agent and infrastructure implementation of the present invention, such devices can provide storage capabilities that allow these devices to appear to users as dedicated NAS devices” *Id.*, col. 42, lines 54–59. Merely “appear[ing]” to a user device does not mean that a given distributed device has represented itself as an NAS device to the user device; such a device may appear as an NAS device to the user device because, *e.g.*, the user device received that representation about the particular device from another device. Regardless, even if “appear(s)” equates to “represent,” the two specification statements do not require each individual client device to present itself to a user device as a dedicated NAS device. The first statement speaks only of a user device seeing NAS

“functionality,” and both it and the second statement are reasonably understood as covering a user device seeing the client devices collectively as dedicated NAS devices. The specification language does not include the word “respectively” that appears in the claims and points toward individualized representations (though not “to the user device”).

Indeed, the sentence following IV’s citation to column 42 says that “a large number of desktop PCs in the enterprise (Intranet) or on the Internet can each act as a[n] NAS device by running a client agent program and NAS component that brings its resources to the network . . . as part of an integrated system that appears as a single or dedicated NAS device.” *Id.*, col. 42, lines 59–65. Thus, the specification contemplates that each distributed device might not make a representation to a user device. IV has so acknowledged, explaining that, while its proposed construction covers the three specific embodiments described in columns 43 and 44, it reads out the “integrated system” implementation identified in column 42.

2

Having rejected IV’s proposed requirement that the claimed representation must be made to the user device, we affirm the Board’s finding that both OceanStore and Carter teach the claim limitation. The crux of IV’s argument that neither reference teaches the limitation is that both references disclose systems in which user devices see only a single, aggregated storage pool. Appellant’s Reply Brief at 9 (“OceanStore does not disclose the ‘representing’ limitation under the correct construction because OceanStore’s system appears to user devices as a single pot of storage.”), 12 (“Carter describes only a shared memory that appears to each node as a single, large storage space.”). IV does not argue that, in the absence of a “to the user device” requirement, OceanStore and Carter do not disclose the representing limitation.

Nor is it surprising that IV keys its argument to the “to the user device” requirement. As we will discuss in the next section, IV’s position is that a distributed device represents itself as an NAS device whenever it engages in a memory transaction with another device. To function as an NAS device on that understanding—*i.e.*, making storage resources available to network-connected user devices—a given distributed device must communicate to some other network-connected device that it has available storage space. Likewise, when a user device accesses data stored on an NAS device, the latter must communicate that data to another device so that it may, directly or indirectly, reach the user device. Therefore, under IV’s position described next, a network-connected distributed device functioning as an NAS device necessarily represents that it is an NAS device to some other device on the network, even if that other device may not be the user device.

B

For the OceanStore IPR, there is a second basis to affirm the Board’s finding about the “representing” limitation. Substantial evidence supports the Board’s finding that OceanStore teaches the limitation even under IV’s construction.

1

In its opening brief and its reply brief, IV argues that all three embodiments discussed in columns 43 and 44 of the ’827 patent—*i.e.*, “stand alone” NAS, “NAS fabric,” and “server assisted” NAS—meet the “representing” limitation. In so arguing, IV makes clear what suffices to meet the claim limitation within its construction.

The first embodiment meets the limitation, IV says, because user devices directly access each NAS device as if it were a traditional dedicated NAS device. ’827 patent, col. 43, lines 44–58. In the NAS fabric embodiment, at least some of the distributed devices contain location

information used to provide links or directions to data that might be stored in any of several NAS devices on the network, *id.*, col. 43, lines 59–66, and an NAS device storing location information receives a request from a user device and then directs the user device to the NAS device storing the requested data, *id.*, col. 44, lines 13–16. IV asserts that the “representing” limitation is met in this setting because, once the user device is directed to the storing device, the resulting direct user-device/storing-device interaction necessarily includes the storing device representing *to* the user device, not just to some other entity on the internal network, that it is an NAS device. IV’s position on coverage of the third embodiment, involving server assistance, is similar. In that embodiment, the server receives requests from a user device and directs the user device to the NAS device storing the requested data. *Id.*, col. 44, lines 24–42. According to IV, the resulting direct user-device/storing-device interaction means that the latter is representing itself to the former as an NAS device, as in the NAS fabric embodiment.

2

IV’s argument for why the NAS fabric and server assisted embodiments come within its construction establishes a sufficient condition for a disclosure to meet the “representing” limitation under IV’s construction. OceanStore satisfies that condition.

Like the ’827 patent, OceanStore notes the ubiquity of computing devices configured with excess storage space. OceanStore at 191. OceanStore envisions a system of geographically distributed servers—referred to as “nodes”—that store “replicas” (copies) of user data, easing users’ access to their data. *Id.* at 191, 193. Every “persistent object” (stored item) in OceanStore is identified by a globally unique identifier (GUID). *Id.* at 191. An object and a replica of the object are directly addressable using the same GUID. *Id.* at 192–93.

Messages in OceanStore are handled by the routing layer of the OceanStore protocol. *Id.* at 193. A user device accesses requested data by a two-step process. “Messages begin by routing from node to node along the distributed data structure until a destination is discovered. At that point, *they route directly to the destination.*” *Id.* (emphasis added); *see also id.* at 194 (“When someone searches for information, they climb the tree until they run into a pointer, after which they route directly to the object.”).

The Board found: “In the second stage, after the node that has the requested object is identified, messages can be directly sent to that node without having to route through the other nodes.” *OceanStore Decision* at *9. That finding is a reasonable reading of the article. And the Board’s finding establishes that OceanStore discloses the “representing” limitation for the same reasons that the NAS fabric meets the limitation according to IV. Just as the user device comes to directly interact with the storing node in the NAS fabric embodiment, the user devices in OceanStore come to communicate directly with the desired object once the location of that object is discovered.

IV suggests that substantial evidence does not support the Board’s finding about OceanStore. IV disputes that OceanStore teaches an NAS device communicating directly with a *user device*; rather, IV argues, the direct communication that occurs during the second stage of message routing is between the storing node and the node nearest the user device. The Board could reasonably find otherwise. Although OceanStore discusses communication with “the closest entity,” the “entit[ies]” at issue in this particular context are the nodes storing a replica of the desired object. OceanStore at 193. OceanStore explains that its method of routing messages allows the client—*i.e.*, the user device—to communicate with the nearest node storing a replica of the desired object, rather than whichever node the client last communicated with when accessing the desired object.

Id. Therefore, this “closest entity” is the storing node, not the node nearest the user device. *Id.*

Figure 2 of OceanStore does not contradict this understanding. OceanStore’s mechanism for routing uses a two-tiered approach, “featuring a fast, probabilistic algorithm backed up by a slower, reliable hierarchical method.” *Id.* The probabilistic algorithm uses attenuated Bloom filters, which indicate the objects stored on an edge of nodes. *Id.* Figure 2 illustrates how queries are routed along the edge whose Bloom filter indicates the desired object is closest; this query eventually determines the precise node where the object is located. *Id.* Thus, Figure 2 portrays how the first step of message routing works—routing node to node until the destination is discovered; it is unrelated to the direct communication that occurs after the destination is discovered. The figure thus does not support IV’s argument.

Nor is IV’s argument about OceanStore supported by OceanStore’s statement that “[i]f replicas move around, only the network, not the users of the data, needs to know.” *Id.* Users need not know the location of the desired object because they are eventually directed there by the network. This is precisely how the NAS fabric described by the ’827 patent functions: A user device makes a request, and another device with location information directs it to the storing device. ’827 patent, col. 44, lines 13–16. IV has insisted that the “representing” limitation is met by that process.

We conclude that substantial evidence supports the Board’s finding that OceanStore discloses the “representing” limitation under IV’s proposed construction. We do not address the same alternative ground for Carter, as to which the resolution of this issue is less clear from the Board’s decision, the particular portions of Carter relied on by the Board’s decision, and EMC’s petition and evidence.

III

IV asserts that the Board erred in holding that the “allocate” limitation of claim 13 was taught by or would have been obvious in light of the prior art. IV’s argument is that the Board, in making that determination, improperly relied on arguments and evidence presented for the first time in EMC’s reply. That reliance, EMC contends, violates statutory and regulatory requirements. *See* 35 U.S.C. § 312(a)(3) (IPR petition must identify the grounds with particularity and the evidence that supports the grounds); 37 C.F.R. § 42.104(b)(4) (petition must specify where each claim element is found in the relied-on prior art); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,767 (Aug. 14, 2012) (a reply may respond to the patent owner’s response but “a reply that raises a new issue or belatedly presents evidence will not be considered”).

We have generally treated Board rulings challenged on such grounds as subject to review for abuse of discretion. *See, e.g., Intelligent Bio-Systems*, 821 F.3d at 1367; *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1078 (Fed. Cir. 2015). Legal errors can make a ruling an abuse of discretion, and legal questions are decided de novo. *See Yancheng Baolong Biochemical Products Co., Ltd. v. United States*, 406 F.3d 1377, 1380 (Fed. Cir. 2005). But we do not see a genuine legal issue here, only an application of the legal standards to the case-specific facts presented in the two IPRs.

We find no reversible error regarding the “allocate” limitation of claim 13. We consider the OceanStore petition first, then the Carter petition.

A

The entirety of the discussion of the “allocate” limitation in the OceanStore petition is as follows:

Claim element 13[d] is satisfied for the same reasons as element 1[d]. (Ex. 1002, ¶138.) In this regard, Dr. Kubiawicz explains that desktop

workstations with excess storage and using OceanStore software would allocate the excess storage for use by OceanStore users (i.e., making it available for other devices to use) but would reserve other workstation storage for purely local use, e.g., to store computer programs, local operating system and the like. (Ex. 1002, ¶138.).

J.A. 249. The referred-to element 1[d] is the “representing” limitation. J.A. 235. The cited paragraph of the declaration of EMC’s expert, Dr. Kubiadowicz, is almost identical to the paragraph in the petition. J.A. 1386 (itself citing back to earlier paragraphs 102–104, J.A. 1371–72).

In its preliminary response, IV argued that EMC failed to explain how any statements it made regarding the “representing” limitation were relevant to the “allocate” limitation. J.A. 298. IV further argued that Dr. Kubiadowicz’s testimony deserved little weight, because it simply parroted the arguments made in the petition. J.A. 299–300. But the Board, in its institution decision, relied partly on Dr. Kubiadowicz’s declaration to determine, under the institution-stage standard, that a relevant artisan would have understood OceanStore as teaching or at least suggesting the “allocate” limitation. J.A. 357–58.

In its post-institution response, IV again argued that EMC’s petition failed to establish a prima facie case of obviousness for the “allocate” limitation of claim 13. J.A. 465. IV further argued that OceanStore does not in fact teach or suggest allocating and contains no discussion of how or when storage is allocated in the OceanStore system. J.A. 467. In reply, EMC pointed out that the ’827 patent itself neither claims any particular method of allocation nor contains any description of an allocation method in its specification. J.A. 535–36. EMC also quoted a portion of its expert’s deposition and argued that IV had not explained why OceanStore does not suggest allocating when it

teaches that its nodes both assess unused storage and make that storage available to other devices. J.A. 536–37.

IV then requested authorization to file a motion to strike certain portions of EMC’s reply. The Board declined, instead granting IV authorization to submit a list of improper reply arguments, a list the Board would consider in its final written decision. J.A. 587–88. IV filed its list, identifying one argument regarding the “allocate” limitation. J.A. 608–09. In its final written decision, the Board determined that the arguments in EMC’s reply were appropriate and fairly responded to arguments IV raised in its responses. *OceanStore Decision* at *25.

We conclude that EMC’s petition provided IV legally adequate notice of and support for its theory of unpatentability, including with respect to the “allocate” limitation. In the portion of its petition effectively incorporated by reference into the analysis of the “allocate” limitation, EMC explained that “the OceanStore software provided the functionality for the pool devices, such as desktop workstations with excess storage, to instead appear, function and act as storage servers on the network, providing storage resources to user devices connected to the network.” J.A. 235–36. Both the petition and Dr. Kubiawicz’s declaration, in their brief discussions of the claim 13 “allocate” limitation, refer back to passages that highlight the requirement to make storage available. *See* J.A. 1371. The express assertions that this claim 13 limitation is satisfied because of the earlier explanation amount to, and should have been understood as, assertions that the claimed allocating is taught or would have been obvious from the other features, including the making available of storage, taught in OceanStore.

Thus, we think that the Board could properly conclude that EMC’s argument from the outset was that, because the OceanStore nodes function as NAS devices and represent that they have available storage, it would have been

obvious to a relevant artisan that the nodes would allocate excess storage space for use by the user devices, and that is the rationale the Board adopted when it found that OceanStore taught or at least suggested the “allocate” limitation. *OceanStore Decision* at *16. In these circumstances, we think that the initial notice was sufficient even without further explanation, especially given that IV’s patent itself provides no more explanation of allocating separate and apart from the other features calling for making storage available. *Cf. SRI Intern. Inc. v. Internet Sec. Systems, Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008) (determining that an anticipatory reference was enabled when its level of detail on how to make was as great as the discussion of the claimed limitation in the patent at issue).

It is not clear that EMC’s argument about the Board’s reliance on reply material is intended to stand independently of its contention about the inadequacy of the petition, but we see no reversible error in this respect if it is. The Board could fairly conclude that the arguments in EMC’s reply were responsive to arguments IV made in its patent owner’s response. They helped explain why the argument in EMC’s petition was correct—namely, why disclosure of the “representing” limitation would teach or suggest the “allocate” limitation. *See Wasica Finance GmbH v. Continental Automotive Systems, Inc.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017). EMC did not abandon its previous theory of prima facie obviousness in favor of a new one, nor did it advance a new theory of invalidity using entirely different references. *See id.* at 1286–87; *Intelligent Bio-Systems*, 821 F.3d at 1369–70.

Therefore, we reject IV’s challenge to the Board’s decision regarding the “allocate” limitation of claim 13 in the OceanStore IPR.

B

The Carter petition’s treatment of the “allocate” limitation is like that of the OceanStore petition in relying on

a cross-reference back to a discussion earlier in the document. *See* J.A. 828 (referring to J.A. 811–17, citing ¶157 of Dr. Kubiadowicz’s declaration, J.A. 1483). But in the Carter IPR, neither the petition’s paragraph on the “allocate” limitation nor the cited paragraph of Dr. Kubiadowicz’s declaration includes even the single explanatory sentence found in their OceanStore IPR counterparts. The petition simply states, “This limitation is satisfied for the reasons given above in the context of claim 1. *See* §§VII.B.1(c), VII.B.1(d), *supra*. (Ex. 1102, ¶157.)” J.A. 828. The cross references are to the petition’s analysis of the “assess” and “representing” limitations of claim 1. J.A. 811–17. Dr. Kubiadowicz’s declaration, for its part, simply states, “This limitation is satisfied for the reasons given above in the context of claim 1.” J.A. 1483.

In its preliminary response, IV argued that claim 1 did not recite the “allocate” limitation, so the petition’s discussion of the “assess” and “representing” limitations could not satisfy the “allocate” limitation. J.A. 885–86. In its institution decision, the Board found that Dr. Kubiadowicz’s discussion of “dynamically distribut[ing] the available resources,” in the context of the “assess” limitation, corresponds to the “allocate” limitation and sufficed to meet EMC’s burden. J.A. 936. In its response, IV argued that merely “distributing available resources” does not satisfy the “allocate” limitation. J.A. 1037–40. In reply, EMC again pointed out that the ’827 patent does not provide any description of allocating. J.A. 1096–97. Additionally, EMC argued that IV’s expert, Dr. Shenoy, admitted during cross-examination that Carter has numerous disclosures regarding allocating, and Dr. Kubiadowicz further testified that allocating was a well-known function that would not require significant description. *Id.*

IV requested permission to file a motion to strike and was granted leave to submit a list of allegedly improper reply arguments. J.A. 1147–48. In its list, IV pointed to EMC’s arguments regarding Dr. Shenoy’s identification of

allocating in Carter and Dr. Kubiawicz's testimony that allocating was a well-known function. J.A. 1162–63. In the final written decision, the Board determined that the identified arguments were not improper and fairly responded to IV's arguments raised in its responses. *Carter Decision* at *25–26.

We do not think that IV's argument as to claim 13 calls for a result for the Carter IPR different from the result we have reached for the OceanStore IPR. On this record, we cannot say that the Board erred in determining that the Carter petition gave adequate notice of and support for its theory of why the “allocate” limitation was taught. The express assertions that this claim 13 limitation is satisfied because of the earlier explanation amount to, and should have been understood to be, assertions that the claimed allocating is taught by the other features disclosed in Carter, including its distinguishing of used and unused storage space and employment of the policy controller to distribute the available unused resources. J.A. 812–13.

This is the disclosure the Board relied on in its institution decision and again in its final written decision for claim 13. *Carter Decision* at *17. There was no switching of theories from petition to decision. And we see no impropriety in the Board's treatment of EMC's reply submissions.

Therefore, we reject IV's challenge to the Board's decision regarding the “allocate” limitation of claim 13 in the Carter IPR.

IV

IV's final argument applies only to the OceanStore IPR. IV argues that the Board's obviousness analysis in that IPR is legally deficient because it relies on gap-filling to find teaching or suggestion of several limitations that IV says are not disclosed by OceanStore. In particular, IV contends that the Board did not find that the “assess unused

or under-utilized storage resources,” “representing,” “centralized server,” and “downloading” limitations are disclosed by OceanStore.

A

With regard to the “representing” and “centralized server” limitations, the Board found that each was explicitly disclosed by OceanStore. There was no gap to fill for those limitations if those findings are supported by substantial evidence. We conclude that they are. We have already discussed the substantial evidence that supports the Board’s finding that OceanStore discloses the “representing” limitation. We discuss here only the “centralized server.”

Claim 4—which depends indirectly on claim 1—recites “managing the NAS service for the at least one of the particular distributed devices at least in part utilizing a centralized server.” ’827 patent, col. 46, lines 65–67. Claim 16 depends indirectly on claim 13 and recites a similar limitation. *Id.*, col. 48, lines 16–18. The Board found that OceanStore discloses the “centralized server” limitation required by claims 4 and 16. *OceanStore Decision* at *18.

IV argues that the Board relied on Dr. Kubiadowicz’s conclusory assertions to reach its finding. But Dr. Kubiadowicz’s declaration is not conclusory: it cites to several portions of OceanStore to support his statements that the disclosed servers would cache, monitor, and manage the NAS functionality for users associated with the server. J.A. 1376–79. Moreover, the Board’s decision cites not only to Dr. Kubiadowicz’s testimony but to OceanStore. *OceanStore Decision* at *18. Although IV contends that the ’827 specification describes a centralized server performing several functions not disclosed by OceanStore, those functions are not recited in the claims.

We conclude that substantial evidence supports the Board's finding that OceanStore discloses the "centralized server" limitation in '827 claims 4 and 16.

B

With regard to "assess[ing] unused or under-utilized storage resources" as required by claims 1 and 13, the Board found that OceanStore does not disclose that limitation expressly or inherently. *Id.* at *11. Nevertheless, based on the testimony of Dr. Kubiadowicz and the prosecution history of the '827 patent, the Board determined that the assessing required by this limitation would have been obvious to a relevant artisan. *Id.* at *12–13. We see no reversible error in that determination.

IV argues that Dr. Kubiadowicz's declaration is conclusory on this point. We disagree. The declaration cites to several portions of OceanStore that describe providing storage resources to users by using software, and the declaration concludes that a device must "assess" storage resources in order to make them available. J.A. 1369–70. Additionally, both the Board and Dr. Kubiadowicz noted that the '827 patent itself provides no detail of how the NAS devices assess resources. *Id.*; *OceanStore Decision* at *13. Indeed, in response to a § 112 rejection during prosecution, the applicant argued that "it would have been obvious to one of ordinary skill in the art that the client agent programs must assess unused or under utilized capabilities for it to be able to configure the devices to mimic stand-alone NAS devices using their spare and/or unused capabilities." J.A. 1701 (underlining omitted). This argument is strikingly similar to Dr. Kubiadowicz's own argument.

We conclude that substantial evidence supports the Board's finding that OceanStore teaches or suggests the "assess" limitation.

C

We reach the same conclusion with respect to the claim 5 requirement of “downloading the software-based NAS component to the selected distributed devices.” ’827 patent, col. 47, lines 1–3. Although OceanStore discloses that its software is written in Java, OceanStore at 199, it does not disclose that the software can be downloaded. But based on the record, particularly the testimony of Drs. Kubiatoiwicz and Shenoy, the Board determined that it would have been obvious to a relevant artisan to download the Java files. *OceanStore Decision* at *18–20. We see no reversible error in that determination.

The Board credited Dr. Kubiatoiwicz’s testimony that Java was downloadable at the time of the ’827 patent’s priority date, and his testimony is supported by documentary evidence. J.A. 3365–67. The Board could reasonably credit that testimony even though Dr. Shenoy testified that software was typically distributed using compact disks at the time. That testimony about what was typical was about software generically, not about Java specifically, and Dr. Shenoy recognized that software could have been downloaded over the network. *OceanStore Decision* at *18–20. Dr. Shenoy did not opine on the distribution practices for Java in particular. J.A. 3665–67.

We conclude that substantial evidence supports the Board’s finding that OceanStore teaches or suggests “downloading the software based NAS component.”

V

For the foregoing reasons, we affirm the Board’s decisions.

The parties shall bear their own costs.

AFFIRMED