

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE INC., APPLE INC.,
SAMSUNG ELECTRONICS AMERICA, INC., and
SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

AMERICAN NAVIGATION SYSTEMS, INC.,
Patent Owner.

Case IPR2015-00849
Patent 5,902,347

Before LYNNE E. PETTIGREW, STACEY G. WHITE, and
BETH Z. SHAW, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Google Inc., Apple Inc., Samsung Electronics America, Inc., and Samsung Electronics Co., Ltd. (collectively, “Petitioner”) challenge the patentability of claims 5–10 of U.S. Patent No. 5,902,347 (Ex. 1001, “the ’347 patent”), owned by American Navigation Systems, Inc. (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 5–10 of the ’347 patent are unpatentable.

A. Procedural History

Petitioner filed a Petition for *inter partes* review of claims 5–10 of the ’347 patent. Paper 1 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). On September 22, 2015, we instituted an *inter partes* review of all challenged claims of the ’347 patent on certain asserted grounds of unpatentability. Paper 9 (“Dec.”). After institution, Patent Owner filed a Patent Owner Response, Paper 21 (“PO Resp.”), and Petitioner filed a Reply to the Patent Owner Response, Paper 25 (“Pet. Reply”). An oral hearing was held on June 8, 2016.¹ A transcript of the hearing has been entered into the record. Paper 30 (“Tr.”).

B. Related Matters

The parties identify the following district court proceedings in which the ’347 patent has been asserted: *American Navigation Systems, Inc. v.*

¹ A consolidated oral hearing was held for this proceeding and IPR2015-00851. See Paper 28 (hearing order).

Apple, Inc., Case No. 3:14-cv-05297 (N.D. Cal.); *American Navigation Systems, Inc. v. Samsung Electronics Co.*, Case No. 3:14-cv-05298 (N.D. Cal.). See Pet. 2; Paper 7, 2. Petitioner filed another petition for *inter partes* review of the '347 patent in IPR2015-00851. A final written decision in that proceeding is entered contemporaneously with this decision.

C. The '347 Patent

The '347 patent, titled “Hand-Held GPS-Mapping Device,” is directed to a portable device that displays a user’s current position on a map image. Ex. 1001, 2:17–19. The device uses a “novel data compression, retrieval, and storage scheme” that allegedly addresses problems with data storage and memory limitations of prior art personal navigation systems. *Id.* at 1:24–28, 3:24–36. According to the '347 patent, the total memory available in a handheld device generally will be far less than an uncompressed map image requires. *Id.* at 3:33–34. Thus, “[i]t [i]s essential that the device be able to decompress . . . images . . . without having to load the entire (decompressed) image in memory.” *Id.* at 3:37–39.

The proposed solution described in the '347 patent processes a map image by dividing it into square arrays, or tiles, each of which contains image data for a small region. *Id.* at 4:17–19, 4:35–39. A file is created that contains header information describing the size and geographic location of each tile, pointers to the tile data, and compressed tile data. *Id.* at 4:19–22. According to the '347 patent, this file structure allows for decompression of only the desired tile. *Id.* at 5:2–5. Further, the format “facilitates caching uncompressed tiles based on user movement to facilitate smooth pan and zoom without requiring that the entire image be decompressed in memory.” *Id.* at 5:5–8.

D. Illustrative Claim

Among the challenged claims, only claim 5 is independent. Claims 6 and 8–10 depend directly from claim 5, and claim 7 depends from claim 6.

Claim 5 is illustrative of the claimed subject matter:

5. A device for personal, portable mapping and navigation, by a user, and adapted to display a map image to the user and to display, to the user, the user's actual location, on the map image, comprising:
- a) a case
 - b) a digital computer mounted in the case,
 - c) a location receiver unit associated with the case and adapted to provide user location information to the computer,
 - d) an image storage unit adapted to store image data and to provide the image data to the computer, said image data including a plurality of tile data which tiles, taken together, represent a map image, said image data including;
 - i) header data describing the size and geographical location of each tile,
 - ii) pointers to the location, in the storage unit, of the data for each tile,
 - iii) compressed tile data for each tile,
 - e) a display unit adapted to receive data from the computer and display the data as an image to the user,
 - f) a computer program adapted to control the computer, and to cause the computer to present the user location information and the image data to the display unit so that the display unit displays, to the user, a map image and the user's actual location, on the map image, said program including;
 - i) an associating routine for associating the user location with one of the tiles,
 - ii) a decompressing routine for decompressing the tile data for the said one of said tiles into a tile image for the said one of said tiles, and

iii) a locating routine for locating the user's location on said tile image.

Id. at 5:57–6:22.

E. Asserted Grounds of Unpatentability

We instituted an *inter partes* review of claims 5–10 of the '347 patent on the following grounds of unpatentability:

References	Basis	Challenged Claim(s)
Israni ² and Fedra ³	35 U.S.C. § 103(a)	5, 8, and 10
Israni, Fedra, and Beckwith ⁴	35 U.S.C. § 103(a)	6 and 7
Israni, Fedra, Muller, ⁵ TIFF, ⁶ and JPEG ⁷	35 U.S.C. § 103(a)	9

II. DISCUSSION

A. Principles of Law

To prevail in challenging the claims of the '347 patent, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is

² U.S. Patent No. 5,968,109, issued Oct. 19, 1999 (Ex. 1007, "Israni").

³ Kurt Fedra & Milan Kubat, *Hybrid Geographical Information Systems*, EARSEL ADVANCES IN REMOTE SENSING, Vol. 1, No. 3, July 1992, at 89 (Ex. 1005, "Fedra").

⁴ U.S. Patent No. 5,140,532, issued Aug. 18, 1992 (Ex. 1006, "Beckwith").

⁵ U.S. Patent No. 5,839,080, issued Nov. 17, 1998 (Ex. 1008, "Muller").

⁶ Adobe Developers Association, TIFF™ Revision 6.0, June 3, 1992 (Ex. 1009, "TIFF").

⁷ Eric Hamilton, C-Cube Microsystems, JPEG File Interchange Format, Version 1.02, Sept. 1, 1992 (Ex. 1010, "JPEG").

unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner’s declarant, Dr. Michael S. Braasch, opines that a person of ordinary skill in the art at the time of the invention of the ’347 patent would have had a minimum of a bachelor’s degree in electrical engineering or a related engineering field and 2–5 years of experience working in the field of electrical engineering and its subfield of navigation systems. Ex. 1003 ¶ 15. Patent Owner’s declarant, Mr. Jay Bhatia, generally agrees. Ex. 2005 ¶ 13. Based on our review of the record, we adopt Dr. Braasch’s characterization of the level of ordinary skill in the art.

C. Claim Construction

In an *inter partes* review, we construe claim terms in an unexpired patent according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); see *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144 (2016) (holding that 37 C.F.R. § 42.100(b) “represents a reasonable exercise of the rulemaking authority that Congress delegated to the Patent Office”). Consistent with the broadest reasonable construction, claim terms are

presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

In its Patent Owner Response, Patent Owner proposes constructions for two claim phrases that were not construed previously in this proceeding by either party or in our institution decision. *See* PO Resp. 5–10; Dec. 5–7. Petitioner responds that Patent Owner’s proposed constructions are overly narrow and inconsistent with the plain meaning of the claim language and the specification of the ’347 patent. Pet. Reply 1–14. In view of the parties’ arguments, we construe the disputed claim language to the extent set forth below. No other claim terms require express construction.

1. “*one of the tiles*” and “*said one of said tiles*” (claim 5)

Independent claim 5 recites an image storage unit adapted to store “image data including a plurality of tile data which *tiles*, taken together, represent a map image.” Ex. 1001, 5:66–6:2 (emphasis added). Claim 5 further recites a computer program including “an associating routine for associating the user location with *one of the tiles*” and “a decompressing routine for decompressing the tile data for the *said one of said tiles* into a tile image for the said one of said tiles.” *Id.* at 6:17–21 (emphases added). Patent Owner contends that the phrases “one of the tiles” and “said one of said tiles” should be construed as a “single tile within the plurality of tiles,” i.e., one and only one tile. PO Resp. 5. In other words, Patent Owner

advocates a construction that limits the scope of claim 5 to “associating a *single* tile with the user location and then decompressing that *single* tile.” *Id.* at 9.

Patent Owner argues that its proposed construction is consistent with the plain meaning of the word “one”—“being a ***single*** unit or thing.” *Id.* at 5 (quoting Ex. 2006 (definition of “one” from <http://www.merriam-webster.com>)). Patent Owner further argues that any construction of “one of the tiles” to encompass multiple tiles would contradict the plain meaning of the word “one.” *Id.* at 7. In addition, Patent Owner contends that construing “‘one of said tiles’ as ‘multiple tiles’ would impermissibly read the claim limitation ‘one’ out of the claim.” *Id.*

Patent Owner also argues that its proposed construction is supported by the specification of the ’347 patent, which states: “Since the starting location of the data is known both geographically and in terms of data storage ***only the desired tile*** need be decompressed.” *Id.* at 6 (quoting Ex. 1001, 5:2–5). Patent Owner contends that although the ’347 patent discloses other embodiments in which more than one tile is decompressed, decompression of additional tiles is “optional.” *Id.* According to Patent Owner, these additional embodiments are claimed in dependent claims 6 and 7, which recite additional routines for identifying and decompressing “peripheral” tiles and “successor” tiles. *Id.* (citing Ex. 1001, 6:23–36).

Petitioner responds that Patent Owner’s narrow construction is “legally flawed and inconsistent with the plain meaning and the preferred embodiment of the ’347 patent.” Pet. Reply 1. First, Petitioner contends that Patent Owner’s proposed construction improperly narrows the scope of claim 5 to exclude the preferred embodiment of the ’347 patent, which

“requires[s] at least 4 active tiles’ to be decompressed in memory.” *Id.* at 2–3 (quoting Ex. 1001, 4:42–45). Moreover, Petitioner contends, the “alternative option” relied on by Patent Owner, in which only the desired tile need be decompressed, merely indicates that a single tile would be *sufficient*, not that the system must decompress one and only one tile. *Id.* at 3–4. Petitioner also submits that dependent claims 6 and 7 demonstrate that independent claim 5 must not be strictly limited in scope to a device that decompresses one and only one tile. *Id.* at 6.

Petitioner further argues that Patent Owner’s proposed construction is inconsistent with other limitations in claim 5. *Id.* at 6. Specifically, Petitioner points out that claim 5 requires the computer program that includes the associating and decompressing routines to display a “map image,” which is represented by “a plurality of . . . tiles, **taken together.**” *Id.* (citing Ex. 1001, 6:1–15). Because displaying the “map image” necessarily requires decompressing the plurality of tiles that represent the map image, Petitioner submits that a construction requiring one and only one tile to be decompressed is inconsistent with claim 5 as a whole. *Id.* at 6–7 (citing Ex. 1016 ¶ 10 (Second Decl. of Dr. Braasch); Ex. 1022, 65:12–24, 62:17–19 (deposition testimony of Patent Owner’s declarant, Mr. Bhatia)).

Having considered all of the parties’ arguments, we agree with Petitioner that claim 5 does not limit the claimed system to one that decompresses tile data for only one tile. As an initial matter, the word “one” when used in patent claims does not necessarily mean “one and only one.” *See Accent Packaging, Inc. v. Leggett & Platt, Inc.*, 707 F.3d 1318, 1325–26 (Fed. Cir. 2013); *IGT v. Bally Gaming Int’l, Inc.*, 659 F.3d 1109, 1116–17 (Fed. Cir. 2011). In *Accent Packaging*, for example, the court held that the

claim term “a respective *one*” did not limit the claims to “require[] that each elongated operator body be coupled to *one and only one* operator element” when “[n]othing in the claim language compel[led] that result.” 707 F.3d at 1326 (emphases added). Similarly, in *IGT*, the court rejected the appellant’s attempt to rewrite “one” as “only one” and held that the claim limitation “issuing a command . . . to *one* of said preselected gaming devices” did not preclude issuing commands to multiple gaming devices. 659 F.3d at 1116–17 (emphasis added). In both cases, the court emphasized that the claim term “one,” like other claim language, must be construed in the context of the claim in which it appears and in view of the embodiments described in the patent specification. *Accent Packaging*, 707 F.3d at 1326; *IGT*, 659 F.3d at 1117.

We also note that claim 5 is an open-ended claim containing the transitional word “comprising.” In such claims, the general rule is that the indefinite articles “a” and “an” carry the meaning of “one or more.” *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008). A narrow exception arises only when the language of the claims themselves, the specification, or the prosecution history necessitates a departure from the general rule. *Id.* at 1342–43. In such a situation, the evidence must indicate a clear intent by the patentee to limit “a” or “an” to the singular. *Id.* Similarly, when the term “one” appears in an open-ended claim, we look to the intrinsic evidence of record to determine whether the patentee intended to limit the meaning of “one” to “only one” despite using the transitional word “comprising.” *See Accent Packaging*, 707 F.3d at 1326 (citing *Baldwin*, 512 F.3d at 1342).

Applying these principles in this case, we focus on the claim language and the written description of the '347 patent, because neither party argues that the prosecution history informs the construction of disputed claim terms. First, we see nothing in the language of claim 5 clearly indicating that only one tile must be associated with the user location or that only one tile must be decompressed. In particular, we disagree with Patent Owner's argument that a construction that allows for decompression of multiple tiles would read the word "one" out of the claim. *See* PO Resp. 7. As Petitioner submits, a system that decompresses only one tile—the same tile associated with the user location—comes within the scope of the claim. *See* Pet. Reply 4–5. Nothing in the claim, however, precludes decompression of additional tiles. Indeed, as Petitioner argues, citing the testimony of both Petitioner's declarant and Patent Owner's declarant, the language in claim 5 providing for display of a "map image" suggests that the *plurality of tiles* that represent the map image must be decompressed in order to display the map image. *See id.* at 6–7 (citing Ex. 1016 ¶ 10; Ex. 1022, 65:12–24, 62:17–19).

We turn now to the written description of the '347 patent, which by Patent Owner's own admission is "rather terse." Tr. 29:7. The '347 patent describes a file structure for map image data in which data for a geographic area (e.g., a tile) are stored in compressed form together in memory. Ex. 1001, 4:12–63. In explaining how a navigation mapping device would utilize data stored in this manner, the patent states that "[i]n general, it is expected that a land user will require at least 4 active [uncompressed] tiles in memory to allow seamless pa[n]ning in the event that the user is located at the intersection of four tiles." *Id.* at 4:42–45. It also explains that, "given a

user location, the tiles needed by the user can be directly identified. Since the starting location of the data is known both geographically and in terms of data storage only the desired tile need be decompressed.” *Id.* at 5:1–5.

Petitioner argues that decompression of four tiles is a “preferred embodiment” that is excluded by Patent Owner’s proposed construction, whereas Patent Owner asserts it is just one of several embodiments. *See* Pet. Reply 2; PO Resp. 6. The ’347 patent does not explicitly refer to “preferred” or alternative embodiments, but the brevity of the patent disclosure suggests that only one embodiment is described. Regardless of whether the four-tile scenario is a preferred embodiment, however, we are not persuaded the ’347 patent describes any embodiment supporting Patent Owner’s restrictive interpretation of claim 5. Patent Owner cites a single sentence, which provides that “only the desired tile need be decompressed.” PO Resp. 6 (quoting Ex. 1001, 5:2–5). We agree with Petitioner that this sentence describes decompressing a minimum of one tile without requiring that only one tile be decompressed. *See* Pet. Reply 3–4. Moreover, the preceding and following sentences refer to “tiles” in the plural, further suggesting that the scope of the invention described and claimed in the ’347 patent is not limited to decompression of only one tile. Ex. 1001, 5:1–2 (“Thus, given a user location, the *tiles* needed by the user can be directly identified.” (emphasis added)); *id.* at 5:5–6 (“This format also facilitates caching *uncompressed tiles*” (emphasis added)).

For these reasons, we do not adopt Patent Owner’s proposed construction of the phrases “one of the tiles” and “said one of said tiles” as a “single tile within the plurality of tiles.” Instead, we agree with Petitioner

that under a proper construction of those phrases, the scope of claim 5 is not limited to a device that decompresses tile data for only one tile.

2. “*projects the movement trend*” (claim 7)

Dependent claim 7 recites “a projection routine which projects the movement trend of the user’s location and identifies and decompresses the successor tile which is adjacent the said one of said tile and in the path of movement of the user’s location.” Ex. 1001, 6:29–30. Patent Owner argues that “projects the movement trend” should be construed as “extrapolates a future movement path from the past changes in the user’s location.” PO Resp. 9.⁸ Patent Owner provides dictionary definitions of “extrapolate” and “movement,” and then asserts that its proposed construction is consistent with the plain meaning of the claim terms. *Id.* (citing Ex. 2007 (defining “extrapolate” as “to predict by projecting past experience or known data”); Ex. 2008 (defining “movement” as “an act of changing physical location or position”)). Patent Owner further contends that its construction is consistent with the recitation in claim 7 of a “successor tile,” which signifies that the claimed step is used to identify a future location. *Id.* at 10.

We agree with Petitioner that Patent Owner’s proposed construction is overly narrow and unsupported by the record. *See* Pet. Reply 11–14. In particular, we find no support for including a requirement that future movement be based on *past changes* in the user’s location. First, although

⁸ We note that this proposed construction is slightly different from that offered by Patent Owner’s declarant, Mr. Bhatia, and by Patent Owner in the concurrent proceeding, IPR2015-00851, involving the same patent and claims. *See* Ex. 2005 ¶ 18 (construing disputed language as “extrapolates a predicted path of movement from the prior changes in the user’s position”); IPR2015-00851, Paper 21, 6 (same).

Patent Owner purports to rely on the plain meaning of claim terms, Patent Owner supplies a definition of “extrapolate,” which is not a recited claim term, but instead is merely a word appearing in Patent Owner’s proposed construction. *See* PO Resp. 9. The actual claim term is “project,” for which Petitioner provides the following definition: “to calculate, estimate, or predict (something in the future), *based on present data* or trends.”

Ex. 1021 (emphasis added); *see* Pet. Reply 13. Thus, in contrast to Patent Owner’s definition of “extrapolate,” which may involve a prediction based on past data, the claim term “project” only requires a prediction based on present data.

Furthermore, nothing in the other terms of claim 7 cited by Patent Owner—“successor tile” and “movement”—requires a projection to be based on “past changes” in the user’s location. *See* PO Resp. 9–10; Pet. Reply 11–12. At the oral hearing, Patent Owner focused on yet another claim term, suggesting that claim 7 requires a projection to be based on a “movement trend.” *See, e.g.*, Tr. 39:17–23. We agree with Petitioner, however, that the “movement trend” recited in the claim is the output or result of the claimed projection routine rather than the input. *See id.* at 62:12–20. Thus, the word “trend” in claim 7 refers to a general direction of movement that is projected for the future, rather than past changes in the user’s location that would serve as a basis for the projection.⁹

Finally, Patent Owner cites no other intrinsic evidence to support its proposed construction. *See* PO Resp. 9–10. As Petitioner points out, the

⁹ A plain meaning of “trend” is “[t]he general direction in which something tends to move.” *AMERICAN HERITAGE DICTIONARY* 1907 (3d ed. 1992) (Ex. 3001).

words “project” and “trend” appear nowhere in the written description of the ’347 patent. *See* Pet. Reply 13. Patent Owner’s declarant agreed that the specification does not disclose any projection routine. Ex. 1022, 94:8–10, 96:8–10. And Patent Owner admitted at the oral hearing that the specification contains no discussion that would shed light on the proper construction of “projects the movement trend.” Tr. 42:4–9.

For these reasons, we do not adopt Patent Owner’s proposed construction of “projects the movement trend,” which improperly includes a requirement that the future movement of the user’s location be based on past changes in the user’s location. We decline to import that limitation into claim 7 because it is not supported by the intrinsic evidence. Instead, in accordance with the ordinary meaning of the claim terms, we construe the phrase “projects the movement trend” to mean “predicts the future direction of movement based on present data.”

D. Overview of Asserted Prior Art References

1. Israni

Israni discloses a system and method for storage of geographic data on a physical medium for use in a computer-based navigation system. Ex. 1007, 1:33–35. In the Background of the Invention section, Israni describes navigation systems in which the navigation software application program, geographic data set, and positioning system are combined into a single unit. *Id.* at 2:1–3. Israni notes further that “[s]uch single unit systems can be installed in vehicles or carried by persons.” *Id.* at 2:3–4. In the Detailed Description section, Israni discloses an exemplary configuration of a navigation system that includes a navigation application program, a storage

medium for storing geographic data, and a positioning system, which may utilize Global Positioning System (GPS) technology. *Id.* at 4:45–67, Fig. 1.

Regarding storage of geographic data, Israni describes organizing the full collection of data for an entire geographic region into smaller portions, or parcels. *Id.* at 10:39–47. For map data in particular, the parcels are organized spatially, i.e., each parcel represents geographic data encompassed within a geographic rectangular area. *Id.* at 10:47–51. This organization attempts “to group into one parcel, or as few parcels as possible, most or all of the data that any one of the navigation functions may require in order to perform an operation for the user.” *Id.* at 10:52–56. For example, if a user wants to display a map of his current location, “it would be preferable that the data relating to the geographic area immediately around the user are organized so that all the necessary data could be accessed and loaded into memory quickly.” *Id.* at 10:56–61. Parcels are maintained in compressed form in memory after they are retrieved from storage and then decompressed as they are requested by navigation application functions. *Id.* at 23:38–43. Each parcel also includes header data describing the parcel. *Id.* at 23:62–66.

2. Fedra

Fedra describes a hybrid Geographical Information Systems (GIS) approach for storing spatial or geo-referenced data using a combination of vector-based representation formats and raster, or grid-based, formats. Ex. 1005, 89.¹⁰ Grid cell data files are a central element of the disclosed

¹⁰ Unless otherwise indicated, we cite page numbers of the prior art references themselves rather than the exhibit page numbers added by Petitioner.

system. *Id.* at 90. Cell header files contain information regarding, for example, the geographic boundaries of a cell. *Id.*

3. *Beckwith*

Beckwith describes a “digital system for the display of elevation and cultural terrain data so as to provide a dynamic visual map of the terrain over which a vehicle, such as an aircraft, is passing.” Ex. 1006, 1:13–16.

Geographic data in Beckwith are divided into 12.5 km blocks and stored on a cassette tape. *Id.* at 5:46–55, 6:44–50, 7:30–35. Beckwith also discloses that geographic data are stored in compressed format. *Id.* at 2:29–36, 2:48–50, 6:1–4.

In operation, Beckwith’s system displays terrain data with the instantaneous location of the aircraft at the center of a square display. *Id.* at 9:1–8. Terrain data being displayed are stored in intermediate memory, and as the aircraft travels across the terrain, the system “track[s] the movement of the aircraft causing the scene to change.” *Id.* at 9:8–11. New 12.5 km blocks of data required to update the display square are written over old 12.5 km blocks that are no longer in the square. *Id.* at 9:11–13.

Beckwith further discloses that upon receiving position commands from the navigation computer, the memory management control “will determine which 12.5 km blocks of data are required to fill out the intermediate memory” with the aircraft at the center of the display. *Id.* at 10:3–7. Then, as the aircraft moves, based on the heading and position data received from the navigation computer, the memory management control will determine which new blocks of data will be required from the tape to ensure a valid display. *Id.* at 10:10–16.

4. *Muller*

Muller discloses a “terrain awareness system” that divides geographic data into a plurality of subsquares, or a plurality of map files or cells.

Ex. 1008, 4:59, 7:7–11, 7:60–8:8. Muller also discloses a data structure for terrain data that includes a data index containing information for each individual terrain data file and header information including the “[n]umber of index’s.” *Id.* at cols. 39–40 (App. A-4).

5. *TIFF and JPEG*

TIFF and JPEG are standards specifications for image data formats. Ex. 1009, 4;¹¹ Ex. 1010, 1. TIFF describes dividing an image into “roughly square tiles.” Ex. 1009, 66. TIFF further describes a data structure for each tile that stores “tile width in pixels” and “tile length (height) in pixels.” *Id.* at 67–68. TIFF also indicates the disclosed file structure is “compatib[le] with compression schemes such as JPEG.” *Id.* JPEG describes a “frame header” that includes values for horizontal and vertical “pixel density” and “pixel count.” Ex. 1010, 5.

E. *Asserted Obviousness Grounds*

Petitioner contends that (i) claims 5, 8, and 10 are unpatentable under 35 U.S.C. § 103(a) as obvious over Israni and Fedra, (ii) claims 6 and 7 are unpatentable as obvious over Israni, Fedra, and Beckwith, and (iii) claim 9 is unpatentable as obvious over Israni, Fedra, Muller, TIFF, and JPEG.

Pet. 25–31, 45–60. Relying on the testimony of Dr. Braasch, Petitioner

¹¹ We refer to the exhibit page numbers added by Petitioner because the TIFF reference does not include original page numbers.

explains how the references allegedly teach or suggest the claim limitations and provides rationales for combining the references. *Id.* (citing Ex. 1003).

In response, Patent Owner argues that the combined references fail to teach two claim limitations: “a decompressing routine for decompressing the tile data for the said one of said tiles into a tile image for the said one of said tiles,” as recited in independent claim 5, and “a projection routine which projects the movement trend of the user’s location and identifies and decompresses the successor tile which is adjacent the said one of said tile and in the path of movement of the user’s location,” as recited in dependent claim 7. PO Resp. 10–24. For support, Patent Owner relies on the testimony of Mr. Bhatia. *Id.*; *see* Ex. 2005 ¶¶ 21–36.

We have reviewed the Petition, Patent Owner Response, and Petitioner’s Reply, as well as the relevant evidence discussed therein. For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that claims 5–10 would have been obvious in view of the asserted combinations of prior art references.

1. Claims 5, 8, and 10

Petitioner relies on Israni for teaching most of the limitations of independent claim 5 and dependent claims 8 and 10, citing Fedra as additional support for some of the limitations. Pet. 24–28, 45–54. We agree with and adopt Petitioner’s contentions regarding these claims, set forth in detail in the Petition and summarized below. *See id.* We also agree with and adopt the reasoning set forth in the Petition and Dr. Braasch’s declaration for why a person of ordinary skill in the art would have modified Israni with the cited teachings of Fedra. *See id.* at 27 (citing Ex. 1003

¶¶ 81–83; Ex. 1005, 89, 90; *KSR*, 550 U.S. at 417); *see also* Pet. 14–16 (similar analysis for a different combination of asserted prior art references).

As Petitioner asserts, Israni discloses a computer-based navigation device that is arranged as a single unit and carried by a user, as required by claim 5. *See* Pet. 25, 45–46 (citing Ex. 1007, 1:33–35, 2:1–4, 4:45–55). The device displays a map image including the user’s location obtained from a location receiver, as required by claim 5, such as a GPS receiver, as recited in dependent claim 8. *See id.* at 25–26, 46–47, 54 (citing Ex. 1007, 4:48–5:17, 9:38–52, 41:64–67). Israni also discloses an image storage unit that stores image data in the form of tiles (i.e., Israni’s parcels), which, taken together, represent a map image. *See id.* at 26, 47–48 (citing Ex. 1007, 2:52–58, 4:48–63, 8:41–44, 10:46–51, 11:47–18:23). Israni further discloses that the stored image data include compressed tile data for each tile, as Israni’s parcels are stored in compressed form in memory. *See id.* at 27, 50–51 (citing Ex. 1007, 23:37–46, 47:53–56). In addition, Israni discloses header data for each tile and pointers to the storage location for each tile, as recited in claims 5 and 10. *See id.* at 26–27, 48–50, 54 (citing Ex. 1007, 8:51–53, 23:62–64, 42:56–43:8).

To the extent Israni does not expressly disclose “header data describing the size and geographical location of each tile,” as recited in claim 5, we are persuaded this commonly was implemented in similar prior art systems. *See id.* at 27, 49–50 (citing Ex. 1003 ¶ 80). For example, we agree with Petitioner that “Fedra describes a similar prior art system and suggests that the cell header should describe both the location and size of a given grid cell.” *Id.* at 27; *see* Ex. 1003 ¶ 80 (Dr. Braasch stating that “a POSITA would have recognized that the ‘geographic boundaries’ provided

by Fedra's header data describe both the size and location of the grid cell");
Ex. 1005, 90.

Israni also discloses the computer program elements recited in claim 5. *See* Pet. 27–28, 52–54 (citing Ex. 1007, 1:62–64, 5:1–10, 10:54–63, 20:17–21, 23:37–46). For example, with regard to the limitations “associating the user location with one of the tiles” and “locating the user's location on said tile image,” Israni describes locating map data corresponding to a vehicle's current position and providing the user with a graphical display of his specific location in the geographic area in which he is located. Ex. 1007, 1:62–62, 20:17–21. Israni further explains:

If the user wants to display a map of his location, it would be preferable that the data relating to the geographic area immediately around the user are organized so that all the necessary data could be accessed and loaded into memory quickly. The parcels including all the data needed to display a map of the user's area should therefore be grouped together into one or as few parcels as possible.

Id. at 10:54–63.

The remaining limitation of claim 5, “a decompressing routine for decompressing the tile data for the said one of said tiles into a tile image for the said one of said tiles,” is the only limitation in claims 5, 8, and 10 that Patent Owner asserts is not taught by the asserted prior art. PO Resp. 10–14. For this limitation, Petitioner cites, among other things, Israni's disclosure that “parcels are maintained in their compressed form in memory 20 after they are read from disk 22, and entities within a parcel are decompressed as they are requested by the navigation application functions.” Ex. 1007, 23:39–43; *see* Pet. 27, 53. Patent Owner argues that Israni fails to teach this limitation because Israni does not disclose decompressing a single tile (i.e.,

only one tile), and Israni discloses decompression of “entities within a parcel” rather than parcels. PO Resp. 11–14.

For the following reasons, we agree with Petitioner that Israni in view of Fedra teaches the “decompressing” limitation, and we are unpersuaded by Patent Owner’s contentions. First, Patent Owner’s arguments depend on its proposed construction of the claim language as limited to a system that decompresses only one tile. *See id.* at 11; Tr. 24:13–16 (Patent Owner admitting that all of its arguments regarding application of the prior art to the claims depend on its proposed claim construction). As discussed above, we do not adopt Patent Owner’s proposed claim construction. Under a proper construction, we agree with Petitioner that Israni teaches the “decompressing” limitation, at least because Israni’s system decompresses parcels as they are requested by the navigation application, indicating that the same parcel associated with the user’s location is decompressed for display to the user. *See* Pet. Reply 16; Ex. 1003 ¶¶ 90–91; Ex. 1016 ¶ 18.

Next, we agree with Petitioner that in addition to describing decompression of “entities within a parcel” (i.e., data objects within a parcel), Israni also teaches decompression of parcels themselves. *See* Pet. Reply 17. Israni explicitly refers to “fully decompressed parcels [that are] kept in a memory cache,” suggesting that decompressing an entire parcel was a known option. Ex. 1007, 23:46–47; *see* Pet. Reply 17; Ex. 1016 ¶ 21. Furthermore, Israni discloses that parcels are stored in compressed format, and both Patent Owner and Mr. Bhatia agree with Petitioner and Dr. Braasch that the compressed parcels must be decompressed before they are displayed on the navigation system. PO Resp. 13; Ex. 2005 ¶ 22; *see* Pet. Reply 17–18; Ex. 1016 ¶¶ 19–21. Although Patent Owner argues that Israni lacks any

explanation as to how parcels are decompressed, claim 5 does not specify any particular algorithm or features for the “decompressing routine,” and Dr. Braasch testifies that a person of ordinary skill in the art would have understood that widely known decompression techniques were readily applicable to Israni’s system. Ex. 1016 ¶ 19; *see* Pet. Reply 20–21.

Finally, Fedra also discloses that grid cell files (corresponding to the claimed tiles) may be stored in compressed format. Ex. 1005, 90. Both Dr. Braasch and Mr. Bhatia agree that a person of ordinary skill in the art would have understood that the compressed data in Fedra necessarily would have been decompressed for display. Ex. 1003 ¶ 91; Ex. 1022, 114:24–116:4; *see* Pet. Reply 19–20; Pet. 13–14.

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that each of claims 5, 8, and 10 would have been obvious over the combination of Israni and Fedra.

2. Claims 6 and 7

Claim 6 depends from claim 5 and further recites “a peripheral routine which identifies and decompresses a peripheral tile which is adjacent to the said one of said tile, so that the decompressed image of said peripheral tile is available to the computer for visual effects.” Ex. 1001, 6:24–27. For this limitation, Petitioner cites Israni’s disclosure of an index identifying neighboring parcels, and further relies on Beckwith’s disclosure of determining which blocks of data are required to fill out the intermediate memory with the aircraft at the center of the display. Pet. 28–29, 55–56 (citing Ex. 1007, 9:45–49, 47:47–49; Ex. 1006, 9:1–16, 10:3–16; Ex. 1003 ¶¶ 99–105). Patent Owner presents no additional arguments for this claim beyond its arguments with respect to claim 5. We agree with and adopt

Petitioner's contentions regarding claim 6, set forth in the Petition. *See* Pet. 28–29, 55–56. We also agree with and adopt the reasoning set forth in the Petition and Dr. Braasch's declaration for why a person of ordinary skill in the art would have modified the combination of Israni and Fedra with the cited teachings of Beckwith. *See id.* at 29 (citing Ex. 1003 ¶¶ 103–05; Ex. 1006, 10:3–19; KSR, 550 U.S. at 417); *see also* Pet. 19–21 (similar analysis for a different combination of asserted prior art references).

Claim 7 depends from claim 6 and further recites:

a projection routine which projects the movement trend of the user's location and identifies and decompresses the successor tile which is adjacent the said one of said tile and in the path of movement of the user's location, so that the decompressed image of said successor tile is available to the computer as the user's location changes from the said one of said tiles to the said successor tile.

Ex. 1001, 6:29–36. Petitioner contends that both Israni and Beckwith disclose this limitation. Pet. 29, 56–57. We agree with and adopt Petitioner's contentions regarding claim 7, set forth in detail in the Petition and summarized below. *See id.*

Israni discloses various navigation applications, including route calculation and a route guidance application, which initially locates map data corresponding to a vehicle's current position and then finds nearby map data, i.e., neighboring parcels along the route that are pointed to by the index of the parcel in which the user currently is located. *See* Pet. 56–57 (citing Ex. 1007, 5:1–10, 20:17–21; Ex. 1003 ¶¶ 106–07). Israni further teaches that the neighboring parcels are decompressed as requested by the navigation application (i.e., the route guidance application). *See id.* at 57 (citing Ex. 1007, 23:37–46). Thus, Israni's route guidance application

“projects the movement trend,” as we have construed the phrase, because it predicts the future direction based on present data, i.e., the calculated route. The route guidance application also identifies and decompresses a successor tile in the path of movement, i.e., the next parcel along the calculated route. *See id.* at 56–57.

Beckwith’s system “track[s] the movement of the aircraft causing the scene to change.” Ex. 1006, 9:8–11. As the aircraft moves, based on the heading and position data received from the navigation computer, the memory management control will determine which new blocks of data will be required to ensure a valid display. *Id.* at 10:10–16. Thus, Beckwith’s system projects a movement trend because it predicts the future movement based on present data (i.e., heading and position), and it also identifies a successor tile in the path of movement. *See* Pet. 57. Beckwith also describes navigation based on a predetermined flight path under control of a navigation computer, which, like Israni’s route guidance application, also is a prediction of future movement based on present data (i.e., the predetermined flight path). *See id.* (citing Ex. 1006, 7:22–28). We agree with Petitioner that a person of ordinary skill in the art would have recognized that loading new adjacent blocks from memory would include decompressing the data for the new blocks. *See id.* (citing Ex. 1003 ¶ 108).

Patent Owner argues that neither Israni nor Beckwith teaches projecting the movement trend of the user’s location, as required by claim 7, because neither extrapolates a future movement path based on past changes in the user’s position. PO Resp. 19–24. We are not persuaded by Patent Owner’s arguments because they depend on its proposed construction of “projects the movement trend,” which we have rejected. *See id.*; Tr. 24:13–

16 (Patent Owner admitting that all of its arguments regarding application of the prior art to the claims depend on its proposed claim construction). As discussed above, we do not adopt Patent Owner’s proposed claim construction, and in particular we disagree with Patent Owner that the claim language requires a projection of future movement to be based on past changes in the user’s location. Under the proper construction—“predicts the future direction of movement based on present data”—Israni’s route calculation and guidance and Beckwith’s predetermined flight path, as well as Beckwith’s teaching of determining required data blocks based on current heading and position, satisfy the projection routine limitation of claim 7.

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that each of claims 6 and 7 would have been obvious over the combination of Israni, Fedra, and Beckwith.

3. *Claim 9*

Claim 9 also depends from claim 5 and recites additional information contained in the header. Ex. 1001, 6:38–42. Petitioner asserts that Muller, TIFF, and JPEG teach or suggest this additional header information. Pet. 30–31, 57–60. Patent Owner presents no additional arguments for this claim beyond its arguments with respect to claim 5. We agree with and adopt Petitioner’s contentions regarding claim 9, set forth in the Petition. *See id.* We also agree with and adopt the reasoning set forth in the Petition and Dr. Braasch’s declaration for why a person of ordinary skill in the art would have modified the combination of Israni and Fedra with the cited teachings of Muller, TIFF, and JPEG. *See id.* at 31 (citing Ex. 1003 ¶¶ 111–16; Ex. 1009, 66; *KSR*, 550 U.S. at 417); *see also* Pet. 23–25 (similar analysis for a different combination of asserted prior art references).

Accordingly, we conclude that Petitioner has shown by a preponderance of the evidence that claim 9 would have been obvious over the combination of Israni, Fedra, Muller, TIFF, and JPEG.

III. CONCLUSION

Based on the evidence and arguments, Petitioner has demonstrated by a preponderance of the evidence that (i) claims 5, 8, and 10 of the '347 patent would have been obvious over Israni and Fedra, (ii) claims 6 and 7 would have been obvious over Israni, Fedra, and Beckwith, and (iii) claim 9 would have been obvious over Israni, Fedra, Muller, TIFF, and JPEG.

IV. ORDER

Accordingly, it is:

ORDERED that claims 5–10 of U.S. Patent No. 5,902,347 have been shown to be unpatentable; and

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

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Patent 5,902,347

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