

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC and ECOBEE, INC.,
Petitioners,

v.

ECOFACITOR, INC.,
Patent Owner.

IPR2021-00054¹
Patent 10,534,382 B2

Before WESLEY B. DERRICK, JEFFREY W. ABRAHAM, and
SCOTT B. HOWARD, *Administrative Patent Judges*.

HOWARD, *Administrative Patent Judge*.

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

¹ Ecobee, Inc., has been joined as a party to this proceeding. IPR2021-01052, Paper 7.

INTRODUCTION

A. Background and Summary

Google LLC (“Petitioner”) filed a Petition seeking to institute an *inter partes* review of claims 1–20 of U.S. Patent No. 10,534,382 B2 (Ex. 1001, “the ’382 patent”).² Paper 2 (“Petition,” “Pet.”). EcoFactor, Inc. (“Patent Owner”) filed a Patent Owner’s Preliminary Response. Paper 6. We instituted an *inter partes* review of claims 1–20 of the ’382 patent on all grounds of unpatentability alleged in the Petition. Paper 9 (“Institution Decision” or “Inst. Dec.”).

After institution of trial, Patent Owner filed a Response (Paper 19, “PO Resp.”), Petitioner filed a Reply (Paper 24, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 26, “PO Sur-reply”).

An oral hearing was held on February 8, 2022, and the record contains a transcript of this hearing. Paper 34 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–20 of the ’382 patent are unpatentable.

B. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 6.

Joined party ecobee, Inc. identifies ecobee, Inc. and ecobee Ltd. as the real parties in interest. *Ecobee, Inc. v. EcoFactor, Inc.*, IPR2021-01052,

² ecobee, Inc., was joined to this proceeding upon instituting *inter partes* review in IPR2021-01052 and granting ecobee’s motion for joinder. *See* Paper 20.

Paper 1, 6 (Petition); IPR2021-015052, Paper 7, 5–7 (Grant of Motion for Joinder).

Patent Owner identifies itself as the real party in interest. Paper 3, 1 (Patent Owner’s Mandatory Notices).

C. Related Matters

The parties identify various district court proceedings, including *EcoFactor, Inc. v. Google LLC*, 6:20-cv-00075 (W.D. Tex. Jan. 31, 2020). Pet. 6; Paper 3, 2. On February 10, 2022, a jury determined that Petitioner did not prove by clear and convincing evidence that claims 2 and 12 were invalid. Verdict Form, *EcoFactor, Inc. v. Google LLC*, 6:20-cv-00075, 3 (W.D. Tex. Feb. 10, 2021), ECF 215.³

D. The ’382 Patent

The ’382 patent is entitled “System and Method for Using a Wireless Device as a Sensor for an Energy Management System.” Ex. 1001, code (54). The ’382 patent is directed to “the use of thermostatic HVAC [(heating, ventilation, and cooling)] and other energy management controls that are connected to a computer network” and, more specifically “to the use of user interactions with an interface such as a personal computer or an Internet-enabled television as signal related to occupancy to inform an energy management system.” *Id.* at 1:16–23.

The ’382 patent describes the advantages of programmable thermostats for HVAC systems. Ex. 1001, 1:24–50. The ’382 patent further

³ As discussed *infra*, Petitioner relies on Geadelmann and Ehlers in this proceeding. Petitioner relied on different prior art references to challenge the claims of the ’382 patent in the district court proceeding. See Jury Instructions, *EcoFactor, Inc. v. Google LLC*, 6:20-cv-00075, 25 (W.D. Tex. Feb. 10, 2021), ECF 208 (relying on “Rhee”).

describes how hotels use occupancy detectors to control HVAC systems. *Id.* at 2:35–48. Such systems detect occupancy by either requiring the guest to use a keycard to control the system or motion detectors. *Id.* at 2:48–59.

According to the '382 patent, “[a]dding occupancy detection capability to residential HVAC systems could . . . add considerable value in the form of energy savings without significant tradeoff in terms of comfort.” Ex. 1001, 2:60–63. “It would thus be desirable to provide a system that could detect occupancy without requiring the installation of additional hardware; that could accurately detect occupancy regardless of which room in the house is occupied, and could optimize energy consumption based upon dynamic and individually configurable heuristics.” *Id.* at 3:15–20.

E. Illustrative Claim

Claims 1 and 17 are independent claims and claim 1, reproduced below with bracketed materials added in the Petition, is illustrative of the subject matter of the challenged claims.

1. [1a] A system for controlling an HVAC system at a user’s building, the system comprising:

[1b] a memory; and

[1c] one or more processors with circuitry and code designed to execute instructions;

[1d] the one or more processors with circuitry and code designed to execute instructions to receive a first data from at least one sensor, wherein the first data from the at least one sensor includes a measurement of at least one characteristic of the building;

[1e] the one or more processors with circuitry and code designed to execute instructions to receive a second data from a network connection, wherein the second data from the network connection is collected from a source external to the building,

wherein the second data from the network connection is received via the Internet;

[1f] the one or more processors with circuitry and code designed to execute instructions to receive a first temperature setpoint for the building corresponding to a desired temperature setting when the building is occupied, and a second temperature setpoint for the building corresponding to a desired temperature setting when the building is unoccupied;

[1g] the one or more processors with circuitry and code designed to execute instructions to receive commands through the Internet by way of a remote interface on a mobile, wireless device running software application code; [1h] wherein the interface is configured to allow the user to adjust temperature setpoints for the HVAC system;

[1i] the one or more processors with circuitry and code designed to execute instructions to send user-specific data through the Internet, wherein user-specific information about the building and HVAC system is generated based at least in part on the user-specific data, [1j] wherein the user-specific information is configured to be presented on a user interface on a mobile, wireless device running software application code via the Internet;

[1k] the one or more processors with circuitry and code designed to execute instructions to determine whether the building is occupied or unoccupied, and based on that determination, to control the HVAC system to provide heating or cooling to the building at an operational temperature;

[1l] wherein the one or more processors comprises a first processor with circuitry and code designed to execute instructions, which is located remotely from the memory and is not electrically connected to the memory;

[1m] the first processor with circuitry and code designed to execute instructions to communicate with the memory;

wherein the memory is configured to store historical values of the first data and second data.

Ex. 1001, 8:12–67 (bracketed designations added in Petition).

F. Prior Art and Asserted Ground

Petitioner asserts that claims 1–20 would have been unpatentable based on the following ground:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–20	103 ⁴	Geadelmann, ⁵ Ehlers ^{6,7}

Additionally, Petitioner relies on the testimony of Mr. Shah (Ex. 1002 (Declaration of Rajendra Shah)). Patent Owner relies on the testimony of Dr. Palmer (Ex. 2013 (Declaration of John A. Palmer, Ph.D.)).

ANALYSIS

A. Legal Standard for Unpatentability

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under 35 U.S.C. § 103 that requires consideration of four factors: (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior

⁴ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Petitioner argues that “because no application leading to the ’382 patent—and certainly not any application filed prior to March 16, 2013—provides written description support for claims 19 and 20,” the ’382 patent is subject to the revisions of the AIA. Pet. 9–10. Patent Owner does not address whether the ’382 patent is subject to the AIA or pre-AIA version of sections 102 and 103. *See* PO Resp. Because neither party contends that the outcome of this proceeding depends on which version of the patent code we use, and it is not apparent that it does, we need not address that issue.

⁵ US 8,196,185 B2, issued June 5, 2012, filed August 27, 2007 (Ex. 1004).

⁶ US 2004/0117330 A1, published June 17, 2004 (Ex. 1010).

⁷ The parties refer to Ehlers as Ehlers ’330. *See, e.g.*, Pet. 7. Because there is only one Ehlers patent in this proceeding, we have removed the reference to “’330” from all quotes.

art,” (3) the “differences between the prior art and the claims at issue,” and (4) if in evidence, “secondary considerations” of non-obviousness such as “commercial success, long felt but unsolved needs, failure of others, etc.” *Id.* at 17–18.⁸ “While the sequence of these questions might be reordered in any particular case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the U.S. Court of Appeals for the Federal Circuit has repeatedly emphasized that “it is error to reach a conclusion of obviousness until all those factors are considered,” *WBIP, LLC v. Kohler*, 829 F.3d 1317, 1328 (Fed. Cir. 2016).

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The “person [of] ordinary skill in the art” is a hypothetical construct, from whose vantage point obviousness is assessed. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). “This legal construct is akin to the ‘reasonable person’ used as a reference in negligence determinations” and “also presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

⁸ Neither party presented objective evidence of non-obviousness. *See* Pet.; PO Resp. Accordingly, we do not consider that factor in the following analysis.

Factors pertinent to a determination of the level of ordinary skill in the art include “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Envtl. Designs, Ltd. v. Union Oil Co. of Cal.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). “Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case.” *Id.*

Relying on Mr. Shah’s testimony, Petitioner argues that a person having ordinary skill in the art would have “a (1) Bachelor’s degree in engineering, computer science, or a comparable field of study, and (2) at least five years of (i) professional experience in building energy management and controls, or (ii) relevant industry experience. Additional relevant industry experience may compensate for lack of formal education or vice versa.” Pet. 21 (citing Ex. 1002 ¶¶ 27–28).

Patent Owner argues, relying on the testimony of Dr. Palmer, that a person having ordinary skill in the art “would be someone having a (1) Bachelor’s degree in engineering, computer science, or a comparable field of study, and (2) at least two years of (i) professional experience in temperature control systems, embedded systems, or building energy management and controls, or (ii) relevant industry experience.” PO Resp. 9 (citing Ex. 2013 ¶ 27). Patent Owner further argues that a person having ordinary skill in the art “would not require a full *five* years of professional experience.” *Id.* (citing Ex. 2013 ¶ 27).

We are persuaded that Petitioner’s formulation, supported by the testimony of Mr. Shah, except for the qualifier “at least,” is correct.⁹

On the one hand, Dr. Palmer’s formulation is conclusory and does not provide any reasoning or underlying supporting facts. *See* Ex. 2013 ¶ 27; 37 C.F.R. § 42.65(a) (2020) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). On the other hand, Mr. Shah bases his opinion on the field of the invention of the challenged ’382 patent and its claims. Ex. 1002 ¶ 27. Because Mr. Shah’s testimony is anchored by an identified factual predicate, we give it some weight.¹⁰

C. Claim Construction

We apply the same claim construction standard used in the federal courts, in other words, the claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005)

⁹ We eliminate the qualifier because it expands the range indefinitely without an upper bound, and thus precludes a meaningful indication of the level of ordinary skill in the art.

¹⁰ In the Institution Decision, we suggested that “[i]f Patent Owner proposes a different level of ordinary skill in the art during its Response” that the parties “address whether there are any material differences between the two proposals and what impact, if any, the different levels have on the obviousness analysis.” Inst. Dec. 17 n.6. The parties declined to do so. *See* PO Resp.; Pet. Reply. Accordingly, the parties forfeited any argument that a different level of ordinary skill would have changed the outcome. *See* Paper 10, 8 (Scheduling Order) (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”); *cf. In re NuVasive, Inc.*, 842 F.3d 1376, 1381 (Fed. Cir. 2016) (explaining that the patent owner waived an issue presented in its preliminary response that it failed to renew in its response during trial).

(en banc). *See* 37 C.F.R. § 42.100(b). Under the *Phillips* standard, the “words of a claim ‘are generally given their ordinary and customary meaning,’” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312–13.

Neither Petitioner nor Patent Owner proposes any express constructions for any claim limitations. *See* Pet. 9 (“In this case, the claim terms as applied to the prior art do not require construction.”); PO Resp. 9 (agreeing that no construction is necessary). Despite the statements that no constructions are necessary, the parties dispute the ordinary and customary meaning of “located remotely” and “one or more processors with circuitry and code designed to execute instructions.” PO Resp. 9–13; Pet. Reply 7–20; PO Sur-reply 1–7. Accordingly, we expressly construe those limitations below. *See O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361–62 (Fed. Cir. 2008) (holding that the court must construe limitations when parties disagree on the ordinary meaning). However, we need not construe any other claim limitations. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

1. “*Located Remotely*”

Claim 1 recites, *inter alia*, “a first processor . . . which is *located remotely* from the memory.” Ex. 1001, 8:58–62 (emphasis added).

a) Patent Owner's Argument

Patent Owner argues that, “[i]n the context of the specification and claim 1 of the ‘382 patent, a [person having ordinary skill in the art] would have understood ‘remotely located’ to mean not in the same building.” PO Resp. 10 (citing Ex. 2013 ¶ 32). Specifically, Patent Owner argues that “[t]he ‘382 patent describes the thermostat 108 and computer 104 connected to a server 106 via the Internet 102.” *Id.* (citing Ex. 1001, Fig. 2, 4:30–37); *see also* PO Sur-reply 7 (citing same). Patent Owner also argues that “[c]onnections between components in different buildings require the Internet, while connections between components in the same building use local networks, such as WiFi or the like.” PO Sur-reply 7.

Patent Owner further argues that the ‘382 patent seeks to improve upon “prior art systems, such as those found in hotels, where individually controlled HVAC systems operate in each room.” PO Resp. 9–11 (citing Ex. 1001, 2:35–59; Ex. 2013 ¶ 34).

Patent Owner further argues that a person having ordinary skill in the art “would understand that the Petitioner’s definition of ‘remote’ is only partially applicable for the ‘382 patent, and would not in fact cover ‘a computer or other device located in another [room].’” PO Sur-reply 7 (quoting Ex. 1029,¹¹ 441 (Dictionary of Information Technology)).

b) Petitioner's Arguments

Petitioner argues there is no support for Patent Owner’s proposed construction. Specifically, Petitioner argues that the ‘382 patent only uses the term “located remotely” in independent claims 1 and 17 and only refers to a “remote server” once, which, based on context, refers to server 106.

¹¹ Patent Owner incorrectly cites Exhibit 2029.

Pet. Reply 17. According to Petitioner, however, “the ’382 patent does not . . . connect the concept of ‘remoteness’ to [a] location in a different building.” *Id.* Patent Owner argues that Figure 2, which is all Dr. Palmer points to, “does not show a building or the walls of a building.” *Id.* at 17–18 (citing Ex. 1025, 21:14–22:14 (Dr. Palmer’s Cross-examination)). Petitioner also argues that the hotel example in the ’382 patent suggests “that the relevant feature of ‘remoteness’ is whether communication over a network link is called for.” Pet. Reply 18–19 (citing Ex. 1001, Fig. 2, 7:63–67).

Petitioner further argues that its understanding of “remote” is consistent with the definition of “remote” in the *Dictionary of Information Technology*. Pet. Reply 19 (citing Ex. 1029, 441).

c) Analysis

We start our analysis with the words of the claims. Claim 1 recites “wherein the one or more processors comprises a first processor with circuitry and code designed to execute instructions, which is *located remotely* from the memory and is not electrically connected to the memory.” Ex. 1001, 8:58–62 (emphasis added). Because claim 1 is otherwise silent about the location of the memory and the first processor, the language of the claims is of little assistance in determining its meaning.

We similarly find the language of the specification to be of little value. Although Figure 2 shows servers 106a and 106b connected to computer 104 via a network 102 (Ex. 1001, Fig. 2), as Patent Owner’s expert conceded, nothing in the figure specifically indicates a building or “where the boundaries or exterior walls of the building might be” (Ex. 1025, 22:8–14). And although the specification states that network 102 is preferably the internet, it further states that “it is also intended to encompass variations

which may be made in the future, including changes [or] additions to existing standard protocols.” Ex. 1001, 4:30–37. Thus, the network connection is not limited to the internet. Nor does anything about the hotel example relate to remoteness. *See id.* at 2:35–3:14.

The language of other claim limitations makes it clear that “located remotely” does not require communication by the internet. When the applicant wanted to indicate that elements needed to communicate by the internet, those internet connections were explicitly claimed:

the one or more processors with circuitry and code designed to execute instructions to receive a second data from a network connection, wherein the second data from the network connection is collected from a source external to the building, wherein the second data from the network connection is received *via the Internet*;

...

the one or more processors with circuitry and code designed to execute instructions to receive commands *through the Internet* by way of a remote interface on a mobile, wireless device running software application code; wherein the interface is configured to allow the user to adjust temperature setpoints for the HVAC system; [and]

the one or more processors with circuitry and code designed to execute instructions to send user-specific data *through the Internet*, wherein user-specific information about the building and HVAC system is generated based at least in part on the user-specific data, wherein the user-specific information is configured to be presented on a user interface on a mobile, wireless device running software application code *via the Internet*.

Ex. 1001, 8:36–51 (emphases added). Similarly, the applicant knew how to claim something being external to a building: “wherein the second data from the network connection is collected from a source *external to the*

building.” *Id.* at 8:22–28. Thus, when the applicant wanted to claim something being outside (or external) to a building or using the internet, the applicant knew how to claim it. The fact that the applicant chose different language—“located remotely”—strongly implies that an outside or external location or the internet is not required. *See Scripps Research Inst. v. Illumina, Inc.*, 782 F. App’x 1018, 1027 (Fed. Cir. 2019) (non-precedential) (“[T]he patentee’s choice of the word ‘connote’ rather than the word ‘is’ implies the patentee intended those two words to carry different meanings.”); *Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1143 (Fed. Cir. 2005) (“When different words or phrases are used in separate claims, a different in meaning is presumed.”); *Tandon Corp. v. U.S. Intern. Trade Com’n*, 831 F.2d 1023 (Fed. Cir. 1987) (“There is presumed to be a difference in meaning and scope when different words or phrases are used in separate claims.”).

“[T]he Board ‘may look to extrinsic evidence so long as the extrinsic evidence does not contradict the meaning otherwise apparent from the intrinsic record.’” *Collabo Innovations, Inv. v. Sony Corp.*, 778 F. App’x 954, 958 (Fed. Cir. 2019) (quoting *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1382 (Fed. Cir. 2008)); *see also Praxair, Inc. v. ATMI, Inc.*, 543 F.3d 1306, 1325 (Fed. Cir. 2008) (“[O]ur decisions, including *Phillips*, 415 F.3d at 1322, do not preclude the use of general dictionary definitions as an aid to claim construction.”). We therefore turn to the *Dictionary of Information Technology*, which defines “remote” as: “Not in the immediate vicinity, as a computer or other device located in another place (room, building, or city) and accessible through some type of cable or communications link.” Ex. 1029, 441. Under this definition,

devices located in different rooms, but within the same building, can be considered remote. *See id.* That definition is neither inconsistent with nor contradicted by the specification and the words of the claims.

Although Patent Owner argues we should ignore a portion of that definition, it offers no evidence in support of that argument. *See* PO Sur-reply 7. Therefore, we decline to do so.

Accordingly, “remotely located” as used in the ’382 patent does not require the first processor and the memory to be located in different buildings. Based on the arguments of the parties, no further construction is necessary.

2. “*One or More Processors . . .*”

Independent claim 1 recites “[1c] one or more processors with circuitry and code designed to execute instructions” and further recites various limitations—limitations [1d], [1e], [1f], [1g], [1i], [1k], and [1l]—that describe what instructions the one or more processors perform.

Ex. 1001, 8:12–67.^{12, 13}

a) *Patent Owner’s Opening Arguments*

Patent Owner argues that because limitation [1c] provides the antecedent basis for limitations [1d], [1e], [1f], [1g], [1i], [1k], and [1l], “a [person having ordinary skill in the art] would understand that all of the ‘one or more processors’ must be able to perform the functions recited in claim elements [1d], [1e], [1f], [1g], [1i], [1k], and [1l].” PO Resp. 13; *see also*

¹² Claim 17 recites similar limitations. *See* Ex. 1001, 9:56–10:50.

¹³ Petitioner refers to the limitations collectively as the “Processor Limitations.” Pet. Reply 7. We refer to them as the “one or more processors limitations.”

PO Sur-reply 2–3. According to Patent Owner, that means that “there needs to be at least a single processor that meets all of the limitations of claim elements [1d], [1e], [1f], [1g], [1i], [1k], and [1l].” PO Resp. 13 (citing Ex. 2013 ¶ 39).¹⁴

b) Petitioner’s Reply Arguments

Petitioner argues that we should not limit the “one or more processors limitations” to a single processor which performs all of the limitations. Pet. Reply 8; *see also id.* at 8–17.

Petitioner argues that the ALJ in *In re Certain Smart Thermostats, Smart HVAC Systems, and Components Thereof*, Inv. No. 337-TA-1185 (ITC) (the “ITC Investigation”) concluded that the claim limitation directed to “one or more processors” to perform certain functions should have its plain and ordinary meaning. Pet. Reply 8–9 (citing Ex. 1024, 59, 61). Petitioner also argues that in the district court proceeding involving the ’382 patent, no party requested a claim construction relevant to the “one or more processors limitations.” *Id.* at 9.

Petitioner further argues that Patent Owner’s argument regarding the antecedent basis of the “one or more processors limitations” does not support Patent Owner’s claim construction. Pet. Reply 9–10. According to

¹⁴ Patent Owner further argues that the “one or more processors with circuitry and code designed to execute instructions” limitations “is not descriptive of the ‘one or more processors’ but rather indicates how the recited actions are performed.” PO Resp. 12–13; *see also id.* at 11–13 (discussing argument). However, because Patent Owner does not contend that the construction would change the outcome of this proceeding (*see* Ex. 1025 (Cross-examination of Dr. Palmer), 22:24–25:9; Pet. Reply 19–20; PO Resp.); PO Resp. 22–23, our construction need not address that aspect. *See Nidec*, 868 F.3d at 1017.

Petitioner, “[t]he existence of antecedent basis for a *group* of ‘one or more processors’ says nothing about the workings of individual processors *within* the group—much as reciting an ‘engine’ to perform various functions does not imply how components within the engine work together to perform those functions.” *Id.* at 10.

Petitioner further argues that two analogous Federal Circuit cases, *Convolve* and *Unwired Planet*, weigh against Patent Owner’s proposed construction. Pet. Reply 10–12 (citing *Unwired Planet L.L.C. v. Google, Inc.*, 660 F. App’x 974, 979–80 (Fed. Cir. 2016); *Convolve, Inc. v. Compaq Computer Corp.*, 812 F.3d 1313, 1321 (Fed. Cir. 2016)). Specifically, Petitioner argues that the Federal Circuit in *Unwired Planet* affirmed a construction of the term “server node” as one or more computers and that “the claim [does not] rule out multiple computers or programs working in concert to operate as the claimed server node.” *Id.* at 10–11 (quoting *Unwired Planet*, 660 F. App’x at 981) (emphasis omitted). Petitioner also argues that the Federal Circuit in *Convolve* recognized that “absent a clear intent in the claims themselves, the specification, or the prosecution history” the term “processor” is interpreted as “one or more processors.” *Id.* at 11–12 (quoting *Convolve*, 812 F.3d at 1321).

Petitioner further argues that Patent Owner’s “interpretation would render portions of the claims superfluous, and make the independent claims inconsistent with the dependent claims.” Pet. Reply 12–14. Specifically, Petitioner argues that Patent Owner’s “interpretation would thus re-write the claim language to mean ‘one processor’, rendering the reference to ‘or more processors’ superfluous.” *Id.* at 13. Petitioner also argues that because (1) claim 1 recites that “the one or more processors comprises a first processor”

and (2) dependent claims 12 and 13 specifically require the first processor to perform certain functions in limitation [1k], “[t]his implies (by claim differentiation), that the independent claim is broad enough to cover arrangements where the ‘first processor’ *does not* perform those functions.” *Id.* at 13–14 (citing *Phillips*, 415 F.3d at 1315).

Finally, Petitioner argues that the specification does not support Patent Owner’s construction. Pet. Reply 14–17. Specifically, Petitioner argues that Patent Owner’s focus on server 106 is inapposite because, according to the specification, server 106 does not perform at least claim element [1i]. *Id.* at 15. Additionally, Patent Owner states that server 106 contains the memory, but, as Petitioner notes, “[a] computer that contains both the processor and the memory cannot have a “first processor” that is “located remotely” from the memory.” *Id.*

c) Patent Owner’s Sur-reply Arguments

Patent Owner argues that the construction of the ALJ in the ITC Investigation is irrelevant. PO Sur-reply 1–2. According to Patent Owner, Petitioner conceded that the construction involved two patents “not formally related to the ’382 patent.” *Id.* at 2 (quoting Pet. Reply 8 n.1).

Patent Owner further argues that the two Federal Circuit cases, i.e., *Unwired* and *Convolve*, are not applicable to this case. First, Patent Owner argues that “[t]he court’s analysis [in *Unwired*] was based on the language of its construction, and not on the actual claim language.” PO Sur-reply 3 (citing *Unwired*, 660 F. App’x at 979–80). According to Patent Owner, “[t]his is different than here, where the actual claim language is at issue.” *Id.*

Second, Patent Owner argues that the Federal Circuit held in *Convolve* that “for three claims, all of the functions were required to be performed by a single processor.” PO Sur-reply 3–4.

Patent Owner further argues that its claim construction would not render portions of the claim superfluous. PO Sur-reply 4–5. According to Patent Owner, “if, for example, two processors perform all of the functions, there is still infringement.” *Id.* at 5.

Patent Owner further argues that its construction is consistent with claim differentiation with the dependent claims. PO Sur-reply 5–6. Specifically, Patent Owner argues that “[t]he dependent claims that refer to functions to be performed by the first processor (claims 12 and 13) are merely different claimed embodiments.” *Id.* at 5. According to Patent Owner, “[t]hat a dependent claim requires the . . . function to be performed by the first processor does not mean that the independent claim does not require that function to be performed by the ‘one or more processors.’ Rather, it merely indicates that different claims have different scopes.” *Id.* at 5–6 (citing *Karlin Tech. Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 971–72 (Fed. Cir. 1999); *Tandon*, 831 F.2d at 1023).

Patent Owner further argues that its construction is supported by the specification of the ’382 patent. PO Sur-reply 6. With regard to limitation [1i], Patent Owner argues that limitation is performed by server 106. *Id.* (citing Ex. 1001, 6:38–58, 7:38–54, Fig. 6). Patent Owner also argues that because multiple servers are shown, the specification does not prohibit a server accessing a database located in another, remote server. *Id.*

d) Analysis

As always, we start with the words of the claims. Limitation [1c] recites “one or more processors with circuitry and code designed to execute instructions.” Ex. 1001, 8:15–16. Limitations [1d], [1e], [1f], [1g], [1i] and [1k] recite various functions that must be performed by the “one or more processors.” *Id.* at 8:17–57.¹⁵ Based on the plain and ordinary meaning of the words of the claims, the various instructions recited in the limitations can either be performed by a single processor (“one . . . processor[]”) or a group of processors (“or more processors”). Additionally, although the claim encompasses a single processor that performs all of the instructions, it is broad enough to also cover a group of processors (the “or more processors”) which collectively perform the recited instructions.

This claim construction is also consistent with the principle of claim differentiation with regard to dependent claims 12 and 13. Claim 1 generally recites a list of instructions that must be performed by the “one or more processors” and further recites that the “one or more processors comprises a first processor . . . designed to execute instructions to communicate with the memory.” Ex. 1001, 8:12–67. Thus, the first processor is one of the one or more processors. One of the requirements of the “one more processors” is that it has “circuitry and code designed to execute instructions *to determine whether the building is occupied or unoccupied*, and based on that determination, *to control the HVAC system to provide heating or cooling to the building at an operational temperature*” as

¹⁵ Patent Owner includes limitation [11] in that group. However, limitation [11] recites the instructions that must be performed by the “first processor,” not the “one or more processors.”

recited in limitation [1k]. *Id.* (emphases added). Under Patent Owner’s construction, each of the “one or more processors,” including the first processor, has to be able to perform those instructions. *See* Tr. 30:1–15.

Dependent claims 12 and 13 depend from claim 1 and recite that the first processor—a specific one of the “one or more processors”—performs the instructions set forth in limitation [1k]. Ex. 1001, 9:40–46.¹⁶ But, as discussed above, that would have already been required under Patent Owner’s construction of claim 1. In order to give dependent claims 12 and 13 meaning, each of the “one or more processors” does not have to perform every set of instructions recited in limitations [1d], [1e], [1f], [1g], [1i] and [1k]. *See Phillips*, 415 F.3d at 1315 (“[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”). That is, dependent claims 12 and 13 only further limit claim 1, and have meaning, if we reject Patent Owner’s proposed construction.

The parties have not identified any language in the specification or the prosecution history that is inconsistent with our construction. The parties dispute whether the preferred embodiment would satisfy Patent Owner’s construction. Although “a claim interpretation that excludes a preferred embodiment from the scope of the claim is rarely, if ever, correct,” *On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1138

¹⁶ Claim 12 recites “[t]he system of claim 1, wherein the determination of whether the building is occupied or unoccupied by is performed by the first processor” and claim 13 recites “[t]he system of claim 1, wherein the controlling of the HVAC system to provide heating or cooling to the building at an operational temperature is performed by the first processor.”

(Fed. Cir. 2004), because we are not adopting Patent Owner’s construction, the argument is moot.

We also agree with Petitioner that Patent Owner’s proposed construction would impermissibly render the “or more” language in the claims superfluous. *See Wasica Fin. GmbH v. Cont’l Automotive Sys., Inc.*, 853 F.3d 1272, 1288 n.10 (Fed. Cir. 2017) (“It is highly disfavored to construe terms in a way that renders them void, meaningless, or superfluous.”). By requiring each of the processors to perform all of the instructions recited in limitations [1d], [1e], [1f], [1g], [1i] and [1k], Patent Owner treats the language no different than a claim that said “one processor” or a “single processor” because a system with a single processor performing all of the instructions would *necessarily* be a “system comprising . . . one or more processors.”

In reaching this conclusion, we have considered the ALJ’s determination in the ITC proceeding and the lack of a proposed construction in the district court proceeding, but do not find them helpful. In each of those cases, claim limitations were given their plain and ordinary meaning. *See* Ex. 1024, 59–61 (ITC Initial Determination); Pet. Reply 9. Those cases give us no guidance as to what that plain and ordinary meaning is.

The two Federal Circuit cases cited by the parties have limited value. Neither *Unwired* nor *Convolve* involve the same term that is in dispute in this case. At most, *Convolve* guides that, just with any other claim limitation, we must look to the claim language, the specification, and the prosecution history to determine whether claims are broad enough to encompass functions that can be carried out by multiple processors or a single processor. *See Convolve*, 812 F.3d at 1321 (holding that “a

processor” can mean “one or more processors” or “a single processor” depending on the entirety of the claim).

Accordingly, the limitations “one or more processors with circuitry and code designed to execute instructions to . . .” is broad enough to encompass a group of processors in which the group as a whole performs the functions recited in limitations [1d], [1e], [1f], [1g], [1i], and [1k] but each individual processor does not.

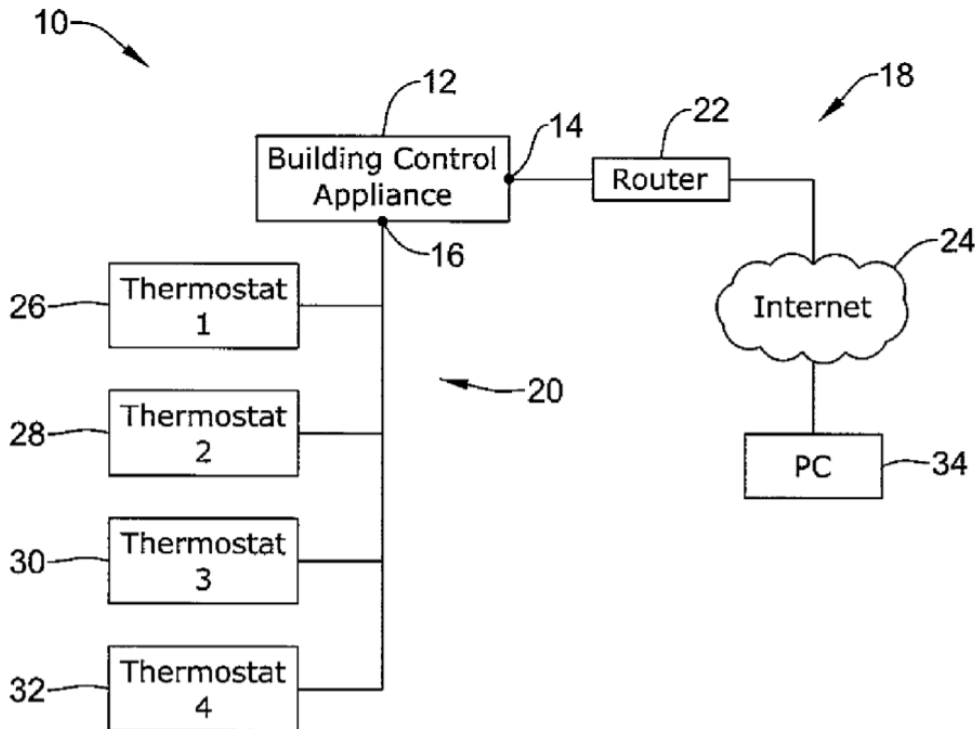
D. Geadelmann and Ehlers

Petitioner argues that claims 1–20 would have been obvious over Geadelmann and Ehlers. Pet. 18–79. Based on the evidence and arguments presented during the trial, Petitioner has persuaded us that claims 1–20 are unpatentable.

1. Geadelmann

Geadelmann is entitled “Remote HVAC Control with a Customizable Overview Display” and is directed to “HVAC control systems that accommodate and/or facilitate control from a remote location.” Ex. 1004, code (54), 1:7–9.

Geadelmann Figure 1 is reproduced below.



Geadelmann Figure 1 “is a schematic view of an illustrative but non-limiting HVAC control system.” Ex. 1004, 1:66–67. Figure 1 shows a series of thermostats that communicate via network 20 with Building Control Appliance (BCA) 14. *Id.* at Fig. 1, 3:62–4:48. The HVAC control system also includes a PC (personal computer) 34, which can access the building control appliance through the internet. *Id.* at Fig. 1, 4:38–46. The PC may also be a mobile device, such as a laptop, cellphone, or PDA. *Id.* at 4:42–46.

2. Ehlers

Ehlers is entitled “System and Method for Controlling Usage of a Community” and is directed to “a system and method for managing the delivery and usage of a commodity such as electricity, natural gas, steam, water, chilled or heated water, or potable or recycled water.” Ex. 1010, code (54), ¶ 2.

Ehlers Figure 1B is reproduced below.

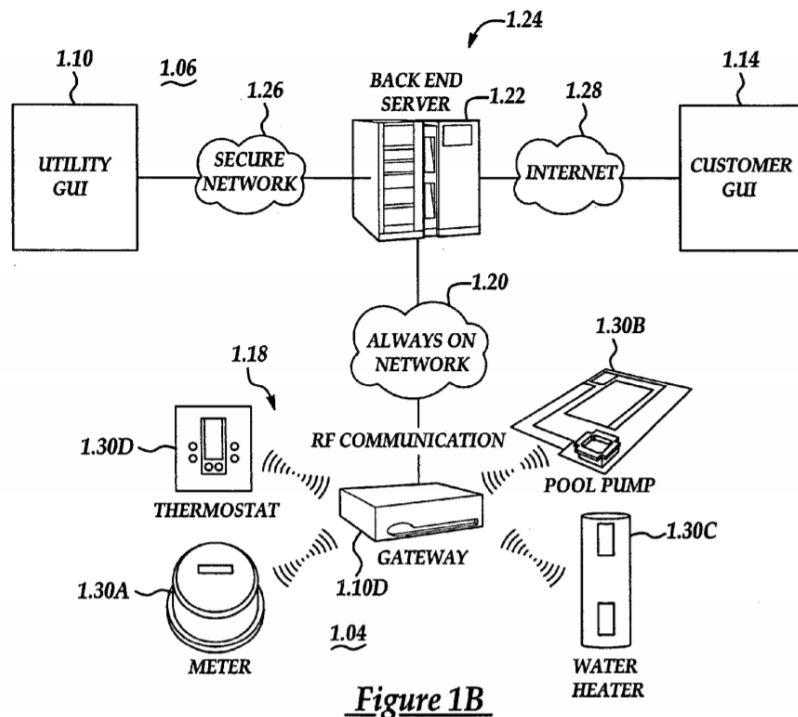


Figure 1B

Ehlers Figure 1B “is a diagrammatic illustration of one implementation of the energy management system.” Ex. 1010 ¶ 20. As shown in Ehlers Figure 1B,

the gateway node 1.10D communicates to the utility control system 1.12 via an “always on”, secured wired or wireless network 1.20 through a cable modem, DSL modem, or other suitable means (not shown). The utility control system 1.12 may be implemented in software which is stored and executed on a back-end server 1.22.

Id. ¶ 72.

Amongst other features, Ehlers recites using occupancy sensors to determine if people are present:

Occupancy sensors as an example would provide the system 3.08 with knowledge of if there were people present in the site 1.04 If unoccupied, the system 3.08 can be directed to take more savings related actions and defer comfort control options. This ability increases its ability to deliver savings and reduce

demand on the supply chain without affecting the occupants' level of comfort.

Ex. 1010 ¶ 266.

3. *Analysis of Claim 1*

a) *Whether the Petition Identifies a Specific Combination of Geadelmann and Ehlers that Teaches Claim 1*

Before we address the individual limitations, Patent Owner challenges Petitioner's mapping. According to Patent Owner, Petitioner maps Geadelmann's BCA, user device 34, and the thermostats as "one or more processors with circuitry and code designed to execute instructions" (limitation [1c]) and then further argues that various combinations can be used to teach the instructions recited in limitations [1g], [1i], [1k], [1l], and [1m]. PO Resp. 20¹⁷; *see also id.* at 17–19 (discussing the various mappings). Patent Owner also argues that "[t]he initial positions in the Petition and Mr. Shah's declaration essentially provided hundreds of different potential alternative structures with little or no guidance as to what specific structure(s) they contend meet all the limitations of claim 1." *Id.* at 20. According to Patent Owner, "it is unclear on its face what is the basis for Mr. Shah's opinions that claim 1 is unpatentable over the combination of Geadelmann and Ehlers." *Id.*; *see also* PO Sur-reply 8.

Petitioner argues that Patent Owner's arguments are incorrect "because they are premised on the incorrect construction for 'one or more processors.'" Pet. Reply 21. According to Petitioner, "[t]here are not

¹⁷ Patent Owner also argues that there are multiple mappings for the memory in limitation [1b]. PO Resp. However, Petitioner makes it clear when discussing limitation [1m] that the memory refers solely to the memory of the BCA. *See* Pet. 49–52.

‘hundreds’ of different possible contentions in the Petition, but rather one contention based on one system in Geadelmann, where certain ‘Processor Limitations’ are simply met by more than one processor.” *Id.*; *see also id.* at 21–22.

We are persuaded by Petitioner’s argument. As properly construed above, “one or more processors with circuitry and code designed to execute instruction to . . .” is broad enough to encompass a group of processors in which the group as a whole performs the functions recited in limitations [1d], [1e], [1f], [1g], [1i], and [1k] but each individual processor does not. The Petition does no more than identify which members of the group of processors perform the different instructions. Contrary to Patent Owner’s assertion, there is only a single structure with a single mapping, not hundreds of potential alternative ways in which the prior art might teach the claims.

b) Preamble [1a] and Limitation [1b]

The preamble of claim 1 states: “[1a] [a] system for controlling an HVAC system at a user’s building, the system comprising.” Ex. 1001, 8:12–13. Petitioner argues Geadelmann teaches the preamble.¹⁸ *See* Pet. 23. Specifically, Petitioner argues “Geadelmann teaches a system for controlling an HVAC system at a user’s building.” *Id.* (citing Ex. 1004, code (54), 3:35–40, 5:3–34; Ex. 1002 ¶ 67) (emphasis omitted).

Claim 1 further recites “[1b] a memory.” Ex. 1001, 8:14. Petitioner argues Geadelmann teaches that limitation. *See* Pet. 23–24. Specifically,

¹⁸ Because, as discussed *infra*, Petitioner has shown that the recitation in the preamble is satisfied by the prior art, there is no need to determine whether the preamble is limiting. *See Nidec*, 868 F.3d at 1017.

Petitioner argues “Geadelmann renders obvious a memory by teaching various computers.” *Id.* at 23 (citing Ex. 1004, 3:12–34, 4:38–46, 9:17–27, 13:1–8, 14:34–41, 16:22–29, 17:23–30, 18:8–16, 21:4–11, 24:10–18, 26:8–17; Ex. 1002 ¶ 69) (emphasis omitted). For example, Petitioner argues that Geadelmann teaches computer programs stored in the computer, “which indicates that the computers have memories.” *Id.* (citing Ex. 1004, 3:12–27; Ex. 1002 ¶ 70). Specifically, Petitioner identifies, *inter alia*, the memory of the BCA. *Id.* at 24.

Based on the undisputed evidence before us and the reasons set forth in the Petition, including the Shah Declaration, which are not addressed by Patent Owner (*see* PO Resp.), we find that Geadelmann teaches preamble [1a] and limitation [1b].

c) Limitations [1c], [1d], and [1f]–[1l]

Claim 1 further recites “[1c] one or more processors with circuitry and code designed to execute instructions.” Ex. 1001, 8:15–16. Petitioner argues Geadelmann teaches that limitation. *See* Pet. 24–25. Specifically, Petitioner argues that the “one or more processors can be found within (1) the BCA, (2) the PC or PDA used by the user, and (3) processors within programmable thermostats.” *Id.* at 24 (citing Ex. 1004, Figs. 1, 2, 4:22–55; Ex. 1002 ¶ 72). Petitioner further argues that “[a] person of ordinary skill would further have found it obvious to carry out or facilitate all functions of the BCA, the user’s PC or PDA, and the programmable thermostats via respective instructions executed by respective processors.” *Id.* at 25 (citing Ex. 1004, 2:49–3:34; Ex. 1002 ¶ 73).

Claim 1 further recites “[1d] the one or more processors with circuitry and code designed to execute instructions to receive a first data from at least

one sensor, wherein the first data from the at least one sensor includes a measurement of at least one characteristic of the building.” Ex. 1001, 8:17–21. Petitioner argues Geadelmann teaches that limitation. *See* Pet. 25–27. Specifically, Petitioner argues that “the BCA (and its processor) receive the temperature of the building from sensors within thermostats,” each of which has at least one sensor. *Id.* at 26 (citing Ex. 1004, 5:13–15, 7:51–53, 17:31–67, 10:46–49, Figs. 3B, 3C, 7A, 7B, 9E; Ex. 1002 ¶ 74). Petitioner also argues that “[t]he processor of the BCA obviously has circuitry and code designed to execute instructions to receive a first data from at least one sensor, because (as explained above under element [1c]) the processor operates via coded instructions.” *Id.* at 27 (citing Ex. 1002 ¶ 76) (emphasis omitted).

Claim 1 further recites

[1f] the one or more processors with circuitry and code designed to execute instructions to receive a first temperature setpoint for the building corresponding to a desired temperature setting when the building is occupied, and a second temperature setpoint for the building corresponding to a desired temperature setting when the building is unoccupied.

Ex. 1001, 8:29–35. Petitioner argues Geadelmann teaches this limitation. *See* Pet. 30–32. Specifically, Petitioner argues that “Geadelmann states that the user can configure, via a Web interface, the occupied and unoccupied HVAC setpoints for each thermostat.” *Id.* at 30 (citing Ex. 1004, Figs. 3D, 9C, 9I, 11:61–12:30, 21:40–45, 11:4–17; Ex. 1002 ¶ 81). According to Petitioner, Geadelmann Figure 3D is a website printout which shows occupied and unoccupied cooling and heating setpoints, and that either the cooling or heating pair represent the first and second temperature setpoints. *Id.* at 31–32 (citing Ex. 1004, 4:22–33, 4:38–41, 11:61–12:30, 21:40–45,

Figs. 3D, 9C; Ex. 1002 ¶¶ 81–82). Petitioner also argues that it would have been “obvious that this function would be carried out by code and circuitry in the processor of the BCA.” *Id.* at 32 (emphasis omitted) (citing Ex. 1002 ¶ 83).

Claim 1 further recites “[1g] the one or more processors with circuitry and code designed to execute instructions to receive commands through the Internet by way of a remote interface on a mobile, wireless device running software application code.” Ex. 1001, 8:36–40. Petitioner argues Geadelmann teaches this limitation. *See* Pet. 32–36. Specifically, Petitioner argues that Geadelmann teaches that a “user uses a laptop, cell phone or PDA (mobile, wireless device) to access Web pages remotely over the Internet, using the displayed Web pages in a Web browser (remote interface and software application code) to enter commands for the BCA.” *Id.* at 32–33 (emphasis omitted) (citing Ex. 1004, code (57), 1:39–50, 9:11–12:67, Figs. 3A–3F; Ex. 1002 ¶ 84). Petitioner further argues that it would have been “obvious that these functions would be carried out by code and circuitry in the processors of the BCA and the user’s wireless, mobile device 34.” *Id.* at 35 (emphasis omitted) (citing Ex. 1002 ¶ 88).

Claim 1 further recites “[1h] wherein the interface is configured to allow the user to adjust temperature setpoints for the HVAC system.” Ex. 1001, 8:40–42. Petitioner argues Geadelmann teaches that limitation, relying on the explanation provided regarding Geadelmann’s disclosure of claim element [1f]. Pet. 35–36 (citing Ex. 1004, 5:4–34, 10:60–11:3, 21:40–45, Figs. 3B, 3D, 9C, 9I; Ex. 1002 ¶ 89).

Claim 1 further recites “[1i] the one or more processors with circuitry and code designed to execute instructions to send user-specific data through

the Internet, wherein user-specific information about the building and HVAC system is generated based at least in part on the user-specific data.” Ex. 1001, 8:43–47. Petitioner argues Geadelmann teaches that limitation. *See* Pet. 36–39. Specifically, Petitioner argues “Geadelmann sends user-specific data through the Internet, in the form of a user’s user ID and password.” *Id.* at 36 (emphasis omitted) (citing Ex. 1002 ¶ 91); *see also id.* at 36–38 (elaborating on explanation). Petitioner further argues that Geadelmann’s Figure 3B shows “that user-specific information about the building and HVAC system is generated based at least in part on the user-specific data.” *Id.* at 38 (emphasis omitted); *see also id.* at 38–39 (providing details). Petitioner also argues that it would have been obvious to use code and circuitry in the one or more processors to achieve that function. *Id.* at 39.

Claim 1 further recites “[1j] wherein the user-specific information is configured to be presented on a user interface on a mobile, wireless device running software application code via the Internet.” Ex. 1001, 8:48–51. Petitioner argues Geadelmann teaches that limitation. Pet. 39–40. Specifically, Petitioner argues Geadelmann teaches the user-specific information is presented on web pages generated by the BCA and viewed by the user on the user’s device 34, which can be a mobile, wireless device, and that the web page is accessed via the internet. *Id.* at 40 (citing Ex. 1004, 5:4–6:47, Fig. 3B; Ex. 1002 ¶ 97).

Claim 1 further recites “[1k] the one or more processors with circuitry and code designed to execute instructions to determine whether the building is occupied or unoccupied, and based on that determination, to control the HVAC system to provide heating or cooling to the building at an operational

temperature.” Ex. 1001, 8:52–57. Petitioner argues that the combination of Geadelmann and Ehlers teaches that limitation. Pet. 40–45. Specifically, Petitioner argues Geadelmann teaches (1) specific occupied and unoccupied times with different setpoints and (2) that the system has occupancy sensors. *See id.* at 40–44. Petitioner further argues Ehlers teaches using “occupancy sensor determinations to control HVAC systems to save energy while not affecting comfort.” *Id.* at 44 (citing Ex. 1010 ¶ 266; Ex. 1002 ¶ 105). Petitioner also argues that a person having ordinary skill in the art “would have found it obvious to use Geadelmann’s occupancy sensor to determine occupancy, and based on the determination, to control the HVAC system” in order “to take advantage of a more granular determination of occupancy, and thus better optimize when to reduce HVAC usage while still not affecting user comfort (as Ehlers teaches).” *Id.* at 44–45 (citing Ex. 1002 ¶ 106). According to Petitioner, it would have been obvious to use code and circuitry in the one or more processors to achieve that function. *Id.* at 45 (citing Ex. 1002 ¶ 107).

Claim 1 further recites “[11] wherein the one or more processors comprises a first processor with circuitry and code designed to execute instructions, which is located remotely from the memory and is not electrically connected to the memory.” Ex. 1001, 8:58–62. Petitioner argues Geadelmann teaches this limitation. *See* Pet. 45–48. Specifically, Petitioner argues Geadelmann teaches that user device 34 or the thermostats (either of which can be mapped to the first processor) may be located remotely from the memory of the BCA and that they are not electrically connected because they can communicate over wireless networks. *Id.* at 45–

48; *see also id.* at 48–49 (alternatively arguing the combination of Geadelmann and Ehlers teaches the limitation).

For each of the limitations recited above, Patent Owner only argues that Petitioner’s evidence is insufficient based on Patent Owner’s proposed constructions of “located remotely” and “one or more processors.” *See* PO Resp. 17–30. However, because we rejected Patent Owner’s proposed constructions, those arguments are not commensurate in scope with the claims.

Accordingly, based on the evidence before us and the reasons set forth in the Petition, including the Shah declaration, which are not addressed by Patent Owner using the proper claim construction, we find that Geadelmann and Ehlers disclose or suggest limitations [1c], [1d] and [1f]–[1l].

d) Limitation [1e]

(1) Petitioner’s Arguments

Claim 1 further recites

[1e] the one or more processors with circuitry and code designed to execute instructions to receive a second data from a network connection, wherein the second data from the network connection is collected from a source external to the building, wherein the second data from the network connection is received via the Internet.

Ex. 1001, 8:22–28. Petitioner argues Geadelmann teaches that limitation. *See* Pet. 27–30. Specifically, Petitioner argues “Geadelmann teaches that the BCA (and thus its processor) receives ‘second data’ in the form of local weather information (including outside temperature).” *Id.* at 28 (citing Ex. 1004, 10:8–13, 24:26–31, reference numeral 68 in all Figs. 3B–9K except 3E, 4C, and 9A; Ex. 1002 ¶ 78). Petitioner further argues that the weather information is received via the World Wide Web and “most

obviously have been made by exposing a temperature sensor to outside air, which can only be found external to a building.” *Id.* at 28–30 (citing Ex. 1004, 10:8–13, 24:19–31, Fig. 10A; Ex. 1002 ¶ 79). According to Petitioner, “[a]s explained above under element [1c], it was obvious that this function would be carried out by code and circuitry in the processor of the BCA.” *Id.* at 30 (citing Ex. 1002 ¶ 80) (emphasis omitted).

Petitioner further argues that Geadelmann teaches that the BCA operates as a webserver and “must access stored information found in Web pages served to the user device.” Pet. Reply 27 (citing Ex. 1004, 5:3–9:16, Fig. 2; Ex. 1025, 14:12–16:6, 34:19–36:2). Petitioner also argues that Geadelmann Figure 10A “shows that Geadelmann’s Web page *actually displays* the outside temperature (and thus received it to put in the Web page), and that the source of the outside temperature is www.weather.com.” *Id.* at 28–29 (citing Ex. 1004, 5:39–40, 10:13–14, 24:19–31, Fig. 10A; Ex. 1002 ¶¶ 78–79). According to Petitioner, “it is apparent that the BCA receives and stores outside temperature from the Internet, rather than just allowing the user device to download outside temperature bypassing the BCA.” *Id.* at 30.¹⁹

(2) Patent Owner’s Arguments

Patent Owner argues that Geadelmann “makes clear that the navigation bar presents the weather icon as ‘**a link that a user may click on**

¹⁹ Petitioner also makes an alternative argument on how the limitation is met even if Patent Owner’s factual contentions are correct. Pet. Reply 31–33. Patent Owner argues that is an improper new argument. PO Resp. 12–13. Because we agree that Geadelmann teaches the limitation under the theory set forth in the Petition, the arguments regarding the alternate theory are moot.

to access local weather information, such as a local weather site.” PO Resp. 31 (quoting Ex. 1004:10:8–13); *see also id.* at 31–32 (discussing Geadelmann Figure 10A). According to Patent Owner, “the BCA is not receiving the second data (weather information) but rather is providing a link to the information” so that “[t]he user interface receives the second data (weather) directly from the weather website (e.g., weather.com) and not from the BCA.” PO Resp. 31 (citing Ex. 2013 ¶ 81)²⁰; *see also* PO Sur-reply 11–12 (arguing that Petitioner “just assumes that the web page information comes solely from the BCA, when as Dr. Palmer stated, the web page information could be sent to the user via a link or pointer” (citing Ex. 1025, 15:16–21)).

Patent Owner further argues that “there is no teaching in Geadelmann where this temperature sensor is located or that the data from it is sent to the BCA via the Internet.” PO Resp. 32–33 (citing Ex. 2013 ¶ 84); *see also id.* at 33 (arguing that there is nothing in Geadelmann that indicates that such data is sent to the BCA (citing Ex. 2013 ¶ 85)); PO Sur-reply 10–11 (arguing that “Petitioner has not provided any evidence about how the actual BCA in Geadelmann functions. Instead, Petitioner makes assumptions not found in its Petition and not stated in Geadelman [sic]”). According to Patent Owner, “[t]he fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.” PO Sur-reply 11 (citing *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993); *In re Oelrich*, 666 F.2d 578, 581–82 (CCPA 1981)).

²⁰ Here and elsewhere, the Patent Owner Response cites to exhibit 1012. Based on the context however, it appears that Patent Owner intended to cite exhibit 2013. Accordingly, those citations appear to be a typographical error and have been corrected in this Decision.

(3) *Analysis*

As discussed above for limitation [1c], Geadelmann's BCA is one of the "one or more processors" with circuitry and code designed to execute instructions. Geadelmann further teaches that Geadelmann's BCA receives outside weather data ("second data") from the internet ("network connection"). *See* Ex. 1002 ¶¶ 78–79. Specifically, Geadelmann teaches that navigation bar 58 can include a weather icon 68, which can be a link to access local weather or the current outside temperature:

Navigation bar 58 may include a Date/Time icon 66 and/or a weather icon 68. In some cases, weather icon 68 may be a link that a user may click on to access local weather information, such as a local weather site. *If desired, weather icon 68 may merely provide a current outside temperature.*

Ex. 1004, 10:8–13 (emphasis added); *see also id.* at 24:26–30 ("Web page 1000 includes a pane 1010 that permits an authorized user to view and/or edit various general parameters. Examples of such parameters may include software updates, time and date settings, engineering units, *local weather*, and the like." (emphasis added)). The current outside temperature, in addition to a link to a weather website, weather.com, is shown in a variety of figures, including Geadelmann Figure 10A, reproduced below.

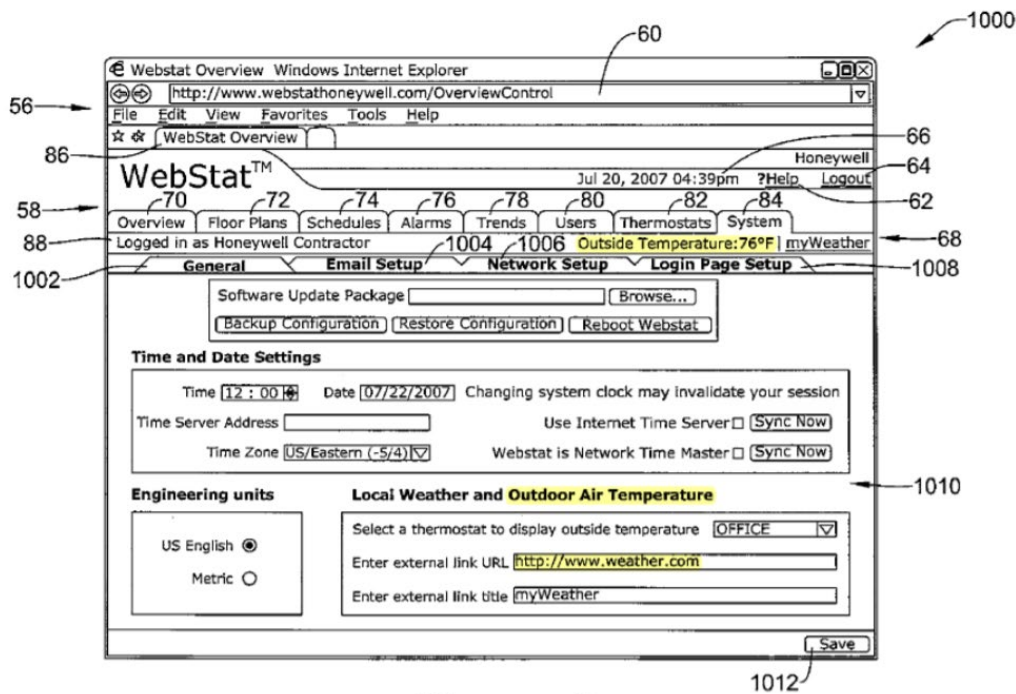


Figure 10A

Pet. Reply 28. Figure 10A is an illustrative example of a web page that may be generated by the HVAC control system pertaining to system configuration functionality. Ex. 1004, 2:17–29. Specifically, the web page is served by web server 38, which is part of the BCA. *Id.* at 24:19–22; Fig. 2; Ex. 1002 ¶ 78. The version of Figure 10A reproduced above has been annotated by Petitioner with yellow highlighting of the current outside temperature in navigation bar 58: “Outside Temperature: 76°F.” Pet. Reply 28. Petitioner also annotates the title of a box labeled “Local Weather and Outdoor Air Temperature” along with an “external link URL: <http://www.weather.com>” with yellow highlighting. *Id.* at 29. The external link URL shows that Geadelmann’s BCA receives the external temperature via the internet from weather.com. Ex. 1004, Fig. 10A; Ex. 1002 ¶ 79; *see also* Ex. 1004, Fig. 9E (showing “Network” selected for “What is the outdoor temperature input?”). Although not explicitly stated, it would have been obvious for an outdoor temperature reading to be determined using a

sensor that is exposed to outside air; that is, a sensor located external to a building. *See* Ex. 1002 ¶ 79.

We do not agree with Patent Owner’s argument that there is no evidence of the weather information being sent to the BCA. As discussed above, Geadelmann teaches that web pages, such as the one shown in Figure 10A, are generated by web server 38, which is shown in Geadelmann Figure 2 as being part of the BCA. Ex 1002, Fig. 2; 24:19–22. In order for webserver 38 to generate a webpage with weather data from a third party, that data must be sent to the BCA’s web server.

We also do not agree with Patent Owner’s argument that Geadelmann merely teaches using a link as opposed to the actual weather data: “But Geadelmann’s description that Mr. Shah quotes makes clear that the navigation bar presents the weather icon as **‘a link that a user may click on to access local weather information**, such as a local weather site.’” PO Resp. 31 (quoting Ex. 1004, 10:8–13) (emphasis added by Patent Owner). Patent Owner omits a portion of the quoted disclosure that explicitly states that besides a link, “weather icon 68 may merely provide a *current outside temperature*.” Ex. 1004, 10:8–13 (emphasis added). That is, a temperature as opposed to a link to a temperature.

Patent Owner’s inherency argument is inapposite. Petitioner relies on obviousness, not inherency. *See* Pet. 29–30 (“Indeed, measurements of outside temperature would *most obviously* have been made by exposing a temperature sensor to outside air, which can only be found external to a building.” (emphasis added) (citing Ex. 1002 ¶ 79)).

Accordingly, for the reasons set forth above, Geadelmann teaches limitation [1e]: “the one or more processors with circuitry and code

designed to execute instructions to receive a second data from a network connection, wherein the second data from the network connection is collected from a source external to the building, wherein the second data from the network connection is received via the Internet.”

e) Limitation [1m]

Claim 1 further recites “[1m] the first processor with circuitry and code designed to execute instructions to communicate with the memory; wherein the memory is configured to store historical values of the first data and second data.” Ex. 1001, 8:63–67.

(1) The Parties’ Arguments

Petitioner argues Geadelmann teaches that limitation. *See* Pet. 49–52.

With regard to the first portion of the limitation—first processor communicating with the memory—Petitioner argues that Geadelmann teaches that both user device 34 and the thermostats communicate with the memory of the BCA. Pet. 49–50.

With regard to the second portion of the limitation—the memory being configured to store historical data of the first data and the second data—Petitioner argues that it would have been obvious to store the historical values in the BCA’s memory in order to produce a graph showing historical internal temperatures (first data) and external temperatures (second data), such as one shown in Geadelmann Figure 7A. Pet. 50–52.

Patent Owner argues that there is no “indication that the BCA stores it, as opposed to merely pushing information received from another website.” PO Resp. 33 (citing Ex. 2013 ¶ 86). Patent Owner argues that “information is received from an outside website at Webstathoneywell.com” and that “[t]here is no indication that this information is stored anywhere

other than at this remote website.” *Id.* at 34 (citing Ex. 2013 ¶ 87; Ex. 1004, Fig. 7A); *see also* PO Sur-reply 12.

(2) *Analysis*

With regard to the first portion of limitation [1m]—“the first processor with circuitry and code designed to execute instructions to communicate with the memory”—Patent Owner does not rebut Petitioner’s showing. *See* PO Resp. 30–34 (discussing limitation [1m]). That is, Patent Owner does not challenge Petitioner’s evidence and argument that Geadelmann’s user device 34 and thermostats have “circuitry and code designed to execute instructions to communicate with the memory.” Accordingly, based on the undisputed evidence before us and the reasons set forth in the Petition, including the Shah Declaration, which are not addressed by Patent Owner, we find that Geadelmann teaches “the first processor with circuitry and code designed to execute instructions to communicate with the memory.”

Focusing on the second portion of limitation [1m]—“wherein the memory is configured to store historical values of the first data and second data”—Geadelmann teaches that web server 38, which is a part of the BCA, provides the various web pages to the user’s device. *E.g.*, Ex. 1004, 9:52–54 (“Once a user has successfully logged into building control appliance 12 (FIG. 2), web server 38 (FIG. 2) may provide a web page 54 that provides an overview.”), 24:19–23 (“FIG. 10A shows a web page 1000 that may be reached, from any or nearly any web page that may be served up by web server 38 (FIG. 2), by clicking on the [s]ystem tab 84 disposed within navigation bar 58.”). This includes Geadelmann Figure 7A, which is reproduced below.

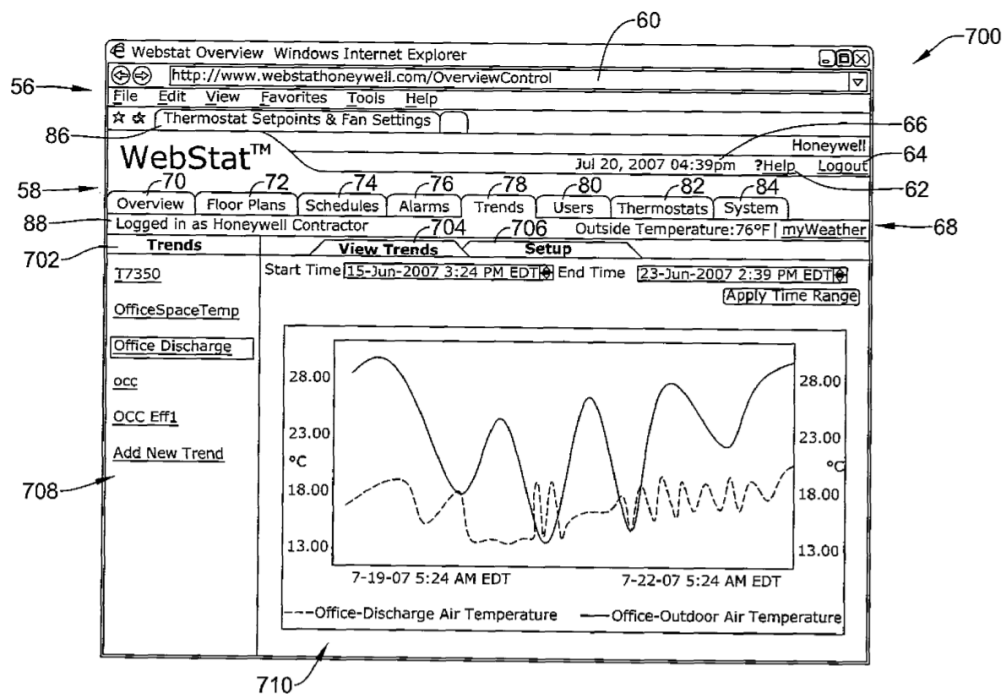


Figure 7A

Figure 7A is an example of a web page “that may be generated by the HVAC control system . . . pertaining to a trend analysis and display functionality.” Ex. 1004, 2:15–18. Figure 7A shows a graph of both “Office-Discharge Air Temperature” and “Office-Outdoor Air Temperature” over a given time period. *Id.* at Fig. 7A, 17:43–54.

Because BCA’s web server 38 creates a web page that displays a graph of the indoor temperature and outdoor air temperature over time, the data to create the graph must be stored someplace. Ex. 1002 ¶ 114. Additionally, because the BCA collects both indoor and outdoor air temperature data to display on the various web pages (*see* discussion of limitations [1d] and [1e] above), we are persuaded by Mr. Shahs’s testimony that it would have been obvious to a person having ordinary skill in the art to use the BCA to store that data so that it can be used to create trend graphs such as the ones shown in Geadelmann Figure 7A. *Id.*

We do not agree with Patent Owner that the web pages come from a third party, namely, Webstathoneywell.com. Dr. Palmer—whose testimony Patent Owner relies on—provides no evidentiary support for his opinion that the “information [in Geadelmann Figure 7A] is received from an outside website at Webstathoneywell.com.” Ex. 2013 ¶ 87.²¹ Such conclusory opinions with no factual support are entitled to little or no weight. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); *Rohm and Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (noting that a fact finder is not required to “credit the unsupported assertions of an expert witness”); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985) (noting that the “[l]ack of factual support” for an expert opinion “may render the testimony of little probative value”). Moreover, contrary to Dr. Palmer’s unsupported assertions, as discussed above, Geadelmann clearly states that the various web pages, such as the one shown in Figure 7A, are provided by the BCA’s web server 38. *See, e.g.*, Ex. 1004, 17:23–25 (“FIGS. 7A-7B provide illustrative but non-limiting examples of web page[s] that may be

²¹ We reproduce the entirety of Dr. Palmer’s cited testimony (including the lack of a citation) below:

87. *However, similar to the second data above, this information is received from an outside website at Webstathoneywell.com. There is no indication that this information is stored anywhere other than at this remote website. Further, since this information is available at this website, a POSITA would be motivated to continue to use that, thereby reducing the data to be stored at the BCA.*

Ex. 2013 ¶ 87 (emphasis added).

served up by web server 38 (FIG. 2).”). Thus, Dr. Palmer’s unsupported, conclusory opinion is rebutted by Geadelmann itself.

Accordingly, for the reasons set forth above, Geadelmann teaches limitation [1m]: “the first processor with circuitry and code designed to execute instructions to communicate with the memory; wherein the memory is configured to store historical values of the first data and second data.”

f) Reason to Combine Geadelmann and Ehlers

Petitioner argues that a person having ordinary skill in the art would have combined the relevant teachings of Ehlers and Geadelmann. *See* Pet. 18–21. For example, Petitioner argues that although Geadelmann teaches using an occupancy sensor, it does not expressly link the occupancy sensor to determining if a space is occupied. *Id.* at 18–20. According to Petitioner, it would have been obvious to a person having ordinary skill in the art to combine Ehlers’ teaching of using an occupancy sensor to determine occupancy so that Geadelmann’s system would know when to switch modes. *Id.* at 19. Petitioner also argues that a person having ordinary skill in the art would have had a reasonable expectation of success when combining the relevant teachings. *Id.* at 21.

Based on the undisputed evidence before us and the reasons set forth in the Petition, including the Shah Declaration, which are not addressed by Patent Owner (*see* PO Resp.), we find that Petitioner has shown that a person having ordinary skill in the art would have had reason to combine the relevant teachings from Geadelmann and Ehlers and would have had a reasonable expectation of success in doing so.

g) Conclusion on Obviousness

We have considered the entirety of the evidence submitted by the parties and determine that Petitioner has shown by a preponderance of the evidence that claim 1 of the '382 patent would have been obvious over Geadelmann and Ehlers.

4. Analysis of Claims 2–11 and 13–20

Petitioner also argues that the combination of Geadelmann and Ehlers teaches the limitations recited in claims 2–11, 13–20. *See* Pet. 52–64, 65–79.

Besides the arguments discussed above for claim 1, Patent Owner did not separately address Petitioner's arguments directed to claims 2–11 and 13–20. PO Resp. 35.

Based on the evidence and arguments presented in the Petition, which are not otherwise argued by Patent Owner, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2–11 and 13–20 would have been obvious over the combined teachings of Geadelmann and Ehlers.

5. Analysis of Claim 12

Claim 12 depends from claim 1 and recites “wherein the determination of whether the building is occupied or unoccupied by is performed by the first processor.” Ex. 1001, 9:40–42.

a) The Parties' Arguments

Petitioner argues that “it would have been obvious to have either the processor in the BCA or a processor in one or more of the thermostats perform the occupancy determination.” Pet. 64 (citing Ex. 1002 ¶ 136).

Petitioner also argues that it would have been obvious to use the thermostats as the first processor and

to perform the determination of occupancy, because (as shown in Fig. 9E of Geadelmann) the thermostats contained the occupancy sensors (Ex. 1004, Fig. 9E, 8:31–43) (Ex. 1002, ¶ 136), and because the thermostats were the units that needed to operate their associated HVAC systems based on the occupied or unoccupied state (Ex. 1004, 4:9-21, 4:55-59) (Ex. 1002, ¶ 136).

Pet. 64; *see also* Pet. Reply 33–34.

Patent Owner argues that the BCA cannot be the first processor because it is not “located remotely” from the BCA’s memory. PO Resp. 35–36. Similarly, Patent Owner argues that the thermostats are also not “located remotely” from the memory because they are also in the same building. *Id.* at 36.

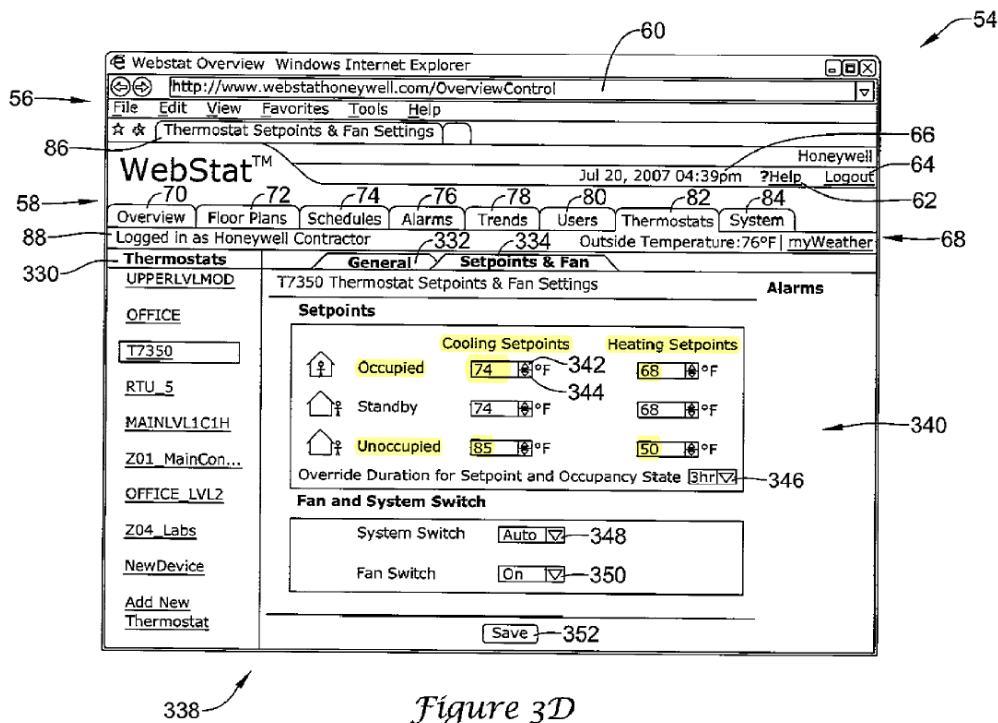
Patent Owner further argues that “there is no disclosure in Geadelmann that the thermostats contain ‘one or more processors with circuitry and code designed to execute instructions to determine whether the building is occupied or unoccupied.’” PO Resp. 36–37 (citing Ex. 2013 ¶ 94). According to Patent Owner, Mr. Shah admitted that “Geadelmann does not expressly state that the occupancy sensor is used to determine occupancy.” PO Resp. 37 (quoting Ex. 1002 ¶ 103); PO Sur-reply 13.

Patent Owner further argues that Mr. Shah “does not address where the determination of occupancy should occur.” PO Resp. 38 (citing Ex. 2013 ¶ 95). Patent Owner also argues that “[t]here is nothing inherent in Geadelmann that requires the occupancy determination to be made in the thermostat.” PO Resp. 38 (citing Ex. 2013 ¶ 95); *see also* PO Sur-reply 13. And, according to Patent Owner, “Mr. Shah provides no opinions on the obviousness of this issue.” PO Resp. 38 (citing Ex. 2013 ¶ 95).

Patent Owner further argues that the reasons given in the Petition for why it would have been obvious to have the thermostats perform the occupancy determination are conclusory. PO Sur-reply 14.

b) Analysis

Geadelmann teaches using multiple sets of cooling setpoints including one for when the space is occupied and another when it is unoccupied. *See* Ex. 1004, Fig. 3D, 11:61–12:1; Ex. 1002 ¶¶ 81–83. A version of Geadelmann Figure 3D annotated by Petitioner is reproduced below.



Pet. 31. Figure 3D is an example of a web page that may be generated by the HVAC control system. Ex. 1004, 2:3–4. Specifically, Figure 3D shows “that web page 338 includes a pane 340 that includes information regarding setpoint and fan information for thermostat 316.” *Id.* at 11:61–63. Figure 3D shows the settings for the thermostat labeled T7350. *Id.* at Fig. 3D. Petitioner has annotated Figure 3D with yellow highlighting on the columns labeled “Cooling Setpoints” and “Heating Setpoints” and the rows labeled

“Occupied” and “Unoccupied.” Pet. 31. This figure demonstrates that Geadelmann teaches using different setpoints based on the occupancy status associated with a thermostat.

Geadelmann also teaches using a thermostat with occupancy sensors. Ex. 1004, Fig. 9E, 8:31–43; Ex. 1002 ¶ 102. Geadelmann Figure 9E, as annotated by Petitioner, is reproduced below.

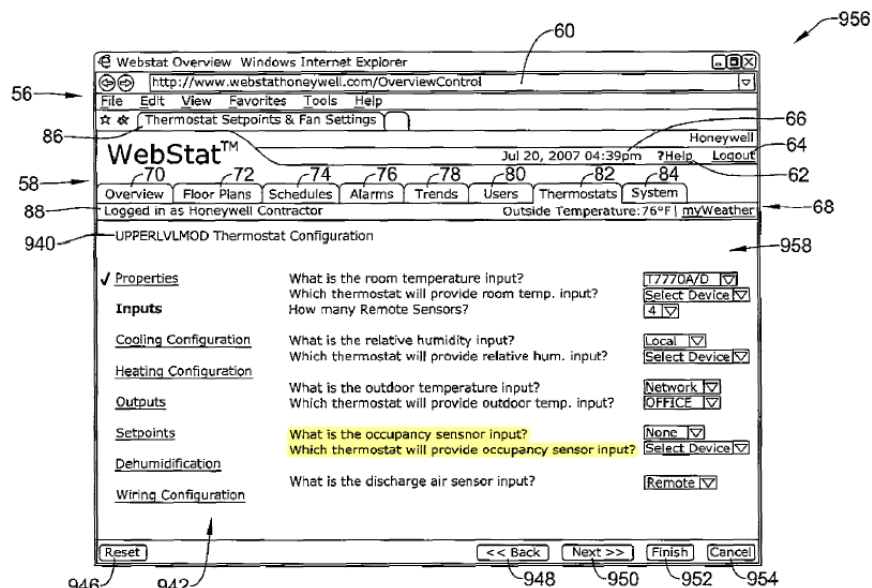


Figure 9E

Pet. 43. Figure 9E shows a “web page[] that may be generated by the HVAC control system of FIG. 1, pertaining to a thermostat configuration functionality thereof.” Ex. 1004, 2:23–26. More specifically, Figure 9E show a web page “includ[ing] a pane 958 that provides a variety of parameter values and/or settings pertaining to the specific thermostat configuration aspect currently being edited.” *Id.* at 22:11–13. Petitioner highlights the lines “What is the occupancy sensor input?” and “Which thermostat will provide the occupancy sensor input?” Pet. 43. Figure 9 shows that Geadelmann both uses occupancy sensors and that the thermostats can provide the input for the sensors. Ex. 1004, Fig. 9E.

Ehlers teaches using occupancy sensors to determine “if there were people present in the site.” Ex. 1010 ¶ 266; *see also* Ex. 1002 ¶ 103. As discussed above for claim 1, a person having ordinary skill in the art would have used Ehlers’ occupancy sensor to determine whether or not an area was occupied. *See also* Ex. 1002 ¶¶ 104–106.

We are persuaded by Petitioner’s argument that it would have been obvious to a person having ordinary skill in the art to have the thermostat’s processor determine whether the building is occupied or not. *See* Ex. 1002 ¶ 136. As shown in Figure 9E, the thermostat can be used to generate the input for the occupancy sensors. Ex. 1004, Fig. 9E; Ex. 1002 ¶ 136. Additionally, the thermostats need to know whether a space is occupied or unoccupied in order to use the correct setpoints. Ex. 1004, Fig. 3D; Ex. 1002 ¶ 136. Therefore, it would have been obvious to a person having ordinary skill in the art to have the thermostat—which contains the sensor and needs the occupancy state—determine whether a building is occupied or unoccupied. Ex. 1002 ¶ 136.

We do not agree with Patent Owner’s arguments. The majority of Patent Owner’s arguments rely on either the wrong processor (the BCA) or an incorrect construction of “located remotely.” Similarly inapposite are Patent Owner’s inherency arguments; Petitioner argues the additional limitation of claim 12 would have been obvious, not that it was inherent.

Patent Owner’s argument also improperly focuses exclusively on Geadelmann. However, Petitioner relies on Ehlers for an explicit teaching of using an occupancy sensor to determine if a space is occupied. Pet. 43–

45.²² “The question in an obviousness inquiry is whether it would have been obvious to a person of ordinary skill in the art to combine the relevant disclosures of the two references, not whether each individual reference discloses all of the necessary elements.” *Game & Tech Co. v. Wargaming Grp. Ltd.*, 942 F.3d 1343, 1352 (Fed. Cir. 2019) (citing *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1364 (Fed. Cir. 2008)). Because Patent Owner argues a reference individually, the argument is not persuasive.

Finally, Patent Owner’s argument that Petitioner’s reason to have the thermostat determine occupancy was conclusory falls short. First, Patent Owner forfeited that argument by not addressing it in the Response. *See* Paper 10, 8; *cf. NuVasive*, 842 F.3d at 1381 (Fed. Cir. 2016). Second, even if we did consider the argument, contrary to Patent Owner’s assertion, Petitioner’s argument is not conclusory. Instead, as discussed above with regard to claim 1, Petitioner provides “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (citations omitted), *cited with approval in KSR*, 550 U.S. at 418. Moreover, Petitioner specifically argues that a person having ordinary skill in the art would have used the thermostats to determine occupancy because the thermostats need that occupancy data and supports its argument with citations to both Gadelmann and Mr. Shah’s testimony. *See* Pet. 64 (citing Ex. 1004, 4:9–21, 4:55–59, 8:31–43, Fig. 9E; Ex. 1002 ¶ 136).

²² Petitioner discusses Ehlers when discussing limitation [1k]. When discussing claim 12, Petitioner references back to its arguments concerning limitation [1k]. Pet. 64.

Accordingly, having considered the entirety of the evidence submitted by the parties, we determine that Petitioner has shown by a preponderance of the evidence that claim 12 of the '382 patent would have been obvious over Geadelmann and Ehlers.

CONCLUSION²³

For the foregoing reasons, we conclude that Petitioner has demonstrated by a preponderance of the evidence the unpatentability of claims 1–20 of the '382 patent. Specifically, Petitioner has demonstrated by a preponderance of the evidence that claims 1–20 would have been obvious under 35 U.S.C. § 103(a) in light of Geadelmann and Ehlers.

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, claims 1–20 of the '382 patent are held unpatentable; and

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

²³ 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).

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1–20	103(a)	Geadelmann, Ehlers	1–20	

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