

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VEEAM SOFTWARE CORPORATION,
Petitioner,

v.

HYBIR, INC.,
Patent Owner.

IPR2020-01039
Patent 9,037,545 B2

Before BART A. GERSTENBLITH, GARTH D. BAER, and
JOHN R. KENNY, *Administrative Patent Judges*.

GERSTENBLITH, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Veeam Software Corporation (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting institution of *inter partes* review of claims 1–20 (“the Challenged Claims”) of U.S. Patent No. 9,037,545 B2 (Ex. 1001, “the ‘545 patent”). Hybir, Inc. (“Patent Owner”) filed a Preliminary Response (Paper 5, “Prelim. Resp.”). In accordance with our prior authorization (Paper 6), Petitioner filed a Reply to the Preliminary Response (Paper 8, “Prelim. Reply”), limited to responding to Patent Owner’s arguments regarding 35 U.S.C. § 325(d) and non-enablement of the asserted prior art, and Patent Owner filed a Sur-reply to Petitioner’s Reply (Paper 10, “Prelim. Sur-reply”). Applying the standard set forth in 35 U.S.C. § 314(a), we instituted an *inter partes* review of the Challenged Claims. Paper 11 (“Inst. Dec.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 16, “PO Resp.”), Petitioner filed a Reply to Patent Owner’s Response (Paper 20, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 29, “PO Sur-reply”).¹ Additionally, we requested that each party file initial and responsive papers on the “ordinary and customary meaning of the term ‘inventory’ as that term is used in the challenged claims.” Paper 27 (Order). In response, the parties each filed Initial Papers (Paper 30 (Patent Owner’s Initial Paper) (“PO Initial Paper”), Paper 31 (Petitioner’s Initial Paper) (“Pet. Initial Paper”)) and Responsive Papers (Paper 32 (Petitioner’s Responsive Paper) (“Pet. Resp. Paper”), Paper 33 (Patent Owner’s Responsive Paper)

¹ Patent Owner initially filed its sur-reply for related case IPR2020-01040 as Paper 24 in this proceeding.

(“PO Resp. Paper”)). An oral hearing was held on September 23, 2021, and a copy of the transcript was entered in the record. Paper 34 (“Tr.”).²

We have jurisdiction pursuant to 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of the claims on which we instituted trial. Petitioner bears the burden of proving unpatentability of the Challenged Claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2019). Having reviewed the arguments and the supporting evidence, we determine that Petitioner has shown, by a preponderance of the evidence, that the Challenged Claims of the ’545 patent are unpatentable.

B. Related Proceedings

Petitioner and Patent Owner identify the following related matter: *Hybir, Inc. v. Veeam Software Corp.*, No. 1:20-cv-10329 (D. Mass) (filed Feb. 19, 2020). Pet. 3; Paper 4 (Patent Owner’s Mandatory Notices), 2. In addition, Petitioner filed two petitions challenging claims of related U.S. Patent No. 8,051,043 B2 in IPR2020-01037 and IPR2020-01038, and a petition challenging claims of related U.S. Patent No. 9,679,146 B2 in IPR2020-01040. *See* Pet. 3.

² The oral hearings for this proceeding and three related proceedings (IPR2020-01037, IPR2020-01038, and IPR2020-01040) were held together because many of the issues presented by the parties overlap. Paper 25 (Order Granting the Parties’ Requests for Oral Hearing), 1.

C. Real Parties in Interest

Petitioner identifies Veeam Software Corporation as the real party in interest. Pet. 3. Patent Owner identifies Hybir, Inc. as the real party in interest. Paper 4, 2.

D. The Instituted Grounds of Unpatentability and Declaration Evidence

Petitioner challenges the patentability of claims 1–20 of the '545 patent on the following grounds:

Claim(s) Challenged	35 U.S.C. §³	Reference(s)/Basis
1–4, 6–10, 12–20	103(a)	Field, ⁴ Anderson ⁵
5	103(a)	Field, Anderson, Ackerman ⁶
11	103(a)	Field, Anderson, Coombs ⁷

Pet. 4; Inst. Dec. 3. Petitioner supports its challenge with two declarations by Prashant Shenoy, Ph.D., one submitted with the Petition (Ex. 1002 (Declaration of Dr. Prashant Shenoy, Ph.D.)) and the other submitted with Petitioner's Reply (Ex. 1024 (Declaration of Dr. Prashant Shenoy, Ph.D. in Support of Petitioner's Reply to Patent Owner's Response)). Patent Owner supports its arguments with a declaration by Jon B. Weissman, Ph.D.

³ The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the '545 patent has an effective filing date before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability.

⁴ U.S. Patent Application Publication No. 2006/0212439 A1, published Sept. 21, 2006 (Ex. 1004, "Field").

⁵ U.S. Patent Application Publication No. 2005/0114614 A1, published May 26, 2005 (Ex. 1005, "Anderson").

⁶ U.S. Patent No. 7,966,495 B2, issued June 21, 2011 (Ex. 1006, "Ackerman").

⁷ U.S. Patent Application Publication No. 2004/0030852 A1, published Feb. 12, 2004 (Ex. 1008, "Coombs").

(Ex. 2008 (Declaration of Dr. Jon Weissman, Ph.D. in Support of Patent Owner's Response)).

E. The '545 Patent

The '545 patent “relates generally to computer data rights and data identity.” Ex. 1001, 1:16–17. The '545 patent indicates that a common inefficiency of most prior art backup techniques is that they rely on taking an initial image or full backup of the entire contents of a computer system. *Id.* at 1:46–49. Another purported inefficiency is that many systems will maintain multiple copies of the same files. *Id.* at 2:8–10. An object of the '545 patent is “to provide a more efficient method and system for managing files, file rights, and file identity.” *Id.* at 2:19–21.

Figure 1 of the '545 patent is reproduced below:

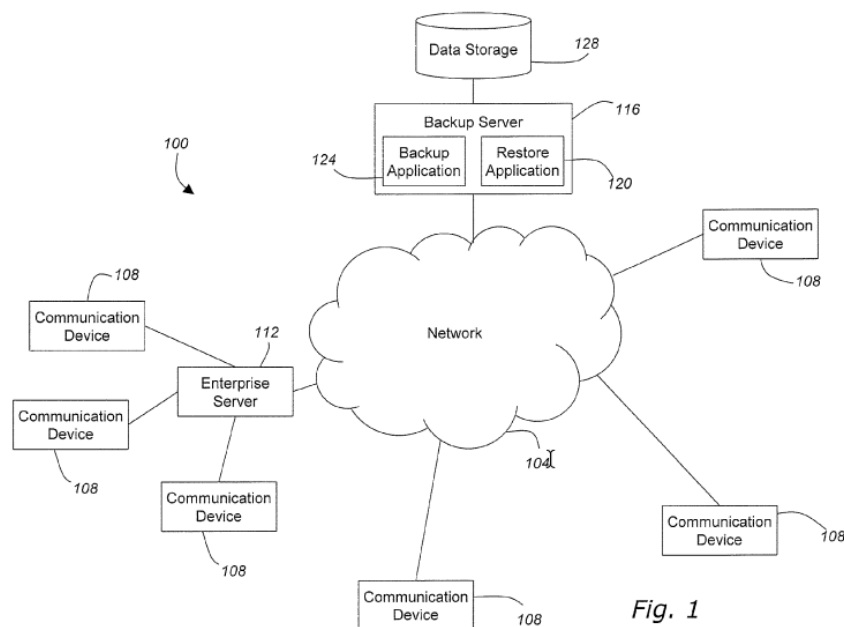


Figure 1 is a block diagram depicting communication system 100, which includes communication network 104, one or more communication devices 108, enterprise server 112, backup server 116, and data storage 128.

Ex. 1001, 3:54–56, 4:51–57. “[B]ackup server 116 is characterized by the ability to manage a file backup system for a group of users, each of which may be associated with one or more communication devices 108.” *Id.* at 5:31–34. Additionally, “backup server 116 is provided with a backup application 124 to enable users to backup files from their respective communication devices 108 to either the backup server 116 or to the data storage 128.” *Id.* at 5:35–38.

Figure 2 of the ’545 patent is reproduced below:

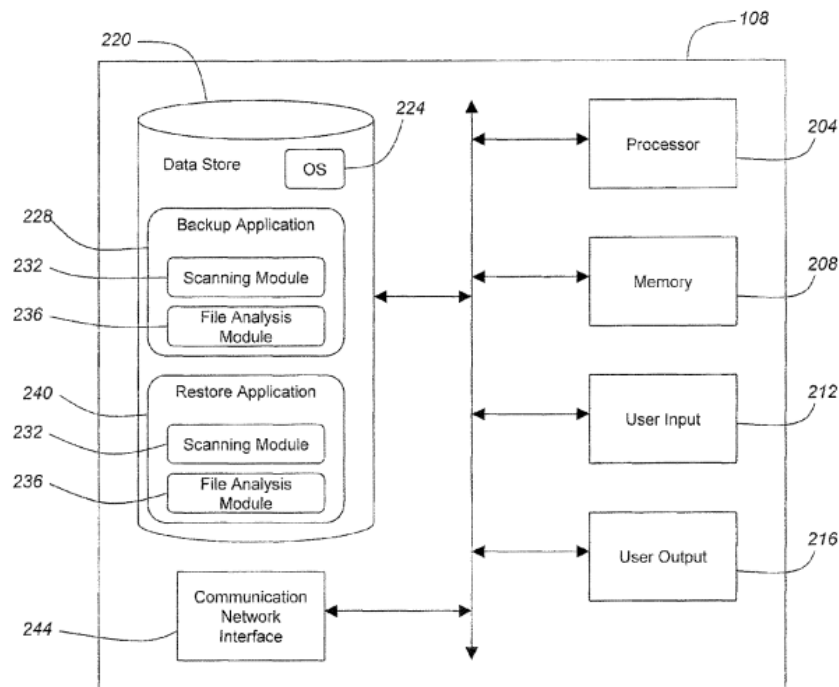


Fig. 2

Figure 2 is a block diagram of communication device 108. Ex. 1001, 3:57–59, 7:22–25. Communication device 108 includes data storage 220, which includes backup application 228 and restore application 240 “that provides functionality similar to the backup server 116 described in relation to FIG. 1.” *Id.* at 7:57–59, 8:1–4. Backup application 228 can backup files from communication device 108 to a remote storage location, such as data

storage 128. *Id.* at 8:4–8. “To facilitate coordination of a group-based backup system,” backup application 228 includes scanning module 232 and file analysis module 236. *Id.* at 8:8–10. Scanning module 232 “perform[s] an initial scan of local files to make a quick determination as to whether file data has been changed, updated, added, etc.” *Id.* at 8:11–13. File analysis module 236 “perform[s] a more in-depth analysis of files that the scanning module 232 has identified as possibly changed, updated, added, and so on.” *Id.* at 8:25–28.

Figure 3 of the ’545 patent is reproduced below:



Fig. 3

Figure 3 is a logical representation of data structure 300, which is used to manage files and data structures in a backup/restore operation. Ex. 1001, 4:60–62, 9:39–42. The data structure includes descriptor generating algorithm field 312 and descriptor field 316. *Id.* at 9:42–45. Each electronic file or portion of a file may have a descriptor associated with it. *Id.* at 10:30–31. “[C]ommunication device 108 and backup server 116 can reference a common file by independently generating a descriptor for the file using an agreed upon descriptor generating algorithm.” *Id.* at 10:34–37. The “descriptor may be a combination of file metadata (e.g., file storage location and other bibliographic information pertaining to the file) and cryptographic signature or signatures.” *Id.* at 2:44–46.

Figure 5 of the '545 patent is shown below:

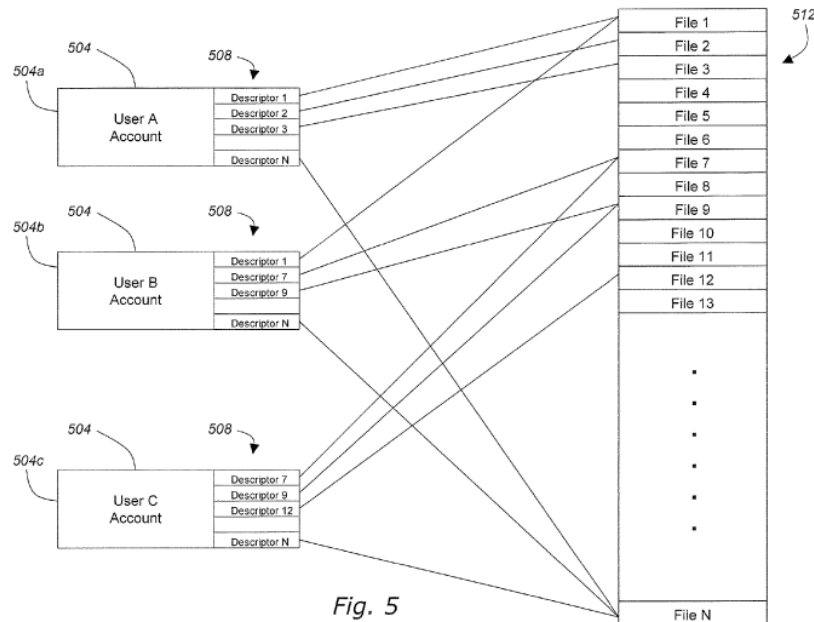


Figure 5 shows a group-based backup data structure, which is typically maintained on backup server 116. Ex. 1001, 3:65–67, 11:1–6. Backup server 116 maintains inventories 504 for each user account. *Id.* at 11:6–8. Backup server 116 may maintain a list of backed up files 512 currently stored in the common data storage 128 and may reference the list of backed up files 512 through a descriptor mapping. *Id.* at 11:23–26. “In other words, the file data itself may be maintained on the data storage 128 and the backup server 116 may maintain its list of backed up files 512 as a list of descriptors.” *Id.* at 11:26–29.

The '545 patent explains that “backup server 116 can quickly compare the descriptors associated with each user to the descriptors outlined in the list of backed up files 512 to determine[] which files each user has access to.” Ex. 1001, 11:29–33. Thus, “backup server 116 only has to maintain one copy of any file in the data storage 128 and can utilize a descriptor mapping to determine which user and/or communication device 108 is

allowed access to the one copy of a file.” *Id.* at 11:33–37. The ’545 patent states:

This is particularly useful in situations where a single file is stored on a number of different communication devices 108. Each communication device 108 may utilize the file locally but desires a backup of the file on the data storage 128. The backup server 116 can provide the backup facilities for the file but does not have to maintain a separate copy corresponding to each copy in the communication system 100.

Id. at 11:37–43.

Figure 6 of the ’545 patent is reproduced below:

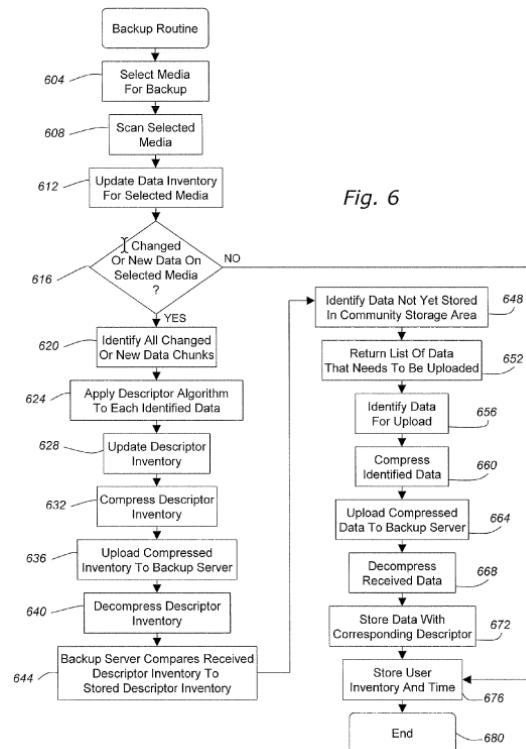


Figure 6 depicts a backup routine. Ex. 1001, 4:1–3, 12:13–15. In step 604, media is selected for backup at communication device 108 or at enterprise server 112. *Id.* at 12:19–22. In step 608, scanning module 232 scans the selected media, creating a snapshot identifying the electronic data (e.g., files) on the selected media and the time at which those files resided there,

and also scans the metadata of the various files in the selected media to determine if any files have a changed timestamp that is more recent than the last backup. *Id.* at 12:30–42.

In step 612, scanning module 232 may update the file inventory for the selected media. Ex. 1001, 12:43–44. In step 616, scanning module 232 determines if there is any data on the selected media that have been changed or added and, in step 620, identifies the changed or new electronic data and updates the inventory of files. *Id.* at 12:51–61. In step 624, “the backup application 228 employs the file analysis module 236 to apply the predetermined descriptor generating algorithm to each identified piece of data”—the algorithm is applied to “any file, portion of file, chunk of data, or data structure that has been identified as changed or new to create a new descriptor corresponding to that piece of data.” *Id.* at 12:63–13:3.

In step 628, file analysis module 236 updates the descriptor inventory locally and, following compression in step 632, the compressed inventory is transmitted across communication network 104 to backup server 116, in step 636. Ex. 1001, 13:4–7, 13:14–16, 13:21–23. The backup server 116 decompresses the descriptor inventory and stores the inventory as part of user’s inventory 504 in list of descriptors 508. *Id.* at 13:23–26. In step 644, backup server 116 uses backup application 124 to compare the received descriptor inventory to descriptors in the list of backed up files 512, “determin[ing] for each descriptor in the received descriptor inventory, whether the corresponding file, file portion, chunk of data, or data structure is already stored in the data storage 128.” *Id.* at 13:30–36. Backup application 124 generates a list of data portions (e.g., a list of files) that need to be uploaded because they are not currently on data storage 128 and that

list, “usually in the form of descriptors,” is sent to communication device 108 in step 652. *Id.* at 13:39–44.

Communication device 108 receives the list of descriptors, identifies the corresponding data or files, and then compresses the identified data using backup application 228 in step 660. Ex. 1001, 13:45–51. The compressed data and corresponding descriptors are then uploaded to backup server 116 in step 664. *Id.* at 13:56–58. The ’545 patent explains that although additional processing is required to compare descriptors, “by performing this preliminary check . . . the amount of data transmitted may be greatly reduced if the backup server 116 has copies of most of the files,” thus reducing the amount of data required for transmission and thereby increasing the speed of a backup operation. *Id.* at 13:58–67.

Figure 7 of the ’545 patent is reproduced below:

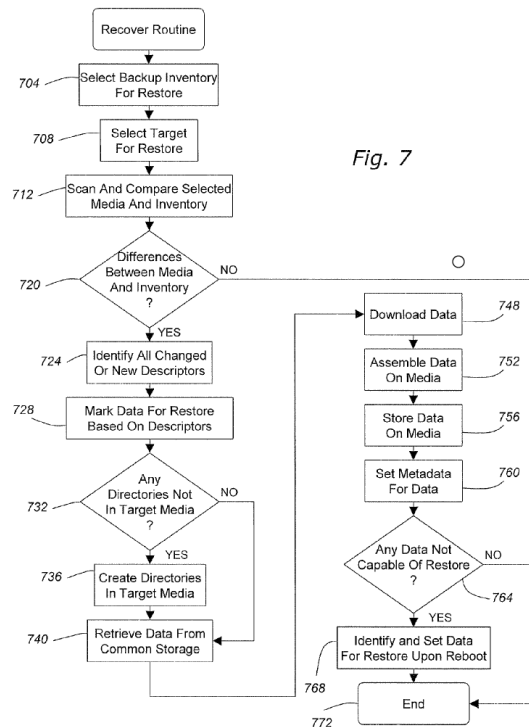


Figure 7 is a flow chart depicting aspects of a restore/recover routine.

Ex. 1001, 4:4–6, 14:21–23. As the ’545 patent explains, “[t]he recover

routine begins with the selection of a backup inventory for the restore” in step 704, where “a user essentially selects the point-in-time that they would like to have their communication device 108 restored back to” or is “automatically selected if there is only one backup for a particular communication device 108.” *Id.* at 14:27–33. In step 708, a user selects the target media (e.g., “a C: drive of a communication device 108 or a particular network drive associated with the enterprise server 112”) for the restore. *Id.* at 14:38–41.

In step 712, restore application 240 of communication device 108 scans the selected target media and compares the selected media with the inventory. Ex. 1001, 14:42–45. “[R]estore application 240 determines if there are any differences between the media and the inventory” in step 720. *Id.* at 14:58–60. The ’545 patent explains:

If any differences are detected, the method continues by identifying the changed electronic data and its corresponding descriptor from the inventory (step 724). More specifically, after the scanning and comparison step, electronic data that is identified as potentially different due to timestamp differences are analyzed to generate the descriptors. If the descriptor is different from the previous descriptor, then the former descriptor is added to the list of files to restore. This can eliminate the need to restore large amounts of data in certain scenarios. For instance, during a restore of a particular backup of a communication device 108 over another communication device 108 such a feature may be useful. However, most electronic data does not usually change since its previous backup and such data would be identified as unchanged if not by the scanning step, then by the comparison of the descriptors. The descriptors from the inventory represent the electronic data at the time the last backup occurred. Those files or electronic data that have changed since the identified point-in-time are then marked for restoration (step 728). More specifically, in accordance with certain embodiments of the present invention,

the descriptors corresponding to the electronic data are marked for restoration.

Id. at 14:64–15:18.

In step 732, restore application 240 determines if any directories in the inventory are not present in the target media and, if not present, restore application 240 creates those directories in the target media in step 736.

Ex. 1001, 15:19–24. In step 740, restore application 240 then requests that the backup server retrieve the electronic data, which is performed by first checking locally to see if the most recent backup is on communication device 108 or some other local media, but, if it is not, restore application 240 provides the list of descriptors marked for restore to backup server 116. *Id.* at 15:29–35, 15:44–47. “[B]ackup server 116 utilizes the descriptor to file mapping to retrieve the requested electronic data from the data storage 128.”

Id. at 15:47–49. Backup server 116 is able to allow communication device 108 to access only the files and other data listed in the inventory associated with the device, thus securely maintaining files that the device never had. *Id.* at 15:49–52. “Accordingly, the descriptor in this step acts as a credential to the files or electronic data that were previously backed up from the communication device 108.” *Id.* at 15:55–58.

In step 748, backup server 116 downloads the electronic data to requesting communication device 108, and restore application 240 stores all of the electronic data on the target media in step 756. Ex. 1001, 15:59–66. In step 764, “[f]ollowing the reassembly and restoration of the target media[,] the restore application 240 determines if there are any files or other electronic data not currently capable of a restore” and identifies and sets such files for a restore upon reboot. *Id.* at 16:12–21.

F. Illustrative Claims

Claims 1 and 10, the independent claims challenged in this proceeding, are illustrative of the claimed subject matter and are reproduced below, with Petitioner's bracketing added for reference:

1. [1-pre] A method of managing data in an encrypted system comprising a backup server and a client device having a first remote storage medium, the client device and backup server being configured to exchange encrypted communications with one another, the method comprising:

[1A] receiving, at the client device, a request to backup data from the first remote storage medium to the backup server;

[1B.1] in response to receiving the request, initiating a backup routine at the client device, the backup routine comprising:

[1B.2] identifying a first set of files stored on the first remote storage medium;

[1B.3] generating, at the client device, a cryptographic signature value for each file in the first set of files, wherein the cryptographic signature value is computed by using actual data of the file as an input to a cryptographic signature generating algorithm which computes the cryptographic signature value;

[1B.4] generating, at the client device, a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature value generated for each file in the first set of files;

[1B.5] transmitting the first inventory from the client device to the backup server via one or more encrypted communications; and

[1B.6] causing one or more files from the first set of files to be transmitted to the backup server for storage by the backup server upon determining that the cryptographic signature values generated for each file in the first set of files allows access to the one or more files on the backup server.

10. [10-pre] A client device configured to exchange encrypted communications with a backup server over a communication network, the client device comprising:
- [10A] a first remote storage medium; and
 - [10B.1] a backup application configured to execute a backup routine comprising:
 - [10B.2] identifying a first set of files stored on the first remote storage medium;
 - [10B.3] generating a cryptographic signature value for each file in the first set of files, wherein the cryptographic signature value is computed by using actual data of the file as an input to a cryptographic signature generating algorithm which computes the cryptographic signature value;
 - [10B.4] generating a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature values generated for each file in the first set of files;
 - [10B.5] transmitting the first inventory from the client device to the backup server via one or more encrypted communications; and
 - [10B.6] causing one or more files from the first set of files to be transmitted to the backup server for storage by the backup server upon determining that the cryptographic signature value generated for each file in the first set of files allows access to the one or more files on the backup server.

Ex. 1001, 18:40–19:6 (claim 1), 19:40–20:11 (claim 10).

G. Level of Ordinary Skill in the Art

Petitioner, supported by Dr. Shenoy’s testimony, proposes that a person of ordinary skill in the art at the time of the invention would have had “a B.S. degree in Computer Science, Computer Engineering, Electrical Engineering, or an equivalent field, as well as at least 3–5 years of academic

or industry experience in the fields of data backup, data restore, data replication, and/or data synchronization.” Pet. 11 (citing Ex. 1002 ¶¶ 13–26).

As we noted in the Institution Decision, Patent Owner’s Preliminary Response proposed a level of ordinary skill in the art that was very similar to Petitioner’s proposal. Inst. Dec. 16 (citing Prelim. Resp. 16). On the preliminary record at that time, we found both parties’ proposals consistent with the level of ordinary skill in the art reflected by the prior art of record. *Id.* (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978)). And, on that record, we found that “one of ordinary skill in the art at the time of the invention would have a Bachelor of Science degree in Computer Science, Computer Engineering, Electrical Engineering, Software Engineering, or an equivalent field, as well as at least three to five years of academic or industry experience in the fields of data storage, data backup, data restoration, data replication and deduplication, and/or data synchronization.” *Id.* at 16–17.

In its Patent Owner Response, Patent Owner, relying on Dr. Weissman’s testimony, appears to adopt the same level of ordinary skill in the art set forth in the Institution Decision, without explicitly stating so. PO Resp. 21 (citing Ex. 2008 ¶ 18). In particular, Patent Owner proposes that a person of ordinary skill in the art at the time of the invention would

at least have a Bachelor of Science degree in Computer Science, Computer Engineering, Electrical Engineering, Software Engineering, or an equivalent field, as well as at least 3–5 years of academic or industry experience in the fields of

data storage, data backup, data restoration, data replication and deduplication, and/or data synchronization.

Id. (citing Ex. 2008 ¶ 18).

As reflected above, Patent Owner agrees with our preliminary finding regarding the level of ordinary skill in the art and Petitioner does not address our preliminary finding in its Reply. Accordingly, we see no reason to disturb that finding, and, therefore, we maintain and reaffirm that one of ordinary skill in the art at the time of the invention would have had a Bachelor of Science degree in Computer Science, Computer Engineering, Electrical Engineering, Software Engineering, or an equivalent field, as well as at least three to five years of academic or industry experience in the fields of data storage, data backup, data restoration, data replication and deduplication, and/or data synchronization.

II. 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). *See* 37 C.F.R. § 42.100(b) (2019). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as understood by one of ordinary skill in the art at the time of the invention. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc). In construing claims in accordance with their ordinary and customary meaning, we take into account the specification and prosecution history. *Phillips*, 415 F.3d at 1315–17.

If the specification “reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise

possess[,] . . . the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316 (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). Another exception to the general rule that claims are given their ordinary and customary meaning is “when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Uship Intellectual Props., LLC v. United States*, 714 F.3d 1311, 1313 (Fed. Cir. 2013) (quoting *Thorner v. Sony Computer Entm’t Am., LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)).

Additionally, only terms that are in controversy need to be construed, and these need be construed only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”); *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs.* in the context of an *inter partes* review).

In the Institution Decision, we noted that neither party proposed any claim terms for construction at that stage of the proceeding, and we did not construe any claim terms expressly as none of the terms were in dispute. Inst. Dec. 18. In the briefing following institution, Patent Owner proposed a construction for the term “inventory,” *see, e.g.*, PO Resp. 21–28, and it became clear that the parties dispute the meaning of the term. Accordingly, we address the parties’ arguments and proposed constructions.

A. “inventory”

1. The Parties’ Proposed Constructions

Patent Owner contends that “inventory” should be construed as “electronic data that reflects the current state of a storage medium and includes a list of files on the storage medium[,] at least one descriptor identifying the file(s)[,] and the directory structure of the file(s).”⁸ PO Resp. 22 (citing Ex. 1001, 8:18–48, 15:19–31; Ex. 2008 ¶ 68); PO Initial Paper 1.

Petitioner contends that “inventory” should be construed as “an itemized list of electronic data.” Pet. Reply 1–4; Pet. Initial Paper 1. In particular, Petitioner contends that “inventory” should be “afforded its ordinary and customary meaning,” (Pet. Reply 1–2 (citing Pet. 11)), which, as recited in the Challenged Claims, is “an itemized list of electronic data” (Pet. Initial Paper 1).

2. The Parties’ Arguments

a. Patent Owner’s Response⁹

As set forth above, Patent Owner contends that “inventory” should be construed as “electronic data that reflects the current state of a storage medium and includes a list of files on the storage medium[,] at least one descriptor identifying the file(s)[,] and the directory structure of the file(s).” PO Resp. 22 (citing Ex. 1001, 8:18–48, 15:19–31; Ex. 2008 ¶ 68) (emphasis

⁸ Patent Owner’s Initial Paper added two commas to the proposed construction, which help identify the specific aspects of Patent Owner’s proposal. PO Initial Paper 1. Whether or not the commas are included, the analysis below is effectively the same.

⁹ As noted above, Patent Owner’s Response was the first instance either party proposed an express construction of “inventory.”

omitted). Patent Owner asserts that the Specification explains that “the file inventory reflects the current state of the drive and may include a description of the hierarchical structure of the drive as well as markers identifying sizes of chunks of files.” *Id.* (citing Ex. 1001, 8:18–21, 13:10–12, 15:17–31; Ex. 2008 ¶ 69). Patent Owner contends that “[t]he electronic data that is part of the inventory includes raw data and metadata” (*id.* (citing Ex. 1001, 8:34–35; Ex. 2008 ¶ 69)), and “[t]he unique descriptor stored in an inventory is generated from raw data and metadata of a file or portion of a file and the directory structure of the same file / portion of the same file” (*id.* (citing Ex. 1001, 8:35–38, 15:17–18; Ex. 2008 ¶ 69)).

Patent Owner relies on Figure 7 of the ’545 patent, which “is a flow chart depicting aspects of a restore routine.” Ex. 1001, 4:4–5; *see* PO Resp. 22 (citing Ex. 1001, Fig. 7; Ex. 2008 ¶ 69). Patent Owner contends that Figure 7 and the description thereof in the Specification support its construction of inventory. PO Resp. 22–24 (citations omitted). In particular, Patent Owner asserts that “a backup inventory stores descriptors, which correspond to the electronic data marked for restoration, as well as directory structures for the restored data.” *Id.* at 23 (citing Ex. 1001, 15:17–18; Ex. 2008 ¶ 70). Patent Owner notes that the Specification states that “[a]fter the descriptors are marked for restoration, the ‘restore application continues by determining if any directories in the inventory are not present in the target media.’” *Id.* (quoting Ex. 1001, 15:19–22). Patent Owner states that “[i]f there are directories stored in the backup inventory and not in the target media, then those directories are created for the target media.” *Id.* (citing Ex. 1001, 15:22–24). Patent Owner refers to the remainder of the restore process, contending that “the backup inventory provides enough data

to allow for a complete restore of a client device.” *Id.* at 24 (citing Ex. 2008 ¶ 71).

Additionally, Patent Owner contends that its proposed construction “is consistent with [inventory’s] ordinary meaning.” PO Resp. 24 (citing Ex. 2008 ¶ 72). In particular, Patent Owner points to two extrinsic dictionary definitions of “inventory,” which define “inventory” as “a complete list of items such as property, goods in stock, or the contents of a building” and “a detailed list of all the things in a place,” and an extrinsic definition of “data backup inventory” as a “detailed and often descriptive catalog, aggregate view or list of relevant Data Backup Items that is often somewhat important, sanctioned or approved in its nature.” *Id.* (citing Ex. 2012 (Google webpage showing definition of “inventory” from “Oxford Languages”), 1; Ex. 2013 (webpage showing definition of “inventory” from the Cambridge English Dictionary), 1; Ex. 2014 (webpage showing definition of “data backup inventory” from The International Foundation for Information Technology), 1; Ex. 2008 ¶¶ 72–73).

Patent Owner contends that Petitioner and Dr. Shenoy assert that “inventory” is simply “an itemized list,” which can consist of “a list of ‘signatures corresponding to the one or more selected files for backup.’” PO Resp. 25 (citing Pet. 37); *id.* at 25–26 (quoting Ex. 2015 (transcript of Dr. Shenoy’s deposition), 97:18–98:13, 98:24–100:2). Patent Owner asserts that Petitioner’s construction “is contradicted by the intrinsic evidence including the claim language itself” because the claims “clearly and repeatedly use the terms inventory and list in different ways.” *Id.* at 26 (citing Ex. 2008 ¶ 75). Although neither Patent Owner nor Dr. Weissman explains the different use of “inventory” and “list,” Patent Owner points to

claim 1 of the '545 patent noting that the following language makes clear that “a ‘cryptographic signature’ is part of, but not identical to the inventory”: “a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature value generated for each file in the first set of files.” *Id.* (citing Ex. 2008 ¶ 75; Ex. 1001, 18:59–64). Additionally, Patent Owner asserts that Dr. Shenoy agreed that additional data about the current state of the drive would be needed to provide a volume backup. *Id.* at 26–27 (quoting Ex. 2015, 45:3–15, 46:11–23).

Further, Patent Owner contends that “use of the language ‘reflects a current state of the first remote storage medium’ indicates that there are more than just cryptographic signatures for an inventory of electronic data, *e.g.*, directory structure of the electronic data.” PO Resp. 27 (citing Ex. 2008 ¶ 76). And, Patent Owner contends, because the ordinary meaning of “inventory” includes the terms “detailed” and “complete,” the extrinsic evidence “does not support Dr. Shenoy’s construction of inventory as merely an ‘itemized list.’” *Id.* (citing Ex. 2008 ¶ 76). Patent Owner further asserts that its construction “is consistent with the embodiments described and claimed in the '545 Patent, in which inventories are transmitted through encrypted communications between the communication device and backup server to determine which files to backup or restore in view of the current state of the drive on the communication device.” *Id.* at 28 (citing Ex. 1001, claims 1, 10, 12, 13; Ex. 2008 ¶ 77).

b. Petitioner's Reply

In its Reply, Petitioner contends that “inventory” should be “afforded its ordinary and customary meaning” and that Patent Owner propounds “an improperly narrow construction of the term ‘inventory,’ purporting to import *four* separate requirements into this single term.” Pet. Reply 1–2. In particular, Petitioner asserts that Patent Owner’s construction seeks to require that an inventory: (1) reflect the current state of a storage medium, (2) include a list of files on the storage medium, (3) include at least one descriptor identifying the file(s), and (4) include the directory structure of the file(s). *See id.* at 2 (citing Ex. 1025 (transcript of Dr. Weissman’s deposition), 39:13–40:13; PO Resp. 22).

First, Petitioner contends that “[i]mportation of these four limitations is improper . . . because the claims themselves define the ‘inventory.’” Pet. Reply 2 (citations omitted).

Second, Petitioner argues that Patent Owner’s construction “is also inconsistent with the ’545 patent specification, which provides no definition for the term ‘inventory’ nor any specific requirements, much less the four propounded by” Patent Owner. Pet. Reply 2–3 (citing Ex. 1024 ¶¶ 8–9). Petitioner contends that “the specification uses the term as an open-ended construct, merely providing examples of what data *may* be included in an inventory—not what *must* be.” *Id.* at 3 (citing Ex. 1001, 8:18–20, 11:18–22; Ex. 1024 ¶¶ 9, 12–13). Petitioner provides additional discussion of each clause in Patent Owner’s proposed construction, arguing that each is improper in light of the Specification. *See id.* at 4–16.

Third, Petitioner asserts that Patent Owner “cannot manufacture a construction based on nothing more than cherry-picked extrinsic evidence

and unsupported expert testimony.” Pet. Reply 3. Petitioner contends that even Patent Owner’s “carefully-selected dictionary definitions do not support [Patent Owner’s] proposed construction” because “[n]one of the four proposed requirements are expressed or implied by the words ‘detailed’ or ‘complete.’” *Id.* (citing Ex. 1024 ¶¶ 10–11). Petitioner further notes that Patent Owner “expressly ignores that [Dr. Shenoy’s construction of inventory as an itemized list] is derived from the Merriam-Webster dictionary, which defines ‘inventory’ as ‘an itemized list of current goods or asserts.’” *Id.* at 3–4 (emphasis omitted) (citing Ex. 1034 ¶ 117 (citing Ex. 1029 (The Merriam-Webster Dictionary), 384); Ex. 1024 ¶ 8).

Further, Petitioner asserts that Patent Owner’s “proposed construction fails at almost every canon of claim construction: it is confusing, makes optional information a requirement, duplicates and renders superfluous claim language, and conflicts with the doctrine of claim differentiation.” Pet. Reply 4. Instead, Petitioner contends that “inventory” should be construed in accordance with its ordinary meaning. *Id.* (citations omitted).

c. PO’s Sur-Reply

In its Sur-reply, Patent Owner contends that “Petitioner incorrectly focuses the weight of its argument on the linguistic aspects of Patent Owner’s claim construction of the term ‘inventory’ rather than the fundamental principles of how one of ordinary skill in the art would have understood the term based on the specification and claims.” PO Sur-reply 1. Patent Owner asserts that it “never characterized its construction as having . . . four requirements nor argued they were entirely independent of one another.” *Id.* at 2. Patent Owner contends that “[e]ach aspect of its

construction adds meaning while at the same time possibly overlapping to some extent with other aspects.” *Id.*

In particular, Patent Owner contends that “nothing precludes some potential overlap between portions of a construction. Here, for example, the list of file(s) and the directory structure of the file(s) may be useful, but not necessarily sufficient, in determining the current state of the storage medium.” PO Sur-reply 3–4. Patent Owner asserts that its construction “captures the data needed in the inventory according to the specification to achieve” the requirements of the claimed deduplication process as well as restoring a storage medium. *Id.* at 4. Patent Owner contends that its construction is “based on the fundamental principle of giving claims their ordinary and customary meaning that would have been accorded by a person of ordinary skill in the art.” *Id.* (citation omitted). Additionally, Patent Owner contends that “patent specifications often use the word ‘may’ even in reference to requirements.” PO Sur-reply 4. Patent Owner walks through each of the four aspects of its construction in response to Petitioner’s arguments. *Id.* at 5–10.

d. Initial and Responsive Papers

In addition to the information provided by the parties in the papers discussed above, each party filed an Initial Paper and Responsive Paper in response to our request for each party to set forth “its contentions regarding the ordinary and customary meaning of the term ‘inventory’ as that term is used in the challenged claims.” Paper 27, 1. In its Initial Paper, Petitioner contends that “the ordinary and customary meaning of the term ‘inventory,’ as recited in the challenged claims, is ‘an itemized list of electronic data.’” Pet. Initial Paper 1. Petitioner contends that the use of “inventory” in the

Specification is consistent with the dictionary definition of “inventory” as “an itemized list of current goods or assets.” *Id.* (quoting Ex. 1029, 384) (citing Ex. 1024 ¶ 8). Petitioner also asserts that Patent Owner’s cited dictionary definitions “further confirm this understanding.” *Id.* at 1–2 (citing Exs. 2012–2014).

Additionally, Petitioner reiterates that “[t]he term ‘inventory’ does not define, describe, or limit the contents of the inventory itself; rather, those limitations are provided by each challenged claim, which describe[s] what information the ‘inventory’ must contain.” Pet. Initial Paper 2 (footnote omitted). Petitioner contends that “[n]othing, in either the extrinsic or intrinsic evidence, demands that the term ‘inventory’ must reflect a certain amount or type of data, or take on any particular form,” although the claims “do provide additional details.” *Id.* (citing Pet. Reply 3–4; Ex. 1024 ¶¶ 8–13).

In its Initial Paper, Patent Owner contends that its construction “is consistent with the ordinary and customary meaning of the term ‘inventory.’” PO Initial Paper 1. Patent Owner offers six exemplary dictionary definitions of “inventory” that it contends reflect that “inventory” is “more than just a list.” *Id.* at 1–2 (citations omitted). In particular, each of Patent Owner’s dictionary definitions includes a version of the phrase “a detailed [or complete] list.” *Id.* at 1 (emphasis omitted); *see id.* at 2 (noting that “inventory” would have been understood as “a ‘complete,’ ‘detailed,’ and ‘often descriptive’ list which includes other data about the items and/or information identified in the inventory”). Patent Owner asserts that “[t]he exact nature of the other data kept in a particular inventory would depend on

the nature of the items contained in the inventory, as these definitions reflect.” *Id.* at 2.

Additionally, Patent Owner explains that the “elements of the inventories in the claims are recited to explain which data or storage medium is being described by the inventory and not to add limitations to what is in the inventory, as Petitioner suggests.” PO Initial Paper 3. For example, Patent Owner points to element [10B.4] of claim 10 of the ’545 patent, which recites “generating a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature values generated for each file in the first set of files.” Ex. 1001, 19:54–20:2; *see* PO Initial Paper 3–4. Patent Owner contends that the first wherein clause “informs the reader that the current state in the first inventory is for the first remote storage medium and not a different storage medium” and that the second wherein clause “establishes [that the cryptographic signature values] are generated for the first set of files as opposed to a different set of files.” *Id.* at 4.

In its Responsive Paper, Petitioner contends that Patent Owner “never actually explains what the ordinary and customary meaning of ‘inventory’ is” and instead relies on “‘exemplary’ dictionary definitions for the vague proposition that ‘the ordinary and customary meaning of “inventory” is more than just a list.’” Pet. Resp. Paper 1. Petitioner asserts, however, that none of the definitions support Patent Owner’s argument because none define how much “more” is needed for a list to be considered an “inventory” nor do any set forth the numerous requirements included in Patent Owner’s proposed construction. *Id.* Petitioner explains that “[c]onsistent with these

definitions, an ‘inventory’ is a specific type of *list* that accounts for *all items* being inventoried, whether that be files selected for backup, files present on a backup server, or—in a different context—items in a grocery store.” *Id.* Petitioner asserts that “[t]he very purpose of an inventory is to account for each subject item, which is why Patent Owner’s cited dictionaries define ‘inventory’ as an ‘itemized,’ ‘detailed,’ or ‘complete’ list of items.” *Id.* Petitioner contends, however, that “those dictionaries contemplate what [P]atent Owner ignores: the form in which those items are represented may vary, and so the ordinary and customary meaning of the term ‘inventory’ in no way requires use of any particular attributes to represent the subject items.” *Id.* at 1–2 (citing Pet. Initial Paper 2–3).

Additionally, Petitioner contends that Patent Owner’s citations to the Specification “do not suggest a different meaning.” Pet. Resp. Paper 2. “Rather, consistent with the ordinary and customary meaning provided by Petitioner, the [’545] patent allows for various different types of information to be present within an inventory.” *Id.* (citations omitted). Particularly, Petitioner contends that the Specification explains “that an inventory *may* include certain information associated with the inventoried items,” but that does not mandate that such information is “inherent within the meaning of ‘inventory.’” *Id.* (citations omitted).

In its Responsive Paper, Patent Owner contends that Petitioner’s construction of inventory “reads all meaning out of th[e] word.” PO Resp. Paper 1. Patent Owner asserts that the claims and Specification contradict any argument that an “inventory” is the same as a list. *Id.* Additionally, Patent Owner asserts that “Petitioner’s argument is blatantly inconsistent with the ordinary and customary meaning of the term ‘inventory’ as set forth

in [the] various dictionaries as including a ‘detailed,’ ‘complete,’ and ‘often descriptive’ set of data.” *Id.* at 2 (citing Exs. 2012–2014). And, Patent Owner contends that its construction is “supported by both the extrinsic evidence and the patent[itself] as including specific types of additional and detailed information about the items.” *Id.*

3. Discussion

Above, we set forth the standard that applies in this proceeding, and we reiterate that “[t]he words of a claim are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history.” *Thorner*, 669 F.3d at 1365 (citing *Phillips*, 415 F.3d at 1313). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Id.* (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1580 (Fed. Cir. 1996)).

In this case, neither party contends that either exception to the general rule of construing claim terms in accordance with their ordinary and customary meaning applies. We agree with the parties that the term “inventory” should be given its plain and ordinary meaning because the patentee did not act as his own lexicographer by defining the term “inventory” and did not disavow the full scope of the term “inventory.” The parties disagree, however, as to the ordinary and customary meaning of “inventory.” Before turning to the parties’ particular disagreements, we recognize where the parties’ proposed constructions agree. In particular, the parties agree, as do we, that the ordinary and customary meaning of

“inventory” includes the terms “electronic data” and “list.” Below, we address the disputed portions of the parties’ proposed constructions, starting with Patent Owner’s.

a. Patent Owner’s Proposed Construction

As described above, Patent Owner’s proposed construction reflects four aspects of an “inventory.” Specifically it is “electronic data” that (1) “reflects the current state of a storage medium,” (2) “includes a list of files on the storage medium,” (3) includes “at least one descriptor identifying the file(s),” and (4) includes “the directory structure of the file(s).” PO Initial Paper 1; *see* PO Resp. 22 (citing Ex. 1001, 8:18–48, 15:19–31; Ex. 2008 ¶ 68). We examine each aspect of Patent Owner’s construction.

i. Reflects the Current State of a Storage Medium

The first aspect of Patent Owner’s proposed construction is that an “inventory” “reflects the current state of a storage medium.” PO Resp. 22; PO Initial Paper 1. For support, Patent Owner relies on the Specification of the ’545 patent and, particularly, the descriptions of an inventory in column 8. PO Resp. 22 (citing *inter alia* Ex. 1001, 8:18–48). This portion of the Specification describes a “file inventory” that scanning module 232 creates when it scans a particular drive or storage medium. In describing Figure 2, the Specification states, “[b]y scanning a particular drive or similar storage medium, the scanning module 232 is capable of creating a file inventory for the selected drive. The file inventory reflects the current state of the drive and may include a description of the hierarchical structure of the drive.” Ex. 1001, 8:16–20 (emphasis added).

We disagree that the Specification supports Patent Owner's arguments. First, this disclosure expressly refers to a "file inventory," whereas the term proposed for construction is "inventory." Second, this disclosure describes a particular trait of the "file inventory" produced by scanning module 232 when it scans a particular drive or storage medium. Third, this disclosure does not indicate that the meaning of "inventory" should be limited to the description of the "file inventory" created by scanning module 232 in the described instance. And, we do not agree that it is appropriate to read a description of the specific "file inventory" produced by scanning module 232 into the claim term "inventory." *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 904 (Fed. Cir. 2004) ("improper to read a limitation from the specification into the claims").

Additionally, neither the claim language nor the dictionary definitions cited by Patent Owner support construing the term "inventory" itself as "reflecting the current state of a storage medium." With respect to the term "inventory," the language of claims 1 and 10 is similar. Claim 1 recites "generating, at the client device, a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature values generated for each file in the first set of files." Ex. 1001, 18:59–64. Claim 10 recites "generating a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature values generated for each file in the first set of files." *Id.* at 19:54–20:2. The claim language for both claims reflects that the first "inventory" is "for the first set of files." The claim language also recites two wherein

clauses further describing the first inventory—first, that the first inventory reflects a current state of the first remote storage medium, and, second, that the first inventory includes the cryptographic signature values generated for each file in the first set of files. As indicated by the first wherein clause, the claims expressly recite that the “first inventory” “reflects a current state of the first remote storage medium.” Although the clause indicates which remote storage medium the first inventory reflects (i.e., the *first* remote storage medium), the clause also expressly recites the first aspect of Patent Owner’s proposed construction of “inventory.”

Considering extrinsic evidence,¹⁰ both parties rely on dictionary definitions.¹¹ A common feature of the definitions proffered by Patent Owner is the use of the adjective “detailed” and the word “list.” See PO Initial Paper 1 (“a complete list,” “a detailed list,” “detailed . . . list,” “detailed . . . list,” “detailed . . . list,” “detailed list”) (citing *inter alia* Exs. 2012–2014). Patent Owner states that these dictionary definitions show that “the ordinary and customary meaning of ‘inventory’ is more than just a list.” *Id.* at 2. Petitioner does not disagree. In fact, Petitioner notes the same commonality across the dictionary definitions the parties relied on—they each include a “list” and a modifier describing the list as “itemized,” “detailed,” or “complete.” Pet. Resp. Paper 1. Petitioner, however, also asserts that none of the dictionary definitions support Patent Owner’s

¹⁰ Neither party argues that the prosecution history of the ’545 patent informs as to the meaning of the “inventory.”

¹¹ The parties also rely on competing expert testimony that is very similar to the parties’ arguments. See, e.g., Ex. 2008 ¶¶ 68–77 (Dr. Weissman’s declaration testimony); Ex. 1024 ¶¶ 6–33 (Dr. Shenoy’s reply declaration testimony).

attempt to require that the term “inventory” *must* include all of the information that the Specification indicates *may* be included in an inventory. *Id.* at 2.

The dictionary definitions shed light on the plain and ordinary meaning of “inventory,” but, in particular, none of the definitions support Patent Owner’s proposed construction. Despite including adjectives such as “itemized,” “detailed,” and “complete,” none of those modifiers even remotely suggests, supports, or is consistent with Patent Owner’s proposed construction of “inventory” as “electronic data that reflects the current state of a storage medium.”¹²

Accordingly, we find that the complete record does not support construing “inventory”¹³ to require “electronic data that reflects the current state of a storage medium.”¹⁴

¹² Nor do any of the definitions reflect that the ordinary and customary meaning of “inventory” includes the other three aspects of Patent Owner’s proposed construction of “inventory”—electronic data that (2) “includes a list of files on the storage medium,” (3) includes “at least one descriptor identifying the file(s),” and (4) includes “the directory structure of the file(s).”

¹³ Also important to our understanding of “inventory” is Patent Owner’s agreement that “the claimed inventory may not account for every file on the system. Instead, the claimed inventory accounts for the data, which may only be a chunk of data, selected by a user to be backed up or restored.” PO Sur-reply 12 (agreeing with Petitioner). In other words, even though the extrinsic definitions modify the term “list” by requiring the list to be “itemized,” “detailed,” and/or “complete,” it is undisputed that the claimed “inventory” can account for *less than all* files on a remote storage medium or drive.

¹⁴ We address the express language of similar clauses recited in claims 1 and 10 in our discussion of the application of the prior art to the claims. *See infra* §§ III.B.3.a.vi. (limitation 1B.4), III.B.3.b. (limitation 10B.4).

ii. Includes a List of Files on the Storage Medium

As mentioned, both parties propose construing inventory to include or constitute a list. PO Resp. 22; Pet. Reply 3–4; Pet. Initial Paper 1. The parties dispute, however, what the list should constitute. Patent Owner argues that “inventory” requires a list of files on the storage medium (PO Resp. 22), whereas Petitioner argues that “inventory” does not require the inclusion of a list of files on the storage medium. Pet. Initial Paper 1.

Patent Owner’s Response does not specifically identify its support for construing inventory to require a list of files on the storage medium. PO Resp. 21–27. Patent Owner’s Sur-reply, however, points to the ’545 patent’s description of the restore process. PO Sur-reply 7–8 (citing Ex. 1001, 14:64–15:15, 16:25–27). Nothing in that discussion in the Specification, however, requires “inventory” to include a list of files on the storage medium and Patent Owner’s discussion does not identify any such requirement. Rather, we find that this portion of the Specification supports Petitioner’s argument that inclusion of a list of files is permissible, but not required. First, the Specification explicitly states that “[w]ith reference to FIG. 7, a restore/recover routine will be described *in accordance with at least some embodiments of the present invention.*” Ex. 1001, 14:21–23 (emphasis added). Thus, on its face, the Specification describes the restore/recover routine as applicable to *some* embodiments, meaning *not every* embodiment. Second, in the portion Patent Owner relies on, the Specification further describes as “an additional embodiment of the present invention” the ability to generate an inventory of protected media. *See id.* at 16:25–26. And the Specification expressly states that “[t]his inventory is a list of all files with corresponding descriptors.” *Id.* at 16:26–27. This

description reflects that when the patentee intended to refer to a list of files as part of an inventory, the patentee knew how to do so. The patentee's failure to do so for all embodiments or to specifically direct the discussion to the term "inventory" generally, supports Petitioner's position that an "inventory" *may* include a list of files on the storage medium, but is not required to do so.¹⁵

Additionally, even the heading of this section of Patent Owner's Sur-reply supports Petitioner's argument that "inventory" may include a list of files on the storage medium, but is not required to do so. In particular, Patent Owner's heading states "[a]n 'inventory' *may* include a 'list of files on the storage medium.'" PO Sur-reply 7 (emphasis added). We do not disagree that it *may*. We do, however, disagree that "inventory" *must* include a list of files on the storage medium, as explained above.

Further, neither the claim language nor the parties' dictionary definitions support limiting "inventory" to include a list of files on the storage medium. Exs. 1029, 2012–2014. In particular, Patent Owner fails to point to any aspect of the claims as supporting its construction. And, none of the dictionary definitions set forth such a requirement. *Id.* Thus, we do not construe "inventory" to require a "list of files on the storage medium."

¹⁵ We also find that the Specification suggests that a list of files is not a required aspect of "inventory." In particular, in describing the embodiment of Figure 5, the '545 patent teaches that "[i]ncluded in a user's inventory may be list of descriptors 508. The list of descriptors 508 for each user are a short-hand representation of the actual files, or portions of files, that have been recently backed up for the user's communication device 108." Ex. 1001, 11:12–15. This disclosure suggests that an "inventory" need not require a list of the files themselves, but rather that a list of descriptors could suffice.

iii. Includes at Least One Descriptor Identifying the File(s)

The third aspect of Patent Owner’s proposed construction of “inventory” is the inclusion of at least one descriptor identifying the file(s). Patent Owner’s Response does not specifically identify why “inventory” should be construed to require this language. Petitioner’s Reply correctly identifies that claims 1 and 10 expressly recite that “the first inventory includes the cryptographic signature value[(s)] generated for each file in the first set of files.”¹⁶ In its Sur-reply, responding to Petitioner’s argument that the claims expressly recite this aspect of Patent Owner’s proposed construction of “inventory,” Patent Owner states “Petitioner does not dispute that an inventory includes at least one descriptor, and thus whether it is explicitly in the construction or not, the Board must consider it as a limitation.” PO Sur-reply 9. Patent Owner further states that claims 1 and 10 “need to refer to the at least one descriptor, *e.g.*, cryptographic signature, in each inventory as an antecedent basis to refer to it again later in the claims.” *Id.*

Patent Owner’s arguments reflect that Patent Owner (1) does not provide any support for why the term “inventory” itself requires “at least one descriptor identifying the file(s)” and (2) expressly equates a cryptographic signature with a descriptor.¹⁷ And, we do not discern any support in the claims, Specification, or dictionary definitions of “inventory” that the term

¹⁶ Claim 1 uses the singular “value,” whereas claim 10 uses the plural “values.” *Compare* Ex. 1001, 18:62–64, *with id.* at 19:56–20:2.

¹⁷ The latter portion of Patent Owner’s argument is noteworthy in that Field discloses cryptographic signatures as discussed further *infra*.

“inventory” must require at least one descriptor identifying the file(s) as Patent Owner proposes.¹⁸

Thus, on the complete record before us, the evidence (claims, Specification, and extrinsic) does not support Patent Owner’s attempt to require “inventory” to mean that it “includes at least one descriptor identifying the file(s).” Accordingly, we do not construe “inventory” to require such.

iv. Includes the Directory Structure of the File(s)

The fourth aspect of Patent Owner’s proposed construction of “inventory” is that an “inventory” must include the directory structure of the file(s). PO Resp. 22. Patent Owner points to the language of claim 1 and identifies two portions of the Specification as allegedly supporting its proposed construction. We address each.

Patent Owner argues that the following language from claim 1—“a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature value generated for each file in the first set of files”—makes it clear that a “‘cryptographic signature’ is part of, but not identical to the inventory.” PO Resp. 26 (citing Ex. 2008 ¶ 75). And, Patent Owner asserts that the phrase “‘reflects a current state of the first remote storage medium’ indicates that there are more than just cryptographic signatures for an inventory of electronic data, *e.g.*, directory structure of the electronic data.” PO Resp. 27 (citing Ex. 2008 ¶ 76).

¹⁸ We address the express language of similar clauses recited in claims 1 and 10 in our discussion of the application of the prior art to the claims. *See infra* §§ III.B.3.a.vi. (limitation 1B.4), III.B.3.b. (limitation 10B.4).

We disagree that the language of claim 1 quoted by Patent Owner (or the similar language of claim 10) supports its proposed construction of “inventory.” In particular, Patent Owner fails to identify any portion of the claim language that *requires* the inclusion of “the directory structure of the file(s)” in the meaning of “inventory.” To the extent Patent Owner’s argument is that “cryptographic signature” has a different meaning than “inventory,” we agree. To the extent Patent Owner argues “inventory” means a list that *must* include these four aspects of Patent Owner’s construction, including the directory structure of the file(s), we disagree that the claim language so requires. Further, the claim language, “reflects a current state of the first remote storage medium,” is nearly identical to the language in the Specification, discussed below, which expressly states that a “file inventory” “*may* include a description of the hierarchical structure of the drive.” Ex. 1001, 8:16–20 (emphasis added). As explained just below, this language is permissive, and, thus, we do not agree that the similar recitations of this language in claims 1 and 10 somehow means that “inventory” must include the directory (or hierarchical) structure of the file(s) or drive.

With respect to the Specification, Patent Owner points to the discussion in column 8, describing Figure 2, as well as the Specification’s discussion of Figure 7 and the restore/recover routine described therein. With respect to column 8, Patent Owner relies on the disclosure regarding scanning module 232, discussed above: “[*b*]y scanning a particular drive or similar storage medium, the scanning module 232 is capable of creating a file inventory for the selected drive. The file inventory reflects the current state of the drive and *may include a description of the hierarchical structure*

of the drive.” Ex. 1001, 8:16–20 (emphasis added); *see* PO Resp. 22 (citing Ex. 1001, 8:18–21, 13:10–12, 15:17–31; Ex. 2008 ¶ 69).

This portion of the Specification does not support Patent Owner’s argument. As quoted above, the same statement from the Specification that says the file inventory produced by scanning module 212 *reflects* the current state of the drive also says that the file inventory *may* include a description of the hierarchical structure, not that it *must* be included. Thus, we reject Patent Owner’s attempt to use the phrase “reflects the current state of the drive” to require a description of the hierarchical structure/directory structure¹⁹ of the drive/files when the Specification explicitly states that the file inventory *may* include such a description. *See* Ex. 1001, 8:16–20. In other words, that the file inventory produced by scanning module 202 reflects the current state of the drive does not mean that a directory structure or hierarchical structure is a required part of that file inventory, especially where the Specification uses the permissive term “may.”

Patent Owner argues that the term “may,” as used in the Specification of the ’545 patent, is not permissive. PO Sur-reply 4. Patent Owner contends that “patent specifications often use the word “may” even in reference to requirements.” *Id.* Patent Owner, however, cites no support for this contention. Patent Owner argues, however, that “[e]verything is described in this patent that’s may this, may that. It’s all permissive

¹⁹ Dr. Weissman’s deposition testimony acknowledged some relationship between Patent Owner’s use of “directory structure of the file(s)” and hierarchical structure of the drive. *See, e.g.*, Ex. 1025, 75:11–15 (acknowledging agreement), 75:16–78:22 (further discussing his understanding of directory structure and hierarchical structure); *see also* Ex. 1024 ¶ 32 (Dr. Shenoy’s reply declaration testimony discussing Dr. Weissman’s declaration).

language.” Tr. 76:18–20. Patent Owner asserts that if we construe “may” as optional (permissive) as opposed to required, then nothing is left of the patent. *See id.* at 76:20–77:2 (“Unfortunately, you can’t take these sentences in isolation and say, well, these are saying permissive, because then nothing is happening in this patent. Practically everything is described in terms of it may be this or it may be that. So there’s nothing definitive about anything here.”). We disagree.

We see nothing in this record that would cause us to interpret the term “may” as mandatory.²⁰ Thus, we interpret the term “may” in accordance with its ordinary, permissive meaning. *See Netword LLC v. Centraal Corp.*, 242 F.3d 1347, 1358 (Fed. Cir. 2001) (“The specification makes quite clear that those added limitations are merely *permissive*, that is to say, they *may or may not* be associated with the client computer that is clearly defined in the specification.” (emphasis added)); *In re Johnston*, 435 F.3d 1381, 1384 (Fed. Cir. 2006) (“[T]hese limitations are stated in *the permissive form ‘may.’* As a matter of linguistic precision, *optional elements* do not narrow the claim because they can always be omitted.” (emphasis added)). And, we do not agree that construing may in accordance with its ordinary and customary

²⁰ The Specification’s use of “may” in several other instances also indicates the permissive (optional) inclusion of items in an inventory. *See* Ex. 1001, 8:34–41 (describing the use of a descriptor algorithm to “create the descriptor that uniquely . . . identifies the file or a portion of the file” and stating that “[t]he results of the application of the descriptor algorithm (e.g., the generated hash corresponding to each file or portion of a file) *may also be added to the inventory to help describe the current state of the drive*” (emphasis added)), 11:6–19 (noting, in the context of Figure 5, that “backup server 116 may be designed to maintain inventories 504 for each user account” and that “[i]ncluded in a user’s inventory may be a list of descriptors 508” (emphasis added)).

meaning deprives the '545 patent of meaning. That an “inventory” may include the directory structure of the file(s) means exactly that, it may. Nothing in our construction *precludes* an “inventory” from including the directory structure of the file(s). In other words, there may be claims that recite the broader term “inventory” and there may be claims that recite a narrower “inventory” if, for example, other language in the claim expressly limits the “inventory” to include one or more of the aspects described in the Specification as optional.²¹

As a second disclosure allegedly supporting its proposed construction, Patent Owner points to the Specification’s discussion of Figure 7 and the restore/recover routine described therein. In particular, Patent Owner points to the statement that “[o]nce the descriptors have been marked for restoration, the restore application 240 continues by determining if any directories in the inventory are not present in the target media (step 732). If there are any directories in the inventory and not in the media, the restore application 240 creates those directories in the target media (step 736).” *See* PO Resp. 22–24 (citing *inter alia* Ex. 1001, 15:19–24) (asserting that Figure 7 and this description from the Specification supports Patent Owner’s construction); Tr. 79:1–12 (contending that this statement from the Specification is definitive that there are directories in this inventory).

We disagree that this statement in the Specification supports Patent Owner’s argument that (a) directories are required to be in the specific inventory referenced and (b) the term “inventory” should be *construed* as

²¹ For example, as we noted previously and as discussed further herein, claims 1 and 10 further limit the “inventory” recited therein. *See, e.g.*, Ex. 1001, 18:59–64 (limitation 1B.4).

requiring “the directory structure of the file(s).” This specific statement says *if* there are any directories in the inventory and not in the media, then directories are created. Nothing in that statement requires the presence of directories in the inventory. The statement is satisfied whether or not directories are included. If there are no directories in the inventory, then there are no directories in the inventory that are not in the target media. Thus, this statement fails to support Patent Owner’s argument that “inventory” should be construed as *requiring* the directory structure of the file(s).

Additionally, the Specification’s description of Figure 7 explicitly states that the restore/recover routine is described “in accordance with *at least some embodiments* of the present invention.” Ex. 1001, 14:21–23 (emphasis added). Thus, even if we were to read the above-description of Figure 7 as requiring directories in this specific inventory (which we do not), this description expressly applies to “at least some embodiments,” meaning not necessarily *all* embodiments.

Further, as we noted above, the parties’ dictionary definitions also do not support Patent Owner’s proposed requirement that an inventory include the directory structure of the file(s). None of those definitions so limit the term “inventory.” Exs. 1029, 2012–2014.

Therefore, we do not construe “inventory” to require inclusion of the directory structure of the file(s).

b. Petitioner’s Proposed Construction

As mentioned above, Petitioner proposes construing “inventory” as “an itemized list of electronic data.” Pet. Reply 1–2; Pet. Initial Paper 1. This construction is consistent with the language of claims 1 and 10 and also

consistent with the Specification of the '545 patent. *See, e.g.*, Ex. 1001, 8:16–18; 11:6–22; 14:9–14. And, Petitioner’s proposed construction is supported by the dictionary definition of inventory as “an itemized list of current goods or assets.” Ex. 1029, 4.

Patent Owner objects to Petitioner’s proposed construction on the grounds that the Specification of the '545 patent teaches that the term “inventory” should have all of the requirements set forth in Patent Owner’s proposed construction. *See, e.g.*, PO Initial Paper 1. As set forth above, we disagree with that argument by Patent Owner.

Patent Owner also relies on dictionary definitions to oppose Petitioner’s proposed construction. *See* PO Initial Paper 1. As discussed above, a common feature of the definitions Patent Owner proffers is the use of the adjective “detailed” and the word “list.” *See id.* (“a complete list,” “a detailed list,” “detailed . . . list,” “detailed . . . list,” “detailed . . . list,” “detailed list”) (citing *inter alia* Exs. 2012–2014). Patent Owner states that these dictionary definitions show that “the ordinary and customary meaning of ‘inventory’ is more than just a list.” *Id.* at 2. Petitioner does not disagree. In fact, Petitioner notes the same commonality across the dictionary definitions—they each include a “list” and a modifier describing the list as “itemized,” “detailed,” or “complete.” Pet. Resp. Paper 1. And Petitioner’s proposed construction requires an inventory to be more than a list—it must be an itemized list. Patent Owner has not argued that there is any difference of significance for this case between construing an inventory as an itemized

list versus a detailed list (aside from using the term “detailed” as a vehicle to argue all four aspects of its proposed construction). And we see none.²²

c. Construction

Considering the intrinsic and extrinsic evidence of record, we determine that “inventory” would have been understood by one of ordinary skill in the art in accordance with its plain and ordinary meaning, which, in this context, is an “itemized list of electronic data.”²³

III. ANALYSIS

A. Legal Standards – Obviousness

The U.S. Supreme Court set forth the framework for applying the statutory language of 35 U.S.C. § 103 in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966):

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc.,

²² As noted previously, important to our understanding of “inventory” is Patent Owner’s agreement that “the claimed inventory may not account for every file on the system. Instead, the claimed inventory accounts for the data, which may only be a chunk of data, selected by a user to be backed up or restored.” PO Sur-reply 12 (agreeing with Petitioner). In other words, even though the extrinsic definitions modify the term “list” by requiring the list to be “itemized,” “detailed,” and/or “complete,” it is undisputed that the inventory can account for *less than all* files on a remote storage medium or drive.

²³ Construing “inventory” as a “detailed list of electronic data” or a “complete list of electronic data” would not change the analysis that follows.

might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

The Supreme Court explained in *KSR International Co. v. Teleflex Inc.* that

[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit.

550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”)).

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016) (citations omitted).

“[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

B. Obviousness over Field and Anderson

Petitioner asserts that the combination of Field and Anderson would have rendered the subject matter of claims 1–4, 6–10, and 12–20 obvious to one of ordinary skill in the art at the time of the invention. Pet. 11–67.

1. *Level of Ordinary Skill in the Art*

For the reasons discussed above, we find that one of ordinary skill in the art at the time of the invention would have a Bachelor of Science degree in Computer Science, Computer Engineering, Electrical Engineering, Software Engineering, or an equivalent field, as well as at least three to five years of academic or industry experience in the fields of data storage, data backup, data restoration, data replication and deduplication, and/or data synchronization. *See supra* § I.G.

2. *Scope and Content of the Prior Art*

a. *Field*

Field is directed to “a system, methods, and a computer-readable medium for efficiently performing a backup of data in a networking environment.” Ex. 1004 ¶ 7.

Figure 1 of Field is reproduced below:

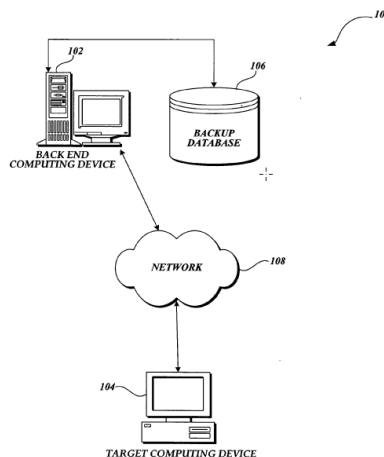


Fig.1.

Figure 1 shows networking environment 100 that includes back end computing device 102 and target computing device 104. Ex. 1004 ¶¶ 13, 20. Back end computing device 102 aggregates data received from multiple

sources (e.g., client computing devices) at a single location (e.g., backup database 106), to prevent the unnecessary transmission of data. *Id.* ¶ 22.

Figure 2 of Field is reproduced below:

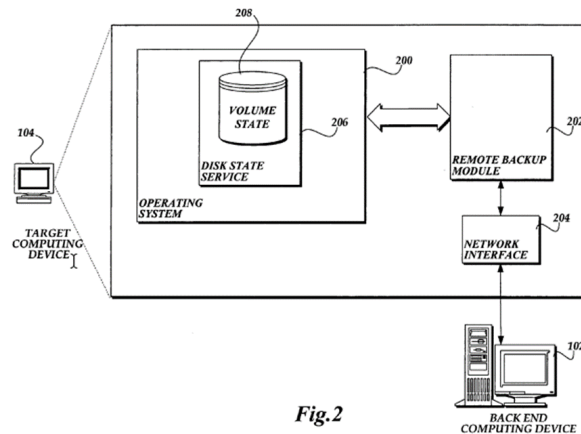


Fig.2

Figure 2 is a block diagram illustrating components of target computing device 104, including remote backup module 202. Ex. 1004 ¶¶ 14, 25.

Figure 3 of Field is reproduced below:

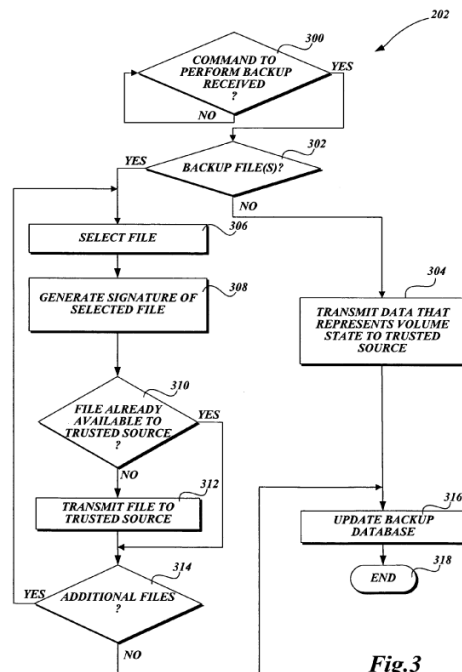


Fig.3

Figure 3 shows a flow diagram for remote backup module 202 for performing a backup of data module 202 and contains blocks 300–318.

Ex. 1004 ¶¶ 15, 31. In block 300, remote backup module 202 waits to receive a command to perform a backup. *Id.* ¶ 32. In block 302, module 202 determines whether the command received requires a backup of one or more files. *Id.* ¶ 33. If backup is required, then the module proceeds to block 306, where it selects a file to be backed up. *Id.* ¶¶ 33, 35.

In block 308, remote backup module 202 generates a signature of the selected file. Ex. 1004 ¶ 36. Hashing algorithm “SHA-1” can be used to generate this signature. *Id.* Alternatively, “other type[s] of algorithms or functions that are capable of generating a signature from file data may be used to generate the signature.” *Id.* In block 310, remote backup module 202 determines if the file is already available to a trusted source by “caus[ing] the signature of the selected file to be transmitted to the trusted source and compared to signatures of files previously submitted to the trusted source.” *Id.* ¶ 37. If a matching signature for the selected file is identified, remote backup module 202 proceeds to block 314. *Id.* If a matching signature for the selected file is not identified, remote backup module 202 proceeds to block 312. *Id.*

At block 312, remote backup module 202 transmits the selected file to a remote computing device associated with the trusted source (e.g., back end computing device 102). Ex. 1004 ¶ 38. Field explains:

If block 312 is reached, the selected file was not previously transmitted to the trusted source and, therefore, is not available to the trusted source. Stated differently, a signature of the selected file could not be identified in the backup database 206 at block 310. Thus, to satisfy the backup command received at block 300, the selected file is transmitted to the remote computing device associated with the trusted source, at block 312. . . . Significantly, a file that was previously made available to the trusted source is not transmitted by the remote

backup module 202. Instead, only a signature of the file, which is a fraction of the size of a complete file, is transmitted to the trusted source. As a result, the remote backup module 202 is able to backup data using less network bandwidth and other resources than is found in the prior art.

Id. At block 314, remote backup module 202 determines if any files that were the object of the backup command received at block 300 have not previously been selected and, if so, remote backup module 202 returns back to block 306 and blocks 306 through 314 repeat until all of the files that were the object of the backup command have been selected. *Id.* ¶ 39.

At block 316, “remote backup module 202 performs an update to the database associated with the trusted source.” Ex. 1004 ¶ 40. Field explains that “more than one user of the backup service may need the file restored back onto a computing device. Thus, the backup database 104 maintains an entry for each user of the backup service.” *Id.* An “entry in the backup database 104 associated with a specific user contains ‘pointers’ to operating system, application program files, and/or user level data that is shared with other users of the backup service.” *Id.* Additionally, an entry will store file metadata “identify[ing] the location (e.g., a file path), name, and permissions of files that may be restored by the backup service.” *Id.* At block 316, the database is updated with this data required to restore files and/or a volume state, after which remote backup module 202 proceeds to block 318 and terminates. *Id.*

b. Anderson

Anderson is directed to “a method and apparatus for differential bandwidth-efficient and storage-efficient backup and restoration.” Ex. 1005 ¶ 12. Anderson describes backing up “articles,” such as “user data, (e.g.,

text, photos, music, movies, etc.), applications . . . command scripts, byte codes, [and] configuration data.” *Id.* ¶ 15.

Figure 9 of Anderson is reproduced below:

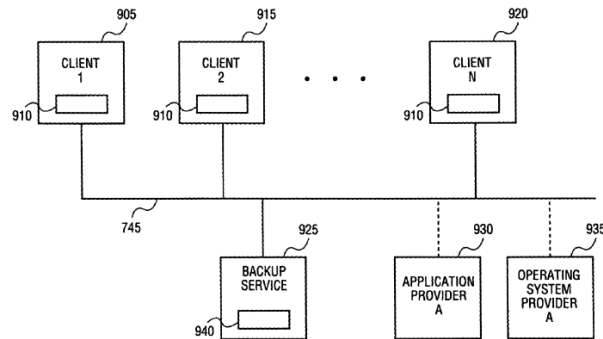


FIG. 9

Figure 9 illustrates an embodiment where multiple clients (1–N) can connect with backup service system 925. Ex. 1005 ¶¶ 11, 128.

When backing up data, the client generates a content identifier (CI) for each article that is stored on the client system. Ex. 1005 ¶ 63. A content identifier includes a signature of the article’s contents. *Id.* ¶ 42. A signature value characterizing the specific article’s content is generated using a well-known cryptographic hash algorithm, e.g., a “secure hash algorithm” such as “SHA-1.” *Id.* “By using one or more content-signaturing mechanisms to generate CI values, the CI uniquely identifies, for all practical purposes, the contents of a particular article, not just on the user’s system, but across the sample space of all computer systems.” *Id.* ¶ 43.

Anderson explains that after a client generates a CI for each article stored on the client system,

[t]he client’s system transmits the CIs to the backup service. Since these CIs identify articles uniquely, the backup service can determine whether a [Client-Invariant Content Descriptor

(CICD)²⁴] corresponding to the CI exists on the backup service's designated storage device. If the backup service determines that it already has a CICD for an article's CI, there is no need for the client system to upload the article contents for backup on the server. If the CICD is not present on the backup service's designated storage device, the client transfers the article's contents and possibly additional data, to the backup service.

Ex. 1005 ¶ 63.

3. *Differences Between the Prior Art and the Claims;
Motivation to Modify*

a. *Independent Claim 1*

i. *1-Pre*²⁵

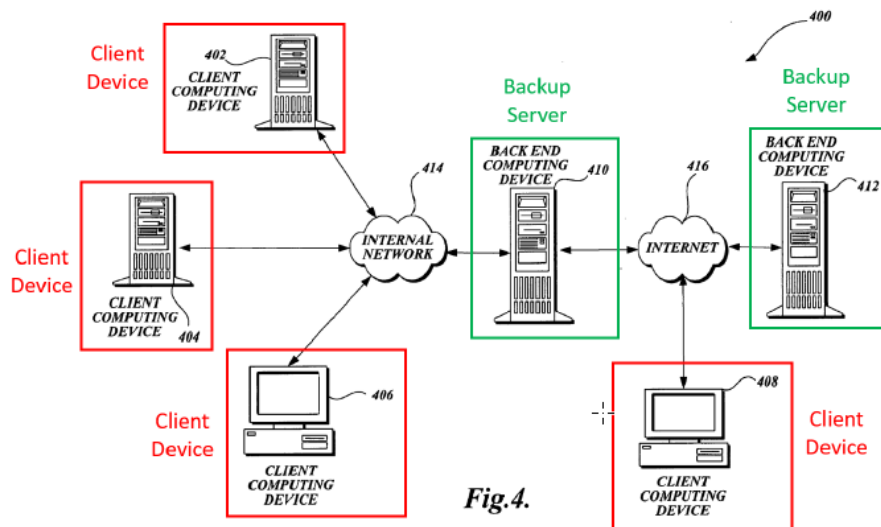
1-pre, which includes the preamble of claim 1, recites “[a] method of managing data in an encrypted system comprising a backup server and a client device having a first remote storage medium, the client device and backup server being configured to exchange encrypted communications with one another, the method comprising.” Ex. 1001, 18:40–44. Petitioner contends, “[t]o the extent the preamble language is deemed limiting, Field in view of Anderson discloses [it.]” Pet. 27 (citing Ex. 1002 ¶¶ 86–91). In particular, Petitioner states that “Field describes the backup of data in an encrypted system between a ‘back end computing device’ (i.e., *backup*

²⁴ A Client-Invariant Content Descriptor “includes a CI, article contents and can also include commonly shared metadata (e.g., article location (e.g., path name), access permissions, article size, etc.). In one embodiment, a content signaturing mechanism identifier is included in [a] CICD . . . to reflect the algorithm used to generate the CI.” Ex. 1005 ¶ 57.

²⁵ 1-pre includes the preamble of claim 1. Although we express no determination on whether the preamble is limiting, for the reasons noted herein, we find that Petitioner sufficiently establishes that Field teaches 1-pre.

server) and one or more client computing devices (i.e., *client devices*).” *Id.* Petitioner points to Field’s Figure 4, which Petitioner asserts “depicts a ‘typical server-based networking environment’ with a ‘plurality of client computing devices’ as well as ‘back end computing devices’ that perform the backup of data from the multiple client devices.” *Id.* at 27–28 (citing Ex. 1004 ¶¶ 16, 42).

Field’s Figure 4, with Petitioner’s annotations, is reproduced below:



EX1004, FIG. 4 (annotated).

Field’s Figure 4 is reproduced above, including Petitioner’s annotations in red (identifying client devices as client computing devices 402, 404, 406, and 408) and green (identifying backup servers as back end computing devices 410 and 412). Pet. 28. Petitioner contends Field “describes its back-end computing devices as servers that backup data for multiple client devices.” *Id.* at 28–29 (citing Ex. 1002 ¶¶ 87–88; Ex. 1004 ¶¶ 16, 23, 43). For support, Petitioner asserts Field describes that “[a]n organization may maintain a ‘server/client-based computer network where resources and services are provided by server-based computing devices to client-based

computing devices” and “existing server-based computing devices associated with an enterprise organization may be used as a backup store for client-based computing devices.” *Id.* at 28 (quoting Ex. 1004 ¶ 43).

Petitioner explains that Field’s Figures 1 and 2 “provide additional details related to the components and functionality of each system.” Pet. 29. Petitioner asserts back-end computing device 102 aggregates data from multiple sources (e.g., target computing device 104), at a single location (e.g., backup database 106) to prevent unnecessary transmission of data. *Id.* (citing Ex. 1004 ¶ 22). Field’s Figure 1, with Petitioner’s annotations, is reproduced below:

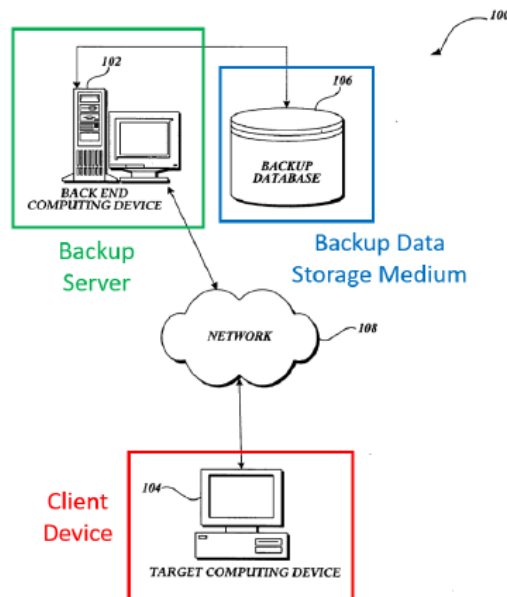


Fig. 1.

EX1004, FIG. 1 (annotated).

Field’s Figure 1 is reproduced above, including Petitioner’s annotations in red (identifying a client device as target computing device 104), green (identifying a backup server as back end computing device 102), and blue

(identifying a backup data storage medium as backup database 106).

Pet. 29.

Relying on Figure 2, Petitioner contends Field’s target computing device 104 includes “an operating system 200, a remote backup module 202, and a network interface 204.” Pet. 30 (citing Ex. 1004 ¶ 25). Additionally, Petitioner relies upon Field’s description—that target computing device 104 can be any one of a variety of electronic devices having “some type of memory”—in mapping the memory of the target computing device to the “first remote storage medium” recited in the preamble of claim 1. *Id.* at 30 (citing Ex. 1004 ¶ 25) (emphasis omitted).

Further, Petitioner contends Field teaches that “electronic data is encrypted prior to being transmitted” from client computing device 408 to back end computing device 412 via the internet. Pet. 30–31 (citing Ex. 1004 ¶ 44). Petitioner points to Field’s statement that “[t]ypically, the connection between the client computing device 408 will use a security mechanism, such as encryption, to prevent data from being intercepted by a third party.” *Id.* at 31 (citing Ex. 1004 ¶ 44) (emphasis omitted).

Patent Owner’s Response does not raise an argument specifically directed to the preamble of claim 1. *See generally* PO Resp.

For the reasons explained by Petitioner, we find that Field teaches the preamble of claim 1.²⁶

ii. Limitation 1A

Limitation 1A recites “receiving, at the client device, a request to backup data from the first remote storage medium to the backup server.”

²⁶ As noted above, in light of our finding that Field teaches the preamble of claim 1, we need not determine whether the preamble is limiting.

Ex. 1001, 18:45–47. Petitioner reiterates its argument from limitation 1-pre that “Field’s ‘target computing device’ having ‘memory’ teaches the claimed ‘client device’ that has a ‘remote storage medium’” and further contends “Field’s memory is ‘remote’ because it is located separate from the backup server.” Pet. 31 (citing Ex. 1004 ¶ 25; Ex. 1002 ¶¶ 92–94) (emphasis omitted). Additionally, Petitioner asserts Field “teaches receiving a request at the client device to backup data from the first remote storage medium to the backup server.” *Id.* Petitioner relies upon the following description in Field:

As illustrated in FIG. 3, the remote backup module 202 remains idle, at block 300, until a command to backup data onto a remote computing device is received. A command to backup data onto a remote computing device, such as the back end computing device 102 (FIG. 1), may be received in a number of contexts of which the following are only examples. A computer user may interact with a user interface provided by the present invention to select between different types of backup.

Id. at 31–32 (quoting Ex. 1004 ¶ 32) (emphasis omitted). Further, Petitioner argues that Field teaches that the command is executed “‘at remote backup module 202’ within a client device.” *Id.* at 32.

Patent Owner’s Response does not raise an argument specifically directed to limitation 1A of claim 1. *See generally* PO Resp.

For the reasons explained by Petitioner, we find that Field teaches limitation 1A.

iii. Limitation 1B.1

Limitation 1B.1 recites “in response to receiving the request, initiating a backup routine at the client device, the backup routine comprising.”

Ex. 1001, 18:48–50. Petitioner relies upon its argument directed to

limitation 1A, reiterating that Field teaches that the client device initiates a backup routine in response to receiving a command to back up data. Pet. 32 (citing Ex. 1004 ¶ 32; Ex. 1002 ¶ 95). Petitioner points to Field's Figure 3 as illustrating the backup routine, and specifically blocks 300 and 302 as illustrating the initiation of the backup routine. *Id.* (citing Ex. 1004 ¶ 32, Fig. 3).

Patent Owner's Response does not raise an argument specifically directed to limitation 1B.1 of claim 1. *See generally* PO Resp.

For the reasons explained by Petitioner, we find that Field teaches limitation 1B.1.

iv. Limitation 1B.2

Limitation 1B.2 recites "identifying a first set of files stored on the first remote storage medium." Ex. 1001, 18:51–52. Petitioner contends Field "teaches that after the client device initiates a backup routine, Field's remote backup module identifies one or more files for backup from the client device's memory." Pet. 33. Petitioner asserts Field's disclosure of selecting and backing-up one or more files teaches "the claimed identification of a first set of files stored on the first remote storage medium." *Id.* at 35 (citing Ex. 1002 ¶¶ 96–97). For support, Petitioner points to the following description in Field of Figure 3:

As illustrated in FIG. 3, at block 306, the remote backup module 202 selects a file that was designated for backup. As mentioned previously, in one embodiment of the present invention, the remote backup module 202 performs a backup of one or more files. If block 3206 is reached, a backup of one or many files for storage . . . will be performed.
Id. at 34 (quoting Ex. 1004 ¶ 35) (emphasis omitted).

Patent Owner's Response does not raise an argument specifically directed to limitation 1B.2 of claim 1. *See generally* PO Resp.

For the reasons explained by Petitioner, we find that Field teaches limitation 1B.2.

v. *Limitation 1B.3*

Limitation 1B.3 recites “generating, at the client device, a cryptographic signature value for each file in the first set of files, wherein the cryptographic signature value is computed by using actual data of the file as an input to a cryptographic signature generating algorithm which computes the cryptographic signature value.” Ex. 1001, 18:53–58. Petitioner contends “[w]ithin Field's backup routine, Field discloses generating a cryptographic signature at the client device at block 308” Pet. 35. Petitioner quotes the following from Field's description, “[a]t block 308, the remote backup module 202 generates a signature of the selected file” and “[f]or each file selected, at block 306, the module 202 will generate a signature” *Id.* (quoting Ex. 1004 ¶¶ 35–36) (emphasis omitted). Petitioner asserts one of ordinary skill in the art “would have understood that Field's description of generating a signature ‘for each file selected’ would have disclosed ‘generating, at the client device, a cryptographic signature value for each file in the first set of files’” and that “‘each file selected’ would have suggested multiple selected files and multiple corresponding signatures.” *Id.* (citing Ex. 1002 ¶¶ 98–99) (emphasis omitted).

Additionally, Petitioner contends Field teaches computing the signature value by using actual data of the file because “Field explains that these signatures are generated based on data of the file being backed-up and

are ‘cryptographic signatures’ in view of the applied ‘SHA-1’ hash algorithm,” which one of ordinary skill in the art “would have understood . . . is an example of a cryptographic algorithm that uniquely identifies files.” Pet. 36 (citing Ex. 1004 ¶¶ 36–37; Ex. 1002 ¶ 99; Ex. 1005 ¶ 42).

Patent Owner’s Response does not raise an argument specifically directed to limitation 1B.3 of claim 1. *See generally* PO Resp.

For the reasons explained by Petitioner, we find that Field teaches limitation 1B.3.

vi. Limitation 1B.4

Limitation 1B.4 recites “generating, at the client device, a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature value generated for each file in the first set of files.” Ex. 1001, 18:59–64. Petitioner raises two alternative arguments directed to limitation 1B.4. Pet. 37–40.

First, Petitioner contends one of ordinary skill in the art “would have understood that Field’s description of generating a signature ‘for each file selected’ would have disclosed ‘generating . . . a first inventory . . . [that] includes the cryptographic signature value generated for each file in the first set of files.’” Pet. 37 (emphasis omitted) (citing Ex. 1002 ¶¶ 100–105). In particular, Petitioner asserts that one of ordinary skill in the art would have understood that Field suggests multiple selected files and multiple corresponding signatures and that “[t]his collection of multiple signatures discloses the claimed ‘first inventory.’” *Id.* (citing Ex. 1002 ¶¶ 100–105) (emphasis omitted). Additionally, Petitioner argues that when Field

generates a signature of a file at a particular point in time, “that signature represents the state of that file (i.e., its current state) at that point in time.” *Id.* at 37–38 (citing Ex. 1002 ¶ 101). Since Field teaches that the process occurs for each file in the set of files stored on the client device’s memory, Petitioner contends “Field’s collection of signatures would reflect the current state of the files stored on the first remote storage medium.” *Id.* at 38 (citing Ex. 1002 ¶ 101). Petitioner asserts that claim 1 of the ’545 patent does not require that the “current state of the first remote storage medium” refer to every file stored on the remote storage medium because the ’545 patent teaches an embodiment where an inventory consists only of files that have been modified since a prior backup. *Id.* (citing Ex. 1001, 16:39–55) (emphasis omitted). Thus, Petitioner, in its first argument, contends Field alone teaches limitation 1B.4.

Second, Petitioner asserts that, if “current state of the first remote storage medium” refers to every file of the remote storage medium, Field in combination with Anderson satisfies limitation 1B.4. Pet. 38 (citing Ex. 1005 ¶ 19; Ex. 1002 ¶ 102) (emphasis omitted). In particular, Petitioner points to the following from Anderson: (a) generating a CI (which Petitioner equates to a cryptographic signature) for each article in a contour to “capture the state of the article contents” and (b) the description of a “contour” as “compris[ing] a snapshot of the state of every article within a designated collection of articles . . . at a given time. . . . and can comprise every article on the client device.” *Id.* at 38–39 (citing, *inter alia*, Ex. 1005 ¶¶ 42–43, 55; Ex. 1002 ¶ 103) (emphasis omitted). Thus, Petitioner contends that “the collection of signatures for each of these articles discloses the claimed ‘first

inventory reflect[ing] a current state of the first remote storage medium.”
Id. at 39 (citing Ex. 1002 ¶ 103) (emphasis omitted).

Petitioner contends that one of ordinary skill in the art would have been motivated to modify Field in light of Anderson because Field’s backup process “would have potentially resulted in a very time consuming back-up process,” which “can create a number of problems.” Pet. 23 (citing Ex. 1002 ¶ 79). As examples, Petitioner explains that “if write access to files is not locked while they are being backed-up, the files can change while the backup is occurring[, which] can result [in] inconsistent backups” and, alternatively, if “write access to files . . . [is] locked during the backup process, . . . this would result in a computer being unusable while the backup is occurring because no writing to files can occur.” *Id.* (citing Ex. 1002 ¶ 80). Petitioner asserts Anderson provides a solution to allow a user to interact with files while performing Field’s back-up process. *Id.* (citing Ex. 1002 ¶ 80). In particular, Petitioner contends Anderson’s “snapshot” captures a current state of each file at a given point-in-time, thus allowing the client device to proceed with the backup process based on the snapshot. *Id.* at 24. Petitioner argues that “[b]ecause the snapshot is used for backup, the user is able to continue interacting with the files even during the potentially lengthy duration of the backup process.” *Id.* (citing Ex. 1022, 5:49–62, 12:2–8).²⁷

Petitioner contends one of ordinary skill in the art would have understood that combining the teachings of Field and Anderson “would have been merely combining known elements to yield predictable results.” Pet. 24 (citing Ex. 1002 ¶¶ 83–85). In particular, Petitioner points to the

²⁷ Exhibit 1022 is U.S. Patent No. 7,590,668 B2, issued Sept. 15, 2009.

similar use of common server and client devices in a network configuration in each reference. *Id.* Petitioner asserts, “[i]n view of these common network devices, a [person of ordinary skill in the art] would have known how to combine Field and Anderson and would have had a reasonable expectation of success in creating the combination.” *Id.* at 26 (citing Ex. 1002 ¶ 84). Petitioner contends:

For example, both Field and Anderson describe signature generation at a client device as well as comparing these signatures at a server to determine whether to backup file data. EX1004, ¶¶36–38; EX1005, ¶97. The server then determines whether a matching signature has already been stored. EX1004, ¶37; EX1005, ¶¶97–98. If not, the client device transmits the file to the server for storage. EX1004, ¶¶37–38; EX1005, ¶¶97–98.

Pet. 26–27. Petitioner thus contends one of ordinary skill in the art “would have been motivated to implement Anderson’s ‘contour’ and ‘snapshot’ framework with Field to allow a user access to files during a backup process.” *Id.* at 27 (citing Ex. 1002 ¶ 85). Further, Petitioner asserts one of ordinary skill in the art would have “found it predictable to combine features from Field and Anderson in view of the common server and client components used in both references and would have had a reasonable expectation of success in forming the combination.” *Id.* (citing Ex. 1002 ¶ 85).

Patent Owner argues that “Field does not teach an ‘inventory’ as recited in claims 1, 10, 12, and 13.”²⁸ PO Resp. 37 (emphasis omitted). Patent Owner contends that Petitioner has not shown that “Field, Anderson,

²⁸ Patent Owner argues claims 1, 10, 12, and 13 as a group. *See* PO Resp. 37–43.

Ackerman, or Coombs teaches a backup or restore process that uses an inventory of electronic data consisting of cryptographic signatures that reflects the current state of the first remote storage medium to determine whether to restore or backup the electronic data that is part of said inventory.” *Id.* Patent Owner, relying on its proposed construction of “inventory,” contends that Field does not disclose or suggest “an inventory of electronic data that is transmitted from the client device to the backup server.” *Id.* at 37–38 (noting and relying on Patent Owner’s proposed construction of “inventory”).

Patent Owner asserts that “[i]n Field, only a file signature, not an inventory, is transmitted to the backup server,” as shown in Field’s Figure 3. PO Resp. 39–40 (discussing Field’s Figure 3). Patent Owner contends that “Field concerns only file signatures of one selected file and Field only teaches restoring just individual files in its file-by-file method and not the volume state of a client device.” *Id.* at 40 (citing Ex. 1004, Fig. 3, ¶ 35; Ex. 2008 ¶ 96). Patent Owner asserts that “[t]he specification and Fig. 3 of Field confirm that the backup process does not need to send any other data of the type included in the ’545 Patent’s claimed inventories since for individual file backups there is no need to send the current state of the drive or even the filename or directory.” *Id.* at 41 (citing Ex. 2008 ¶ 97). Patent Owner argues that because Field’s backup process “only deals with backing up *one* file at a time, the client device and the backup server know which file the system is processing at any given time.” *Id.* (citing Ex. 2008 ¶ 97). Thus, according to Patent Owner, “the file name, directory, or other volume state data is irrelevant and unnecessary in Field’s file-based backup” and “[a]s such, in Field, a user would not have the information needed in the

backup server, including file name and information on the directory structure, to restore an entire storage medium of a client device.” *Id.* (citing Ex. 2008 ¶¶ 97–98).

In its Sur-reply, Patent Owner maintains its arguments that Field fails to disclose the claimed “inventory” based on Patent Owner’s proposed construction of “inventory.” PO Sur-reply 10–14. Patent Owner further contends that Petitioner’s analysis of Field and Field’s generation of signatures for each file selected, including the collection of signatures as Petitioner’s proposes, does not establish that the collection of signatures reflects the current state of the remote storage medium because “additional data about the current state of the drive would need to be provided from the client device to the backup server at some point, but this is not disclosed in Field.” *Id.* Patent Owner asserts that Dr. Shenoy agreed that this additional data was needed and Patent Owner contends that the additional data “may include, but [is] not limited to metadata, *e.g.*, filename or directory.” *Id.* (citing PO Resp. 26–27; Ex. 2008 ¶¶ 99, 111). Thus, according to Patent Owner, Field does not teach that an inventory “reflects the current state of a storage medium” because Field “does not disclose storing this data with the signature of a file.” *Id.* at 11–12.

We find Petitioner’s arguments and evidence persuasive to show that each of Petitioner’s alternatives—Field alone and Field in combination with Anderson—teaches or suggests limitation 1B.4. With respect to Petitioner’s first alternative based on Field alone, we offer the following. First, as reflected above, Patent Owner’s arguments are primarily based on its proposed construction of “inventory,” which we have not adopted. Additionally, Petitioner has shown sufficiently that Field’s description of

generating a signature “for each file selected” teaches “generating, at the client device, a first inventory for the first set of files” because that signature or collection of signatures (in the case of more than one selected file) constitutes a first “itemized list” for the first set of files. Nothing more is required by the term “inventory.”²⁹

Second, with respect to the requirement that the first inventory “includes the cryptographic signature value for each file in the first set of files,”³⁰ Petitioner’s argument is persuasive that Field teaches this aspect of limitation 1B.4 because Field generates a signature for each selected file. *See, e.g.*, Ex. 1004 Fig. 3, ¶¶ 35 (“For each file selected, at block 306, the module 202 will generate a signature for the file”), 36 (“At block 308, the remote backup module 202 generates a signature of the selected file.”). Hence, Petitioner has persuasively shown that Field teaches that the first inventory (i.e., first “itemized list of electronic data”) includes the cryptographic signature value for each selected file.

Third, with respect to the requirement that the first inventory “reflects a current state of the first remote storage medium,” Petitioner’s argument is persuasive at least because Patent Owner acknowledges that “the claimed inventory may not account for every file on the system.” PO Sur-reply 12. Specifically, Patent Owner agrees with Petitioner that the claimed inventory “accounts for the data, which may only be a chunk of data, selected by a user

²⁹ Nothing in the claim nor the record supports or is sufficiently persuasive to require that “inventory” be read as requiring an itemized list of *two or more*. An itemized list of one is still an itemized list.

³⁰ We discuss this language of limitation 1B.4 before considering whether the inventory “reflects a current state of the first remote storage medium” so that we can more easily discuss Patent Owner’s arguments directed to the latter clause.

to be backed up or restored.” *Id.* Thus, because the claimed inventory need not account for every file on the system, Petitioner’s argument—that Field’s signature or collection of signatures would reflect the current state of the files on the first remote storage medium and correspondingly reflect a current state of the first remote storage medium—is persuasive.

Additionally, even without Patent Owner’s acknowledgement that the claimed inventory need not account for all files, Petitioner sets forth an alternative position that Field, when modified by Anderson, teaches this aspect of limitation 1B.4. Pet. 38–40. In particular, as discussed above, Petitioner relies on modifying Field to include Anderson’s contour and snapshot process, which would have “included every article on the client device [i.e., first remote storage medium] and would have therefore reflected the state of its first remote storage medium.” *Id.* at 39.

We agree with Petitioner that the alternative combination of Field and Anderson also teaches this aspect of limitation 1B.4 for the reasons set forth by Petitioner, as reproduced above. In particular, we agree with Petitioner that one of ordinary skill in the art would have been motivated to modify Field in light of Anderson, as proposed, and would have had a reasonable expectation of success in so doing for the reasons explained by Petitioner. *See, e.g.*, Pet. 23–27, 38–40.

Patent Owner addresses the issue of motivation to combine in several different places in its Patent Owner Response. Many of Patent Owner’s arguments on this issue, however, are based on its position that Field teaches away from Petitioner’s proposed combination, a view that we do not share and which we find inadequately supported on the record. Therefore, we now

discuss Patent Owner’s alleged instances of teaching away and then turn to Patent Owner’s additional arguments on the particulars of the combination.

We begin with Patent Owner’s explanation and discussion of Field. *See* PO Resp. 29–34. Patent Owner explains that Field discloses two ways of backing up a storage device—a full-volume backup and a backup of individual files.³¹ *Id.* at 29 (citing Ex. 2008 ¶ 80). Patent Owner states that when Field performs a full-volume backup, that process does not involve generating signatures, as shown on the right-hand side of the flowchart of Figure 3. *See* PO Resp. 30. We agree. Patent Owner, however, asserts further that because Field does not teach using signatures for a full-volume backup, that means “Field teaches away from generating signatures for a full-volume backup, which creates a copy of the entire target computing device system and is not concerned with backing up individual files for which signatures might be generated in Field.” *Id.* at 30–31 (citing Ex. 2008 ¶ 82); *see* PO Sur-reply 16 (asserting Field teaches away). On these points, we disagree.³²

³¹ Petitioner describes this distinction in Field as between a file-based backup and an image-based backup, noting that Field’s volume-state backup “captures an image of the entire volume but does not prevent duplication of data across different users or devices,” whereas Field’s file-based backup is designed to prevent data duplication through the use of file signatures. *See* Pet. Reply 18 (citing Ex. 1024 ¶¶ 51–55; Ex. 1025, 87:19–88:15; Ex. 1004 ¶ 29) (emphasis omitted). Our consideration and determination on the issues presented does not hinge on which characterization is applied.

³² Many of Patent Owner’s arguments stem from the position that the “inventory” must have enough electronic data to perform a complete restore. *See, e.g.*, PO Resp. 44 (“the ’545 Patent identifies the need for a solution that provides a complete backup and restore of an entire storage medium”), 49 (“Contrary to Field, the ’545 Patent teaches a full backup and restore of a file system using descriptors transmitted as part of an inventory having

First, it is important to understand Petitioner’s argument. Petitioner does not propose adding signatures to Field’s full-volume backup. *See, e.g.*, Pet. Reply 17–18. Rather, Petitioner relies on Field’s disclosure that its file-by-file backup process can be used for one *or more* files. *Id.* at 17 (citing Ex. 1004 ¶¶ 32–33; Ex. 1024 ¶ 50). In other words, Petitioner argues, and we agree, that Field’s file-by-file backup process is not limited to backing up only one file. Petitioner relies upon that express teaching in Field to argue that one of ordinary skill in the art would have understood that disclosure to indicate no upper limit on the number of files that could be backed up using the file-by-file backup process, which includes the option of backing up all of the files on a storage medium (in other words, using signatures for a full backup). *Id.* And, we agree with Petitioner because the argument is supported by Field’s disclosure, as Petitioner indicates. Thus, Patent Owner’s argument that “Field teaches away from generating signatures for a full-volume backup,” PO Resp. 30–31 (citing Ex. 2008 ¶ 82), is inapposite because that is not a modification Petitioner proposes.

Second, to the extent Patent Owner is arguing that Field teaches away from using signatures to backup an entire drive (which is not required by the

sufficient data to reflect the current state of the drive.”). But, Patent Owner’s acknowledgement that “inventory” need not account for every file on a remote storage medium demonstrates the fallacy of that position. In particular, even assuming that a restore is required by the Challenged Claims, an “inventory” of less than all files on a remote storage medium (which includes an inventory representing one file) would not perform a complete restore of that remote medium. Ex. 1024 ¶ 48 (Dr. Shenoy noting that the ’545 patent explicitly discusses backups of fewer than all files on a storage medium); Ex. 1025, 40:14–21 (Dr. Weissman confirming that “inventory” is not required to reflect every file residing on the storage medium).

claims), we disagree that Field teaches away from such a backup. In particular, “[a] reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant.” *In re Haruna*, 249 F.3d 1327, 1335 (Fed. Cir. 2001) (quoting *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999)); *see In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (holding that, to teach away, the prior art must “criticize, discredit, or otherwise discourage the solution claimed”). Here, Patent Owner fails to identify, and we do not discern, any indication in Field that criticizes, discredits, or otherwise discourages one of ordinary skill in the art from using signatures to backup an entire drive. That one backup (file-by-file) involves generating signatures where the other backup (volume state), which is used for a complete backup, does not, does not mean that Field teaches away from using signatures for a complete backup simply because it is not disclosed. Patent Owner’s argument would effectively mean that any lack of disclosure is a teaching away, which it is not.

Additionally, Patent Owner argues that “Field teaches away from using an inventory of electronic data consisting of cryptographic signatures that reflects the current state of the first remote storage medium as described and claimed in the ’545 Patent.” PO Resp. 34 (citing Ex. 2008 ¶ 86); *see* PO Sur-reply 13 (citing PO Resp. 34). Patent Owner contends that

[s]ince Field selects one file for backup at a time, there is no need or disclosure in Field to send any data to the backup server other than the signature for that one file, as the backup system can determine quickly whether that one file is stored in the storage medium through the use of a single file signature.

PO Resp. 34 (citing Ex. 2008 ¶ 86); *see* PO Sur-reply 13 (quoting PO Resp. 34). Patent Owner asserts that because Field only sends one file

signature at a time, and is concerned with optimizing bandwidth usage, “it teaches away from creating and sending an inventory which would include multiple file signatures much less any other data such as data representing the current state of the drive, filenames, or directories.” *Id.* (citing Ex. 2008 ¶ 87); *see* PO Sur-reply 16 (“Field teaches away from using a signature file method for full volume backups of a system”), 16 (“Field’s two backup processes certainly teach away from performing full backups of electronic data”)). Thus, Patent Owner contends that one of ordinary skill in the art “would learn from Field *not* to create an inventory of electronic data consisting of cryptographic signatures that reflects the current state of the first remote storage medium as it would lead to inefficiencies that counteract the ultimate goal of an efficient backup process.” PO Resp. 34 (citing Ex. 2008 ¶ 87).

Patent Owner’s argument raises two issues—(1) whether Field teaches away and (2) whether one of ordinary skill in the art would have been motivated to modify Field in light of potential inefficiencies. With respect to whether Field teaches away, Patent Owner’s argument is premised, in part, on a requirement derived from its proposed construction of “inventory”—that the claimed “inventory” must include additional data, such as filenames and directories. As discussed above, we do not agree with Patent Owner’s construction. Similar to Patent Owner’s earlier argument of a teaching away, Patent Owner fails to identify anything in Field that criticizes, discredits, or otherwise discourages one of ordinary skill in the art from creating an inventory, as properly construed. Accordingly, we do not find that Field teaches away from using or creating an inventory.

Further, in its discussion of Anderson (*see* PO Resp. 35–37), Patent Owner argues that one of ordinary skill in the art would not have been motivated to modify Field in light of Anderson (an issue we discuss further below), and contends that “Field teaches away from backing up multiple files at the same time.” *Id.* at 36–37 (citing Ex. 2008 ¶ 89). Patent Owner does not explain its reasoning for asserting that Field teaches away in this instance, but, again, Patent Owner fails to identify anything in Field that criticizes, discredits, or otherwise discourages one of ordinary skill in the art from backing up multiple files at the same time. Accordingly, we do not find that Field teaches away from backing up multiple files at the same time.

To summarize, we do not find that Field teaches away from the combination proposed by Petitioner. We now address Patent Owner’s additional arguments beyond the alleged instances of teaching away.

Patent Owner argues that one of ordinary skill in the art would not have modified Field with teachings from Anderson because “it would lead to inefficiencies that counteract the ultimate goal of an efficient backup process.” PO Resp. 34 (citing Ex. 2008 ¶ 87). Patent Owner’s argument is based on the premise that Field “is concerned with optimizing bandwidth usage.” *Id.* (citing Ex. 2008 ¶ 87).

Patent Owner’s argument does not identify a deficiency with respect to Petitioner’s challenge. Field states that it is directed to “a system, methods, and a computer-readable medium for efficiently performing a backup of data in a networking environment” (Ex. 1004 ¶ 7) and that Field explains that its solution “performs optimizations designed to reduce the amount of time and network bandwidth required to backup a computing device” (*id.* ¶ 23). Neither Patent Owner nor Dr. Weissman explains why

transmitting multiple signatures at the same time would lead to inefficiencies and we do not agree that it would. Thus, we give Dr. Weissman’s testimony less weight. Petitioner’s position, supported by Dr. Shenoy’s testimony, is that the modifications proposed would “reduce network bandwidth” by transmitting signatures for selected files at the same time. *See, e.g.*, Ex. 1002 ¶ 109. Petitioner’s position is logical and fully supported on the record. Thus, we do not agree with Patent Owner’s arguments that one of ordinary skill in the art would not have been motivated to modify Field.³³

In its section under a heading expressly referring to motivation (*see* PO Resp. 43), Patent Owner raises additional arguments as follows. First, Patent Owner asserts that “[w]hen considering the problems that Field and Anderson attempt to solve, there is no justifiable reason for a [person of ordinary skill in the art] at the time of the ’545 Patent to combine these references.” *Id.* at 44 (citing Ex. 2008 ¶ 105). Patent Owner’s argument and the testimony of Dr. Weissman on which Patent Owner relies (*see, e.g.*, Ex. 2008 ¶¶ 104–105) refer back to Patent Owner’s previous discussion of Field and Anderson, where Patent Owner asserts that Field teaches away from the combination—an argument we have addressed and rejected as unsupported on the complete record before us.

Second, Patent Owner asserts that “just because Field and Anderson are in the same general field does not mean it would have been obvious to

³³ Patent Owner also attempts to discredit Petitioner’s reliance on Dr. Shenoy’s testimony, asserting, “Field teaches away from backing up multiple files at the same time, and only discusses selecting, processing, and backing up files one at a time, so Dr. Shenoy’s arguments are not applicable.” PO Resp. 36–37 (referencing Ex. 1002 ¶ 27; citing Ex. 2008 ¶ 89). For the reasons explained above, we disagree that Field teaches away from backing up multiple files at the same time.

combine them.” PO Resp. 45 (citing Ex. 2008 ¶ 106). We agree with this statement. But, we understand the position articulated by Petitioner as directed to explaining that Field and Anderson are analogous art, rather than providing an additional reason why one of ordinary skill would have been motivated to combine their teachings. *See* Pet. 22 (discussing that Field and Anderson are both directed to efficient data backup across multiple client devices).

Third, Patent Owner again asserts that Field teaches away from using a signature file method for full backups of a system simply because Field’s full-volume-state backup does not use signatures. PO Resp. 47 (citing Ex. 2008 ¶ 110). We have already addressed this argument and found it lacking because Patent Owner fails to identify where Field criticizes, discredits, or otherwise discourages one of ordinary skill in the art from using signatures with a full backup.³⁴

Considering the complete record before us, for the reasons explained above we find that Petitioner has established that the combination of Field and Anderson teaches limitation 1B.4 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify Field with the teachings of Anderson as proposed by Petitioner with a reasonable expectation of success.

³⁴ Patent Owner raises an additional argument as to whether one of ordinary skill in the art would have been motivated to modify Field, but that argument is directed to limitation 1B.5 and, thus, we discuss it there. *See* PO Resp. 48–50 (addressing whether Field “could be modified to transmit multiple signatures at the same time”).

vii. Limitation 1B.5

Limitation 1B.5 recites “transmitting the first inventory from the client device to the backup server via one or more encrypted communications.” Ex. 1001, 18:65–67. Petitioner sets forth three positions as to how limitation 1B.5 is met by the combination of Field and Anderson. Pet. 40–43.

First, Petitioner contends Field’s disclosure of transmitting a signature to the backup server teaches limitation 1B.5. Pet. 40–41. Petitioner offers two reasons: (1) the claim language does not require that all of the signatures be transmitted at the same time, “thus Field’s disclosure of transmitting signatures individually until all signatures are sent discloses ‘transmitting the first inventory’” and (2) even if the claim language requires all signatures to be transmitted at the same time, “any one of the signatures itself constitutes the claimed ‘first inventory’ . . . because a ‘set’ of files can be just a single file,” and thus the transmission of one signature teaches transmitting the first inventory as recited. *Id.* at 41 (emphasis omitted) (citing Ex. 1002 ¶ 108).

Second, to the extent the claim language requires that multiple signatures be transmitted at the same time, Petitioner asserts that one of ordinary skill in the art “would have found it obvious to send all of Field’s signatures at the same time.” Pet. 41 (citing Ex. 1002 ¶¶ 109–112). Petitioner contends Field provides an express motivation to “perform[] optimizations designed to reduce the amount of time and network bandwidth required to back up a computing device.” *Id.* at 41–42 (citing Ex. 1004 ¶¶ 22, 23). Thus, Petitioner asserts one of ordinary skill in the art “would have found it obvious to transmit the generated signatures for the selected files at the same time (i.e., ‘a first inventory’) to the back end computing

device to reduce network bandwidth (e.g., overhead).” *Id.* at 42 (citing Ex. 1002 ¶ 109) (emphasis omitted); *see id.* (citing Ex. 1002 ¶ 110).

Third, Petitioner contends Anderson is an example of a method of reducing network bandwidth, asserting “Anderson teaches concurrently transmitting multiple content identifiers at the same time for files (i.e., ‘articles’) to be backed up.” Pet. 42 (citing Ex. 1002 ¶ 111). Petitioner argues that Anderson’s client generates a CI for each article that is stored on the client system and then transmits the CIs to the backup service. *Id.* at 43 (citing Ex. 1005 ¶¶ 63, 97, Fig. 7 (block 730)). Petitioner contends that implementing this change to Field, “would require nothing more than executing block 308 of Field’s process depicted in FIG. 3 (i.e., generating a signature of a selected file) for each file to be backed up prior to transmitting the signatures to the back end computing device (trusted source) in block 310.” *Id.* (citing Ex. 1002 ¶¶ 111–112).

We find Petitioner’s arguments and evidence persuasive to show that each alternative—Field, Field as modified, and Field as modified by the teachings of Anderson—teaches or suggests limitation 1B.5 for the reasons explained by Petitioner.

With respect to Petitioner’s first alternative based on the disclosure of Field, Patent Owner does not contest that limitation 1B.5 is met based on Field alone. In particular, Patent Owner does not address the transmission of one signature except to argue that one signature does not constitute an itinerary, which relies on Patent Owner’s construction of “inventory” that we have not adopted. *See, e.g.*, PO Resp. 38 (discussing Patent Owner’s proposed construction and asserting that Field lacks “disclosure or suggestion of an inventory of electronic data that is transmitted from the

client device to the backup server”), 40 (“In Field, only a file signature, not an inventory, is transmitted to the backup server.”). Nor does Patent Owner address Petitioner’s arguments (above) that (1) the claim language does not require that all of the signatures be transmitted at the same time, and “thus Field’s disclosure of transmitting signatures individually until all signatures are sent discloses ‘transmitting the first inventory’” and (2) even if the claim language requires all signatures to be transmitted at the same time, “any one of the signatures itself constitutes the claimed ‘first inventory’ . . . because a ‘set’ of files can be just a single file,” and thus the transmission of one signature teaches transmitting the first inventory as recited. Pet. 41 (emphasis omitted) (citing Ex. 1002 ¶ 108). On the present record, Petitioner’s arguments are uncontested and persuasive for the reasons explained by Petitioner.³⁵ Thus, for limitation 1B.5, we find that Petitioner establishes that Field alone teaches limitation 1B.5.

For completeness, we also address Petitioner’s second and third alternatives and Patent Owner’s arguments as to whether one of ordinary skill in the art would have been motivated to modify Field to transmit more than one signature at a time, although these alternatives proposed by Petitioner are not necessary to our determination regarding limitation 1B.5. In particular, Patent Owner asserts that “Petitioner’s arguments are . . . premised on an incorrect assumption that Field could be modified to transmit multiple signatures at the same time to compare said multiple signatures at the same time to determine which of the multiple files should be transmitted

³⁵ In particular, as reproduced above, limitation 1B.5 recites “transmitting the first inventory . . . via *one or more* encrypted communications.” Ex. 1001, 18:65–67 (emphasis added).

to the trusted source.” PO Resp. 49 (citing Ex. 2008 ¶ 114). Patent Owner asserts that “[s]imply put, Field teaches a file-by-file backup and restore process for individual files and there is no evidence that Field can successfully transmit multiple signatures and then backup and restore multiple files at the same time.” *Id.* (citing Ex. 2008 ¶ 115). Thus, according to Patent Owner, “there would have been no motivation to combine the multiple signatures from Anderson into Field.” *Id.* (citing Ex. 2008 ¶ 115).³⁶

We find Dr. Shenoy’s testimony particularly persuasive and credible. Dr. Shenoy’s testimony supports Petitioner’s arguments as to why and how one of ordinary skill in the art would have modified Field. *See* Ex. 1002 ¶¶ 109–111. In addition, as Petitioner notes, Dr. Weissman acknowledged during his deposition that one of ordinary skill in the art would have been capable of modifying Field. *See, e.g.,* Ex. 1025, 112:11–22. Although Dr. Weissman explained that such modification would not be simple, we find that one of ordinary skill in the art (as we have defined the level of skill above), would have recognized the clear possibility of the modification proposed, been motivated to make the modification for the reasons explained by Petitioner, and would have had a reasonable expectation of success in so doing. *See, e.g.,* Ex. 1024 ¶¶ 57–61 (Dr. Shenoy’s testimony in his Reply Declaration discussing these issues). Thus, based on Petitioner’s second and third alternative positions relying on (1) the modification of Field alone and

³⁶ We understand Patent Owner’s arguments as responding to Petitioner’s second and third alternatives that require either a modification of Field alone or a modification of Field by combining with Anderson.

(2) the combination of Field and Anderson, we also find that Petitioner establishes that limitation 1B.5 is met.

viii. Limitation 1B.6

Limitation 1B.6 recites:

causing one or more files from the first set of files to be transmitted to the backup server for storage by the backup server upon determining that the cryptographic signature values generated for each file in the first set of files allows access to the one or more files on the backup server.

Ex. 1001, 19:1–6. Petitioner contends that the '545 patent “does not describe any analyzing of permissions or determining whether to allow access during the backup process. Rather, the '545 patent only describes an analysis of permissions during a restoration process, which occurs after a file has already been backed-up.” Pet. 43 (citing Ex. 1001, 6:21–41, 6:65–7:3, 11:56–63). Petitioner asserts that the '545 patent describes comparing descriptors (e.g., cryptographic signatures) of files, and if a matching descriptor is not found, access is allowed and the file is backed up. *Id.* at 44 (citing Ex. 1001, 13:30–39). Thus, Petitioner contends, “by referencing the backup server ‘allow[ing] access’ in the context of the backup process, this claim term is merely referring to the backup server determining that a file should be stored at the backup server.” *Id.* (citing Ex. 1002 ¶¶ 113–114) (alteration in original).

Petitioner asserts that Field describes the same process by comparing signatures and “determining whether to upload data when the backup server does not identify a matching signature.” Pet. 44 (citing Ex. 1004 ¶¶ 8, 37).

Petitioner relies upon blocks 310 and 312 of Field's Figure 3. *Id.* at 44–45.

Petitioner argues:

Field states that a signature generated by the client device is “transmitted to the back end computing device where it is compared to signatures of files already available to the trusted source.” *Id.*, ¶8. In particular, Field explains that “at block 310, the remote backup module 202 causes the signature of the selected file to be transmitted to the trusted source and compared to signatures of files previously submitted to the trusted source.” *Id.*, ¶37. Field performs this comparison because of its stated goal of storing only “one copy of a file” in its backup database for multiple client computing devices. *Id.*, ¶40. Like the '545 patent's goal of storing “a single copy of a file,” Field's goal of storing only “one copy of a file” reduces network bandwidth usage as well as occupied storage space in the backup storage. *Compare id.*, ¶40 with EX1001, Abstract, 6:65-7:3.

Pet. 45–46 (emphasis omitted). Thus, Petitioner asserts that “Field's system determines access (i.e., whether a file can be stored at the back-up server) based on whether the files has been already backed-up.” *Id.* at 46 (citing Ex. 1002 ¶¶ 115–117).

Patent Owner's Response does not raise an argument specifically directed to limitation 1B.6 of claim 1. *See generally* PO Resp.

For the reasons explained by Petitioner, we find that the combination of Field and Anderson teaches limitation 1B.6.

ix. Summary of Claim 1

For the reasons explained above, on the complete record before us Petitioner has established that the combination of Field and Anderson teaches the subject matter of claim 1 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify Field with the

teachings of Anderson as proposed by Petitioner with a reasonable expectation of success.

b. Independent Claim 10

Independent claim 10 is directed to “[a] client device configured to exchange encrypted communications with a backup server over a communication network, the client device comprising” (a) “a first remote storage medium” and (b) “a backup application configured to execute a backup routine comprising” steps that mirror the steps recited in method claim 1. Ex. 1001, 19:40–20:11; *see* Pet. 46 (“Independent claim 10 recites a system claim directed to a ‘client device’ that performs the operations described in claim 1.” (emphasis omitted)); Prelim. Resp. 5 (“Independent claim 10 is directed to a physical device that follows the method described in claim 1.”).

Petitioner contends that Field “describes a ‘client computing device’ or ‘target computing device’ that discloses the claimed ‘client device’” and “explains that its client device includes ‘some type of memory’ that discloses the first remote storage medium.” Pet. 47 (citing Ex. 1004 ¶¶ 13, 16, 25, 42) (emphasis omitted). Petitioner asserts that Field’s client device also includes “a ‘remote backup module 202,’ which discloses the claimed ‘backup application configured to execute a backup routine[,]’” and “exchanges encrypted communications with its back end computing device, which discloses the claimed ‘backup server.’” *Id.* (citing Ex. 1004 ¶¶ 16, 32, 42, 44) (emphasis omitted).

Petitioner provides a table showing the correspondence between claims 1 and 10 and identifying the sections of the Petition that apply to each of claim 10’s limitations. Petitioner’s identification of the limitations of

claim 10, corresponding limitations of claim 1, and sections of the Petition addressing each are reproduced below:

Claim 10	Corresponding Limitations of Claim 1 and Petition Sections
[10-pre] A client device configured to exchange encrypted communications with a backup server over a communication network, the client device comprising:	Claim limitations [1-pre], [1A]; Sections VI.A.4.a-b.
[10A] a first remote storage medium;	Claim limitations [1-pre], [1A]; Sections VI.A.4.a-b.
[10B.1] a backup application configured to execute a backup routine comprising:	Claim limitation [1B.1]; Section VI.A.4.c.
[10B.2] identifying a first set of files stored on the first remote storage medium;	Claim limitation [1B.2]; Section VI.A.4.d.
[10B.3] generating a cryptographic signature value for each file in the first set of files, wherein the cryptographic signature value is computed by using actual data of the file as an input to a cryptographic signature generating algorithm which computes the cryptographic signature value;	Claim limitation [1B.3]; Section VI.A.4.e.
[10B.4] generating a first inventory for the first set of files, wherein the first inventory reflects a current state of the first remote storage medium, and wherein the first inventory includes the cryptographic signature values generated for each file in the first set of files;	Claim limitation [1B.4]; Section VI.A.4.f.
[10B.5] transmitting the first inventory from the client device to the backup server via one or more encrypted communications; and	Claim limitation [1B.5]; Section VI.A.4.g.

Claim 10	Corresponding Limitations of Claim 1 and Petition Sections
[10B.6] causing one or more files from the first set of files to be transmitted to the backup server for storage by the backup server upon determining that the cryptographic signature value generated for each file in the first set of files allows access to the one or more files on the backup server.	Claim limitation [1B.6]; Section VI.A.4.h.

Pet. 47–48.

Patent Owner addresses claim 10 together with its discussion of claim 1. *See* PO Resp. 29–51.

Claim 10, as reflected in Petitioner’s discussion, and reproduced in part above, is similar to claim 1. We find Petitioner’s arguments and evidence persuasive for the reasons explained by Petitioner. On the complete record before us, for the reasons explained in the context of claim 1 and based on Petitioner’s discussion of claim 10 and evidence directed thereto, we find that Petitioner has established that the combination of Field and Anderson teaches the subject matter of claim 10 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify Field with the teachings of Anderson as proposed by Petitioner with a reasonable expectation of success.

c. Dependent Claims 2–4, 6, 8, 12–16, 18, and 20

Petitioner contends the combination of Field and Anderson would have rendered the subject matter of claims 2–4, 6, 8, 12–16, 18, and 20 of the ’545 patent obvious to one of ordinary skill in the art at the time of the invention. Pet. 48–60, 61–62, 64–67. Petitioner provides a detailed discussion of each claim, identifies how the combination of Field and

Anderson teaches the subject matter recited therein, and provides reasons with rational underpinning for each modification proposed. *Id.*; *see also* Inst. Dec. 51–52 (addressing claim 20).

Patent Owner does not raise a separate argument addressing any of claims 2–4, 6, 8, 12–16, 18, and 20. *See generally* PO Resp.

We find Petitioner’s arguments and evidence persuasive for the reasons explained by Petitioner. On the complete record before us, for the reasons explained in the context of claims 1 and 10, and based on Petitioner’s discussion of the additional limitations recited expressly by dependent claims 2–4, 6, 8, 12–16, 18, and 20, we find that Petitioner has established that the combination of Field and Anderson teaches the subject matter of claims 2–4, 6, 8, 12–16, 18, and 20 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify Field with the teachings of Anderson as proposed by Petitioner with a reasonable expectation of success.

d. Dependent Claims 7 and 17

Claim 7 depends from claim 1 (Ex. 1001, 19:31), and claim 17 depends from claim 10 (*id.* at 20:44). The language of each claim is similar. Claim 7 recites “[t]he method of claim 1, further comprising: compressing the one or more files prior to causing the one or more files to be transmitted to the backup server” and claim 17 recites “[t]he client device of claim 10, wherein the backup application is further configured to compress the one or more files prior to causing the one or more files to be transmitted to the backup server.” *Id.* at 19:31–33 (claim 7), 20:44–47 (claim 17). Thus, each claim requires compression prior to transmission to the backup server.

Petitioner contends that “Field in view of Anderson” teaches these requirements of claims 7 and 17. Pet. 60–61. Petitioner asserts that Anderson “discloses compressing files before transmitting them from the client device to the backup server.” *Id.* at 60 (citing Ex. 1002 ¶ 144); *see id.* (citing Ex. 1005 ¶¶ 48, 101 (describing compression of a file using a zip-type compression or other compression algorithm), 49 (noting that different compression rates may apply for music, video, or still pictures)).

Petitioner contends that one of ordinary skill in the art would have been “motivated to incorporate this compression with Field’s system, with a reasonable expectation of success, to further reduce the size of files or data transmitted to the backup server.” Pet. 60 (citing Ex. 1002 ¶ 145). Relying on Dr. Shenoy’s testimony, Petitioner asserts:

Compressing the size of the data would have further reduced the amount of network bandwidth used when transmitting files over a network. Further, this compression would have also reduced storage space occupied at the backup server. A [person of ordinary skill in the art] would have understood that these features would have been desirable in view of Field’s stated goal of reducing network bandwidth usage and minimizing storage space by storing only one copy of a file. Thus, a [person of ordinary skill in the art] would have been motivated to combine Field with Anderson.

Id. at 60–61 (citing Ex. 1002 ¶¶ 145; Ex. 1004 ¶¶ 23, 38). Accordingly, Petitioner contends that the combination of Field and Anderson teaches the subject matter of dependent claims 7 and 17.

Patent Owner asserts, in its Response, that “as explained . . . above, it would in fact *not* have been obvious to one of ordinary skill in the art to employ a technique like compressing files used for a full backup as in Anderson with the backing up of individual files one at a time as discussed

in Field.” PO Resp. 51 (citing Ex. 2008 ¶ 122). Patent Owner contends that it “would likely be considered *more* inefficient and wasteful of resources to first compress individual files before transmitting them as done in Field, and thus if anything Field teaches away from this combination.” *Id.* (citing Ex. 2008 ¶ 122).

In its Reply, Petitioner reiterates that compressing the size of the data would reduce network bandwidth used when transmitting files over a network and that this “reduction in transmission size is expressly in line with Field’s goal of reducing ‘network bandwidth required to backup a computing device.’” Pet. Reply 20 (citing Ex. 1004 ¶ 23; Ex. 1024 ¶ 63). Petitioner notes that Dr. Weissman agreed, during his deposition, that compression can reduce the file size and amount of data that needs to be sent over a network. *Id.* (citing Ex. 1025, 145:9–146:5).

Additionally, Petitioner asserts that Field does not teach away from incorporating compression techniques. Pet. Reply 20. Rather, Petitioner points to Dr. Weissman’s testimony, which explains that “if you compress, there’s a classic tradeoff that’s X computation cycles versus what, you know, either storage or network bandwidth.” *Id.* at 21 (quoting Ex. 1025, 134:17, 146:12–22) (emphasis omitted). Petitioner contends that “such a tradeoff arising from knowledge of alternative implementation techniques would not have led a [person of ordinary skill in the art] away from considering and employing compression techniques—especially in view of Field’s express objective to reduce network bandwidth.” *Id.* (citing *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017); Ex. 1004 ¶ 23; Ex. 1024 ¶ 65).

In its Sur-reply, Patent Owner contends that in the context of Field, which teaches a system that backs up one file at a time, “compressing one file would actually not be in line of providing an efficient backup system.” PO Sur-reply 18. Patent Owner also offers additional testimony by Dr. Weissman, including that one of ordinary skill in the art would not be led to think that compression was advocated in Field, that compression itself is time consuming and could, although not necessarily, “overpower the benefit of reduction in data transmitted,” that compression is normally applied to an archive or collection of files so it’s not evident that one of ordinary skill in the art would have gravitated to compression, and that compression of an individual file in Field’s file-by-file backup method is not explicitly disclosed. *See id.* (citing Ex. 1025, 134:17–21, 146:7–11, 147:9–15).

We find Petitioner’s arguments and evidence persuasive for the reasons explained by Petitioner. In particular, a given course of action may have simultaneous advantages and disadvantages. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (stating that “a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine”); *see also Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) (“The fact that the motivating benefit comes at the expense of another benefit . . . should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another.”). Dr. Weissman’s testimony is directly on point and, as noted by Petitioner, highlights the specific advantages and disadvantages of applying compression to one or more

file(s) before transmission. *See, e.g.*, Pet. Reply 21 (citing Ex. 1025, 134:17, 146:12–22). In the context here, it is clear that one of ordinary skill in the art would have been motivated to compress the files, even a single file, before transmission in light of the evidence presented by Petitioner and Patent Owner, including Dr. Weissman’s testimony noted above. Even if compression might not have saved time in each instance, we find that one of ordinary skill in the art would have understood the advantages of compression and that the teachings of Field and Anderson would have taught and suggested applying compression in the context of Field’s file-by-file backup process.³⁷

On the complete record before us, we find that Petitioner has established that the combination of Field and Anderson teaches the subject matter of claims 7 and 17 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify Field with the teachings of Anderson as proposed by Petitioner with a reasonable expectation of success.

e. Dependent Claims 9 and 19

Claim 9 depends from claim 1 (Ex. 1001, 19:37), and claim 19 depends from claim 10 (*id.* at 20:51). The language of each claim is similar. Claim 9 recites “[t]he method of claim 1, wherein the cryptographic signature values comprise multiple file signatures using multiple cryptographic algorithms,” and claim 19 recites “[t]he client device of

³⁷ Additionally, Patent Owner has not directed us to any evidence supporting its argument that Field teaches away by criticizing, discrediting, or otherwise discouraging the combination as proposed. Thus, we do not find that Field teaches away.

claim 10, wherein the cryptographic signature values comprise multiple file signatures using multiple cryptographic algorithms.” *Id.* at 19:37–39 (claim 9), 20:51–53 (claim 19). Thus, each claim requires that the cryptographic signature values comprise more than one file signature using more than one cryptographic algorithm.

Petitioner contends that “both Field and Anderson describe multiple cryptographic algorithms” and that Field identifies the “SHA-1” algorithm and states that other algorithms or functions capable of generating a signature from file data may be used as well. Pet. 62–63 (citing Ex. 1004 ¶ 36) (disclosing the SHA-1 algorithm and noting that the description is not limited to that example). Petitioner also points to Anderson, asserting that “Anderson also describes ‘using well-known cryptographic hash algorithms,’ such as ‘MD5’ and SHA-1.” *Id.* at 63 (citing Ex. 1005 ¶ 42 (also noting that the algorithms include “content-derived or attribute-derived signaturing algorithms”)).

Petitioner asserts the following with respect to how one of ordinary skill in the art would have understood the teachings of Field and Anderson:

In view of Field and Anderson’s disclosures that multiple signature generating algorithms may be used to uniquely characterize a file, a [person of ordinary skill in the art] would have found it obvious to use multiple different cryptographic signatures in generating the multiple signatures to provide flexible and adaptable client-server communications. EX1002, ¶151. For example, common considerations when selecting a particular hash algorithm for use would have been the length of the resulting hash signature, the level of security required, as well as the speed of computation. *Id.* Anderson provides an example where its CI may vary in length: “the CI is relatively small in size, e.g., 24-48 bytes.” EX1005, ¶¶ 42, 46. Similarly, when considering the MD5 and SHA-1 algorithms, both generate different bit lengths as hash signatures; MD5 generates

a 128-bit hash while SHA-1 generates a 160-bit hash. EX1002, ¶151. SHA-1 provides additional security over MD5 but at a trade-off of being slower to compute and having a longer signature length. *Id.* An MD5 hash would have been faster to compute but generally less secure. *Id.*

Depending on the scenario and design of the client-backup server system, a [person of ordinary skill in the art] would have used multiple hash algorithms to provide flexibility. *Id.*, ¶152. For example, the client may initially generate SHA-1 signatures, but upon detecting an excessive use of network bandwidth due to the longer signature length, the client may change to generating MD5 signatures. *Id.* Having the flexibility to apply different and multiple types of hash algorithms would have allowed the client device to adapt to different networking conditions while balancing the trade-offs between security and bandwidth usage. *Id.*; EX1004, ¶¶23, 38; EX1005, Title, ¶¶12, 35, 94. Similarly, a [person of ordinary skill in the art] would have also known how to apply two or more hash algorithms together or in combination with other data if additional security were required. EX1002, ¶153. For example, a first signature may be generated using a first hash algorithm, and then a second signature may be generated by applying the first signature (with or without additional data) to a second hash algorithm. *Id.* Similarly, two signatures may be generated using different hash algorithms and then concatenated. *Id.* These configurations would have provided additional security. *Id.*

Pet. 63–64. Thus, Petitioner contends the combination of Field and Anderson teaches the subject matter of dependent claims 9 and 19.

Patent Owner contends that claims 9 and 19 “require that the cryptographic signatures included in the first inventory be generated using different cryptographic algorithms.” PO Resp. 52. Patent Owner asserts that “[t]his technique allows for different types or amounts of data and is possible in the [’]545 Patent because the inventories can contain additional data including the descriptor generating algorithm.” *Id.* (citing Ex. 1001,

Fig. 3; Ex. 2008 ¶ 124). Patent Owner argues that the subject matter of claims 9 and 19 is not disclosed or suggested by the combination of Field and Anderson because Field backs up files one at a time “and thus Field teaches away from sending data with multiple signatures much less signatures generated from multiple signature algorithms” and “[t]o the extent Anderson may suggest alternative mechanisms to be used in full backup scenarios . . . it would not have been obvious to combine such mechanisms with the file-by-file backup with signatures used in Field.” *Id.* at 52–53 (citing Ex. 2008 ¶ 126).³⁸

We find Petitioner’s arguments and evidence persuasive for the reasons explained by Petitioner. We addressed, in several instances, Patent Owner’s arguments that Field teaches away from various aspects of the combination and this instance, as with the others, is similarly unsupported for the same reasons. Additionally, we have also addressed whether one of ordinary skill in the art would have been motivated to modify Field’s file-by-file backup in light of several teachings by Anderson. Patent Owner’s arguments here do not lead us to a different conclusion as they reiterate the same positions we previously addressed.

On the complete record before us, we find that Petitioner has established that the combination of Field and Anderson teaches the subject matter of claims 9 and 19 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify Field with the teachings

³⁸ Although not required, we note for completeness that Patent Owner does not address claims 9 or 19 in its Sur-reply. *See generally* PO Sur-reply; *see also id.* at 17–19 (discussing dependent claims 7 and 17).

of Anderson as proposed by Petitioner with a reasonable expectation of success.

4. *Objective Considerations of Nonobviousness*

Neither party presents evidence of objective considerations of nonobviousness.

5. *Weighing the Graham Factors*

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves the weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat*, 876 F.3d at 1361. On balance, considering the complete record before us, Petitioner has established by a preponderance of the evidence that the combination of Field and Anderson would have rendered the subject matter of claims 1–4, 6–10, and 12–20 of the ’545 patent obvious to one of ordinary skill in the art at the time of the invention.

C. *Obviousness over Field, Anderson, and Ackerman*

Petitioner contends the combined teachings of Field, Anderson, and Ackerman would have rendered the subject matter of claim 5 of the ’545 patent obvious to one of ordinary skill in the art at the time of the invention. Pet. 67–71.

1. *Level of Ordinary Skill in the Art*

Above, we set forth our findings as to the level of ordinary skill in the art. *See supra* § I.G.

2. *Scope and Content of the Prior Art*

a. *Field and Anderson*

The scope and content of Field and Anderson is set forth above. *See supra* §§ III.B.2.a., III.B.2.b.

b. *Ackerman*

Ackerman is directed to “a hierarchical data storage and retrieval system implemented using a computed statistically unique signature for the content of given computer data as its basis.” Ex. 1006, code (57); *see id.* at 1:21–23. Ackerman’s teachings “relate to the efficient storage, backup and validation of files using hash functions” to generate cryptographic signatures. *Id.* at code (57); *see id.* at 1:14–17, 1:25–28. Ackerman explains that “[t]he signature is computed by any number of techniques so long as it is able to produce a statistically unique signature, one example being the SHA-1 algorithm.” *Id.* at 1:25–28.

Ackerman teaches that “[t]here are many well[-]known hash algorithms that are used for computing checksums, message digests and statistically unique signatures.” Ex. 1006, 8:49–51. To ensure that files are uniquely identified, Ackerman explains that algorithms should be selected “so long as they produce a significantly large hash value.” *Id.* at 8:62–64. Ackerman provides examples of several hash functions, including “the SHA-N algorithms, SHA-1(SHA-160), SHA-193, SHA-224, SHA-256, SHA-384 or SHA-512,” and Ackerman explains that “the numeral corresponds to the number of bits that are produced by the function.” *Id.* at 8:57–64.

3. *Differences Between the Prior Art and Claim 5;
Motivation to Modify*

Claim 5 depends from claim 1 and recites “[t]he method of claim 1, wherein the cryptographic signature values are generated with at least a 256-bit encryption algorithm.” Ex. 1001, 19:25–27. Petitioner contends that Field discloses generating a cryptographic signature using a hashing algorithm, but does not explicitly provide a criteria for selecting one algorithm over another. Pet. 67 (citing Ex. 1002 ¶ 159). Petitioner, relying on Dr. Shenoy’s testimony, explains in detail why one of ordinary skill in the art would have considered using a longer key length (including a 256-bit-based algorithm) in the context of Field, including to avoid “collisions” (instances where two files with different data generate the same cryptographic key). *Id.* at 67–68 (citing Ex. 1002 ¶ 160). Petitioner asserts that “[u]sing Ackerman, a [person of ordinary skill in the art] would have selected a particular hash algorithm that would produce a sufficiently large hash value to ensure statistical uniqueness” and would have had a reasonable expectation of success in using a 256-bit algorithm at least because Field teaches that other types of algorithms (aside from those disclosed in Field) can be used to generate signatures. *Id.* at 69 (citing Ex. 1002 ¶ 163; Ex. 1004 ¶¶ 36–37). Thus, Petitioner contends that one of ordinary skill in the art “would have recognized that Ackerman provides details beneficial to the implementation of Field’s signatures to provide statistical uniqueness.” *Id.* at 69–70 (citing Ex. 1002 ¶ 163); *see also id.* at 70–71 (noting that Ackerman discloses the “SHA-256” algorithm that teaches a 256-bit encryption algorithm as recited by claim 5).

Patent Owner reiterates its arguments directed to claim 1, PO Resp. 54, which we have already addressed, and additionally argues that

“given the limited nature of the use of signatures in Field . . . there is no reason to suspect collisions would occur and no suggestion or motivation to use a stronger algorithm to avoid them,” *id.* at 55 (citing Ex. 2008 ¶ 132). Patent Owner asserts that “in as much as Field is focused primarily on optimizing the backup process, it teaches away from using a signature generating algorithm which is stronger than needed.” *Id.* (citing Ex. 2008 ¶ 132).³⁹

Petitioner’s arguments and evidence are persuasive for the reasons explained by Petitioner. First, Field expressly discloses that other types of algorithms may be used. Ex. 1004 ¶ 36. Second, as with Patent Owner’s previous arguments that Field teaches away, Patent Owner fails to identify anything in Field that criticizes, discredits, or otherwise discourages uses a stronger algorithm, including a 256-bit algorithm, such as that disclosed by Ackerman. Third, Petitioner provides persuasive evidence as to why one of ordinary skill in the art would have been motivated to modify the combination of Field and Anderson to use Ackerman’s algorithm and persuasive evidence that such combination would have had a reasonable expectation of success. *See* Pet. 67–71; Pet. Reply 22–24.

Thus, we find that Petitioner has established that the combination of Field, Anderson, and Ackerman teaches the subject matter of claim 5 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify the combination of Field and Anderson with the

³⁹ Although not required, we note for completeness that Patent Owner does not address claim 5 in its Sur-reply. *See generally* PO Sur-reply; *see also id.* at 17–19 (discussing dependent claims 7 and 17).

teachings of Ackerman as proposed by Petitioner with a reasonable expectation of success.

4. *Objective Considerations of Nonobviousness*

As noted above, neither party presents evidence of objective considerations of nonobviousness.

5. *Weighing the Graham Factors*

On balance, considering the complete record before us, Petitioner has established by a preponderance of the evidence that the combination of Field, Anderson, and Ackerman would have rendered the subject matter of claim 5 of the '545 patent obvious to one of ordinary skill in the art at the time of the invention.

D. *Obviousness over Field, Anderson, and Coombs*

Petitioner contends the combined teachings of Field, Anderson, and Coombs would have rendered the subject matter of claim 11 of the '545 patent obvious to one of ordinary skill in the art at the time of the invention. Pet. 71–74.

1. *Level of Ordinary Skill in the Art*

Above, we set forth our findings as to the level of ordinary skill in the art. *See supra* § I.G.

2. *Scope and Content of the Prior Art*

a. *Field and Anderson*

The scope and content of Field and Anderson is set forth above. *See supra* §§ III.B.2.a., III.B.2.b.

b. Coombs

Coombs is titled “System and Method for Data Backup” and is directed to “[a] method and system of data backup for a computer system” in which “[f]ull and incremental backups of data stored to a first storage device coupled to the computer system are stored to a backup storage device coupled to the computer system.” Ex. 1008, codes (54), (57). In relation to primary storage device 22, Coombs explains that “[a] full backup is a copy at a particular point in time of all the files to be backed up from primary storage device 22” and that “[a]n incremental backup is a copy at a particular point in time of data files to be backed up from primary storage device 22 and that were changed or added to primary storage device 22 subsequent to a previous backup.” *Id.* ¶ 35. Coombs teaches that “[w]hether performing a full or incremental backup, the entire file structure at the primary data storage device is scanned to establish a list of every file and their file attributes, such as, last-changed time . . . [etc.], that may be desired for constructing a backup index.” *Id.* ¶ 45.

*3. Differences Between the Prior Art and Claim 11;
Motivation to Modify*

Claim 11 depends from claim 10 and recites “[t]he client device of claim 10, wherein the first set of files is determined by scanning a list of files stored in the first remote storage medium and identifying the first set of files as being one of new and changed since a last backup operation was performed.” Ex. 1001, 20:12–16. Petitioner contends that although Field discloses that a user may automatically backup a device at regular intervals and that a command to perform a backup may be generated automatically as part of an archival process, “Field does not explicitly disclose how its system automatically determines which files need to be backed up, but Coombs

does.” Pet. 71 (citing Ex. 1002 ¶ 166). Petitioner asserts that one of ordinary skill in the art “looking to implement the teachings of Field using an automatic backup process would have needed to understand techniques for determining which files needed to be backed up.” *Id.* Petitioner contends that “[t]his would have motivated a [person of ordinary skill in the art] to seek out other references that describe such determinations, such as Coombs.” *Id.* (citing Ex. 1002 ¶ 166).

Petitioner contends that one of ordinary skill in the art “would have recognized that Coombs’s process of scanning a client device to determine which files changed since the last backup would have naturally allowed Field to perform its automatic backup at regular intervals.” Pet. 72 (citing Ex. 1002 ¶¶ 168–169). Petitioner further asserts that one of ordinary skill in the art

would have had a reasonable expectation of success implementing the techniques of Coombs because no architectural changes would be required in Field’s process. [Ex. 1002 ¶¶ 168–169.] Rather, these well-known techniques could be employed at the start of Field’s backup process.[] *Id.* Identifying files that changed since the last backup also aligns with Field’s goal of “reduc[ing] network bandwidth” by only attempting to backup files that have changed, rather than having to transmit signatures of all files across the network for each backup. *Id.* Therefore, a [person of ordinary skill in the art] would have recognized that Coombs provides details beneficial to the implementation of Field’s automated backup processes. *Id.*

Pet. 72–73; *see also id.* at 73–74 (further explaining the combination of Field, Anderson, and Coombs).

Patent Owner reiterates its arguments directed to claim 10. *See* PO Resp. 57 (“Petitioner has failed to show that Field, Anderson, or Coombs,

alone or in combination, teach or suggest a backup or restore process that uses an inventory of electronic data that reflects the current state of the first remote storage medium to determine whether to restore or backup the electronic data that is part of said inventory”). We have already addressed this argument and its deficiencies in the context of our discussion of claims 1 and 10. *See supra* §§ III.B.3.a.vi. (addressing Limitation 1B.4 of claim 1), III.B.3.b. (addressing claim 10).

Additionally, Patent Owner contends that one of ordinary skill in the art “would not be motivated to combine Coombs with Field as Field relies on file signatures to provide an efficient file-by-file based backup process and Coombs does not.” PO Resp. 57 (citing Ex. 2008 ¶ 140). Patent Owner asserts that “[s]ince Field uses signatures *only* when backing up selected files it would have been inefficient to first check which ones have changed since a last backup.” *Id.* (citing Ex. 2008 ¶ 140). Patent Owner argues that “Field only suggests doing point-in-time and version copies to store modifications for its *full volume* backups, *not* when backing up individual selected files using file signatures.” *Id.* (citing Ex. 1004 ¶ 27; Ex. 2008 ¶ 140). Thus, Patent Owner asserts that “Field teaches away from being combined with this aspect of the teachings of Anderson and Coombs.” *Id.* (citing Ex. 2008 ¶ 140).⁴⁰

In its Reply, Petitioner points to Field’s description of backing up different versions of *files* in addition to volume-state backups. Pet. Reply 24–25 (citing Ex. 1004 ¶¶ 32, 41). In particular, Petitioner notes that

⁴⁰ Although not required, we note for completeness that Patent Owner does not address claim 11 in its Sur-reply. *See generally* PO Sur-reply; *see also id.* at 17–19 (discussing dependent claims 7 and 17).

Field refers to automatically backing up different versions of files, not just different versions of a volume state. *Id.* And, Petitioner reiterates that Coombs provides a mechanism, which one of ordinary skill in the art would have applied to Field's process of automatic file backup, to determine which files are new or have changed since the last backup and would have allowed Field to avoid transmitting signatures of files that have not changed. *See id.* at 25 (citing Pet. 73–74; Ex. 1008 ¶¶ 35, 45; Ex. 1024 ¶ 75).

We find Petitioner's arguments and evidence persuasive for the reasons explained by Petitioner. In particular, Field is not limited to automatically backing up full-volume states. Rather, as Petitioner explains, Field expressly discloses automatic backup of different *file* versions. *See, e.g.,* Ex. 1004 ¶ 32. In light thereof, Patent Owner's argument that Coombs is inapplicable and one of ordinary skill in the art would not have modified Field and Anderson because of additional inefficiencies is not supported sufficiently on the record.

Thus, we find that Petitioner has established that the combination of Field, Anderson, and Coombs teaches the subject matter of claim 11 and that one of ordinary skill in the art would have had a reason with rational underpinning to modify the combination of Field and Anderson with the teachings of Coombs as proposed by Petitioner with a reasonable expectation of success.

4. *Objective Considerations of Nonobviousness*

As noted above, neither party presents evidence of objective considerations of nonobviousness.

5. *Weighing the Graham Factors*

On balance, considering the complete record before us, Petitioner has established by a preponderance of the evidence that the combination of Field, Anderson, and Coombs would have rendered the subject matter of claim 11 of the '545 patent obvious to one of ordinary skill in the art at the time of the invention.

IV. SUMMARY⁴¹

For the reasons discussed above, Petitioner has demonstrated, by a preponderance of the evidence, that claims 1–20 of the '545 patent are unpatentable.

Our conclusions regarding the Challenged Claims are summarized below:

Claims Challenged	35 U.S.C. §	Reference(s) /Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–4, 6–10, 12–20	103(a)	Field, Anderson	1–4, 6–10, 12–20	
5	103(a)	Field, Anderson, Ackerman	5	

⁴¹ Should Patent Owner wish to pursue amendment of the Challenged Claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

11	103(a)	Field, Anderson, Coombs	11	
Overall Outcome			1–20	

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–20 of U.S. Patent No. 9,038,545 B2 are determined to be unpatentable; and

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

IPR2020-01039
Patent 9,037,545 B2

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