No. ____

IN THE

United States Court of Appeals for the Federal Circuit

IN RE GOOGLE LLC,
Petitioner.

On Petition for Writ of Mandamus to the
United States District Court for the Western District of Texas
No. 6:20-cv-0075-ADA
District Judge Alan D. Albright

GOOGLE LLC'S PETITION FOR WRIT OF MANDAMUS

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CERTIFICATE OF INTEREST

Counsel for Petitioner Google LLC hereby certifies as follows:

1. The full name of every party represented by me is: **Google LLC.**

2. The real parties in interest are: **Google LLC.**

3. All parent corporations and any publicly held companies that own 10% or more of the stock of the parties I represent are as follows:

Google LLC is a subsidiary of XXVI Holdings Inc., which is a subsidiary of Alphabet Inc., a publicly traded company. No publicly held company owns 10% or more of Alphabet Inc.'s stock.

4. The names of all law firms and the partners or associates that appeared for the party now represented by me in the trial court or that are expected to appear in this court (and who have not or will not enter an appearance in this case) are:

Hogan Lovells US LLP: Neal Kumar Katyal and Mitchell P. Reich

White & Case LLP: Bijal V. Vakil, Eric Lancaster, Henry Huang, Michael J. Songer, and Shamita D. Etienne-Cummings

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5. The title and number of any case known to counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal: **None.**

6. Organizational Victims and Bankruptcy Cases:

N/A

Dated: May 10, 2021 /s/ Neal Kumar Katyal

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INTRODUCTION

EcoFactor, Inc. and Google LLC are both headquartered in the Northern District of California ("NDCA"). EcoFactor sued Google, alleging that Google's Nest Learning Thermostat—a product designed and developed in NDCA—infringed its patents. Every piece of evidence likely to be relevant to this litigation is located in NDCA. NDCA is where EcoFactor developed the patents-in-suit and Google engaged in the allegedly infringing conduct. And nearly every potential witness resides or works in NDCA.

Despite all this, EcoFactor chose to sue Google in the District Court for the Western District of Texas ("WDTX"). Google moved to transfer the case to NDCA, but the District Court—after sitting on the motion for nearly 10 months—denied the motion, holding that not a *single* factor weighed in favor of transfer, whereas two factors weighed "heavily" in favor of keeping the case in WDTX. Appx10-11.

The District Court reached that remarkable conclusion via a series of legal errors that this Court and the Fifth Circuit have repeatedly and specifically admonished district courts against committing. Among other errors, the District Court refused to "assume any [non-party] witnesses are unwilling" to testify, Appx7, even though this Court has held that, "when there is no indication that a non-party witness is willing, the witness is *presumed* to be unwilling." *In re HP Inc.*, No. 2018-149, 2018 WL 4692486, at *3 n.1 (Fed. Cir. Sept. 25, 2018) ("*HP I*")

(emphasis added). The District Court held that "the focus on physical location of electronic documents is out of touch with modern patent litigation," Appx5, even though this Court and the Fifth Circuit have time and again rejected the very same "antiquated era argument." *In re Genentech, Inc.*, 566 F.3d 1338, 1346 (Fed. Cir. 2009). The District Court also found that considerations of judicial efficiency "strongly weigh[] against transfer" because EcoFactor brought two parallel infringement cases in WDTX that are themselves the subject of motions to transfer to NDCA. Appx10. Four years ago, this Court rejected the same argument, explaining that "it is improper for a district court to weigh the judicial economy factor in a plaintiff's favor solely based on the existence of multiple co-pending suits, while the remaining defendants have similar transfer motions pending seeking transfer to a common transferee district." *In re Google Inc.*, No. 2017-107, 2017 WL 977038, at *3 (Fed. Cir. 2017).

When the dust settles, it is no exaggeration to state that nearly every major legal proposition on which the District Court rested its transfer denial is at odds with the precedents of this Court and the Fifth Circuit. And the District Court coupled that catalog of legal errors with a number of similarly clear factual errors, such as disregarding evidence in Google's reply declaration, *see In re Apple, Inc.*, 581 F. App'x 886, 888 (Fed. Cir. 2014) ("*Apple I*") (per curiam) (granting mandamus based on similar error), and insisting that all of Google's evidence, even the "[p]rototypes"

of its allegedly infringing thermostat product, Appx155-156 (¶ 17), is stored in electronic form. *See* Appx4-5.

In recent years, this Court has often granted mandamus when district courts failed to transfer cases despite "a stark contrast in relevance, convenience, and fairness between the two venues." *In re HP Inc.*, 826 F. App'x 899, 903 (Fed. Cir. 2020) ("*HP II*") (per curiam) (quoting *In re Hoffman-La Roche Inc.*, 587 F.3d 1333, 1336 (Fed. Cir. 2009)). Here, the contrast between the two forums is even starker than in many of these precedents. And the District Court denied mandamus based on errors similar—and in many cases identical—to errors that have led this Court to grant mandamus in the past.

Mandamus should be granted, and the District Court should be directed to transfer this matter to NDCA.

RELIEF SOUGHT

Google respectfully requests that the Court grant its petition for a writ of mandamus, vacate the District Court's ruling denying Google's transfer motion, and remand the case with instructions to transfer this action to the U.S. District Court for the Northern District of California.

ISSUE PRESENTED

Whether the District Court clearly abused its discretion in refusing to transfer this case to the Northern District of California, where the overwhelming weight of the convenience factors under 28 U.S.C. § 1404(a) favors transfer.

BACKGROUND

A. Google and the Nest Learning Thermostat

Google is a corporation headquartered in Mountain View, California, a city in NDCA. Appx152 (¶ 3); Appx25 (¶ 5). As of April 2020, Google's offices in NDCA housed over 60% of Google's total U.S. workforce. Appx152 (¶ 4). Google also had an office in Austin, Texas, at which it employed less than 2% of its U.S. workforce. Appx154 (¶ 11).

In 2010, Nest Labs was launched in Palo Alto, a city in NDCA. Appx152 (¶ 5). Nest Labs developed the Nest Learning Thermostat, a product that automatically detects when individuals are home and creates a dynamic, personalized temperature schedule. *Id.*; *see* Appx32-36 (¶ 19). Google's parent company, Alphabet, Inc., acquired Nest Labs in 2014. Appx152 (¶ 5). Nest became a division of Google four years later. *Id.*

As of April 2020, Google's Nest product division employed over 1,500 full-time employees, or more than 75% of its total personnel, in NDCA. Appx152-153

(¶¶ 6-8).[1] The Google Nest employees in NDCA included "all" of the individuals with relevant knowledge about the marketing and financing of the Nest Learning Thermostat, Appx154 (¶ 12), and "[t]he engineers and managers from Google Nest who work on the Nest Learning Thermostat functionality at issue," Appx349 (¶ 9). "The vast majority of the research, design, and development activities related to the Nest Learning Thermostat . . . occurred and continue to occur in" NDCA, as do "the vast majority of the marketing, sales, pricing, and finance decisions." Appx153 (¶ 7). Similarly, all of the relevant documents and items concerning the Nest Learning Thermostat, including its prototypes and source code, are created and stored in NDCA. Appx155-156 (¶ 17); *see* Appx350 (¶ 10); Appx249-250.

Google's Nest product division has no facilities and almost no employees in Texas. Appx153 (¶ 8). As of April 2020, only six Google employees who worked on Nest in any capacity were located in Texas. Appx154-155 (¶¶ 13-14). Four of those employees worked on customer service for all Google devices and services out of the company's Austin office. Appx155 (¶ 14). The other two employees—one located in WDTX, the other in the Northern District of Texas—worked on Google sales. Appx154-155 (¶ 13). All of these employees ultimately reported to management in Mountain View, California, Appx155 (¶ 15), and none worked on

[1] Most of the remaining Google Nest employees worked outside the United States, primarily in Canada, India, and Taiwan. Appx153 (¶ 8).

the development, financing, or functionality of the Nest Learning Thermostat, Appx154-155 (¶¶ 11-12, 15).

B. EcoFactor

EcoFactor is headquartered in Palo Alto, California, just five miles from Google's Mountain View headquarters. *See* Appx23, Appx25 (¶¶ 2, 5). Since its founding in 2006, EcoFactor has been associated with several other addresses, all in NDCA. *See* Appx23-24 (¶ 2 & n.1); Appx160-198. The company's Chief Executive Officer lives and works in Palo Alto. Appx343 (¶¶ 2-3).

EcoFactor owns four patents that recite systems and methods for managing thermostat technologies. Appx26, Appx37, Appx49, Appx64 (¶¶ 10, 24, 37, 50).[2] Each patent recites that it was issued to EcoFactor in Palo Alto or Millbrae, both cities in NDCA. Appx80, Appx96, Appx114, Appx133. The patents state that their inventors were located in Millbrae and Redwood City, also in NDCA. Appx80, Appx96, Appx114, Appx133. And, in the course of developing the patent, EcoFactor worked closely with the Center for the Built Environment at the University of California, Berkeley, and received grant funding from the California Institute for Energy and Environment at the University of California, Berkeley. Appx158 (¶¶ 10-11), Appx267-280.

[2] The patents-in-suit are U.S. Patent Nos. 8,180,492, 8,412,488, 8,738,327, and 10,534,382.

By contrast, EcoFactor and its patents have no evident connection to Texas. EcoFactor has no employees in Texas. Appx343 (¶ 5). It has identified no relevant documents or items located there. Appx343 (¶¶ 5-6). And to the extent persons connected with its patents live or work outside of NDCA, they are far from Texas. The prosecuting attorneys for the patents-in-suit are located in Irvine, California, a city in the Central District of California. Appx157 (¶ 4), Appx200-215. Of the patents' two inventors—neither of whom is an EcoFactor employee—one continues to live and work in NDCA, Appx158 (¶¶ 8-9), Appx261-266, while the other has moved to Idaho, *see* ECF No. 23, at 7.

EcoFactor has previously indicated that it prefers to litigate in NDCA. EcoFactor has entered multiple agreements stating that any disputes between the parties must be litigated before courts located in the county of Santa Clara, California. Appx224 (¶ 9.11); Appx244 (¶ 11). In October 2019, EcoFactor filed a complaint against Google before the International Trade Commission ("ITC") alleging that the Nest Learning Thermostat infringed several patents not at issue here. Appx312, Appx325 (¶¶ 17-18, 76-80).[3] During that litigation—and about a month before Google filed its motion to transfer in this case—EcoFactor insisted

[3] EcoFactor also filed a complaint against Google in the District of Massachusetts alleging that the Nest Learning Thermostat infringed the same patents asserted in the ITC proceeding. That litigation is stayed pending resolution of the ITC case. *See* Order, *EcoFactor, Inc. v. Google, Inc.*, No. 1:19-cv-12322-DJC (D. Mass. Feb. 22, 2021), ECF No. 19.

that it be permitted to review the source code for the Nest Learning Thermostat in Palo Alto, on the ground that both "the Source Code itself" and EcoFactor's "source code reviewers" are "located in Silicon Valley," and it would not be "realistic" to require the reviewers to travel elsewhere to review the code. Appx249 (email dated May 1, 2020). At no point during the ITC litigation did EcoFactor or any other party call a witness from WDTX or produce an item of evidence stored in WDTX. *See infra* p. 22 n.7.

C. Procedural History

In January 2020, EcoFactor filed this suit in WDTX. Appx77. EcoFactor alleged that Google infringed the patents-in-suit by developing, marketing, and distributing the Nest Learning Thermostat. Appx26, Appx37, Appx49, Appx64-65 (¶¶ 11, 25, 38, 51). On the same day, EcoFactor brought parallel suits against ecobee, a corporation based in Toronto, and Vivint, Inc., a Utah corporation, alleging infringement of the same patents. *See* Complaint ¶ 5, *EcoFactor, Inc. v. Ecobee, Inc.*, No. 6:20-cv-00078-ADA (W.D. Tex. Jan. 31, 2020), ECF No. 1; Complaint ¶ 5, *EcoFactor, Inc. v. Vivint, Inc.*, No. 6:20-cv-00080-ADA (W.D. Tex. Jan. 31, 2020), ECF No. 1.[4]

[4] EcoFactor filed three additional infringement suits in WDTX, all of which it voluntarily dismissed. *See EcoFactor, Inc. v. Alarm.com Inc.*, No. 6:20-cv-00076-ADA (W.D. Tex.); *EcoFactor, Inc. v. Daikin Indus., Ltd.*, No. 6:20-cv-00077-ADA (W.D. Tex.); *EcoFactor, Inc. v. Schneider Elec. USA, Inc.*, No. 6:20-cv-00079-ADA (W.D. Tex.).

In May 2020, Google moved to transfer this case to NDCA pursuant to 28 U.S.C. § 1404. ECF No. 21. In support of its motion, Google submitted two declarations and more than a dozen exhibits demonstrating the extent of its operations in NDCA and the absence of any connection between this suit and WDTX. *See* Appx151-156 (Shaper Decl.); Appx157-159 (Vakil Decl.). Google also identified a number of potential witnesses located in NDCA, including three Google employees "with relevant knowledge about the Nest Learning Thermostat," Appx153-154 (¶ 10), one of the patents' inventors, Appx158 (¶¶ 8-9), Appx261-266, and the employees of organizations that partnered with EcoFactor in developing the asserted patents, *see* ECF No. 21, at 4-5; Appx158 (¶¶ 10-13), Appx267-289.

EcoFactor responded by submitting two declarations of its own. One declaration, by EcoFactor's CEO, indicated that EcoFactor had no employees or relevant documents located in Texas. Appx343 (¶¶ 2-3, 5-6). The other contained the results of a search of LinkedIn pages. Appx345 (¶¶ 3-7). Based on that search, EcoFactor speculated that Google had five additional Google employees in WDTX who were involved with Nest in some way. ECF No. 23, at 6. EcoFactor did not seek venue discovery.

Google submitted a reply brief and a supplemental declaration. *See* ECF No. 27; Appx348-350. In the supplemental declaration, Google's Global Head of Report and Insights, People Operations explained that EcoFactor's speculation about

Google's workforce was incorrect. Of the five individuals EcoFactor identified, one worked in NDCA, not WDTX; one had not been involved with Nest products since 2017 (when he worked in California); and two no longer worked for Google at all. *See* Appx349 (¶¶ 5-8). The fifth individual, meanwhile, had been identified in Google's original declaration as the only Google employee in WDTX who worked on Nest sales, and who ultimately reported to management in NDCA. Appx349 (¶ 4). The declaration reaffirmed that "no other Google employees involved in the sales and distribution of Nest Learning Thermostat are located in Texas." Appx349 (¶ 9).

Despite this Court's repeated instruction that district courts must give "top priority" to transfer motions, *In re Apple Inc.*, 979 F.3d 1332, 1343 (Fed. Cir. 2020) ("*Apple III*") (citing cases), the District Court did not rule on the transfer motion for nearly 10 months after it was fully briefed. In light of the District Court's failure to act, in November 2020, Google requested that the District Court stay proceedings while the transfer motion was pending and before resolving any substantive issues in the case. ECF No. 41. The District Court waited several months to decide that motion, as well. During that period, the District Court held a Markman hearing and scheduled a trial for December 2021. *See* ECF Nos. 33, 50. In March 2021, the District Court granted Google's request for a stay. ECF No. 61.

The District Court denied Google's transfer motion on April 16, 2021. Appx1. That same day, the District Court denied parallel motions filed by ecobee and Vivint to transfer their respective cases to NDCA. *See* Order Denying Motion to Transfer Venue, *Ecobee*, No. 6:20-cv-00078-ADA (W.D. Tex. Apr. 16, 2021), ECF No. 57 ("*Ecobee* Order"); Order Denying Motion to Transfer Venue, *Vivint*, No. 6:20-cv-00080-ADA (W.D. Tex. Apr. 16, 2021), ECF No. 55 ("*Vivint* Order").

REASONS WHY THE WRIT SHOULD ISSUE

The writ of mandamus is "available to correct a clear abuse of discretion or usurpation of judicial power." *Apple III*, 979 F.3d at 1336 (citing *Cheney v. U.S. Dist. Ct.*, 542 U.S. 367, 380 (2004)). "In general, three conditions must be satisfied for a writ to issue: (1) the petitioner must demonstrate a clear and indisputable right to issuance of the writ; (2) the petitioner must have no other adequate method of attaining the desired relief; and (3) the court must be satisfied that the writ is appropriate under the circumstances." *Id.* "In the transfer context, these requirements coalesce into one." *HP II*, 826 F. App'x at 901. "[B]ecause the possibility of an appeal after judgment is not an adequate remedy and mandamus is deemed an appropriate vehicle to correct patently erroneous transfer determinations," the sole question on mandamus review is "whether the district court clearly abused its discretion." *Id.*

In conducting that analysis, this Court "follow[s] regional circuit law"—here, the law of the Fifth Circuit. *In re TracFone Wireless, Inc.*, --- F. App'x ---, 2021 WL 1546036, at *2 (Fed. Cir. Apr. 20, 2021). "Under Fifth Circuit law, a motion to transfer venue should be granted upon a showing that the transferee venue is 'clearly more convenient' than the venue chosen by the plaintiff." *In re TS Tech USA Corp.*, 551 F.3d 1315, 1319 (Fed. Cir. 2008) (quoting *In re Volkswagen of Am., Inc.*, 545 F.3d 304, 315 (5th Cir. 2008) ("*Volkswagen II*") (en banc)).

That determination turns on "a comparison of the relative convenience of the two venues based on assessment of the traditional transfer factors," *HP II*, 826 F. App'x at 901, taking into account any declarations and evidence produced by the parties, *see, e.g.*, *Apple III*, 979 F.3d at 1340. The private interest factors relevant to a decision to transfer are "(1) the relative ease of access to sources of proof; (2) the availability of compulsory process to secure the attendance of witnesses; (3) the cost of attendance for willing witnesses; and (4) all other practical problems that make trial of a case easy, expeditious and inexpensive." *In re Volkswagen AG*, 371 F.3d 201, 203 (5th Cir. 2004) ("*Volkswagen I*") (per curiam). The public interest factors are "(1) the administrative difficulties flowing from court congestion; (2) the local interest in having localized interests decided at home; (3) the familiarity of the forum with the law that will govern the case; and (4) the avoidance of unnecessary problems of conflict of laws [or in] the application of foreign law." *Id.*

Although a district court has some discretion to weigh these factors, "[d]iscretion is not whim." *Halo Elecs., Inc. v. Pulse Elecs. Inc.*, 136 S. Ct. 1923, 1931 (2016) (citation omitted). A "court must exercise its discretion within the bounds set by relevant statutes and relevant, binding precedents." *Volkswagen II*, 545 F.3d at 310. "A district court abuses its discretion" if it "relies on clearly erroneous factual findings," "relies on erroneous conclusions of law," or "misapplies the law to the facts." *Id.* (citation omitted). This Court "will grant mandamus relief when such errors produce a patently erroneous result." *Id.*; *see TS Tech*, 551 F.3d at 1319.

Here, there is no dispute that the statutory prerequisite for transfer is met: EcoFactor's suit "might have been brought" in NDCA, the forum in which both parties are headquartered and the underlying transactions occurred. 28 U.S.C. § 1404(a); *see* Appx3. The dispositive question is therefore whether the District Court reached a "patently erroneous result" in applying the private and public factors. *Volkswagen II*, 545 F.3d at 310.

It did. This Court has repeatedly held that "[i]n a case featuring most witnesses and evidence closer to the transferee venue with few or no convenience factors favoring the venue chosen by the plaintiff, the trial court should grant a motion to transfer." *In re Acer Am. Corp.*, 626 F.3d 1252, 1255 (Fed. Cir. 2010) (quoting *In re Nintendo Co.*, 589 F.3d 1194, 1198 (Fed. Cir. 2009)). That describes

this case to a T: Every relevant convenience factor points toward NDCA, while nothing ties this case to WDTX but EcoFactor's choice to file suit there.

I. THE PUBLIC INTEREST FACTORS WEIGH HEAVILY IN FAVOR OF TRANSFER.

A. Relative Ease of Access to Sources of Proof

The first private interest factor—relative ease of access to sources of proof—should have weighed heavily in favor of transfer to NDCA. This Court has held that because "the bulk of the relevant evidence usually comes from the accused infringer . . . the place where the defendant's documents are kept weighs in favor of transfer to that location." *Apple III*, 979 F.3d at 1340 (quoting *Genentech*, 566 F.3d at 1345). Where a "majority," *Nintendo*, 589 F.3d at 1199-1200, or a "significant portion," *Acer*, 626 F.3d at 1256, of the alleged infringer's evidence is located in the transferee forum, and none is located in the transferor forum, this factor weighs "heavily in favor of transfer." *Nintendo*, 589 F.3d at 1199-1200; *see Acer*, 626 F.3d at 1256 (similar).

Here, the relevant evidence in Google's possession is stored in NDCA, including "documents and items" relating to the design, distribution, and marketing of the Nest Learning Thermostat, as well as "[p]rototypes" of the product itself. Appx155-156 (¶17); Appx350 (¶10). Much if not all of EcoFactor's evidence appears to be located at its NDCA headquarters, too. *See* Appx343 (¶6); *see also Acer*, 626 F.3d at 1256 (explaining that sources of proof are likely to be located at a

company's headquarters). And any relevant third-party evidence is also likely in NDCA, given that EcoFactor developed the patents-in-suit in conjunction with several NDCA-based entities. *See supra* p. 6. By contrast, neither party has identified any relevant evidence located in or near WDTX. Accordingly, "the sources of proof factor . . . weighs significantly in favor of transfer." *Acer*, 626 F.3d at 1256.

The District Court nonetheless held that this factor was "neutral." Appx6. It reasoned that "the focus on physical location of electronic documents is out of touch with modern patent litigation," Appx5, and that, because all of Google's and EcoFactor's evidence is supposedly stored electronically, it "can be easily accessed" in WDTX. Appx6. On both the law and the facts, the District Court unambiguously erred.

With regard to the law, this Court and the Fifth Circuit have instructed district courts no fewer than five times that the type of "antiquated era argument" invoked by the District Court is wrong. *Genentech*, 566 F.3d at 1346. In *Volkswagen II*, the en banc Fifth Circuit held that "advances in copying technology and information storage" have not rendered the location of documents "superfluous." 545 F.3d at 316. In *Genentech*, this Court held that "[t]he notion that the physical location of some relevant documents" is "antiquated in the era of electronic storage and transmission" was "essentially rejected in *Volkwagen*." *Genentech*, 566 F.3d at

1345-46 (citation omitted). This Court and the Fifth Circuit have repeated that holding again, *see In re Radmax, Ltd.*, 720 F.3d 285, 288 (5th Cir. 2013) (per curiam), and again, *see Nintendo*, 589 F.3d at 1199, and again, *see TS Tech*, 551 F.3d at 1320-21.[5]

On the facts, the District Court's assertion that all of the evidence in this case is "electronically available" and thus "easily access[ible]" anywhere was also erroneous. Appx6. Google's declarant stated that the potentially relevant evidence in NDCA includes "[p]rototypes" of the Nest Learning Thermostat, Appx155-156 (¶ 17)—a physical thermostat product whose prototypes are necessarily physical, as well. Further, just weeks before the filing of the transfer motion, EcoFactor's counsel acknowledged that the product's "Source Code" was located "in Silicon Valley." Appx249; *see* Appx155-156 (¶ 17) (explaining that "designs for the Nest Learning Thermostat" are stored in NDCA). As the record makes clear, transporting a product's source code—the company's "crown jewels," *Protegrity Corp. v. Epicor*

[5] Two weeks after issuing the decision in this case, the District Court offered a lengthy criticism of "Fifth Circuit precedent regarding this factor," describing it as "at odds with the realities of modern patent litigation" and urging the Fifth Circuit to "amend[] its precedent to explicitly give district courts the discretion to fully consider the ease of accessing electronic documents." Order Granting Google's Motion to Transfer Venue at 5 n.5, *InfoGation Corp. v. Google LLC*, No. 6:20-cv-00366-ADA (W.D. Tex. Apr. 29, 2021), ECF No. 65. As the District Court acknowledged in that case, however, "current Fifth Circuit precedent" unambiguously deems relevant "the physical location of electronic documents." *Id.* The District Court had no authority to depart from that controlling precedent here.

Software Corp., No. 3:13 CV 1781(JBA), 2014 WL 3864899, at *4 (D. Conn. Aug. 6, 2014) (citation omitted)—presents significant "complexities." Appx250. It requires "finalizing and implementing an entirely new remote source code review protocol," taking steps to ensure that the code is kept "confidential and secure," and relocating the necessary "source code reviewers" as well as the computer containing the code itself. Appx249-250. Because the sources-of-proof factor turns on "*relative* ease of access, not *absolute* ease of access," *Radmax*, 720 F.3d at 288, the inconvenience of transporting the product's prototypes, its source code, and every relevant physical and electronic document in Google's possession from NDCA to WDTX plainly should have "weigh[ed] in favor of transfer." *Id.* (citation omitted); *see In re TOA Techs., Inc.*, 543 F. App'x 1006, 1008-09 (Fed. Cir. 2013) (similar).

B. Availability of Compulsory Process

The availability of compulsory process also should have weighed heavily in favor of transfer. "This factor will weigh heavily in favor of transfer when more third-party witnesses reside within the transferee venue than reside in the transferor venue." *Apple I*, 581 F. App'x at 889; *see Genentech*, 566 F.3d at 1345 (same). Google identified three sets of potential non-party witnesses who are located in NDCA or in California more broadly, and so would be subject to the subpoena power of a district court in NDCA. *See* Fed. R. Civ. P. 45(c)(1)(A)-(B). Those witnesses include one of the patents' inventors (located in NDCA), both of the prosecuting

attorneys (located in the Central District of California), and employees of the organizations that EcoFactor collaborated with in developing its patents (located in NDCA). *See* ECF No. 21, at 4-5. By contrast, neither party identified any non-party witnesses in or near WDTX. The fact that "there is a substantial number of witnesses within the subpoena power of the Northern District of California and no witness who can be compelled to appear in the [Western] District of Texas . . . weighs in favor of transfer, and not only slightly." *Genentech*, 566 F.3d at 1345.

The District Court again found this factor "neutral." Appx9. Again, its reasoning rested on a cascade of legal errors.

First, the court refused to "assume any [non-party] witnesses are unwilling," and instead placed the burden on Google "to show that any of the mentioned witnesses are unwilling to attend trial." Appx7. This Court, however, has held that "when there is no indication that a non-party witness is willing, the witness *is presumed to be unwilling* and considered under the compulsory process factor." *HP I*, 2018 WL 4692486, at *3 n.1 (emphasis added). This Court has thus found that the compulsory process factor favors transfer where a court's subpoena powers "may" be useful "in the event process is required to hale relevant witnesses into court." *Acer*, 626 F.3d at 1255; *see In re Biosearch Techs., Inc.*, 452 F. App'x 986, 988 (Fed. Cir. 2011) (same). The District Court clearly erred by requiring an

affirmative showing of unwillingness before considering the availability of compulsory process.

Second, the District Court said it gave no weight to the "possibl[e] researchers" located in NDCA, because Google did not "specifically identify" the individual researchers it might call as witnesses or specify what information they might have. Appx8. But this Court has stated that there is "no basis to discount" the presence of potential non-party witnesses in the transferee forum "just because individual employees were not identified." *HP II*, 826 F. App'x at 903. And it has held that a movant is "not required" to indicate "the nature of the testimony [the non-party witnesses] would give," *HP I*, 2018 WL 4692486, at *3, or detail "the significance of the identified witnesses' testimony," *Genentech*, 566 F.3d at 1343-44; *see In re Toyota Motor Corp.*, 747 F.3d 1338, 1340 (Fed. Cir. 2014) (similar). Here, Google specifically identified the institutions whose employees might need to testify, and explained how their knowledge would likely be relevant to this case. ECF No. 21, at 4-5. Nothing more was required. *See HP II*, 826 F. App'x at 903.

Third, the District Court observed that some of the non-party witnesses could testify by video. Appx8. That was a non-sequitur. In order to compel non-party witnesses to give deposition or trial testimony by video, just as in person, Google would need to obtain a subpoena. *See, e.g.*, *Ping-Kuo Lin v. Horan Cap. Mgmt., LLC*, No. 14 Civ. 5202(LLS), 2014 WL 3974585, at *1 (S.D.N.Y. Aug. 13, 2014);

Roundtree v. Chase Bank USA, N.A., No. 13 Civ. 239, 2014 WL 2480259, at *2 (W.D. Wa. June 3, 2014). As between the two potential forums, Google could only obtain such a subpoena in NDCA. *See Hoffman-La Roche*, 587 F.3d at 1337-38 (finding that this factor favored transfer where transferor venue lacked deposition subpoena power and any trial subpoenas would be subject to motions to quash).[6]

C. Cost of Attendance for Willing Witnesses

The third private interest factor—cost of attendance for willing witnesses—should have weighed heavily in favor of transfer, too. "[T]he convenience of the witnesses is probably the single most important factor in transfer analysis." *In re Apple Inc.*, 818 F. App'x 1001, 1003 (Fed. Cir. 2020) ("*Apple II*") (quoting *Genentech*, 566 F.3d at 1343). "[T]he factor of inconvenience to witnesses increases in direct relationship to the additional distance to be traveled." *Volkswagen II*, 545 F.3d at 317 (quoting *Volkwagen I*, 371 F.3d at 204-205). When "a substantial

[6] To the extent the Court meant that the availability of video testimony eliminated any "inconvenience" for Google, Appx8, that too was incorrect. The Federal Rules permit video testimony only "[f]or good cause in compelling circumstances and with appropriate safeguards," Fed. R. Civ. P. 43(a), so Google would have no assurance that all of its witnesses could testify remotely. Remote testimony would be, at best, an imperfect substitute for live testimony. And this Court and the Fifth Circuit have held that "the factor of inconvenience to witnesses increases in direct relationship to the additional distance" that must be traveled "to attend trial." *Genentech*, 566 F.3d at 1343 (citations omitted); *see Volkswagen II*, 545 F.3d at 317. That distance would be irrelevant—and the third private interest factor would be largely "superfluous," *cf. Volkswagen II*, 545 F.3d at 316—if the possibility of video testimony automatically eliminated any inconvenience.

number of material witnesses reside within the transferee venue . . . and no witnesses reside within the [transferor venue]," this factor "weigh[s] substantially in favor of transfer." *Genentech*, 566 F.3d at 1345.

That is the situation here. Nearly all of the material witnesses are located in NDCA—including all of the Google employees with relevant knowledge about the Nest Learning Thermostat, all of the EcoFactor employees involved in the development of the patents, one of the patents' two inventors, and researchers who assisted in the patents' development. If this case were tried in NDCA, those witnesses could commute to and from hearings within a single day; were trial held in WDTX, they would need to travel more than 1,000 miles to testify, resulting in unnecessary travel expenses, missed work, and personal disruptions. *See Acer*, 626 F.3d at 1255; *Volkswagen I*, 371 F.3d at 205. Likewise, the only potential witnesses located outside of NDCA are based in Irvine, California and Eagle, Idaho, both more than 800 miles closer to NDCA than WDTX. *See TS Tech*, 551 F.3d at 1320 (factor "considerably weigh[ed] . . . in favor of transfer" where "witnesses would need to travel approximately 900 more miles to attend trial in Texas than in" the transferee forum).

By contrast, there are no witnesses with relevant information in or near WDTX. The only six Google employees in the entire state of Texas with any involvement in Nest are four customer-service employees and two sales agents, none

of whom has any relevant knowledge about the functionality, marketing, or financing of the Nest Learning Thermostat. Appx154-155 (¶¶ 12-15).[7] Just as was the case four years ago, "the vast majority of Google's employees—in particular those responsible for projects relating to the accused products—work and reside in the Northern District of California," and so "this factor tips significantly in Google's favor." *Google*, 2017 WL 977038, at *3.

In spite of all this, the District Court held that the convenience factor is "neutral." Appx10. None of the reasons it gave for that conclusion bears any weight.

The District Court discounted the number of potential witnesses located in NDCA on the ground that these individuals are only "potential" witnesses, some of whom would not ultimately "testify live at trial." Appx9. This Court and the Fifth Circuit, however, have repeatedly found that the convenience factor favors transfer when more "potential witnesses" are located near the transferee forum than the transferor forum. *In re Adobe Inc.*, 823 F. App'x 929, 931 (Fed. Cir. 2020); *see Apple I*, 581 F. App'x at 889 (relying on location of "prospective witness[es]"); *Volkswagen II*, 545 F.3d at 317 (relying on "list of potential witnesses"). Indeed,

[7] The parties' actions confirm that no pertinent witnesses are located in Texas. In March 2020, the parties submitted lists of dozens of potential witnesses in EcoFactor's pending ITC proceeding; none is located in Texas. *See In re Certain Smart Thermostats, Smart HVAC Systems, and & Components Thereof*, Inv. No. 337-TA-1185, Dkt. Nos. 704091, 704198 (I.T.C.). The parties' initial disclosures and discovery requests in this case also have not included any Google Nest employees located in Texas.

just four days after the District Court issued its order denying transfer in this case, this Court granted mandamus in another case because the District Court discounted the convenience of "*likely* employee witnesses residing in the transferee venue." *TracFone*, 2021 WL 1546036, at *2 (emphasis added).

The District Court also discounted the party witnesses located in NDCA on the theory that the "convenience of party witnesses is given little weight." Appx9 (citation omitted). That too was mistaken. This Court has time and again placed significant, often dispositive weight on the convenience of party witnesses. *See, e.g.*, *Google*, 2017 WL 977038, at *3; *Genentech*, 566 F.3d at 1343-44; *Adobe*, 823 F. App'x at 931-932. Indeed, the convenience of party witnesses is the crux of the inquiry under the third private interest factor, because non-party witnesses are "presumed to be unwilling." *HP I*, 2018 WL 4692486, at *3 n.1. This Court thus expressed its "concern" when the same District Court previously relied on the "discordant proposition that the convenience of party witnesses is given 'little weight,' " and indicated that mandamus would have been warranted had this error "tip[ped] the scales" against transfer. *Apple II*, 818 F. App'x at 1003.

Last, the District Court reasoned that WDTX is just as convenient as NDCA because "EcoFactor represents that it has identified five additional Google employees in Austin who work or have worked directly on the accused Nest products

and are thus highly likely to have relevant, material information." Appx9. That assertion was incorrect on a number of levels.

First, EcoFactor's representation was definitively refuted by Google's supplemental declaration. That declaration explained that four of the individuals EcoFactor purported to identify based on its LinkedIn searches either did not work on Nest products, did not work in Texas, or did not work for Google at all, while the fifth was a general sales employee. Appx349 (¶¶ 4-8). The District Court did not offer any reason for crediting EcoFactor's uninformed speculation about Google's workforce over the sworn declaration of Google's Global Head of People Operations. Appx348 (¶ 1). Indeed, the District Court did not acknowledge Google's supplemental declaration at all. Its finding was therefore clear error. *See Apple I*, 581 F. App'x at 888 (finding that district court clearly erred "by failing to fully consider the facts in the record," including evidence produced along with Apple's "reply brief").

Second, even accepting the District Court's finding at face value, its conclusion still would not follow. The allegation that five Google Nest employees are located in WDTX would not make that forum just as convenient as NDCA when *more than 1,500* Google Nest employees are located in NDCA—including "all personnel with relevant knowledge regarding the marketing or finance of the Nest Learning Thermostat," Appx154 (¶ 12), and "[t]he engineers and managers . . . who

work on the Nest Learning Thermostat functionality at issue," Appx349 (¶ 9). There is no reason to believe that the five individuals purportedly in WDTX would have information that could not be more easily or accurately obtained from the more than 1,500 employees in NDCA, *see In re WMS Gaming Inc.*, 564 F. App'x 579, 581-582 (Fed. Cir. 2014), especially where "the [overwhelming] majority of witnesses would find the [transferee forum] less inconvenient," *TOA Techs.*, 543 F. App'x at 1009.

D. Other Practical Problems

The District Court found that the fourth public interest factor—"other practical problems that make trial of a case easy, expeditious, and inexpensive," *Volkswagen I*, 371 F.3d at 203—"strongly weighs against transfer." Appx10. It reasoned that, because EcoFactor filed parallel infringement cases in WDTX against ecobee and Vivint, "judicial economy favors having the infringement of the same patent considered by one judge." *Id.* (citation omitted).

That holding was once again contrary to precedent. In 2017, this Court considered and rejected the same argument, holding that "it is improper for a district court to weigh the judicial economy factor in a plaintiff's favor solely based on the existence of multiple co-pending suits, while the remaining defendants have similar transfer motions pending seeking transfer to a common transferee district." *Google*, 2017 WL 977038, at *3. "To hold otherwise," the Court explained, would be to

"effectively inoculat[e] a plaintiff against convenience transfer under § 1404(a) simply because it filed related suits against multiple defendants in the transferor district." *Id.* "That is not the law under the Fifth Circuit." *Id.*; *see also Toyota*, 747 F.3d at 1340-41 (finding that "nothing favors the transferor forum" where the plaintiff "initiated [other] cases [involving the patents at issue] more or less simultaneously with the present case").

The District Court recapitulated the error that led this Court to grant mandamus in *Google*. The suits against ecobee and Vivint are "co-pending" in the WDTX. *Google*, 2017 WL 977038, at *3. Ecobee and Vivint had "similar transfer motions pending seeking transfer to a common transferee district"—NDCA. *Id.*; *see supra* p. 11. And the District Court's orders in those cases vividly illustrate the "inoculat[ion]" concern this Court identified in *Google*. In each case, the court held that the co-pendency of the other two suits "strongly weigh[ed] against transfer," effectively establishing a circular loop in which denial of one transfer motion compelled the denial of the other two. *See* Appx10; *Ecobee Order* at 10; *Vivint* Order at 11.

Properly applied, the administration-of-justice factor should have been neutral, or even slightly in Google's favor. This Court has repeatedly held that "[t]he proper administration of justice may be to transfer to the far more convenient venue even when the trial court has some familiarity with a matter" or other related cases

remain pending before the transferor court. *Apple I*, 581 F. App'x at 889 (quoting *In re Morgan Stanley*, 417 F. App'x 947, 949 (Fed. Cir. 2011) (per curiam)). Here, every other convenience factor weighs heavily in favor of transfer to NDCA, *see supra* pp. 14-25, and so the co-pendency of two related suits that were themselves subject to transfer motions should not have affected the District Court's calculus.

II. THE PUBLIC INTEREST FACTORS WEIGH IN FAVOR OF TRANSFER.

The District Court also seriously erred in its analysis of the public interest factors. The parties agree, and the District Court accepted, that two of the public interest factors—familiarity of the forum with the law that will govern the case, and the avoidance of unnecessary conflict-of-law or foreign-law problems—are neutral. Appx12. But the other two factors plainly favor transfer, and the District Court clearly abused its discretion in holding otherwise.

A. Local Interest in Having Localized Interests Decided at Home

The local interest factor "most notably regards not merely the parties' significant connections to each forum writ large, but rather the 'significant connections between a particular venue and *the events that gave rise to a suit*.'" *Apple III*, 979 F.3d at 1345 (emphasis in original) (quoting *Acer*, 626 F.3d at 1256). Here, all of those connections point to NDCA. "[T]he accused products were designed, developed, and tested in NDCA." *Id.*; *see TOA Techs.*, 543 F. App'x at 1009-10. "The company asserting harm" and "the compan[y] alleged to cause that

harm" are "residents of [NDCA]." *Acer*, 626 F.3d at 1256; *see TracFone*, 2021 WL 1546036, at *3; *Apple III*, 979 F.3d at 1345; *TOA Techs.*, 543 F. App'x at 1009; *Volkswagen II*, 545 F.3d at 317-318. Further, "the lawsuit 'calls into question the work and reputation of several individuals residing' in NDCA," *Apple III*, 979 F.3d at 1345 (quoting *Hoffman-La Roche*, 587 F.3d at 1336), including "the inventor . . . whose work may be questioned at trial," *Acer*, 626 F.3d at 1256.

The District Court held that all of these connections with NDCA were counterbalanced by the fact that Google has an office in Austin at which it "employs over 1,400 employees," and "plans to expand its presence in Texas even further." Appx12. The Court reasoned that this office gave "both districts . . . a significant interest in this case," and so rendered the local interest factor "neutral." *Id.*

This Court rejected a virtually indistinguishable argument just six months ago in *Apple III*. There, the District Court held that the local interest factor was neutral because Apple, whose headquarters is also in NDCA, planned to build "a second campus in Austin," giving it "substantial presences in both NDCA and WDTX." 979 F.3d at 1344 (citation omitted). This Court held that the District Court "misapplied the law to the facts" by "so heavily weighing Apple's general contacts with the forum that are untethered to the lawsuit, such as Apple's general presence in WDTX." *Id.* at 1345. What should have mattered, it explained, were "the 'significant connections between NDCA and *the events that gave rise to a suit*,' "

such as the plaintiff's " 'presence in NDCA' and absence from WDTX" and the fact that Apple developed and designed the accused products "in NDCA." *Id.* (citations and brackets omitted).

The same could be said here. Just as in *Apple III*, Google's Austin campus had no involvement in the development, marketing, or financing of the allegedly infringing product. *See* Appx153-155 (¶¶ 8, 11-12, 15). And here, like there, the overwhelming majority of the relevant conduct occurred in NDCA; both defendants are headquartered there; and the vast majority of Google's employees—and, more specifically, the vast majority of Google Nest employees—reside there.[8] Indeed, EcoFactor itself chose to file a separate suit about the Nest Learning Thermostat in the District of Massachusetts, *see supra* p. 7 n.3, and WDTX has no greater interest in this case than that one. Just as in *Apple III*, "this factor weighs in favor of transfer." 979 F.3d at 1345.

B. Administrative Difficulties Flowing from Court Congestion

The final public interest factor—the administrative difficulties flowing from court congestion—is typically the "most speculative" and the least important. *Genentech*, 566 F.3d at 1347; *see Apple III*, 979 F.3d at 1344 n.5; *WMS Gaming*,

[8] Also like in *Apple III*, the contention that Google's "presence in the district is expected to increase in the future" is irrelevant where "neither [EcoFactor] nor the district court has explained how [Google]'s future plans in WDTX relate in any way to this lawsuit." *Apple III*, 979 F.3d at 1345 n.6.

564 F. App'x at 581. "To the extent that court congestion is relevant, the speed with which a case can come to trial and be resolved may be a factor." *Genentech*, 566 F.3d at 1347. But "when, as here, several relevant factors weigh in favor of transfer and others are neutral, then the speed of the transferee district court should not alone outweigh all of those other factors." *Id.*; *see Adobe*, 823 F. App'x at 932.

In this case, the court congestion factor should have weighed slightly in favor of transfer. Case-disposition statistics indicate that NDCA has substantially fewer patent cases than WDTX, which has recently seen an exponential increase in the quantity of such litigation. *See* Appx341. Moreover, WDTX "has not historically resolved cases so quickly," as the nearly 10-month delay in deciding the transfer motion in this case may show. *Apple III*, 979 F.3d at 1344. To the extent "there is an appreciable difference in docket congestion between the two forums," this factor thus favors NDCA. *Adobe*, 823 F. App'x at 932.

The District Court concluded that the court congestion factor "weigh[ed] heavily against transfer" because NDCA had "suspended all criminal and civil jury trials until at least early 2021" in light of COVID-19, whereas the District Court "demonstrated its capability of conducting in-person jury trials in a safe and efficient manner in the COVID-19 pandemic" by holding trials in October 2020 and "the first quarter of 2021." Appx11. That analysis was flawed. This Court has indicated that "[m]otions to transfer venue are to be decided based on 'the situation which existed

when suit was instituted.' " *HP II*, 826 F. App'x at 903 (emphasis added) (quoting *In re EMC Corp.*, 501 F. App'x 973, 976 (Fed. Cir. 2013), in turn quoting *Hoffman v. Blaski*, 363 U.S. 335, 343 (1960)); *see In re TracFone Wireless, Inc.*, --- F. App'x ---, 2021 WL 865353, at *2 (Fed. Cir. Mar. 8, 2021) (per curiam) (information learned "since the filing of the complaint is irrelevant when considering the transfer motion and should not color [the court's] decision"); *In re Google Inc.*, No. 2015-138, 2015 WL 5294800, at *2 (Fed. Cir. July 16, 2015) (same). All of the COVID-related developments on which the District Court relied occurred well after the suit was instituted in January 2020. Indeed, the NDCA's July 2020 order temporarily suspending jury trials,[9] as well the trials the District Court conducted in October 2020 and the first quarter of 2021, occurred after the transfer motion had been filed and fully briefed. Those events are therefore "not relevant to the venue inquiry." *EMC Corp.*, 501 F. App'x at 976; *see also Apple III*, 979 F.3d at 1343.

The District Court's analysis also fails on its own terms. Although the District Court neglected to mention it, NDCA issued an order in September 2020 stating that "[j]ury trials and bench trials may proceed in accordance with the logistical considerations necessitated by the Court's safety protocols." General Order No. 72-

[9] *See* General Order No. 72-5 (N.D. Cal. July 23, 2020), https://www.cand.uscourts.gov/wp-content/uploads/general-orders/GO_72-5_In_Re_Coronavirus_Disease_Public_Health_Emergency_7-23-2020.pdf.

6 (N.D. Cal. Sept. 16, 2020).[10] Several jury trials have been successfully conducted in NDCA since then. *See, e.g.*, *United States v. Hougen*, No. 5:20-cr-00432-EJD (N.D. Cal.) (jury trial scheduled on January 12, 2021, and conducted between April 2 and 9, 2021). Further, the administrative-difficulties factor "concerns whether there is an appreciable difference in docket congestion between the two forums," and "[n]othing about the court's general ability to set a schedule directly speaks to that issue." *Adobe*, 823 F. App'x at 932. Particularly during a fast-changing pandemic, the District Court's assumption that it could move more quickly than NDCA was far too "speculative" to weigh heavily in the transfer analysis. *Genentech*, 566 F.3d at 1347.

* * *

This transfer motion should not have been a close call. The parties reside in NDCA. The evidence is maintained in NDCA. The vast majority of the witnesses live and work in NDCA. The parties-in-suit and the allegedly infringing products were developed in NDCA. Every private interest factor and the most critical public interest factor heavily favor NDCA. Nothing ties this case to WDTX but EcoFactor's decision, for reasons of its own, to file suit there.

[10] *Available at* https://www.cand.uscourts.gov/wp-content/uploads/general-orders/GO_72-6_In_Re_COVID_Public_Health_Emergency_9-16-2020.pdf.

This Court has rarely confronted a case in which a district court refused to grant a transfer motion despite so "stark [a] contrast in relevance, convenience, and fairness between the two venues." *HP II*, 826 F. App'x at 903 (quoting *Hoffman-La Roche*, 587 F.3d at 1336). When it has, it has invariably granted mandamus. The Court should do so again, and order this case transferred to NDCA.

CONCLUSION

The writ of mandamus should be granted, and the District Court should be directed to transfer this matter to the Northern District of California.

Dated: May 10, 2021

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

1. This document complies with the type-volume limits of Fed. R. App. P. 21(d)(1) because, excluding the parts of the document exempted by Fed. R. App. P. 32(f) and Fed. Cir. R. 32(b), this document contains 7,769 words.

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CERTIFICATE OF SERVICE

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No. ____

IN THE

United States Court of Appeals for the Federal Circuit

IN RE GOOGLE LLC,
Petitioner.

On Petition for Writ of Mandamus to the
United States District Court for the Western District of Texas
No. 6:20-cv-0075-ADA
District Judge Alan D. Albright

NONCONFIDENTIAL APPENDIX IN SUPPORT OF GOOGLE LLC'S PETITION FOR WRIT OF MANDAMUS

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CONFIDENTIAL MATERIAL OMITTED

The material omitted from this appendix (Appx152-154, Appx157, Appx217-240, Appx242-246, Appx349) includes confidential information relating to Petitioner's business practices and other commercially sensitive information. That material is subject to the District Court's docket text orders granting Google's motion to file under seal portions of its motion to transfer (entered May 29, 2020), and Google's motion to file under seal portions of its reply in support of motion to transfer (entered June 11, 2020). These docket text orders may be found at Appx18.

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC., *Plaintiff,*	§	
v.	§	**6-20-CV-00075-ADA**
GOOGLE LLC, *Defendant.*	§	

ORDER DENYING MOTION TO TRANSFER VENUE

Before the Court is Defendant Google LLC's ("Google") motion to transfer (ECF No. 19) to the Northern District of California ("NDCA") pursuant to 28 U.S.C. § 1404(a). After careful consideration of the parties' briefs and the applicable law, the Court **DENIES** Google's Motion to Transfer.

I. BACKGROUND

Plaintiff EcoFactor, Inc. ("Ecofactor") filed this lawsuit on January 31, 2020, alleging that Google's Nest Learning Thermostat line of products infringe U.S. Patent Nos. 8,180,492, 8,412,488, 8,738,327, and 10,534,382 (the "Asserted Patents"). Pl.'s Compl., ECF No. 1. On May 27, 2020, Google filed an answer (ECF No. 16) and this motion to transfer venue under 28 U.S.C. § 1404(a) requesting that this case be transferred to the NDCA. Def.'s Mot., ECF No. 19.

EcoFactor is a California corporation with its corporate headquarters in Palo Alto, California. ECF No. 1, at ¶ 2. Google is a Delaware limited liability company with its corporate headquarters located in Mountain View, California. Def.'s Answer, ECF No. 16, at ¶ 5. Google maintains a corporate office in Austin, Texas and has been registered to do business in the State of Texas for over fourteen years. *Id.* at ¶¶ 5, 8.

II. LEGAL STANDARD

In patent cases, motions to transfer under 28 U.S.C. § 1404(a) are governed by the law of the regional circuit. *In re TS Tech USA Corp.*, 551 F.3d 1315, 1319 (Fed. Cir. 2008). 28 U.S.C. § 1404(a) provides that, "[f]or the convenience of parties and witnesses, . . . a district court may transfer any civil action to any other district or division where it might have been brought or to any district or division to which all parties have consented." *Id.* "Section 1404(a) is intended to place discretion in the district court to adjudicate motions for transfer according to an 'individualized, case-by-case consideration of convenience and fairness.'" *Stewart Org., Inc. v. Ricoh Corp.*, 487 U.S. 22, 29 (1988) (quoting *Van Dusen v. Barrack*, 376 U.S. 612, 622 (1964)).

The preliminary question under Section 1404(a) is whether a civil action "might have been brought" in the transfer destination venue." *In re Volkswagen, Inc.*, 545 F.3d 304, 312 (5th Cir. 2008) (hereinafter "*Volkswagen II"*). If the destination venue would have been a proper venue, then "[t]he determination of 'convenience' turns on a number of public and private interest factors, none of which can be said to be of dispositive weight." *Action Indus., Inc. v. U.S. Fid. & Guar. Co.*, 358 F.3d 337, 340 (5th Cir. 2004). The private factors include: "(1) the relative ease of access to sources of proof; (2) the availability of compulsory process to secure the attendance of witnesses; (3) the cost of attendance for willing witnesses; and (4) all other practical problems that make trial of a case easy, expeditious and inexpensive." *In re Volkswagen AG*, 371 F.3d 201, 203 (5th Cir. 2004) (hereinafter "*Volkswagen I*") (citing to *Piper Aircraft Co. v. Reyno*, 454 U.S. 235, 241 n.6 (1982)). The public factors include: "(1) the administrative difficulties flowing from court congestion; (2) the local interest in having localized interests decided at home; (3) the familiarity of the forum with the law that will govern the case; and (4) the avoidance of unnecessary problems of conflict of laws of the application of foreign law." *Id.*

Courts evaluate these factors based on the situation which existed at the time of filing, rather than relying on hindsight knowledge of the defendant's forum preference. *Hoffman v. Blaski*, 363 U.S. 335, 343 (1960).

The burden to prove that a case should be transferred for convenience falls squarely on the moving party. *In re Vistaprint Ltd.*, 628 F.3d 1342, 1346 (Fed. Cir. 2010). The burden that a movant must carry is not that the alternative venue is more convenient, but that it is clearly more convenient. *Volkswagen II*, 545 F.3d at 314 n.10. Although the plaintiff's choice of forum is not a separate factor entitled to special weight, respect for the plaintiff's choice of forum is encompassed in the movant's elevated burden to "clearly demonstrate" that the proposed transferee forum is "clearly more convenient" than the forum in which the case was filed. *In re Vistaprint Ltd.*, 628 F.3d at 314–15. While "clearly more convenient" is not necessarily equivalent to "clear and convincing," the moving party "must show materially more than a mere preponderance of convenience, lest the standard have no real or practical meaning." *Quest NetTech Corp. v. Apple, Inc.*, No. 2:19-cv-118, 2019 WL 6344267, at *7 (E.D. Tex. Nov. 27, 2019).

III. ANALYSIS

The threshold determination in the Section 1404 analysis is whether this case could initially have been brought in the destination venue—the NDCA. Neither party contests the fact that venue is proper in the NDCA and that this case could have been brought there. Thus, the Court proceeds with its analysis of the private and public interest factors.

A. The Private Interest Factors Weigh Against Transfer.

i. The Relative Ease of Access to Sources of Proof

"In considering the relative ease of access to proof, a court looks to where documentary evidence, such as documents and physical evidence, is stored." *Fintiv Inc. v. Apple Inc.*, No. 6:18-cv-00372, 2019 WL 4743678, at *2 (W.D. Tex. Sept. 10, 2019). "[T]he question is *relative* ease of access, not *absolute* ease of access." *In re Radmax*, 720 F.3d 285, 288 (5th Cir. 2013) (emphases in original). "In patent infringement cases, the bulk of the relevant evidence usually comes from the accused infringer. Consequently, the place where the defendant's documents are kept weighs in favor of transfer to that location." *In re Apple Inc*., 979 F.3d 1332, 1340 (Fed. Cir. 2020) (citing *In re Genentech*, 566 F.3d at 1345).

1. Witnesses Are Not Sources of Proof

Google argues that "any documents, source code, prototypes, and witnesses . . . are likely in Palo Alto, California." Def.'s Mot. at 10. This Court, in following Federal Circuit precedent, has made clear that witnesses are not sources of proof to be analyzed under this factor; rather, the Court considers only documents and physical evidence. *Netlist, Inc. v. SK hynix Inc. et al*, No. 6:20-cv-00194-ADA (W.D. Tex. Feb. 2, 2021) ("The first private factor, ease of access to sources of proof, considers 'documents and physical evidence' *as opposed to witnesses.*") (emphasis added); *In re Apple Inc.*, 979 F.3d 1332, 1339 (Fed. Cir. 2020) ("[t]his factor relates to the ease of access to non-witness evidence, such as documents and other physical evidence"); *Volkswagen II*, 545 F.3d at 315 ("All of the documents and physical evidence relating to the accident are located in the Dallas Division"). Accordingly, any analysis pertaining to witnesses is more appropriately assessed under the second or third private factor.

2. Location of Physical Documents

Google does not point with particularity to any relevant physical documents, nor does it confirm the existence of any physical documents located in the NDCA. Rather, Google asserts in

conclusory fashion that any such evidence is "likely in Palo Alto, California." Def.'s Mot. at 10. As such, the Court is not persuaded by Google's vague and conclusory argument regarding physical documents. *See Rockstar Consortium US LP v. Google Inc.*, No. 2:13-CV-893-JRG-RSP, 2014 WL 4748692, at *3–5 (E.D. Tex. Sept. 23, 2014) (weight of the evidence presented by Google for this factor did not meet its burden where Google provided "neither evidence of where its documents are actually located nor evidence that these documents are more available or accessible from the Northern District of California than they would be from [] Texas").

EcoFactor likewise does not specifically point out in its response the location of any relevant physical documents. EcoFactor does note that most relevant documents are electronically stored and readily accessible from this District. Pl.'s Resp. at 3.

3. Location of Electronic Documents

Although the physical location of electronic documents does affect the outcome of this factor under current Fifth Circuit precedent (*see Volkswagen II*, 545 F.3d at 316), this Court has stressed that the focus on physical location of electronic documents is out of touch with modern patent litigation. *Fintiv*, 2019 WL 4743678, at *8; *Uniloc 2017 LLC v. Apple Inc.*, 6-19-CV-00532-ADA, 2020 WL 3415880, at *9 (W.D. Tex. June 22, 2020) ("[A]ll (or nearly all) produced documents exist as electronic documents on a party's server. Then, with a click of a mouse or a few keystrokes, the party [can] produce[] these documents" and make them available at almost any location). Other courts in the Fifth Circuit similarly found that access to documents that are available electronically provides little benefit in determining whether a particular venue is more convenient than another. *See Uniloc USA Inc. v. Samsung Elecs. Am.*, No. 2:16-cv-642-JRG, 2017 U.S. Dist. LEXIS 229560, at *17 (E.D. Tex. Apr. 19, 2017) ("Despite the absence of newer cases acknowledging that in today's digital world computer stored documents are readily

moveable to almost anywhere at the click of a mouse, the Court finds it odd to ignore this reality in favor of a fictional analysis that has more to do with early Xerox machines than modern server forms.").

In its motion, Google focuses heavily on the location of EcoFactor's documents and argues that evidence about EcoFactor's patents and potential prior art is "likely in Northern California." Def.'s Mot. at 10. However, as EcoFactor points out, the realities of modern-day electronic document storage and production is that "all of [its] documents are available electronically and can easily be made available in this District." Pl.'s Resp. at 4. Google does not explain why those documents cannot be accessed from its Austin, Texas office.

Google also points out that review of its source code for the co-pending ITC litigation between the parties took place in the NDCA because Google's code and EcoFactor's reviewers are located there. Def.'s Mot. at 4. However, Google fails to identify where the source code is actually stored. Even assuming Google's source code is stored in the NDCA, "source code is, by its very nature, electronic, it can be easily transported electronically to distant locations essentially instantaneously." *Fintiv*, 2019 WL 4743678, at *3 n.1. In fact, during the course of that ITC proceeding, Google tried to move its source code review from Palo Alto to Washington D.C. (Pl.'s Resp. at 4), which clearly shows that it has the capability to make the source code available at another location, such as in Austin, Texas.

Because the relevant documentary evidence identified by the parties are electronically available, which can be easily accessed from this District, the Court finds that this factor is neutral.

ii. The Availability of Compulsory Process to Secure the Attendance of Witnesses

In this factor, the Court considers particularly non-party witnesses whose attendance may need to be secured by a court order. *Fintiv*, 2019 WL 4743678, at *5 (citing *Volkswagen II*, 545 F.3d at 316); *Uniloc*, 2020 WL 3415880, at *10. This factor "weigh[s] heavily in favor of transfer when more third-party witnesses reside within the transferee venue than reside in the transferor venue." *In re Apple, Inc.*, 581 F. App'x. 886, 889 (Fed. Cir. 2014). Under the Federal Rules, a court may subpoena a witness to attend trial only (a) "within 100 miles of where the person resides, is employed, or regularly transacts business in person"; or (b) "within the state where the person resides, is employed, or regularly transacts business in person, if the person . . . is commanded to attend a trial and would not incur substantial expense." Fed. R. Civ. P. 45(c)(1)(A), (B)(ii); *Gemalto S.A. v. CPI Card Grp. Inc.*, No. 15-CA-0910, 2015 WL 10818740, at *4 (W.D. Tex. Dec. 16, 2015). As party witnesses almost invariably attend trial willingly, "[w]hen no party has alleged or shown any witness's unwillingness, a court should not attach much weight to the compulsory process factor." *CloudofChange, LLC v. NCR Corp.*, No. 6-19-cv-00513 (W.D. Tex. Mar. 17, 2020) (citation omitted).

Google argues that the NDCA could compel the attendance of certain non-party witnesses, while this Court cannot. Def.'s Mot. at 11. Google asserts that "relevant third-party witnesses include the named inventors and possibly researchers who collaborated with EcoFactor." *Id.* However, Google fails to show that any of the mentioned witnesses are unwilling to attend trial. Rather, Google asks the court to assume any such witnesses are unwilling. *Id.* But hypothetical scenarios are not evidence of unwillingness. *Turner v. Cincinnati Ins. Co.*, No. 6:19-cv-642-ADA-JCM, 2020 WL 210809, at *3 (W.D. Tex. Jan. 14, 2020) ("This private interest factor carries far less weight when the movant has not alleged or shown that any witnesses are unwilling to testify."). Further, EcoFactor has a consulting agreement with Mr.

Steinberg, the only named inventor who lives in NDCA. Pl.'s Resp. at 5. As such, his attendance at trial can be secured without a subpoena. *Id.*

As to the "possibly researchers" who may be relevant third-party witnesses, Google does not identify the relevant knowledge, if any, that these alleged individuals may have. Google cannot rely on cherry-picked "possibl[e]" witnesses who might live in NDCA to support its argument—especially when Google cannot specifically identify those individuals, the nature of the information those individuals have, and how any such information relates to this case. "The Court gives more weight to those specifically identified witnesses and affords less weight to vague assertions that witnesses are likely located in a particular forum." *Core Wireless Licensing, S.A.R.L. v. Apple, Inc.*, No. 6:12-cv-100 LED-JDL, 2013 WL 682849, at *3 (E.D. Tex. Feb. 22, 2013); *Rockstar Consortium US LP v. Google Inc.*, No. 2:13-cv-893-JRG-RSP, 2014 WL 4748692, at *4–5 (burden not met where movant provided "little, if any, evidence for the Court to work with as to what the witnesses would actually testify to and as to where the witnesses actually live," and made "no statement which, if any, of these witnesses will be called to testify and whether any of the witnesses are willing or unwilling").

Finally, to the extent that any of Google's out-of-district unidentified third-party witnesses would be necessary for trial, Google does not assert that it would be inconvenienced by presenting any such testimony by video. While there is some benefit to providing live witnesses at trial, using non-party witnesses' deposition as opposed to live testimony would not likely inconvenience the party. *See, e.g., Nexus Display Techs. LLC v. Dell, Inc.*, No. 2:14-cv-762, 2015 WL 5043069, at *4. (E.D. Tex. Aug. 25, 2015). Google fails to acknowledge the potential use of non-party witnesses' deposition testimony, much less show that any such use would inconvenience it.

In view of the above, the Court finds this factor is neutral.

iii. The Cost of Attendance for Willing Witnesses

"The convenience of witnesses is the single most important factor in the transfer analysis." *Fintiv*, 2019 WL 4743678, at *6. "Courts properly give more weight to the convenience of non-party witnesses than to party witnesses." *Netlist*, No. 6:20-cv-00194-ADA at 13; *see Moskowitz Family LLC v. Globus Med., Inc.*, No. 6:19-cv-00672-ADA, 2020 WL 4577710, at *4 (W.D. Tex. Jul. 2, 2020).

As a preliminary matter, given typical time limits at trial, the Court does not assume that all of the party and third-party witnesses listed in Section 1404(a) briefing will testify at trial. *Fintiv*, 2019 WL 4743678, at *6. Rather, in addition to the party's experts, the Court assumes that no more than a few party witnesses—and even fewer third-party witnesses, if any—will testify live at trial. *Id.* Therefore, long lists of potential party and third-party witnesses do not affect the Court's analysis for this factor. *Id.*

Although Google specifically identifies three employee witnesses located in the NDCA, Google admits that there are also employees in Texas with knowledge about the accused products. Def.'s Mot. at 2; Shaper Decl. ¶¶ 10–14. EcoFactor represents that it has identified five additional Google employees in Austin who work or have worked directly on the accused Nest products and are thus highly likely to have relevant, material information. Pl.'s Resp. at 6. Among those identified by EcoFactor are engineers and program managers involved in product development, the "Head of Central Region Energy Partnerships" for Nest, and the Technical Lead for the Data Integration team at Nest. *Id.*

Google also relies on EcoFactor's potential witnesses to support its argument for transfer. *See* Def.'s Mot. at 8. However, the "convenience of party witnesses is given little weight."

SynKloud Techs., LLC v. Dropbox, Inc., No. 6:19-cv-00525-ADA, 2020 WL 2494574, at *4 (W.D. Tex. May 14, 2020). When EcoFactor filed its actions in this Court, it had already taken consideration of such potential costs. *See Netlist*, No. 6:20-cv-00194-ADA at 13. Further, EcoFactor represents that its own representative and likely Rule 30(b)(6) witness has declared that he is willing to attend trial in this District and that such attendance will not be inconvenient for him. Pl.'s Resp. at 6. Therefore, the Court finds that this factor is also neutral.

iv. All Other Practical Problems That Make Trial of a Case Easy, Expeditious and Inexpensive

When considering the private interest factors, courts must consider "all other practical problems that make trial of a case easy, expeditious and inexpensive." *Volkswagen II*, 545 F.3d at 314. "Particularly, the existence of duplicative suits involving the same or similar issues may create practical difficulties that will weigh heavily in favor or against transfer." *PersonalWeb Techs., LLC v. NEC Corp. of Am., Inc.*, No. 6:11-cv-655, 2013 WL 9600333, at *5 (E.D. Tex. Mar. 21, 2013).

EcoFactor has filed multiple lawsuits in this District involving the same patents.[1] The cases involve overlapping issues, such as claim construction, invalidity, prior art, conception, and reduction to practice. This Court has recognized that "judicial economy favors having the infringement of the same patent considered by one judge." *SynKloud*, 2020 WL 2494574, at *5.

Because parallel litigation concerning the same patent at issue is pending in this District, this factor strongly weighs against transfer.

B. The Public Interest Factors Weigh Against Transfer.

i. Administrative Difficulties Flowing From Court Congestion

[1] *EcoFactor, Inc. v. Ecobee, Inc*, No. 6:20-cv-00078-ADA; *EcoFactor, Inc. v. Vivint, Inc.*, No. 6:20-cv-00080-ADA.

The relevant inquiry under this factor is actually "[t]he speed with which a case can come to trial and be resolved[.]" *In re Genentech, Inc.*, 566 F.3d 1338, 1347 (Fed. Cir. 2009). A faster average time to trial means a more efficient and economical resolutions of the claims at issue. Google suggests that this factor is either neutral or weighs in favor of transfer because "statistics show that the number of new patent cases in WDTX continues to rise, while NDCA received fewer new cases between 2018 and 2019, and fewer cases last year than this Court alone." Def.'s Mot. at 13. However, Google then expressly admits that "this Court's default schedule would lead to a trial date sooner than the average time to trial in NDCA." *Id.*

Google argues that "the COVID-19 pandemic makes trial schedules even more speculative." *Id.* However, this Court has demonstrated its capability of conducing in-person jury trials in a safe and efficient manner in the COVID-19 pandemic. This Court held its first patent jury trial in October 2020, and has held three more in-person jury trials in the first quarter of 2021 already. Thus, this Court is fully open and equipped to safely conduct jury trials in the COVID-19 pandemic. Conversely, the NDCA suspended all criminal and civil jury trials until at least early 2021, and there is no evidence that any division in the NDCA is fully open to this date. If this case is transferred to the NDCA, in addition to deferred trial settings as a result of the COVID-19 pandemic, transferring this case and establishing a new schedule with a new presiding judge would cause greater delay. Therefore, this factor weighs heavily against transfer.

ii. Local Interest in Having Localized Interests Decided at Home

Under this factor, the Court must evaluate whether there is a local interest in deciding local issues at home. *Volkswagen II*, 545 F.3d at 317. "A local interest is demonstrated by a relevant factual connection between the events and the venue." *Word to Info, Inc. v. Facebook, Inc.*, No. 3:14-cv-04387-K, 2015 WL 13870507, at *4 (N.D. Tex. Jul. 23, 2015).

Google states that the NDCA has a stronger local interest because this litigation "involves two companies currently located in that District, with extensive histories there." Def.'s Mot. at 12. However, Google has had a substantial presence in Austin for nearly 14 years. As EcoFactor notes, Google has leased significant square feet in office space and currently employs over 1,400 employees in Austin, with plans to expand its presence in Texas even further. Pl.'s Resp. at 9.

Because both districts have a significant interest in this case, the Court finds this factor neutral.

iii. Familiarity of the Forum With the Law That will Govern the Case

Both parties agree that this factor is neutral. Def.'s Mot. at 13; Pl.'s Resp. at 10. The Court also agrees.

iv. Avoidance of Unnecessary Problems of Conflict of Laws or in the Application of Foreign Law

Both parties agree that this factor is neutral. *Id*. The Court also agrees.

IV. CONCLUSION

Having considered the Section 1404(a) factors, the Court finds that Google has not met its significant burden to demonstrate that the NDCA is "clearly more convenient" than this District. Therefore, the Court **DENIES** Google's Motion to Transfer.

SIGNED this 16th day of April, 2021.

ALAN D ALBRIGHT
UNITED STATES DISTRICT JUDGE

PATENT,STAYED

U.S. District Court [LIVE]
Western District of Texas (Waco)
CIVIL DOCKET FOR CASE #: 6:20-cv-00075-ADA

EcoFactor, Inc. v. Google LLC
Assigned to: Judge Alan D Albright
Related Case: 6:21-cv-00244-ADA
Cause: 35:271 Patent Infringement

Date Filed: 01/31/2020
Jury Demand: Both
Nature of Suit: 830 Patent
Jurisdiction: Federal Question

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Date Filed	#	Docket Text
01/31/2020	1	COMPLAINT (Filing fee $ 400 receipt number 0542-13152928), filed by EcoFactor, Inc.. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Exhibit 4, # 5 Civil Cover Sheet)(Mirzaie, Reza) (Entered: 01/31/2020)
01/31/2020	2	RULE 7 DISCLOSURE STATEMENT filed by EcoFactor, Inc.. (Mirzaie, Reza) (Entered: 01/31/2020)
01/31/2020	3	NOTICE *of AO 120 Patent Report Form* by EcoFactor, Inc. (Mirzaie, Reza) (Entered:

		01/31/2020)
01/31/2020	4	REQUEST FOR ISSUANCE OF SUMMONS by EcoFactor, Inc.. (Mirzaie, Reza) (Entered: 01/31/2020)
01/31/2020		Case assigned to Judge Alan D Albright. CM WILL NOW REFLECT THE JUDGE INITIALS AS PART OF THE CASE NUMBER. PLEASE APPEND THESE JUDGE INITIALS TO THE CASE NUMBER ON EACH DOCUMENT THAT YOU FILE IN THIS CASE. (bw) (Entered: 02/03/2020)
01/31/2020	7	Summons Issued as to Google LLC. (bw) (Entered: 02/03/2020)
02/03/2020	5	Pursuant to the Standing Order Regarding Patent Trademark Cases effective 12/9/19, Attorneys filing Patent/Trademark cases in TXWD Waco division must prepare the attached form AO120 and e-file upon opening of the case using the event NOTICE OF FILING OF PATENT/TRADEMARK FORM. (Attachments: # 1 Blank AO120) (bw) (Entered: 02/03/2020)
02/03/2020	6	Notice of Filing of Patent/Trademark Form (AO 120). AO 120 forwarded to the Director of the U.S. Patent and Trademark Office. (Mirzaie, Reza) (Entered: 02/03/2020)
03/03/2020	8	Unopposed MOTION for Extension of Time to File Answer re 1 Complaint by Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 03/03/2020)
03/04/2020	9	Amended MOTION for Extension of Time to File Answer re 1 Complaint by Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 03/04/2020)
03/04/2020		Text Order GRANTING 9 Motion for Extension of Time to Answer entered by Judge Alan D Albright. Before the Court is Defendant's Unopposed Amended Motion to Extend Time to Move, Answer, or Otherwise Respond to First Amended Complaint. The Court GRANTS the motion. It is therefore ORDERED that Defendant shall have until and through April 6, 2020 to answer, plead, move, or otherwise respond, in any manner whatsoever, included but not limited to Rule 12 motion(s), to Plaintiff's Complaint. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 03/04/2020)
03/04/2020		Text Order MOOTING 8 Motion for Extension of Time to Answer entered by Judge Alan D Albright. In light of the filing of ECF No. 9, the Court MOOTS this motion. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 03/04/2020)
03/04/2020		Reset Answer Deadlines: Google LLC answer due 4/6/2020. (bw) (Entered: 03/04/2020)
03/24/2020	10	STANDING ORDER from U.S. District Judge Alan D. Albright regarding scheduled civil hearings. (tada) (Entered: 03/25/2020)
03/27/2020	11	MOTION to Appear Pro Hac Vice by Michael E. Jones *for Eric Lancaster* (Filing fee $ 100 receipt number 0542-13396337) by on behalf of Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 03/27/2020)
03/28/2020		Text Order GRANTING 11 Motion to Appear Pro Hac Vice. Before the Court is the Motion for Admission Pro Hac Vice. The Court, having reviewed the Motion, finds it should be GRANTED and therefore orders as follows: IT IS ORDERED the Motion for Admission Pro Hac Vice is GRANTED. IT IS FURTHER ORDERED that Applicant, if he/she has not already done so, shall immediately tender the amount of $100.00, made payable to: Clerk, U.S. District Court, in compliance with Local Rule AT-I (f)(2). Pursuant to our Administrative Policies and Procedures for Electronic Filing, the attorney hereby granted to practice pro hac vice in this case must register for electronic filing with our court within 10 days of this order. entered by Judge Alan D Albright. (This is a text-only

		entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 03/28/2020)
03/30/2020	12	Second MOTION for Extension of Time to File Answer re 1 Complaint *or Otherwise Respond* by Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 03/30/2020)
03/31/2020		Text Order GRANTING 12 Motion for Extension of Time to Answer entered by Judge Alan D Albright. Came on for consideration is Defendant's Motion. Noting that it is unopposed, the Court GRANTS the Motion. Defendant shall have up to and including May 27, 2020 to answer or otherwise respond to Plaintiff's Complaint. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 03/31/2020)
03/31/2020		Reset Answer Deadlines: Google LLC answer due 5/27/2020. (bw) (Entered: 03/31/2020)
04/01/2020	13	NOTICE of Attorney Appearance by Bijal V. Vakil on behalf of Google LLC. Attorney Bijal V. Vakil added to party Google LLC(pty:dft) (Vakil, Bijal) (Entered: 04/01/2020)
04/01/2020	14	NOTICE of Attorney Appearance by Shamita D. Etienne-Cummings on behalf of Google LLC. Attorney Shamita D. Etienne-Cummings added to party Google LLC(pty:dft) (Etienne-Cummings, Shamita) (Entered: 04/01/2020)
04/23/2020	15	MOTION to Appear Pro Hac Vice by Michael E. Jones *Michael J. Songer* (Filing fee $ 100 receipt number 0542-13493184) by on behalf of Google LLC. (Jones, Michael) (Entered: 04/23/2020)
04/24/2020		Text Order GRANTING 15 Motion to Appear Pro Hac Vice. Before the Court is the Motion for Admission Pro Hac Vice. The Court, having reviewed the Motion, finds it should be GRANTED and therefore orders as follows: IT IS ORDERED the Motion for Admission Pro Hac Vice is GRANTED. IT IS FURTHER ORDERED that Applicant, if he/she has not already done so, shall immediately tender the amount of $100.00, made payable to: Clerk, U.S. District Court, in compliance with Local Rule AT-I (f)(2). Pursuant to our Administrative Policies and Procedures for Electronic Filing, the attorney hereby granted to practice pro hac vice in this case must register for electronic filing with our court within 10 days of this order. entered by Judge Alan D Albright. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 04/24/2020)
05/27/2020	16	ANSWER to 1 Complaint by Google LLC.(Jones, Michael) (Entered: 05/27/2020)
05/27/2020	17	RULE 7 DISCLOSURE STATEMENT filed by Google LLC. (Jones, Michael) (Entered: 05/27/2020)
05/27/2020	18	Opposed Motion for leave to File Sealed Document (Attachments: # 1 Sealed Document, # 2 Sealed Document, # 3 Sealed Document, # 4 Sealed Document, # 5 Sealed Document, # 6 Sealed Document, # 7 Proposed Order) (Jones, Michael) (Entered: 05/27/2020)
05/27/2020	19	Opposed MOTION to Change Venue by Google LLC. (Attachments: # 1 Affidavit Sealed, # 2 Affidavit Sealed, # 3 Exhibit 1 Lexis Advance search, # 4 Exhibit 2 EcoFactor SEC Form D, # 5 Exhibit 3 PAIR attorneys, # 6 Exhibit Sealed, # 7 Exhibit Sealed, # 8 Exhibit Sealed, # 9 Exhibit 7 Steinberg LinkedIn, # 10 Exhibit 8 Steinberg CA Bar, # 11 Exhibit 9 EcoFactor Field Trial Results, # 12 Exhibit 10 CIEE report, # 13 Exhibit 11 Arens, # 14 Exhibit 12 Ota thesis, # 15 Exhibit 13 ITC complaint - public, # 16 Exhibit 14 Docket Navigator, # 17 Proposed Order)(Jones, Michael) (Entered: 05/27/2020)
05/27/2020	20	Unopposed Motion for leave to File Sealed Document (Attachments: # 1 Sealed Document, # 2 Sealed Document, # 3 Sealed Document, # 4 Sealed Document, # 5 Sealed

		Document, # 6 Sealed Document, # 7 Proposed Order) (Jones, Michael) (Entered: 05/27/2020)
05/29/2020		Text Order MOOTING 18 Motion for Leave to File Sealed Document entered by Judge Alan D Albright. In light of ECF No. 20, the Court MOOTS this motion. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 05/29/2020)
05/29/2020		Text Order GRANTING 20 Motion for Leave to File Sealed Document entered by Judge Alan D Albright. Before the Court is Defendant Google LLC's Unopposed Motion for Leave to File Under Seal. The Court GRANTS the motion. The Clerk's Office is directed to file under seal Defendant Google LLCs Opposed Motion to Transfer Venue to the Northern District of California, the Declaration of Shannon Shaper, and Exhibits 4-6 to the Declaration of Bijal Vakil. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 05/29/2020)
05/29/2020	21	Sealed Motion filed: Google LLCs Opposed Motion to Transfer Venue to the Northern District of California (Attachments: # 1 DECLARATION OF SHANNON SHAPER, # 2 DECLARATION OF BIJAL VAKIL, # 3 Exhibit, # 4 Exhibit, # 5 Exhibit) (lad) (Entered: 05/29/2020)
06/03/2020	22	Unopposed Motion for leave to File Sealed Document (Attachments: # 1 Sealed Document Opposition, # 2 Proposed Order) (Chung, C.) (Entered: 06/03/2020)
06/03/2020	23	Response in Opposition to Motion, filed by EcoFactor, Inc., re 19 Opposed MOTION to Change Venue filed by Defendant Google LLC (Attachments: # 1 Affidavit of Shayan Habib, # 2 Affidavit of C. Jay Chung, # 3 Exhibit 1, # 4 Exhibit 2, # 5 Exhibit 3, # 6 Exhibit 4, # 7 Exhibit 5, # 8 Exhibit 6, # 9 Exhibit 7, # 10 Exhibit 8, # 11 Exhibit 9, # 12 Exhibit 10, # 13 Proposed Order)(Chung, C.) (Entered: 06/03/2020)
06/05/2020		Text Order GRANTING 22 Motion for Leave to File Sealed Document entered by Judge Alan D Albright. Before the Court is Plaintiff EcoFactor, Inc.'s Unopposed Motion to Seal Its Opposition to Google's Motion to Transfer Venue to the Northern District of California. The Court GRANTS the motion. The Clerk's Office is directed to file EcoFactor's Opposition to Google's Motion to Transfer Venue to the Northern District of California shall be filed under seal. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 06/05/2020)
06/05/2020	24	Sealed Document filed. (bw) (Entered: 06/08/2020)
06/10/2020	25	Unopposed Motion for leave to File Sealed Document (Attachments: # 1 Exhibit 1 - Reply filed under seal, # 2 Exhibit 2 - Declaration filed under seal, # 3 Proposed Order) (Jones, Michael) (Entered: 06/10/2020)
06/11/2020		Text Order GRANTING 25 Motion for Leave to File Sealed Document entered by Judge Alan D Albright. Before the Court is Defendant Google LLC's Unopposed Motion for Leave to File Under Seal. The Court GRANTS the motion. The Clerk's Office is directed to file under seal Defendant Google LLCs Reply in Support of its Motion to Transfer Venue to the Northern District of California and the Supplemental Declaration of Shannon Shaper.(This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 06/11/2020)
06/11/2020	26	ORDER GOVERNING PROCEEDINGS PATENT CASE. This case is SET for a telephonic Rule 16 Case Management Conference on Friday, June 26, 2020 at 2:00 p.m before Judge Alan D Albright. Signed by Judge Alan D Albright. (bw) (Entered: 06/11/2020)
06/11/2020	27	Sealed Document filed. GOOGLE LLCS REPLY IN SUPPORT OF ITS MOTION TO

		TRANSFER VENUE TO THE NORTHERN DISTRICT OF CALIFORNIA. (Attachments: # 1 Exhibit) (bw) (Entered: 06/11/2020)
06/17/2020	28	AMENDED COMPLAINT *FOR PATENT INFRINGEMENT* against Google LLC amending 1 Complaint., filed by EcoFactor, Inc.. (Attachments: # 1 Exhibit 1, # 2 Exhibit 2, # 3 Exhibit 3, # 4 Exhibit 4)(Mirzaie, Reza) (Entered: 06/17/2020)
06/26/2020	29	ORDER setting Telephone Conference for 6/29/2020 02:30 PM before Judge Alan D Albright. Signed by Judge Alan D Albright. (lad) (Entered: 06/26/2020)
06/29/2020	30	ORDER CANCELLING TELEPHONIC SCHEDULING CONFERENCE. TELEPHONIC SCHEDULING CONFERENCE on Monday, June 29, 2020 at 02:30 PM is hereby CANCELLED until further order of the court. Signed by Judge Alan D Albright. (bw) (Entered: 06/29/2020)
07/01/2020	31	ANSWER to 28 Amended Complaint with Jury Demand by Google LLC.(Jones, Michael) (Entered: 07/01/2020)
07/14/2020	32	CORRECTED MOTION *for Agreed Scheduling Order* by EcoFactor, Inc.. (Attachments: # 1 Exhibit A)(Mirzaie, Reza) (Entered: 07/14/2020)
07/16/2020		Text Order GRANTING 32 Motion entered by Judge Alan D Albright. Before the Court is the Parties' Joint Motion for Entry of the Scheduling Order. The Court GRANTS the motion. The Clerk's Office is directed to enter Exhibit A attached hereto as the scheduling order for this case. (This is a text-only entry generated by the court. There is no document associated with this entry.) (jy) (Entered: 07/16/2020)
07/16/2020	33	AGREED SCHEDULING ORDER: Markman Hearing set for 12/9/2020 01:30 PM before Judge Alan D Albright. Joinder of Parties due by 1/20/2021. Amended Pleadings due by 3/3/2021. Dispositive Motions due by 9/15/2021. Pretrial Conference set for 11/17/2021 09:00 AM before Judge Alan D Albright. Jury Selection and Trial set for 12/6/2021 09:00AM before Judge Alan D Albright. (bw) (Entered: 07/16/2020)
10/06/2020	34	BRIEF by Google LLC. (Attachments: # 1 Declaration of D. Turnbull, # 2 Declaration of B. Vakil, # 3 Ex. 1 US8180492 file history, # 4 Ex. 2 US8180492 file history, # 5 Ex. 3 US8180492 file history, # 6 Ex. 4 US8180492 file history, # 7 Ex. 5 WDTX-DF-EE_0000001, # 8 Ex. 6 WDTX-DF-EE_0000013, # 9 Ex. 7 WDTX-DF-EE_0000019, # 10 Ex. 8 WDTX-DF-EE_0000029, # 11 Ex. 9 WDTX-DF-EE_0000006, # 12 Ex. 10 WDTX-DF-EE_0000003, # 13 Ex. 11 WDTX-DF-EE_0000005, # 14 Ex. 12 WDTX-DF-EE_0000050, # 15 Ex. 13 WDTX-DF-EE_0000056)(Jones, Michael) (Entered: 10/06/2020)
10/06/2020	35	BRIEF by EcoFactor, Inc.. (Attachments: # 1 Affidavit of Robert Zeidman, # 2 Affidavit of Reza Mirzaie, # 3 Exhibit 1, # 4 Exhibit 2, # 5 Exhibit 3, # 6 Exhibit 4, # 7 Exhibit 5, # 8 Exhibit 6, # 9 Exhibit 7, # 10 Exhibit 8, # 11 Exhibit 9, # 12 Exhibit 10, # 13 Exhibit 11) (Mirzaie, Reza) (Entered: 10/06/2020)
10/27/2020	36	BRIEF regarding 35 Brief, by Google LLC. (Attachments: # 1 Turnbull Declaration) (Jones, Michael) (Entered: 10/27/2020)
10/27/2020	37	BRIEF regarding 34 Brief,, by EcoFactor, Inc.. (Attachments: # 1 Affidavit of Robert Zeidman)(Mirzaie, Reza) (Entered: 10/27/2020)
11/10/2020	38	BRIEF regarding 35 Brief, by EcoFactor, Inc.. (Mirzaie, Reza) (Entered: 11/10/2020)
11/10/2020	39	BRIEF regarding 35 Brief, by Google LLC. (Jones, Michael) (Entered: 11/10/2020)
11/17/2020	40	NOTICE *Joint Claim Construction Statement* by Google LLC (Jones, Michael) (Entered: 11/17/2020)

11/24/2020	41	Opposed MOTION to Stay Case *Pending Transfer* by Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 11/24/2020)
11/30/2020	42	NOTICE of Attorney Appearance by Kristopher R. Davis on behalf of EcoFactor, Inc.. Attorney Kristopher R. Davis added to party EcoFactor, Inc.(pty:pla) (Davis, Kristopher) (Entered: 11/30/2020)
11/30/2020	43	MOTION to Appear Pro Hac Vice by C. Jay Chung *for Brian W. Lewis* (Filing fee $ 100 receipt number 0542-14230640) by on behalf of EcoFactor, Inc.. (Chung, C.) (Entered: 11/30/2020)
12/01/2020	44	MOTION to Appear Pro Hac Vice by C. Jay Chung *for James N. Pickens* (Filing fee $ 100 receipt number 0542-14235456) by on behalf of EcoFactor, Inc.. (Chung, C.) (Entered: 12/01/2020)
12/01/2020	45	Response in Opposition to Motion, filed by EcoFactor, Inc., re 41 Opposed MOTION to Stay Case *Pending Transfer* filed by Defendant Google LLC (Chung, C.) (Entered: 12/01/2020)
12/02/2020	46	NOTICE *of Waiver of Reply* by Google LLC re 41 Opposed MOTION to Stay Case *Pending Transfer* (Jones, Michael) (Entered: 12/02/2020)
12/03/2020		Text Order GRANTING 43 Motion to Appear Pro Hac Vice for Attorney Brian W. Lewis for EcoFactor, Inc. Before the Court is the Motion for Admission Pro Hac Vice. The Court, having reviewed the Motion, finds it should be GRANTED and therefore orders as follows: IT IS ORDERED the Motion for Admission Pro Hac Vice is GRANTED. IT IS FURTHER ORDERED that Applicant, if he/she has not already done so, shall immediately tender the amount of $100.00, made payable to: Clerk, U.S. District Court, in compliance with Local Rule AT-I (f)(2). Pursuant to our Administrative Policies and Procedures for Electronic Filing, the attorney hereby granted to practice pro hac vice in this case must register for electronic filing with our court within 10 days of this order entered by Judge Alan D Albright. (This is a text-only entry generated by the court. There is no document associated with this entry.) (mm6) (Entered: 12/03/2020)
12/03/2020		Text Order GRANTING 44 Motion to Appear Pro Hac Vice for Attorney James N. Pickens for EcoFactor, Inc. Before the Court is the Motion for Admission Pro Hac Vice. The Court, having reviewed the Motion, finds it should be GRANTED and therefore orders as follows: IT IS ORDERED the Motion for Admission Pro Hac Vice is GRANTED. IT IS FURTHER ORDERED that Applicant, if he/she has not already done so, shall immediately tender the amount of $100.00, made payable to: Clerk, U.S. District Court, in compliance with Local Rule AT-I (f)(2). Pursuant to our Administrative Policies and Procedures for Electronic Filing, the attorney hereby granted to practice pro hac vice in this case must register for electronic filing with our court within 10 days of this order entered by Judge Alan D Albright. (This is a text-only entry generated by the court. There is no document associated with this entry.) (mm6) (Entered: 12/03/2020)
12/08/2020	47	MOTION to Appear Pro Hac Vice by Michael E. Jones (Filing fee $ 100 receipt number 0542-14258465) by on behalf of Google LLC. (Jones, Michael) (Entered: 12/08/2020)
12/08/2020	48	NOTICE of Attorney Appearance by Brian W. Lewis on behalf of EcoFactor, Inc. (Lewis, Brian) (Entered: 12/08/2020)
12/08/2020	49	NOTICE of Attorney Appearance by James N. Pickens on behalf of EcoFactor, Inc. (Pickens, James) (Entered: 12/08/2020)
12/09/2020		Text Order GRANTING 47 Motion to Appear Pro Hac Vice for Attorney Henry Huang for Google LLC. Before the Court is the Motion for Admission Pro Hac Vice. The Court, having reviewed the Motion, finds it should be GRANTED and therefore orders as

		follows: IT IS ORDERED the Motion for Admission Pro Hac Vice is GRANTED. IT IS FURTHER ORDERED that Applicant, if he/she has not already done so, shall immediately tender the amount of $100.00, made payable to: Clerk, U.S. District Court, in compliance with Local Rule AT-I (f)(2). Pursuant to our Administrative Policies and Procedures for Electronic Filing, the attorney hereby granted to practice pro hac vice in this case must register for electronic filing with our court within 10 days of this order entered by Judge Alan D Albright. (This is a text-only entry generated by the court. There is no document associated with this entry.) (mm6) (Entered: 12/09/2020)
12/09/2020	50	Minute Entry for proceedings held before Judge Alan D Albright: Markman Hearing held on 12/9/2020. Case called for Markman Hearing for this and 2 companion cases. The Court heard argument regarding one claim term. After hearing argument the Court determined that he will adopt the defendant's alternative proposed construction. The Court swore Todd Lanis into the TXWD. The Court states that December 6, 2021 is the jury trial date with the voir dire being handled either Thursday or Friday before that by the magistrate judge. There will be 7 jurors, 4 strikes on each side. The Court will determine the number of hours allowed at the pretrial conference. (Minute entry documents are not available electronically.). (Court Reporter Kristie Davis.)(am) (Entered: 12/09/2020)
12/09/2020	51	TRANSCRIPT REQUEST by Google LLC for proceedings held on 12/9/20. Proceedings Transcribed: Markman Hearing. Court Reporter: Kristie Davis. (Jones, Michael) (Main Document 51 replaced on 12/9/2020) (am). (Entered: 12/09/2020)
12/09/2020	52	TRANSCRIPT REQUEST by EcoFactor, Inc. for proceedings held on 12/9/20. Proceedings Transcribed: Markman Hearing. Court Reporter: Kristie Davis. (Chung, C.) (Entered: 12/09/2020)
12/11/2020	53	Transcript filed of Proceedings held on 12-9-20, Proceedings Transcribed: Markman hearing. Court Reporter/Transcriber: Kristie Davis, Telephone number: 254-340-6114. Parties are notified of their duty to review the transcript to ensure compliance with the FRCP 5.2(a)/FRCrP 49.1(a). A copy may be purchased from the court reporter or viewed at the clerk's office public terminal. If redaction is necessary, a Notice of Redaction Request must be filed within 21 days. If no such Notice is filed, the transcript will be made available via PACER without redaction after 90 calendar days. The clerk will mail a copy of this notice to parties not electronically noticed Redaction Request due 1/1/2021, Redacted Transcript Deadline set for 1/11/2021, Release of Transcript Restriction set for 3/11/2021, (kd) (Entered: 12/11/2020)
02/09/2021	54	Opposed MOTION for Hearing re 41 Opposed MOTION to Stay Case *Pending Transfer* by Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 02/09/2021)
02/12/2021	55	Standing Order Regarding Filing Documents Under Seal and Redacted Pleadings in Patent Cases. Signed by Judge Alan D Albright. as of 2/12/2021. (bot1) (Entered: 02/24/2021)
02/26/2021	56	ORDER Setting Zoom Motion Hearing for 3/8/2021 01:30 PM before Judge Alan D Albright. Signed by Judge Alan D Albright. (bot1) (Entered: 02/26/2021)
03/04/2021	57	Joint MOTION to Stay Case by Google LLC. (Attachments: # 1 Proposed Order)(Jones, Michael) (Entered: 03/04/2021)
03/05/2021	58	ORDER GRANTING 57 Motion to Stay Case Signed by Judge Alan D Albright. (lad) (Entered: 03/05/2021)
03/05/2021	59	ORDER CANCELLING Motion Hearing. Signed by Judge Alan D Albright. (bot1) (Entered: 03/05/2021)
03/12/2021	60	MOTION to Withdraw as Attorney *Brian Lewis* by EcoFactor, Inc.. (Attachments: # 1

		Proposed Order)(Mirzaie, Reza) (Entered: 03/12/2021)
03/14/2021	61	ORDER GRANTING 41 Motion to Stay Case. Signed by Judge Alan D Albright. (bw) (Entered: 03/12/2021)
04/16/2021	62	ORDER DENYING 19 Motion to Change Venue. Having considered the Section 1404 (a) factors, the Court finds that Google has not met its significant burden to demonstrate that the NDCA is clearly more convenient than this District. Therefore, the Court DENIES Googles Motion to Transfer. Signed by Judge Alan D Albright. (bw) (Entered: 04/18/2021)
04/20/2021	63	Agreed MOTION *for Entry of Protective Order and Stipulated Discovery Order* by EcoFactor, Inc.. (Attachments: # 1 Proposed Order Protective Order, # 2 Proposed Order Discovery Order)(Mirzaie, Reza) (Entered: 04/20/2021)
04/29/2021	64	Opposed MOTION to Amend/Correct *for Leave to Amend Invalidity Contentions* by Google LLC. (Attachments: # 1 Vakil Declaration, # 2 Ex. 1 90014679 file history-compressed, # 3 Ex. 2 2021-02-03 Final Invalidity Contentions, # 4 Ex. 3 2021-04-27 Email, # 5 Proposed Order)(Jones, Michael) (Entered: 04/29/2021)

PACER Service Center

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PACER Login:	sharedlogin:5149898:0	**Client Code:**	707424-000300
Description:	Docket Report	**Search Criteria:**	6:20-cv-00075-ADA
Billable Pages:	8	**Cost:**	0.80

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC, Plaintiff, v. GOOGLE LLC, Defendant.	Case No. 6:20-cv-00075 **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 *et seq.*, in which Plaintiff EcoFactor, Inc. ("Plaintiff" or "EcoFactor") makes the following allegations against Defendant Google LLC. ("Defendant"):

INTRODUCTION

1. This complaint arises from Defendant's unlawful infringement of the following United States patents owned by EcoFactor: U.S. Patent No. 8,180,492 ("'492 Patent"); U.S. Patent No. 8,412,488 ("'488 Patent"); U.S. Patent No. 8,738,327 ("'327 Patent"); and U.S. Patent No. 10,534,382 ("'382 Patent") (collectively the "Asserted Patents").

PARTIES

2. EcoFactor is a privately held company, having its principal place of business at 441 California Avenue, Number 2, Palo Alto, CA 94301.[1] EcoFactor was founded in 2006 and is headquartered in Palo Alto, California. EcoFactor is a leader in smart home energy

[1] Prior to October 2019, EcoFactor's principal place of business was at 1450 Veterans Blvd., Suite 100, Redwood City, CA 94063.

management services. EcoFactor delivers smart home energy management services that improve energy efficiency, reduce energy bills and vastly increase demand response efficacy – all while maintaining consumer comfort. EcoFactor's patented big-data analytics and machine learning algorithms collect and process massive amounts of residential data – including home thermodynamics, family comfort preferences and schedules, plus external data such as weather – to continually monitor, adapt and learn for optimum energy savings. The company provides homeowners significant cost savings and energy usage benefits. EcoFactor's award-winning service has been offered through channel partners such as utilities, energy retailers, broadband service providers and HVAC companies.

3. EcoFactor has transformed how homes use energy by applying advanced analytics to connected devices in the home. EcoFactor's platform actively manages thermostats on occupants' behalf in intelligent ways that improve comfort while helping them save time, energy and money. Utilities, home service providers and homeowners rely on EcoFactor for demand response, energy efficiency, and HVAC performance monitoring services.

4. The HVAC industry and researchers in the field recognize the technological and commercial impact of EcoFactor's patented technologies and innovations. For example, EcoFactor's demand response solution has been recognized multiple times from the Association of Energy Services Professionals (AESP) for outstanding achievement in pricing and demand response. EcoFactor was also named "Innovator of the Year" by San Mateo County Economic Development Association for EcoFactor's automated approach to energy efficiency and demand response services, and has also been named Owler HOT in Redwood City, CA. Moreover, EcoFactor received Powergrid International's Demand Response/Energy Efficiency Project of the Year award, and was assessed as one of the top innovators with some of the most

commercially important smart home patents.

5. Google LLC is a wholly-owned subsidiary of Alphabet, Inc, and a Delaware limited liability company with a principal place of business at 1600 Amphitheatre Parkway, Mountain View, California 94043. Google LLC operates a division named Google Nest ("Nest") which, on information and belief, designs and manufactures, among other things, smart Thermostats. Google LLC may be served with process through its registered agent, the Corporation Service Company, at 211 East. 7th Street, Suite 620, Austin, Texas 78701. Google LLC is registered to do business in the State of Texas and has been since at least November 17, 2006.

JURISDICTION AND VENUE

6. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has original subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

7. This Court has personal jurisdiction over Defendant in this action because Defendant has committed acts within this District giving rise to this action, and has established minimum contacts with this forum such that the exercise of jurisdiction over Defendant would not offend traditional notions of fair play and substantial justice. Defendant, directly and through subsidiaries or intermediaries, has committed and continue to commit acts of infringement in this District by, among other things, importing, offering to sell, and selling products that infringe the asserted patents.

8. Venue is proper in this District under 28 U.S.C. § 1400(b). Upon information and belief, Defendant has transacted business in this District and has committed acts of direct and indirect infringement in this District by, among other things, making, using, offering to sell,

selling, and importing products that infringe the asserted patents. Defendant has at least one regular and established place of business in the District. For example, Google invested $20 million to build a corporate office at 500 West 2nd Street, Austin, Texas 78701.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 8,180,492

9. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

10. Plaintiff is the owner and assignee of United States Patent No. 8,180,492 titled "System and method for using a networked electronic device as an occupancy sensor for an energy management system." The '492 Patent was duly and legally issued by the United States Patent and Trademark Office on May 15, 2012. Plaintiff is the owner and assignee, possessing all substantial rights, to the '492 Patent. A true and correct copy of the '492 Patent is attached as Exhibit 1.

11. Defendant makes, uses, offers for sale, sells, and/or imports into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '492 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, all generations of the Google Nest Learning Thermostat and all versions and variations thereof since the issuance of the '492 Patent ("Accused Instrumentalities").

12. Defendant has had knowledge of the '492 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and has known, or has been willfully blind to the fact, that making, using, offering to sell, and selling the

accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

13. Defendant has induced, and continues to induce, infringement of the ’492 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information, education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

14. Defendant has also infringed, and continue to infringe, claims of the ‘492 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the ’492 patent, in violation of 35 U.S.C. § 271(c).

15. The Accused Products satisfy all claim limitations of one or more claims of the ’492 Patent. For example the Accused Instrumentalities infringe claim 10 of the ’492 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below.

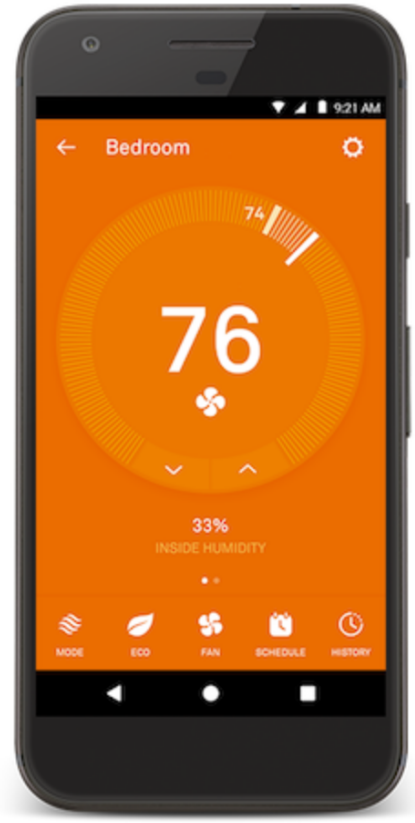
16. The Accused Instrumentalities include: “A system for altering the setpoint on a thermostat for space conditioning of a structure comprising: at least one thermostat having at least a first temperature setpoint associated with a non-occupied structure, and at least a second temperature setpoint associated with the existence of occupants in said structure.” For example,

the Accused Instrumentalities allow users to adjust set points that vary based on whether a structure is occupied.

How to change the target temperature

1. Drag your finger along the ring to change the target temperature.
2. To fine tune the temperature, tap the up or down arrow at the bottom of the ring.

Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

17. The Accused Instrumentalities include "one or more electronic devices having at least a graphic user interface comprising a display wherein said electronic devices receive input

from one or more users and wherein use of said electronic devices comprises at least one of cursor movement, keystrokes or other user interface actions intended to alter a state of one or more of said electronic devices by one or more users wherein activity of one or more networked electronic devices indicates whether said thermostat should be changed from said first temperature setpoint to said second temperature setpoint." For example, the Accused Instrumentalities are designed to work the Google Nets mobile application, that includes a graphic user interface that allows to alter the set points and to move the house between Heat, Cool, Heat/Cool, and Eco modes as well as to set up Home/Away assist and Early-On.

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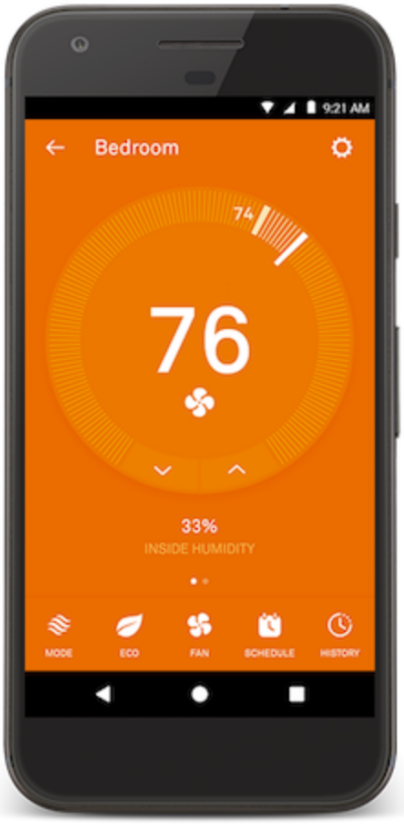
Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



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https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

Home/Away Assist

Home/Away Assist can use your Eco Temperatures to help save energy while no one's home.

How to change Home/Away Assist settings >

https://support.google.com/googlenest/answer/9244728

Early-On won't activate if everyone'e away

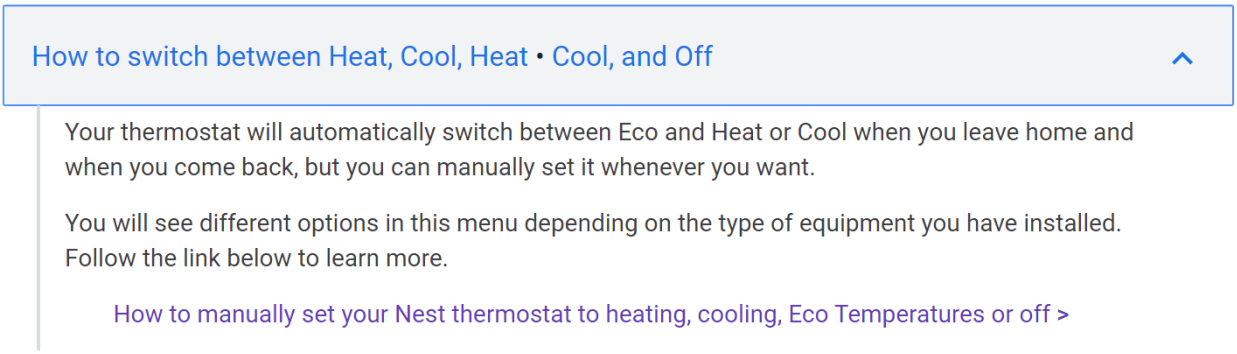
As long as someone is home, Early-On can turn on your system early to reach your scheduled temperature on time. But if everyone is away and your thermostat is set to Eco Temperatures, it will wait to start pre-heating or pre-cooling until someone comes home or until someone manually changes the temperature with the app.

If you use Home/Away Assist, your thermostat will try to stay in Eco Temperatures while you're away.

https://support.google.com/googlenest/answer/9246532

18. The Accused Instrumentalities include "wherein said electronic devices and said thermostat are connected to a network; an application comprising one or more computer processors in communication with said network, wherein said application determines whether said one or more electronic devices are in use and in response, whether said thermostat is set to said first temperature setpoint that indicates said structure is not occupied." For example, a smartphone using the Google Nest application can be designated to provide location information

that is used to determine whether the user is home and thus whether the thermostat should be set to an unoccupied temperature setpoint.



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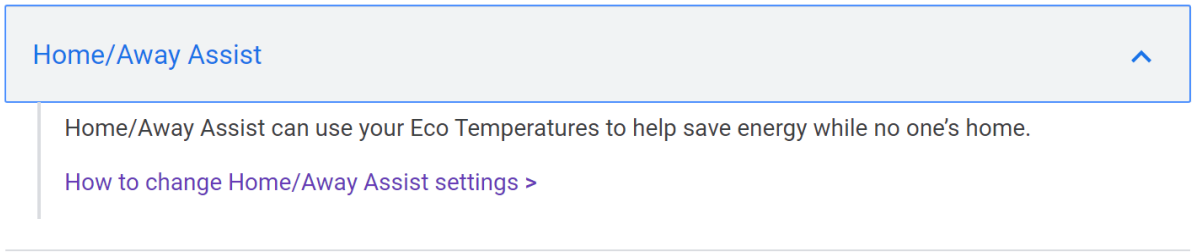
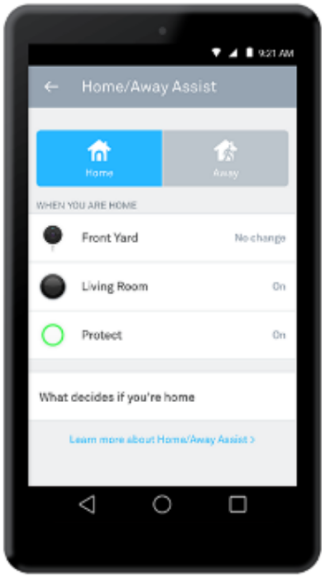


https://support.google.com/googlenest/answer/9244728

How to change what Nest products do when you're home or away

To change how Home/Away Assist controls your Nest products, follow these steps.

1. Open the Nest app on your phone or tablet. If you're on a computer, go to home.nest.com.
2. Tap **Settings** in the top right corner of the app home screen.
3. Select **Home/Away Assist**.
4. Tap either the **Home** or **Away** icon at the top of the screen. You'll see a summary of what each of your Nest products will do when your home is in that mode.
5. If you want to make any changes, tap on the Nest product you'd like to control.



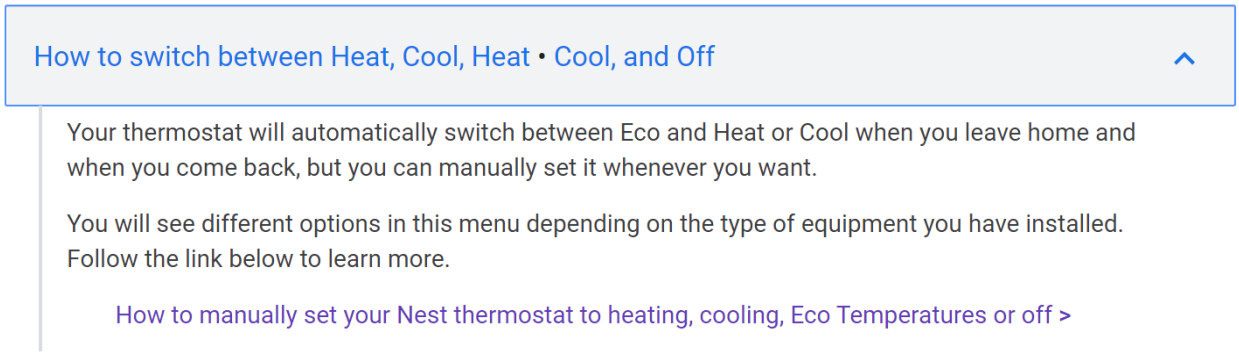
In general, if you have multiple Nest products in your home, you have different settings for each one. The one exception is Nest Protect: all the Protects in your home share the same Home/Away Assist settings, so you'll only see one Protect in this list.

Settings for each product's Home/Away Assist options are listed below.

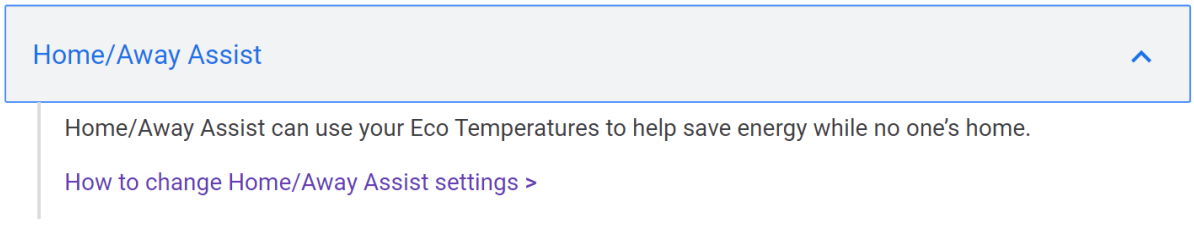
https://support.google.com/googlenest/answer/9261489

19. The Accused Instrumentalities include "said application determining that said one or more users has previously indicated a preference that said user's input be obtained before automatically changing said first HVAC temperature setpoint to said second HVAC temperature setpoint indicating that said structure is deemed to be occupied; said application prompting said one or more users based on said determining that said one or more of said user's input should be obtained, wherein said application provides electronic notice to one or more of said users of said electronic devices that said thermostat is set for a non-occupied structure and whether to keep said first temperature setpoint or change to said second temperature setpoint; and wherein said application in response to said prompting, receives input from said one or more users to keep said first HVAC temperature setpoint; and wherein said thermostat is kept at said first

temperature setpoint based upon said input from said one or more users." For example, the Accused Instrumentalities will store schedules set by a user that determine whether and when to switch to an active Heating/Cooling from an away Eco state. The user can access these settings and modify the settings by use of the mobile application. The user can also disable auto-scheduling so that user input is required to switch between modes. Further, the user can set and enable or disable Home/Away assist and Early-On modes.



https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

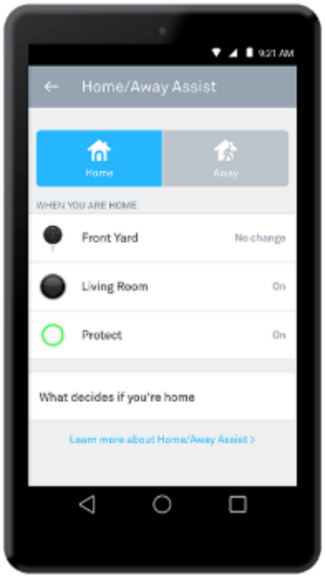


https://support.google.com/googlenest/answer/9244728

How to change what Nest products do when you're home or away

To change how Home/Away Assist controls your Nest products, follow these steps.

1. Open the Nest app on your phone or tablet. If you're on a computer, go to home.nest.com.
2. Tap **Settings** in the top right corner of the app home screen.
3. Select **Home/Away Assist**.
4. Tap either the **Home** or **Away** icon at the top of the screen. You'll see a summary of what each of your Nest products will do when your home is in that mode.
5. If you want to make any changes, tap on the Nest product you'd like to control.



In general, if you have multiple Nest products in your home, you have different settings for each one. The one exception is Nest Protect: all the Protects in your home share the same Home/Away Assist settings, so you'll only see one Protect in this list.

Settings for each product's Home/Away Assist options are listed below.

https://support.google.com/googlenest/answer/9261489

Schedule (Nest Thermostat E)

Note: If you have a Nest Learning Thermostat, you'll find the **thermostat schedule** in the Quick View menu instead.

Depending on the type of system you have, you can set up to 3 different schedules for Heat, Cool, and Heat•Cool. If you have a fan installed, you can also set a separate fan schedule.

Before you adjust your schedule, make sure you've selected the correct **mode**: Heat, Cool, or Heat•Cool.

Select **Schedule** to see the temperature schedule for the mode that your thermostat is currently set to. You can set a new schedule or edit your current one.

You can also view and set your thermostat's schedule in the Nest app.

Learn about Nest thermostat temperature schedules and how to change them

How Nest thermostats are different from programmable thermostats

Programmable thermostats will simply continue cycling through their schedule even if nobody's home. Nest thermostats can prevent this waste by automatically detecting when everyone's gone, using Home/Away Assist. When no one's home, your Nest thermostat will set itself to your Eco Temperatures to help save energy.

Nest thermostats use their unique Nest Sense and Auto-Schedule features to create a dynamic, comfortable schedule that's personalized for you and your home.

Learn about Auto-Schedule

All Nest thermostats have Auto-Schedule, and it's turned on by default when you install your thermostat to help keep you comfortable and help save energy.

With Auto-Schedule, you don't have to manually program your thermostat to save energy. Simply change the temperature to get comfortable whenever you like with the Nest app or on the thermostat itself, and it will learn from your preferences. After a few days, it will program a schedule for you, based on what temperatures you prefer and when you want them.

For more details, see the following article:

Learn about Auto-Schedule

How to turn off Auto-Schedule

In the first few days after you install it, your Nest thermostat will learn what temperatures you like and when you want them. It will automatically create a temperature schedule for you. If you don't want to use this feature and program your own schedule, you can turn off Auto-Schedule on the thermostat. See the following article for full instructions:

How to use your Nest thermostat as a traditional programmable thermostat

https://support.google.com/googlenest/answer/9243487

Early-On won't activate if everyone'e away

As long as someone is home, Early-On can turn on your system early to reach your scheduled temperature on time. But if everyone is away and your thermostat is set to Eco Temperatures, it will wait to start pre-heating or pre-cooling until someone comes home or until someone manually changes the temperature with the app.

If you use Home/Away Assist, your thermostat will try to stay in Eco Temperatures while you're away.

https://support.google.com/googlenest/answer/9246532

How Home/Away Assist works

> You can open the Nest app any time to see whether your home is in **Home** or **Away** mode.
>
> There are two ways Home/Away Assist determines whether anybody's home: where people's phones are, and whether Nest products are currently noticing any activity in your home.
>
> How Home/Away Assist decides to switch your home to Home or Away >

How to change Home/Away Assist settings

> What happens when you leave and come home depends on which products you have connected to the Nest app and how you've set their behaviors.
>
> During setup, the Nest app will ask if you want your product to use information from Home/Away Assist to automatically switch behaviors. Any time after setup, you can easily change Home/Away Assist behavior in Settings.
>
> If you don't want to use Home/Away Assist, you don't have to.

https://support.google.com/googlenest/answer/9257400

20. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and is liable for infringement of the '492 Patent pursuant to 35 U.S.C. § 271.

21. As a result of Defendant's infringement of the '492 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

22. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '492 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 8,412,488

23. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

24. Plaintiff is the owner and assignee of United States Patent No. 8,412,488 titled "System and method for using a network of thermostats as tool to verify peak demand reduction." The '488 patent was duly and legally issued by the United States Patent and Trademark Office on April 2, 2013. Plaintiff is the owner and assignee, possessing all substantial rights, to the '488 Patent. A true and correct copy of the '488 Patent is attached as Exhibit 2.

25. Defendants make, use, offer for sale, sell, and/or import into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '488 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, such all generations of the Google Nest Learning Thermostat and all versions and variations thereof since the issuance of the '488 Patent ("Accused Instrumentalities").

26. Defendant has had knowledge of the '488 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and has known, or has been willfully blind to the fact, that making, using, offering to sell, and selling the accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

27. Defendant has induced, and continues to induce, infringement of the ’488 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information, education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

28. Defendant has also infringed, and continue to infringe, claims of the ‘488 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the ’488 patent, in violation of 35 U.S.C. § 271(c).

29. The Accused Products satisfy all claim limitations of one or more claims of the ’488 Patent. For example the Accused Instrumentalities infringe claim 1 of the ’488 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below.

30. The Accused Instrumentalities include “[a] system for monitoring the operational status of an HVAC system comprising: at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system.” For example, Accused Instrumentalities receive temperature measurements from inside the building that it is servicing.


nest
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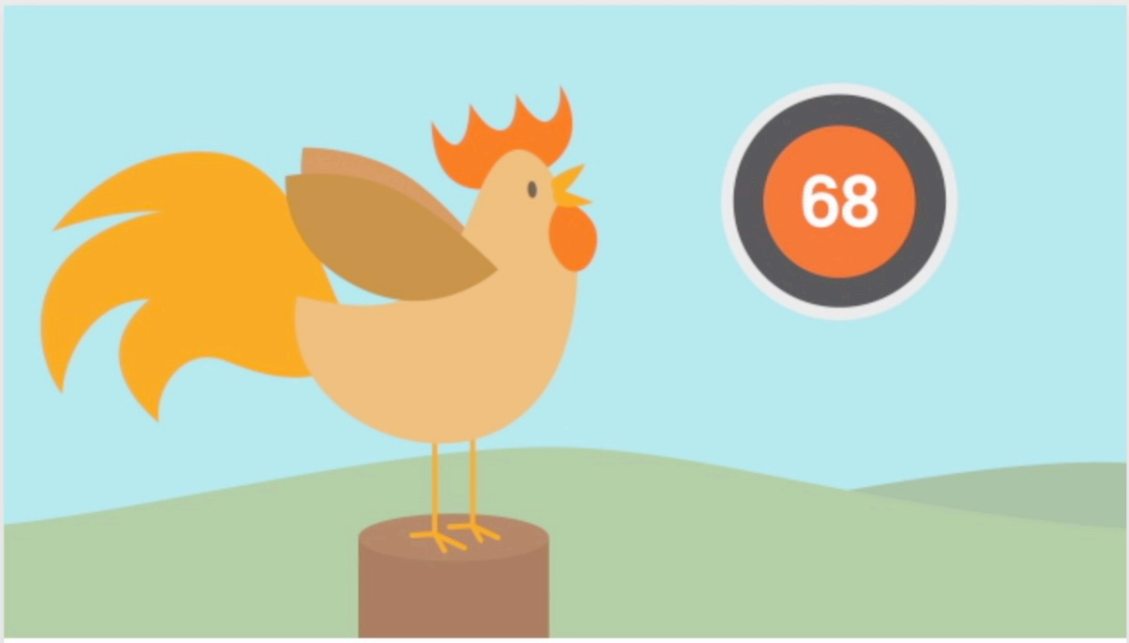
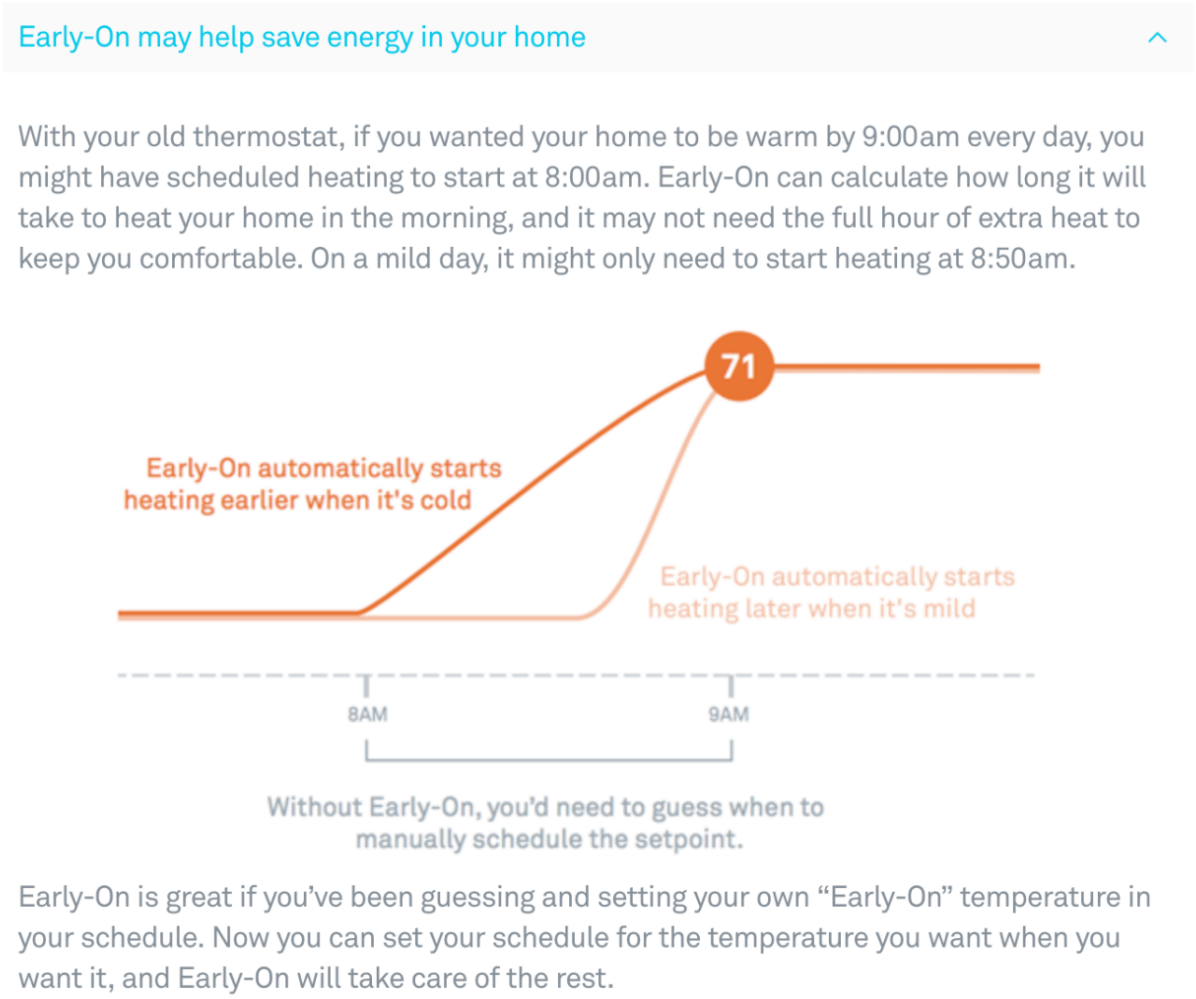
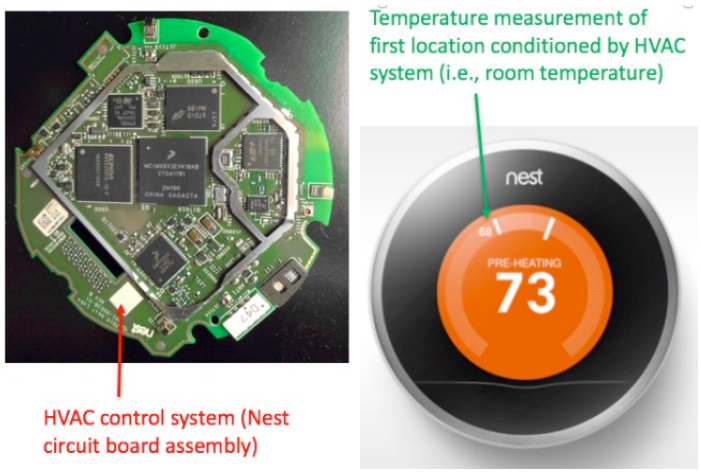

68
Early On
Want it to be 68° at 7am? Early-On will figure out when to turn up the heat so you'll wake up to a perfectly warm house.
Learn more about Early-On >



https://support.google.com/googlenest/answer/9246532?hl=en

31. The Accused Instrumentalities include "one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system." For example, the Accused Instrumentalities receive measurements of outside temperature and sunset and sunrise information from the internet.



Learn about Early-On and how to change settings

When Early-On is enabled, your Nest thermostat automatically calculates when to turn on heating or cooling so your home will reach a scheduled temperature on time. To do this, your thermostat takes into account the weather, what it has learned about how quickly your home warms and cools, and how efficient your system is.

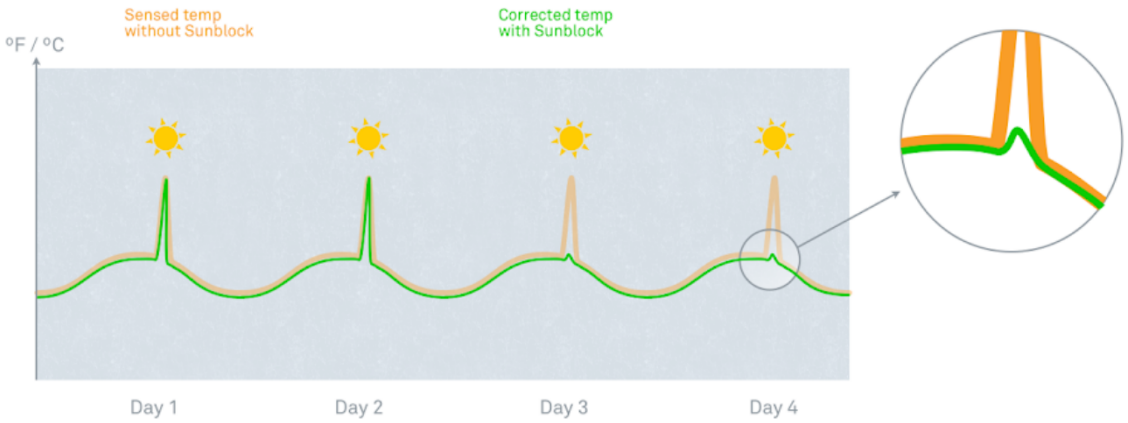
Early-On works a lot like pre-heating the oven when you're making cookies. You typically start heating your oven a few minutes ahead of time so that it's the right temperature when you're ready to put your batch of cookies in to bake. Now imagine that your oven knew you'd be done mixing the dough at 5pm and would automatically turn on early to be 350°F/175°C right at 5pm.

https://support.google.com/googlenest/answer/9246532

https://store.google.com/product/nest_learning_thermostat_3rd_gen

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



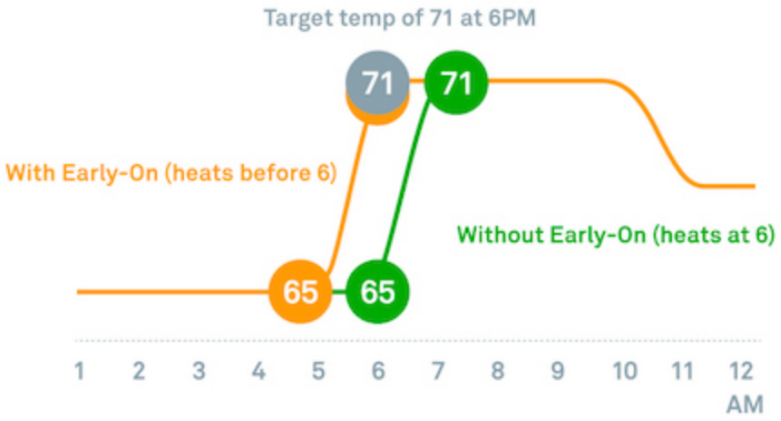
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

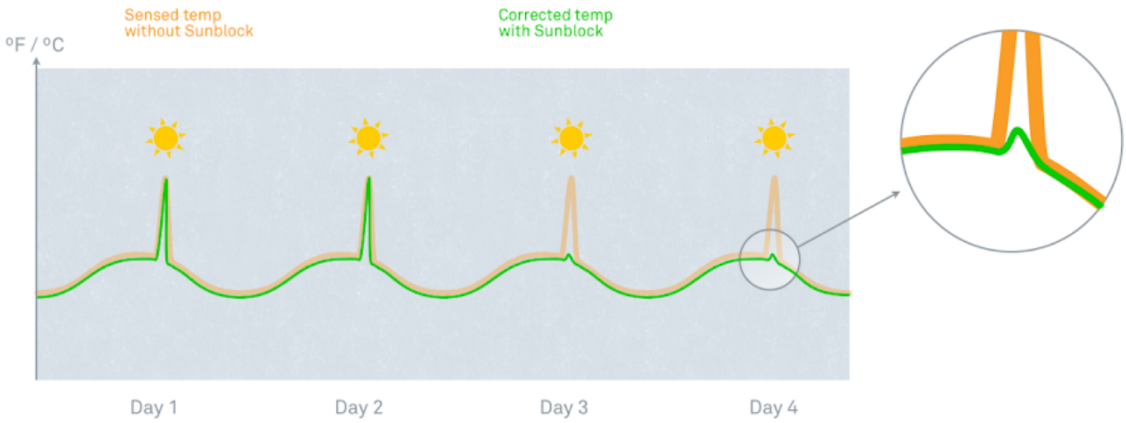
Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

32. The Accused Instrumentalities include "wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time to derive an estimation for the rate of change in inside temperature of said first structure in response to outside temperature, and wherein said one or more processors compare an inside temperature recorded inside the first structure with said estimation for the rate of change in inside temperature of said first structure to determine whether the first HVAC system is on or off." For example, the Accused Instrumentalities will compare internal temperature and external temperature and, other factors, to calculate the rate of change of inside temperature, and use this calculation to determine when to turn the HVAC system on or off.

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



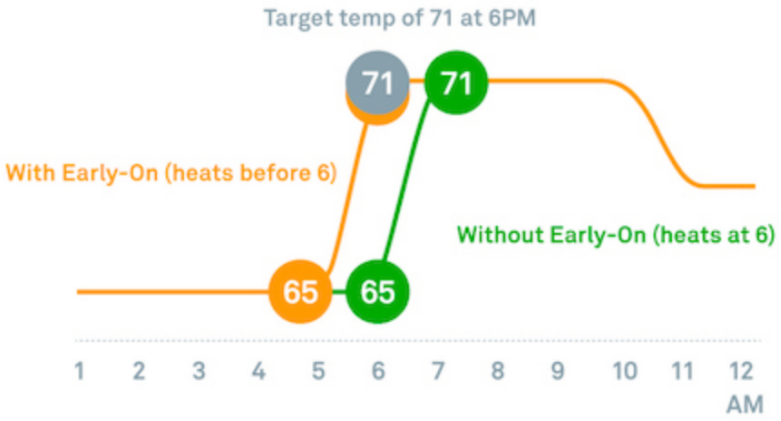
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

33. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and is liable for infringement of the '488 Patent pursuant to 35 U.S.C. § 271.

34. As a result of Defendant's infringement of the '488 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

35. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '488 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for

sale that come within the scope of the patent claims.

COUNT III

INFRINGEMENT OF U.S. PATENT NO. 8,738,327

36. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

37. Plaintiff is the owner and assignee of United States Patent No. 8,738,327 titled "System and method for using a network of thermostats as tool to verify peak demand reduction." The '327 patent was duly and legally issued by the United States Patent and Trademark Office on May 27, 2014. Plaintiff is the owner and assignee, possessing all substantial rights, to the '327 Patent. A true and correct copy of the '327 Patent is attached as Exhibit 3.

38. Defendants make, use, offer for sale, sell, and/or import into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '327 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, such as all generations of the Google Nest Learning Thermostat and and all versions and variations thereof since the issuance of the '327 Patent ("Accused Instrumentalities").

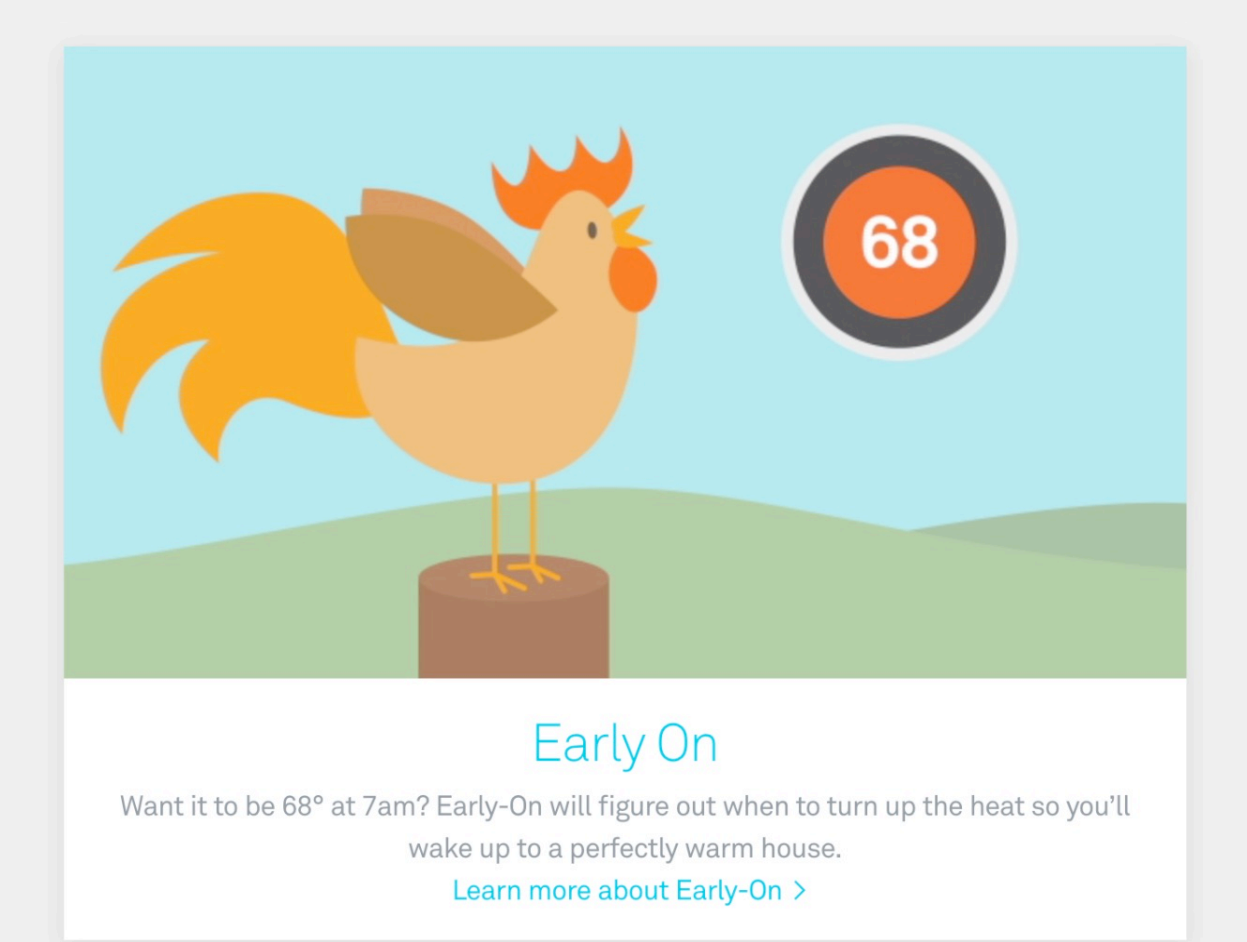
39. Defendant has had knowledge of the '327 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and have known, or have been willfully blind to the fact, that making, using, offering to sell, and selling the accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

40. Defendant has induced, and continue to induce, infringement of the ’327 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information, education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

41. Defendant has also infringed, and continue to infringe, claims of the ‘327 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the ’327 patent, in violation of 35 U.S.C. § 271(c).

42. The Accused Products satisfy all claim limitations of one or more claims of the ’327 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below. For example, the Accused Instrumentalities include “[a] system for controlling the operational status of an HVAC system comprising: at least one thermostat associated with a structure that receives temperature measurements from inside the structure, the structure conditioned by at least one HVAC system, the thermostat having at least a first setting stored therein.” For example, the Accused Instrumentalities have a thermostat that receives temperature settings from inside the structure which can store settings, including a schedule for heating and cooling, set points, whether the device is in Heat/Cool, Heat, Cool, or Eco modes, whether to

enable Home/Away assist, whether to enable automatic scheduling, and whether to enable Early-On.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Learn more about Early-On >

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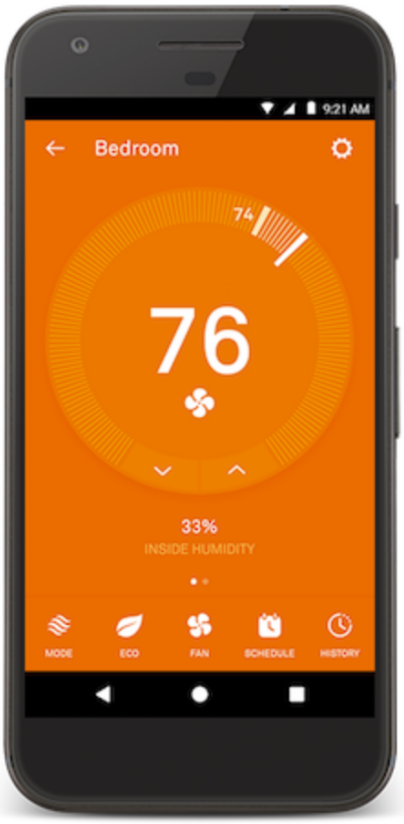
https://support.google.com/googlenest/answer/9246532?hl=en

How to change the target temperature

1. Drag your finger along the ring to change the target temperature.
2. To fine tune the temperature, tap the up or down arrow at the bottom of the ring.

Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

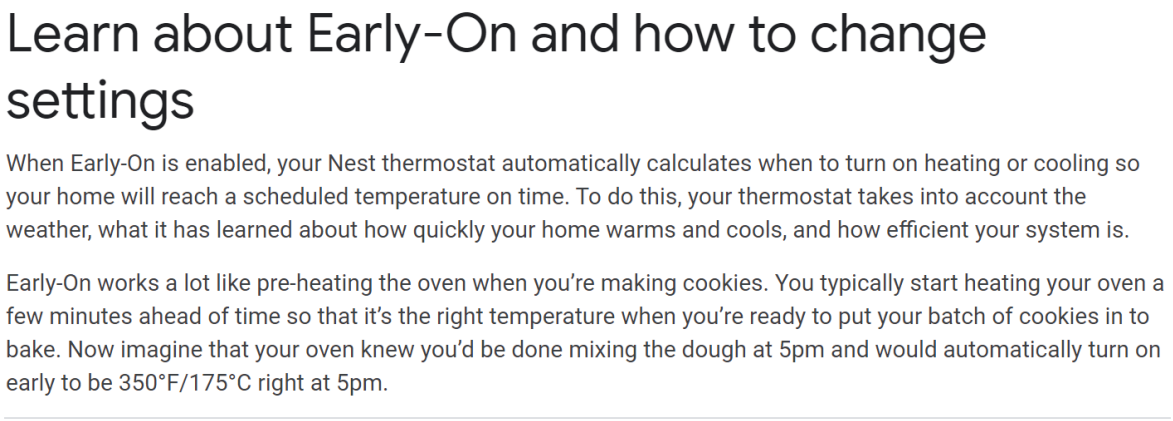
You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

43. For example, the Accused Instrumentalities include "one or more servers located remotely from the structure, the one or more servers configured to receive measurements of outside temperatures from at least one source other than the HVAC system." For example, the

Accused Instrumentalities receive measurements of outside temperature from the internet.



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https://support.google.com/googlenest/answer/9246532

https://store.google.com/product/nest_learning_thermostat_3rd_gen

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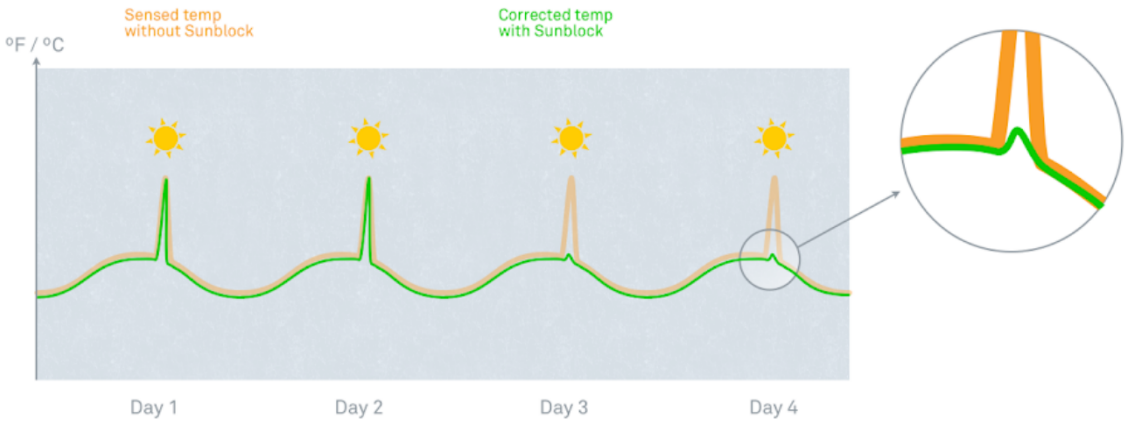

https://support.google.com/googlenest/answer/9249796

With Early-On

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- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
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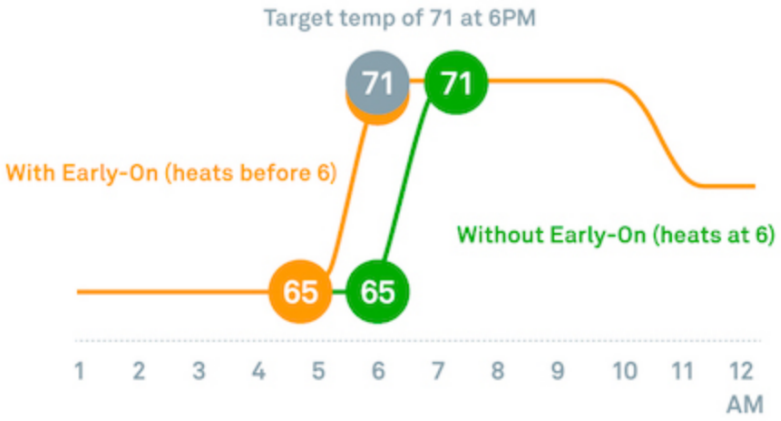

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https://support.google.com/googlenest/answer/9246532

44. For example, Accused Instrumentalities include "the one or more servers are further configured to communicate with the thermostat via a network, wherein the one or more servers receive inside temperatures from the thermostat and compares the inside temperatures of the structure and the outside temperatures over time to derive an estimation for the rate of change in inside temperature of the structure in response to outside temperature." For example, the Accused Instrumentalities will compare internal temperature and external temperature and, other factors, to calculate the rate of change of inside temperature in order to allow Early-On, auto scheduling, and Home/Away Assist modes to operate.

Learn about Early-On and how to change settings

When Early-On is enabled, your Nest thermostat automatically calculates when to turn on heating or cooling so your home will reach a scheduled temperature on time. To do this, your thermostat takes into account the weather, what it has learned about how quickly your home warms and cools, and how efficient your system is.

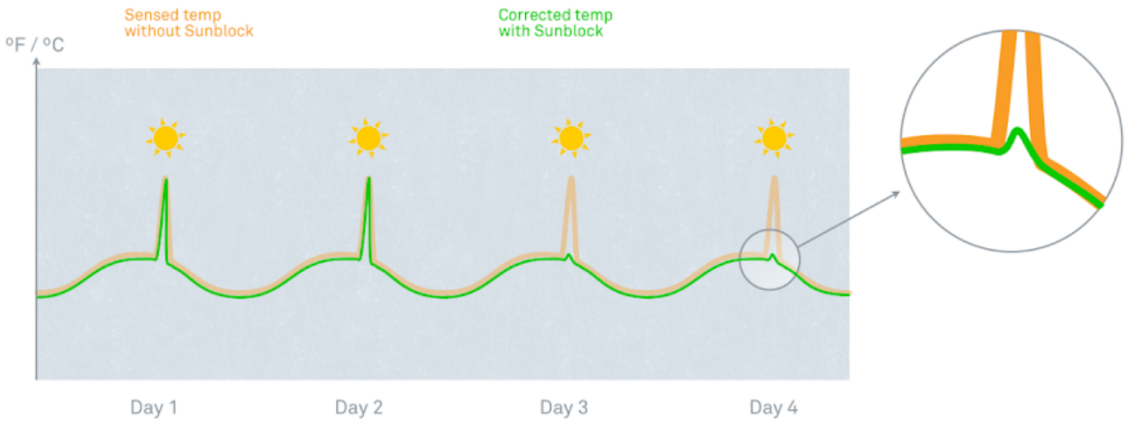
Early-On works a lot like pre-heating the oven when you're making cookies. You typically start heating your oven a few minutes ahead of time so that it's the right temperature when you're ready to put your batch of cookies in to bake. Now imagine that your oven knew you'd be done mixing the dough at 5pm and would automatically turn on early to be 350°F/175°C right at 5pm.

https://support.google.com/googlenest/answer/9246532

https://store.google.com/product/nest_learning_thermostat_3rd_gen

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



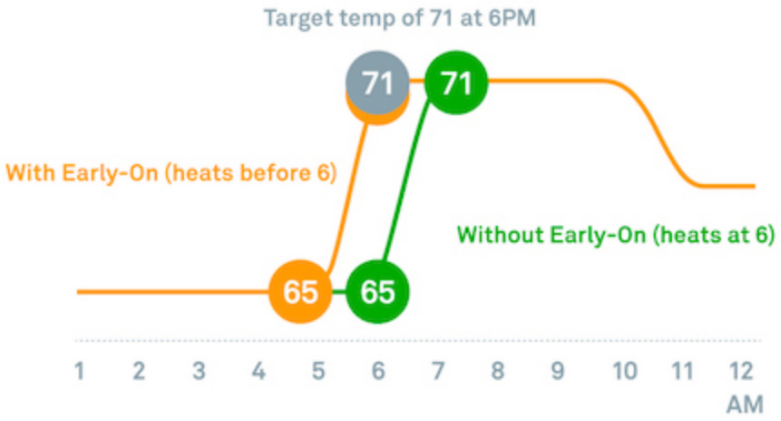
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

45. The Accused Instrumentalities further include "the one or more servers are further configured to receive a demand reduction request and determine whether the structure is associated with demand rejection request, and based on the determination that the structure is associated with the demand reduction request, the one or more servers are further configured to send a signal to the thermostat to change the setting to a second setting to reduce electricity demand by the HVAC system." For example, using the mobile application users of the Accused Instrumentalities can instruct the Accused Instrumentalities to reduce the amount of usage of the devices by placing the device into Eco mode, by enabling Early-On to reduce unnecessary HVAC use, by using Home/Away assist, by altering set point temperatures, or by using Sun

Block as described above.

46. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and are liable for infringement of the '327 Patent pursuant to 35 U.S.C. § 271.

47. As a result of Defendant's infringement of the '327 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

48. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '327 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

COUNT IV

INFRINGEMENT OF U.S. PATENT NO. 10,534,382

49. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

50. Plaintiff is the owner and assignee of United States Patent No. 10,534,382 titled "System and method for using a wireless device as a sensor for an energy management system." The '382 patent was duly and legally issued by the United States Patent and Trademark Office on January 14, 2020. Plaintiff is the owner and assignee, possessing all substantial rights, to the '382 Patent. A true and correct copy of the '382 Patent is attached as Exhibit 4.

51. Defendants make, use, offer for sale, sell, and/or import into the United States certain products and services that directly infringe, literally and/or under the doctrine of

equivalents, one or more claims of the ’382 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant’s products and services, *e.g.*, all generations of the Google Nest Learning Thermostat and all versions and variations thereof since the issuance of the ’382 Patent (“Accused Instrumentalities”).

52. Defendant has had knowledge of the ’382 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and have known, or have been willfully blind to the fact, that making, using, offering to sell, and selling the accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

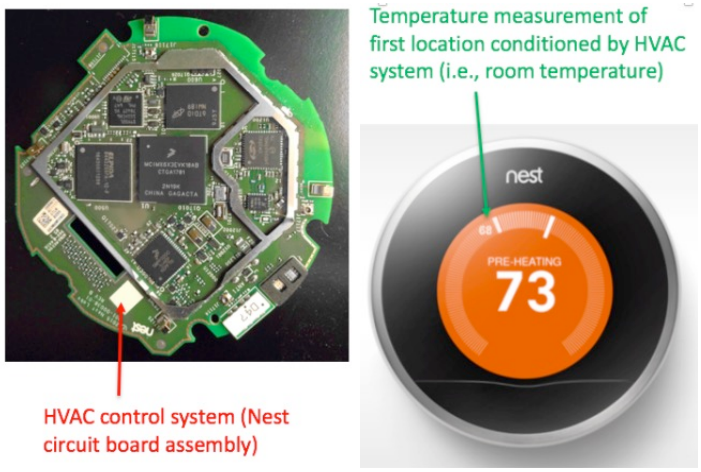
53. Defendant has induced, and continue to induce, infringement of the ’382 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information, education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

54. Defendant has also infringed, and continue to infringe, claims of the ‘382 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use.

Accordingly, Defendant has been, and currently are, contributorily infringing the ’382 patent, in violation of 35 U.S.C. § 271(c).

55. The Accused Products satisfy all claim limitations of one or more claims of the ’327 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below.

56. The Accused Instrumentalities include: “[a] system for controlling an HVAC system at a user's building, the system comprising: a memory; and one or more processors with circuitry and code designed to execute instructions.” For example, the Accused Instrumentalities includes memory, processors and circuity and code, to schedule heating and cooling, to set the device into Cool, Heat, Heat/Cool, or Eco modes, and to enable a variety of features including Home/Away Assist, Early-On, automatic scheduling, Sun Block, and others.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

Home/Away Assist

Home/Away Assist can use your Eco Temperatures to help save energy while no one's home.

How to change Home/Away Assist settings >

https://support.google.com/googlenest/answer/9244728

Early-On won't activate if everyone'e away

As long as someone is home, Early-On can turn on your system early to reach your scheduled temperature on time. But if everyone is away and your thermostat is set to Eco Temperatures, it will wait to start pre-heating or pre-cooling until someone comes home or until someone manually changes the temperature with the app.

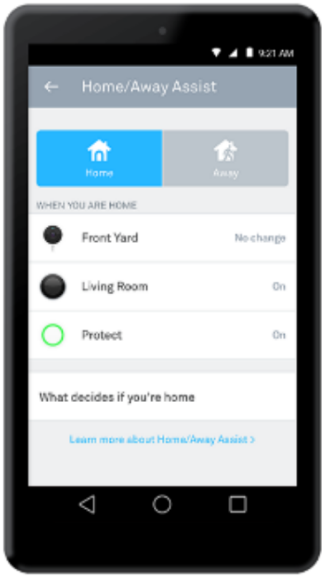
If you use Home/Away Assist, your thermostat will try to stay in Eco Temperatures while you're away.

https://support.google.com/googlenest/answer/9246532

How to change what Nest products do when you're home or away

To change how Home/Away Assist controls your Nest products, follow these steps.

1. Open the Nest app on your phone or tablet. If you're on a computer, go to home.nest.com.
2. Tap **Settings** in the top right corner of the app home screen.
3. Select **Home/Away Assist**.
4. Tap either the **Home** or **Away** icon at the top of the screen. You'll see a summary of what each of your Nest products will do when your home is in that mode.
5. If you want to make any changes, tap on the Nest product you'd like to control.



In general, if you have multiple Nest products in your home, you have different settings for each one. The one exception is Nest Protect: all the Protects in your home share the same Home/Away Assist settings, so you'll only see one Protect in this list.

Settings for each product's Home/Away Assist options are listed below.

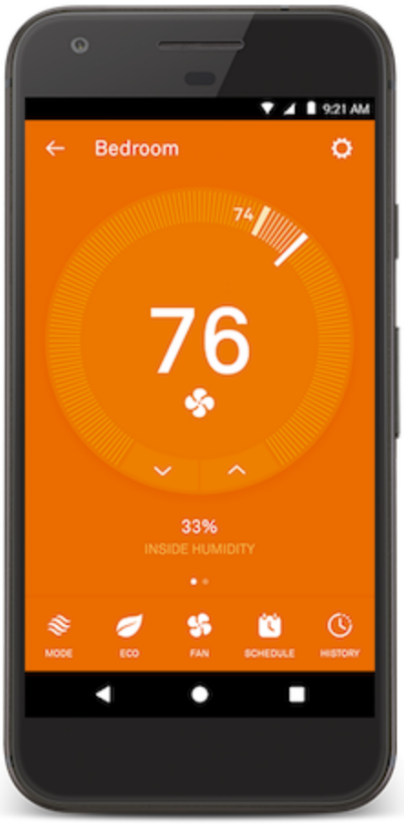
https://support.google.com/googlenest/answer/9261489

57. The Accused Instrumentalities include "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." For example, the Accused Instrumentalities can determine whether the building is occupied, the internal temperature of the building, and the status of the HVAC system.

How to change the target temperature

1. Drag your finger along the ring to change the target temperature.
2. To fine tune the temperature, tap the up or down arrow at the bottom of the ring.

Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

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Home/Away Assist

Home/Away Assist can use your Eco Temperatures to help save energy while no one's home.

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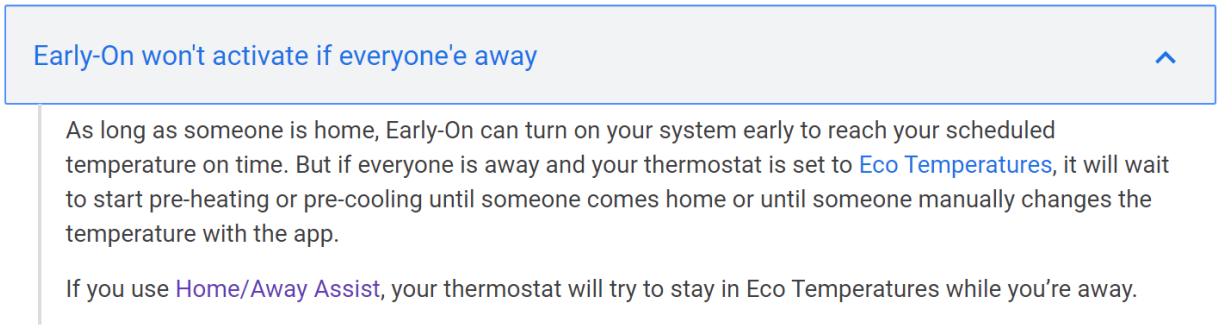


https://support.google.com/googlenest/answer/9246532

58. The Accused Instrumentalities include "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." For example, as explained above, the Accused Instrumentalities receive information concerning outdoor temperature, weather, sunrise and sunset times, anticipated rates of temperature change, and mobile device lations, which, on information and belief is received from the internet.

59. The Accused Instrumentalities include "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." For example, as explained above, the Accused Instrumentalities using, e.g., Home Assist, Early-On, automatic scheduling, and user settings to identify a target temperature set point when the building is occupied (e.g., the temperature set by a user or automatic scheduling) and a temperature setpoint for when the building is unoccupied (e.g., an automatically scheduled away temperature, the Eco setting temperature, Home/Away Assist

designated temperature set points, or a temperature that allows for Early-On adjustment when a user arrives home).

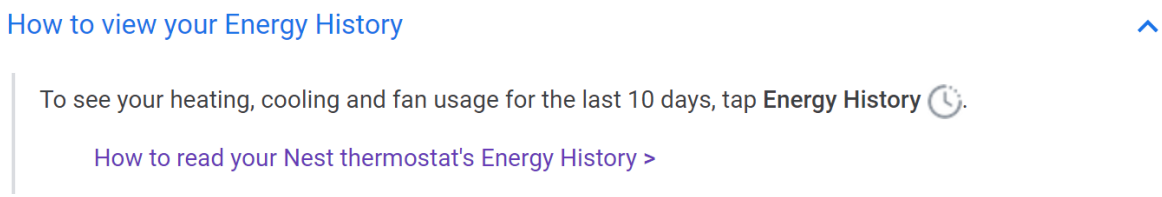
60. The Accused Instrumentalities include "the one or more processors with circuitry and code designed to execute instructions to receive commands through the Internet by way of a remote interface on a mobile, wireless device running software application code; wherein the interface is configured to allow the user to adjust temperature setpoints for the HVAC system; 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." For example, as explained above, using the Google Nest mobile application, a user can change temperature set points and enable or disable features that alter the set point through the user settings in combination with, on information and belief, cloud based features such as automatic scheduling, Home/Away Assist, and Early-On.

61. The Accused Instrumentalities include "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." For example, the Accused Instrumentalities will provide heating or cooling based on whether a building is occupied or unoccupied through their Home/Away Assist features, automatic temperature scheduling, and Early-On features, among others.

62. The Accused Instrumentalities include "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; the first processor with circuitry and code designed to execute instructions to communicate with the memory." For example, using a mobile device with the Google Nest mobile application, which is not connected to the memory on the Accused Instrumentalities, a user can change the setpoints of the thermostat and enable or disable features capable of doing same. On information and belief, Google's cloud-based program may also communicate with the memory. In addition, the Accused Instrumentalities can communicate with remote sensors, which are configured to communicate with the memory of the Accused Instrumentalities.

63. The Accused Instrumentalities include "wherein the memory is configured to store historical values of the first data and second data." For example, on information and belief, the Accused Instrumentalities store historical information about internal temperature, temperature set points, occupation and activity, external temperature, external weather, mobile device location, etc. as part of the learning features of the device including learning for automatic scheduling, Home/Away Assist, and Early-On and in order to provide Energy History.



https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

Viewing Energy History on your thermostat

You can find your Energy History by selecting **Energy** in the Nest thermostat's Quick View menu.

If you're using a Nest Thermostat E, your **Energy** option will be in the **Settings** ⚙ menu.

Your Energy History at a glance

When you first select **Energy**, you'll see a simple graphic that represents how long your system ran for the day. An orange bar represents heating, and a blue one represents cooling (if available). If your thermostat was in HEAT • COOL mode (if available), or you recently switched between modes, you'll see both orange and blue bars.

Turn the thermostat's ring to see the Energy History for other days. You can look as far back as 10 days ago. Since the Nest thermostat needs time to learn about how you use energy, it will usually take at least a day after installation for information to appear.

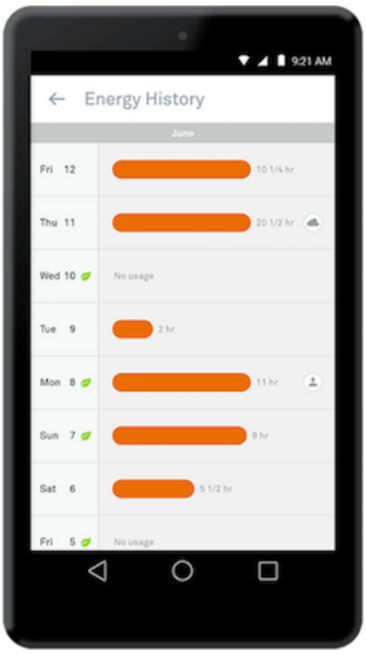
Daily Energy History details

Press the thermostat's ring to see more details about a particular day. Turn the ring to scroll down and to see more information, like if your energy use was significantly higher or lower than the average over the last week. If it was, the thermostat will also show you the main contributor: your adjustments, Home/Away Assist, or the weather.

Press the thermostat ring to go back to the main Energy History screen when you're done, or hold down the ring to exit and return to the thermostat temperature screen.

Viewing Energy History with the Nest app

1. Open the Nest app and tap your Nest thermostat on the home screen.
2. Tap the **History** icon.
3. Here, you'll see a 10 day summary. Tap on any day to see more details about your heating and cooling system's energy use.



https://support.google.com/googlenest/answer/9247300

How your Nest thermostat learns

Note: Nest thermostats learn a different schedule for each temperature mode. For instance, if you currently have your thermostat set to **Heat**, it will learn the temperatures you like for heating your home. If you have both heating and cooling, your thermostat will create separate schedules for **Heat**, one for **Cool**, and another for **Heat•Cool**.

Learning on day one

Your thermostat can start learning your temperature preferences from the day you start using it.

Simply turn the ring to select a new temperature whenever you like. Your thermostat will remember your choice and add it to the schedule that it's building for you.

While your thermostat is learning, the exact behavior you'll see depends on which model you have:

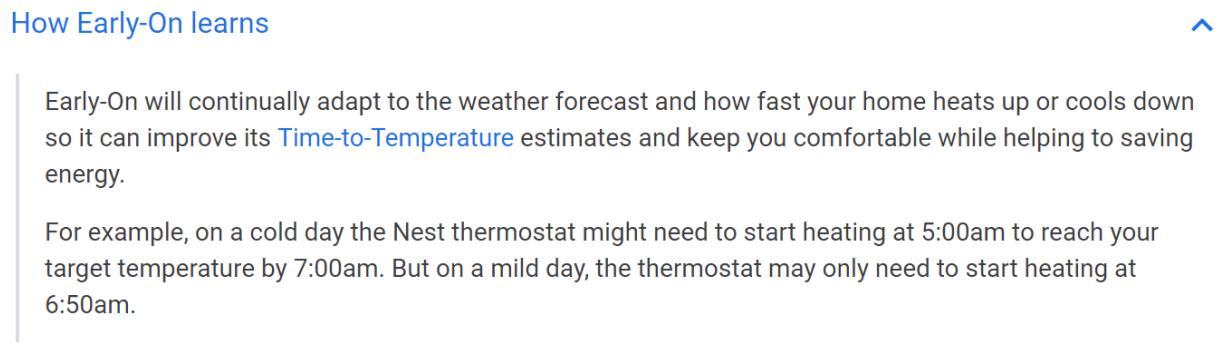
- **3rd, 2nd, or 1st gen Nest Learning Thermostat**: When you adjust the temperature on the first day, your Nest thermostat will hold that temperature until someone changes it. For instance, if you set your thermostat to 70°F (21°C), it will stay at that temperature until it's changed.
- **Nest Thermostat E**: During setup, you'll have the option to choose a pre-programmed schedule that balances energy savings and comfort.
  - If you chose the pre-programmed schedule and **also** have Auto-Schedule turned on, your thermostat will learn your preferences on top of the pre-programmed schedule. So your thermostat will hold its current temperature until someone changes it, or until the next scheduled temperature change, whichever comes first.
  - If you chose **not** to use the pre-programmed schedule, your thermostat will simply hold the temperature until someone changes it.
  - Learn about your options in our article about Nest thermostat schedules.

Learning after about a week and going forward

After about a week, your thermostat will have learned your temperature preferences and it will have settled on a schedule for you.

It will never stop learning, but now it will be less sensitive to each change you make. Going forward, your Nest thermostat will only learn from a **pattern of at least two similar changes**.

https://support.google.com/googlenest/answer/9247510


How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

https://support.google.com/googlenest/answer/9246532

64. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and are liable for infringement of the '382 Patent pursuant to 35 U.S.C. § 271.

65. As a result of Defendant's infringement of the '382 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

66. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '382 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that this Court enter:

a. A judgment in favor of Plaintiff that Defendant has infringed, either literally and/or under the doctrine of equivalents, the '492 Patent, the '488 Patent, the '327 Patent, and the '382 Patent;

b. A permanent injunction prohibiting Defendant from further acts of infringement of the '492 Patent, the '488 Patent, the '327 Patent, and the '382 Patent;

c. A judgment and order requiring Defendant to pay Plaintiff its damages, enhanced damages, costs, expenses, and pre-judgment and post-judgment interest for Defendant's infringement of the '492 Patent, the '488 Patent, the '327 Patent, and the '382 Patent;

d. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to Plaintiff, including without limitation, pre-judgment and post-judgment interest;

e. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees against Defendant; and

f. Any and all other relief as the Court may deem appropriate and just under the circumstances.

DEMAND FOR JURY TRIAL

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: January 31, 2020

Respectfully submitted,

/s/ Reza Mirzaie

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Attorneys for Plaintiff EcoFactor, Inc.

Exhibit 1

US008180492B2

(12) **United States Patent**
Steinberg

(10) **Patent No.: US 8,180,492 B2**
(45) **Date of Patent: May 15, 2012**

(54) **SYSTEM AND METHOD FOR USING A NETWORKED ELECTRONIC DEVICE AS AN OCCUPANCY SENSOR FOR AN ENERGY MANAGEMENT SYSTEM**

(75) Inventor: **John Douglas Steinberg**, Millbrae, CA (US)

(73) Assignee: **EcoFactor, Inc.**, Millbrae, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/502,064**

(22) Filed: **Jul. 13, 2009**

(65) **Prior Publication Data**

US 2010/0280667 A1 Nov. 4, 2010

Related U.S. Application Data

(60) Provisional application No. 61/134,714, filed on Jul. 14, 2008.

(51) **Int. Cl.**
G05B 15/00 (2006.01)
G05D 23/00 (2006.01)

(52) **U.S. Cl.** ..... **700/276**; 700/299; 236/46 R

(58) **Field of Classification Search** ..... 700/276, 700/278, 295, 296; 62/176.6; 236/46 R
See application file for complete search history.

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(Continued)

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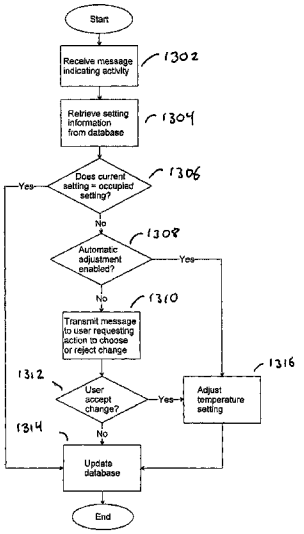
(Continued)

Primary Examiner — Dave Robertson
(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **ABSTRACT**

The invention comprises systems and methods for detecting the use of networked consumer electronics devices as indications of occupancy of a structure for purposes of automatically adjusting the temperature setpoint on a thermostatic HVAC control. At least one thermostat is located inside a structure and is used to control an HVAC system in the structure. At least one networked electronic device is used to indicate the state of occupancy of the structure. The state of occupancy is used to alter the setpoint on the thermostatic HVAC control to reduce unneeded conditioning of unoccupied spaces.

18 Claims, 8 Drawing Sheets



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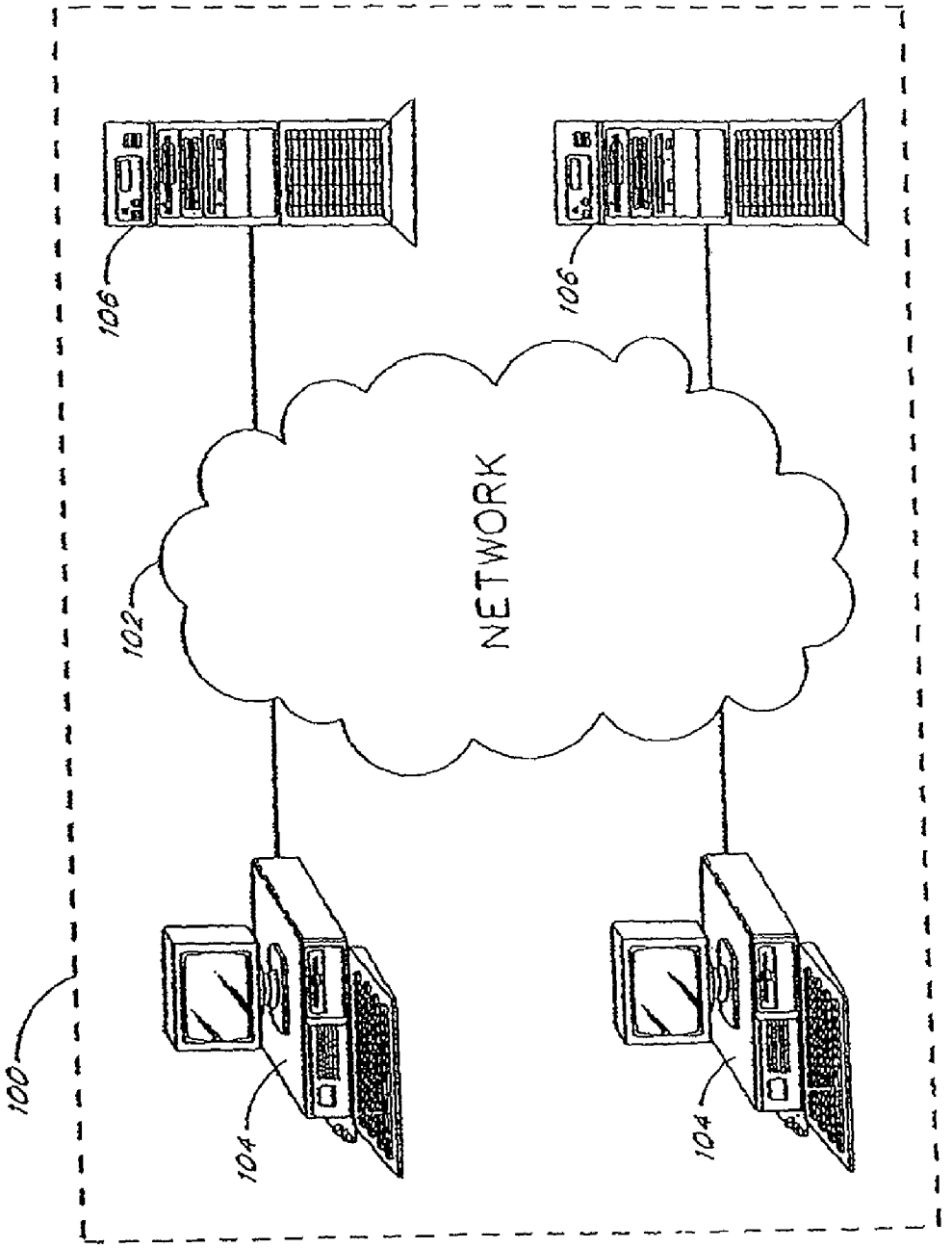


FIG. 1

FIGURE 2

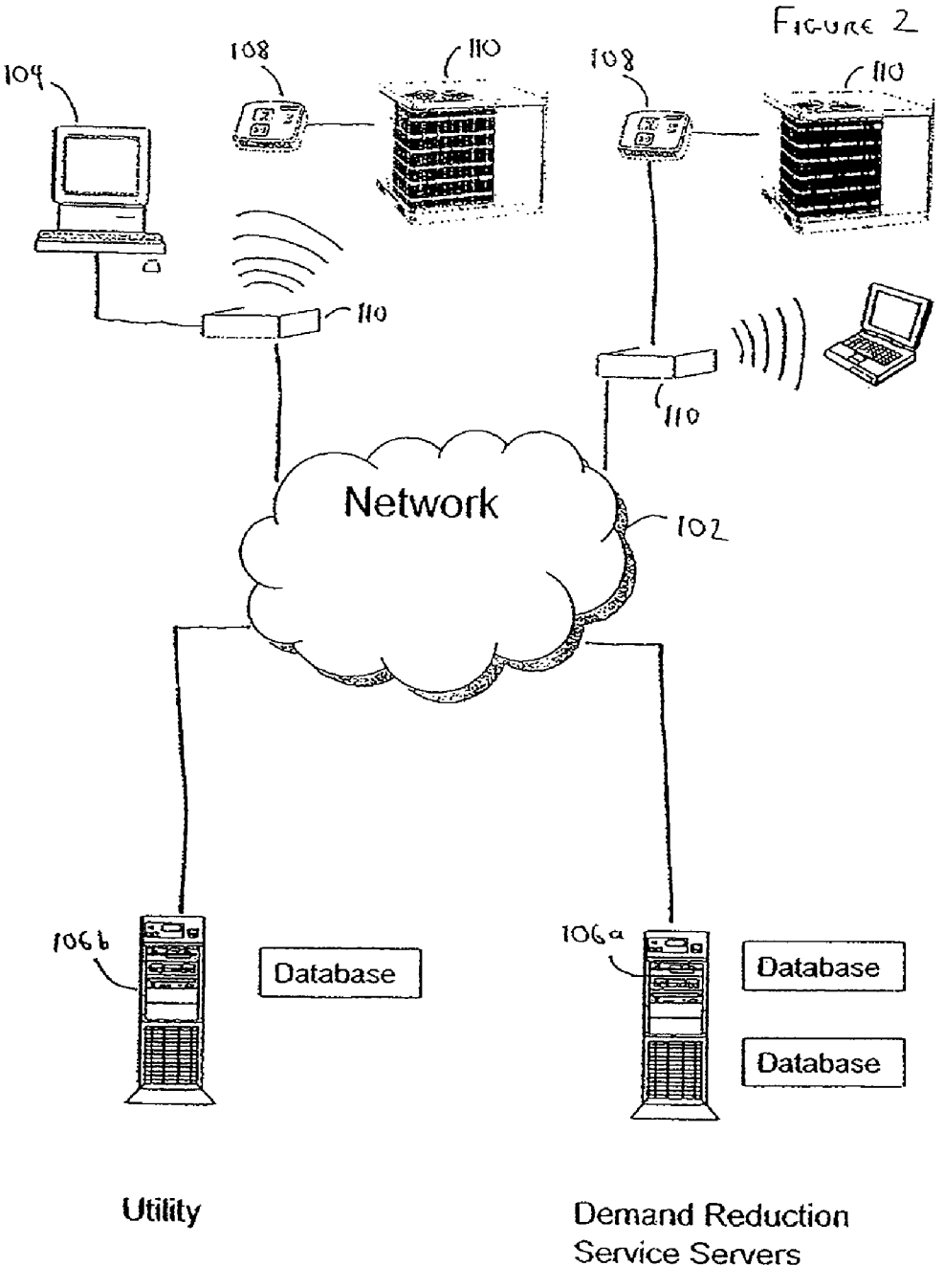

104
108
110
108
110
110
110
Network
102
106b
Database
106a
Database
Database
Utility
Demand Reduction
Service Servers

FIGURE 3

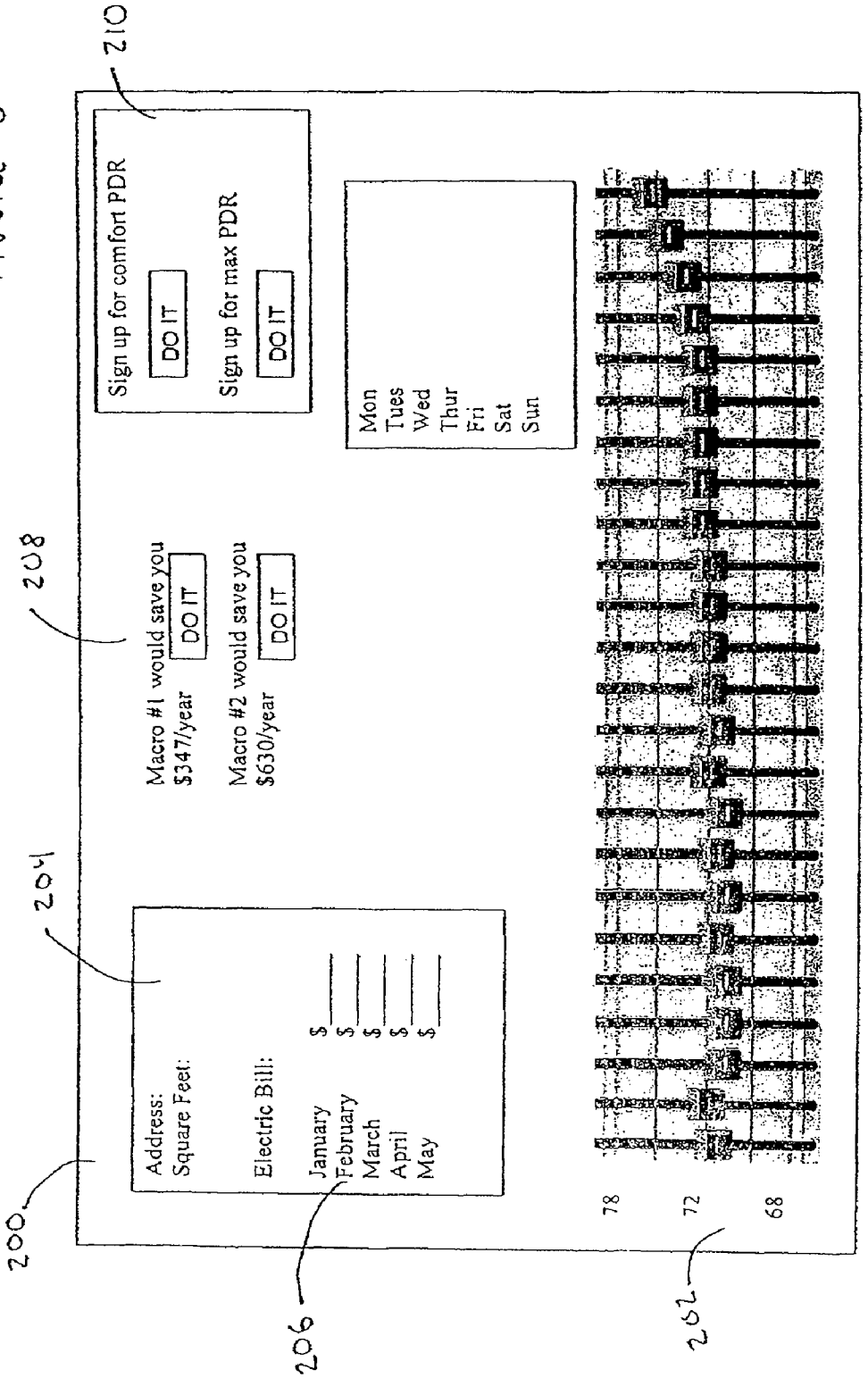

210
Sign up for comfort PDR
DO IT
Sign up for max PDR
DO IT
Mon
Tues
Wed
Thur
Fri
Sat
Sun
208
Macro #1 would save you $347/year
DO IT
Macro #2 would save you $630/year
DO IT
204
Address:
Square Feet:
Electric Bill:
January
February
March
April
May
$
$
$
$
$
200
206
78
72
68
202

FIGURE 4

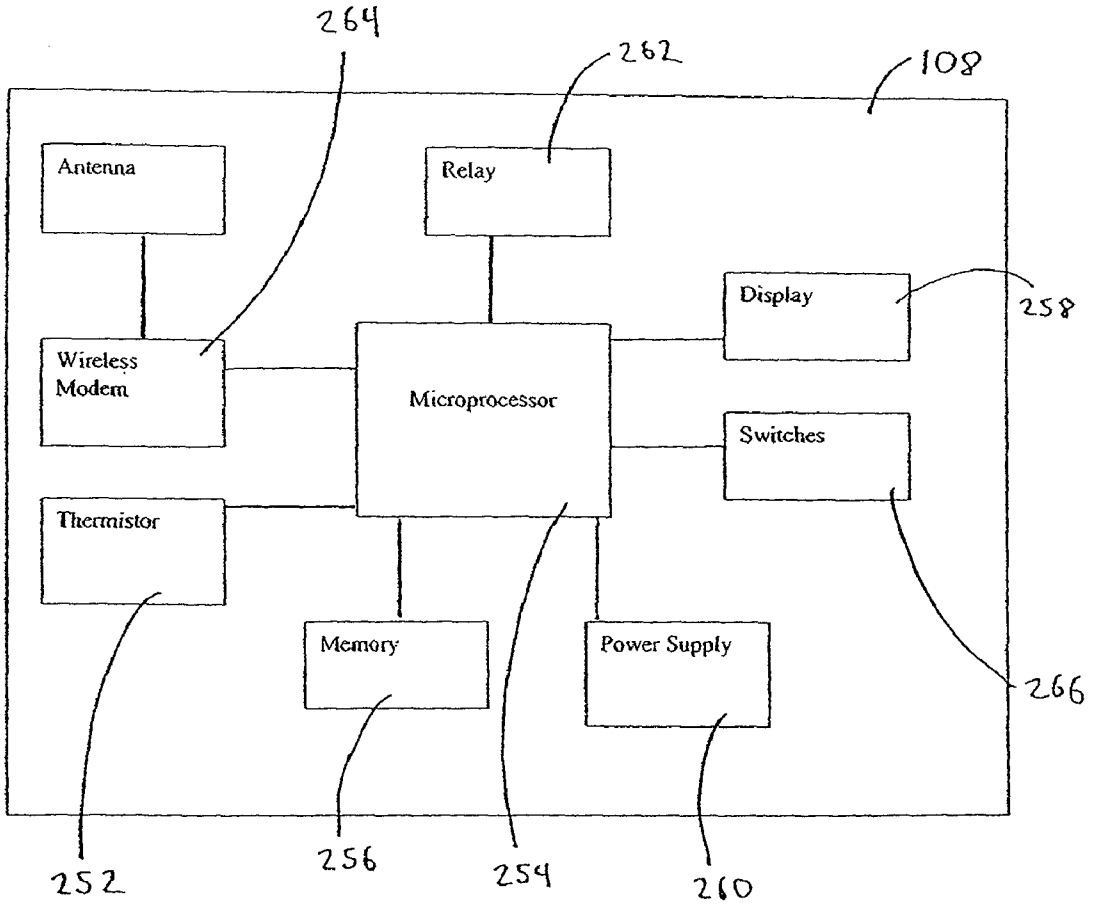

264
262
108
Antenna
Relay
Display
258
Wireless Modem
Microprocessor
Switches
Thermistor
Memory
Power Supply
266
252
256
254
260

FIGURE 5

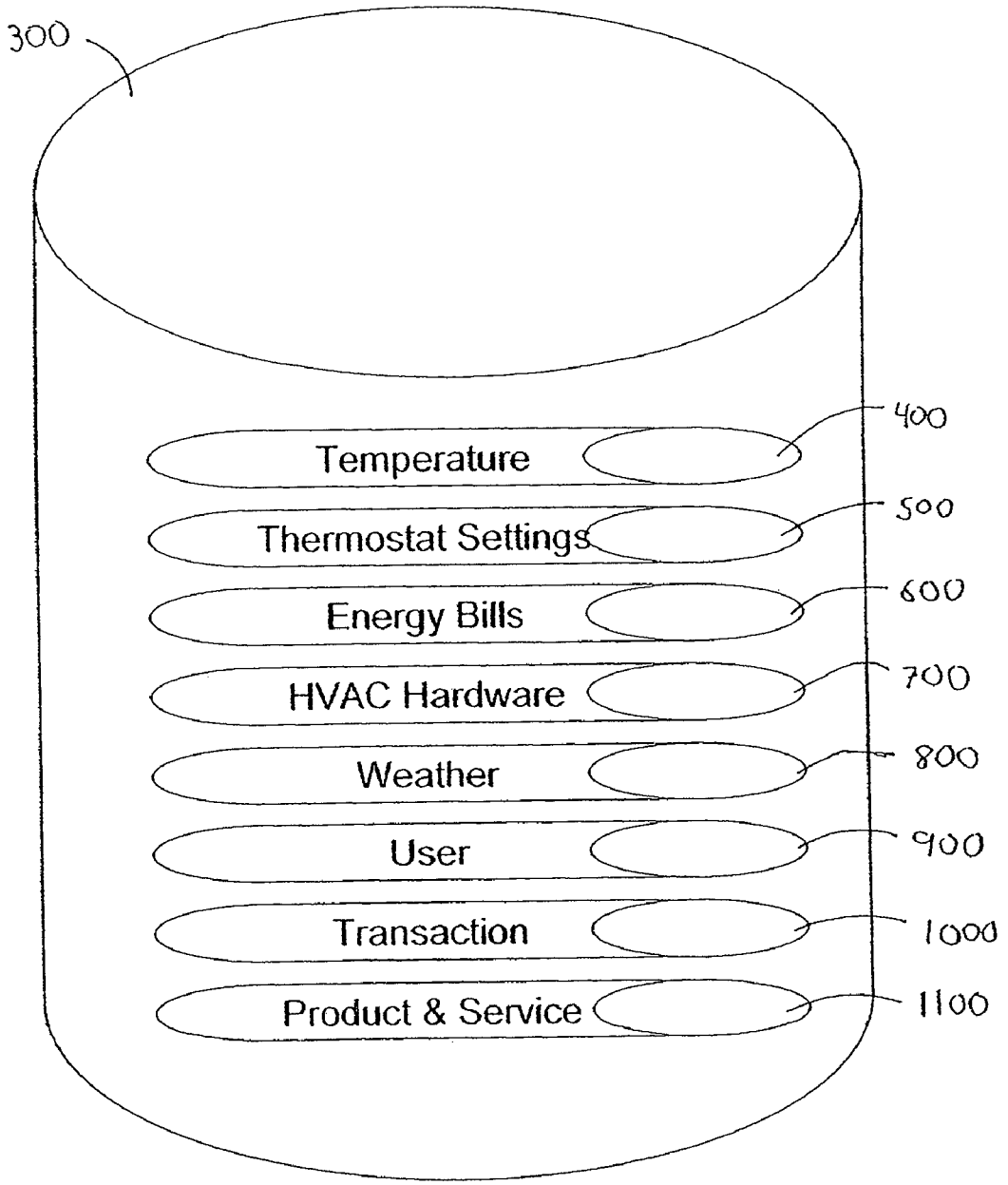

300
400
Temperature
500
Thermostat Settings
600
Energy Bills
700
HVAC Hardware
800
Weather
900
User
1000
Transaction
1100
Product & Service

Fig 6

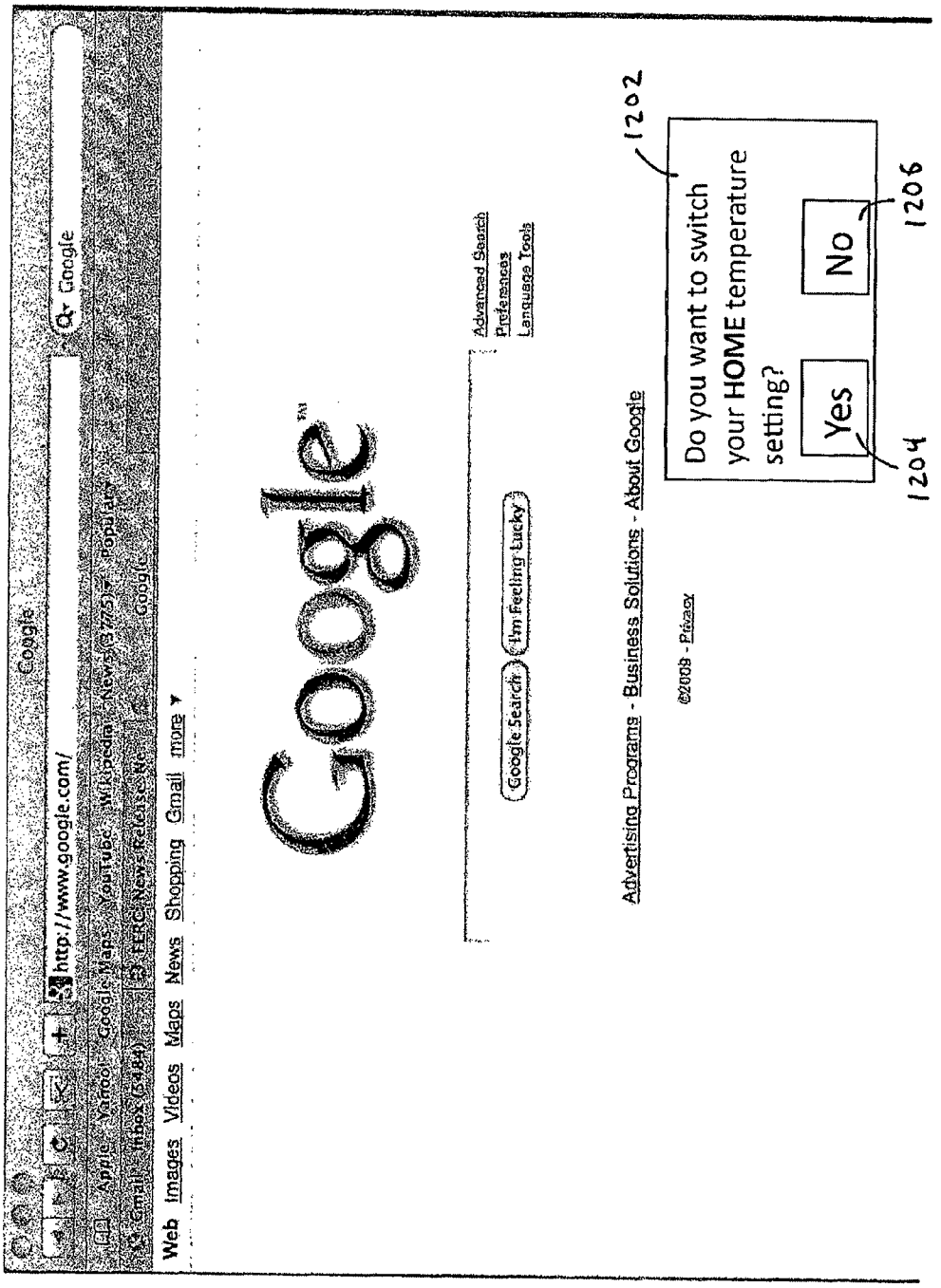

Google
http://www.google.com/
Google
Web Images Videos Maps News Shopping Gmail more
Google
Advanced Search
Preferences
Language Tools
Google Search
I'm Feeling Lucky
Advertising Programs - Business Solutions - About Google
©2009 - Privacy
1202
Do you want to switch your HOME temperature setting?
Yes
No
1204
1206

Fig 7

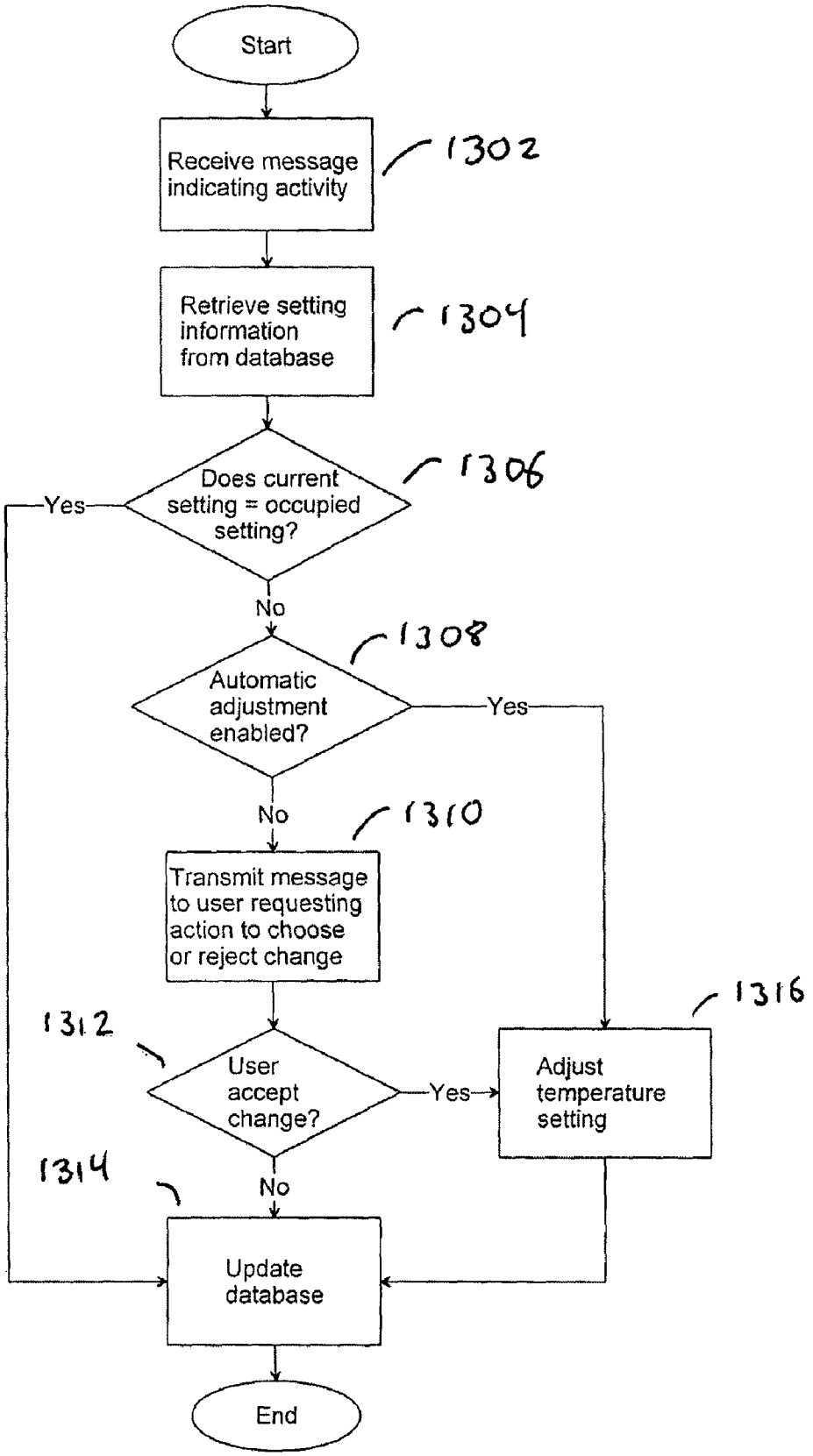
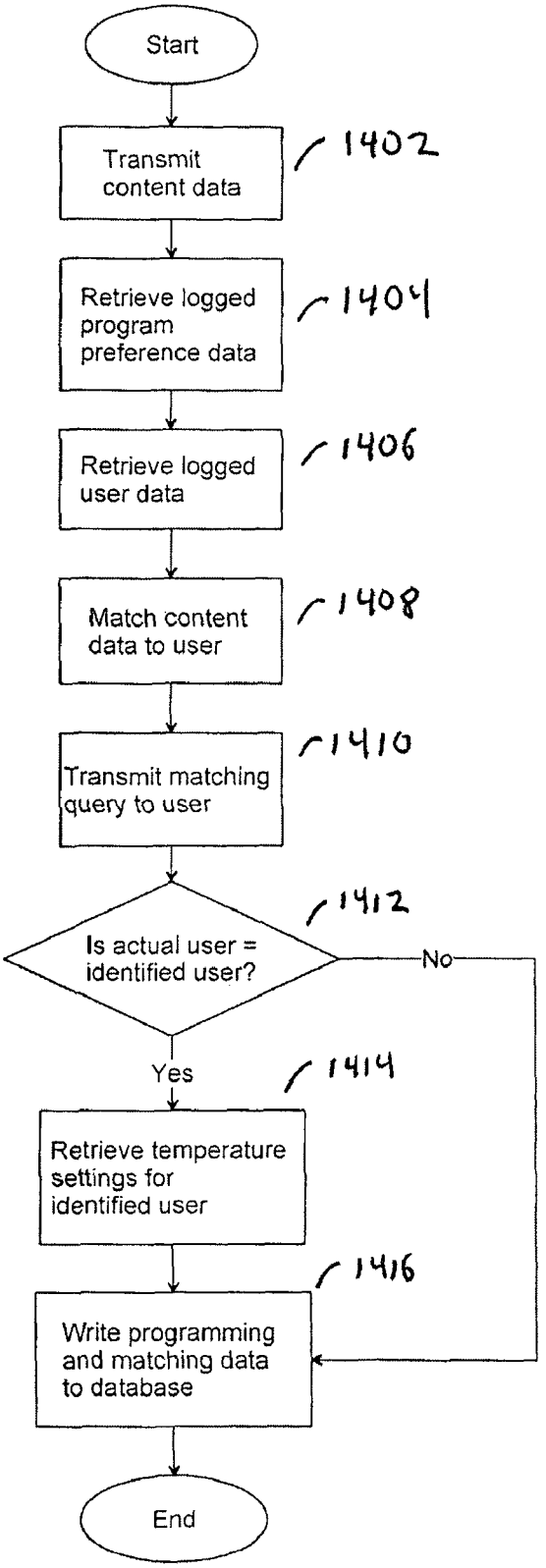

Start
Receive message indicating activity
1302
Retrieve setting information from database
1304
Does current setting = occupied setting?
1306
Yes
No
Automatic adjustment enabled?
1308
Yes
No
Transmit message to user requesting action to choose or reject change
1310
1312
User accept change?
Yes
Adjust temperature setting
1316
1314
No
Update database
End

Fig 8


Start
Transmit content data
1402
Retrieve logged program preference data
1404
Retrieve logged user data
1406
Match content data to user
1408
Transmit matching query to user
1410
Is actual user = identified user?
1412
No
Yes
1414
Retrieve temperature settings for identified user
1416
Write programming and matching data to database
End

SYSTEM AND METHOD FOR USING A NETWORKED ELECTRONIC DEVICE AS AN OCCUPANCY SENSOR FOR AN ENERGY MANAGEMENT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority to U.S. Provisional Application No. 61/134,714, filed Jul. 14, 2008, the entirety of which is incorporated herein by reference and is to be considered part of this specification.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to the use of thermostatic HVAC and other energy management controls that are connected to a computer network. More specifically, the present invention pertains 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.

Heating and cooling systems for buildings (heating, ventilation and cooling, or HVAC systems) have been controlled for decades by thermostats. At the most basic level, a thermostat includes a means to allow a user to set a desired temperature, a means to sense actual temperature, and a means to signal the heating and/or cooling devices to turn on or off in order to try to change the actual temperature to equal the desired temperature. The most basic versions of thermostats use components such as a coiled bi-metallic spring to measure actual temperature and a mercury switch that opens or completes a circuit when the spring coils or uncoils with temperature changes. More recently, electronic digital thermostats have become prevalent. These thermostats use solid-state devices such as thermistors or thermal diodes to measure temperature, and microprocessor-based circuitry to control the switch and to store and operate based upon user-determined protocols for temperature vs. time.

These programmable thermostats generally offer a very restrictive user interface, limited by the cost of the devices, the limited real estate of the small wall-mounted boxes, and the inability to take into account more than two variables: the desired temperature set by the user, and the ambient temperature sensed by the thermostat. Users can generally only set one series of commands per day, and in order to change one parameter (e.g., to change the late-night temperature) the user often has to cycle through several other parameters by repeatedly, pressing one or two buttons.

Because the interface of programmable thermostats is so poor, the significant theoretical savings that are possible with them (sometimes cited as 25% of heating and cooling costs) are rarely realized. In practice, studies have found that more than 50% of users never program their thermostats at all. Significant percentages of the thermostats that are programmed are programmed sub-optimally, in part because, once programmed, people tend to not to re-invest the time needed to change the settings very often.

A second problem with standard programmable thermostats is that they represent only a small evolutionary step beyond the first, purely mechanical thermostats. Like the first thermostats, they only have two input signals—ambient temperature and the preset desired temperature. The entire advance with programmable thermostats is that they can shift between multiple present temperatures at different times without real-time involvement of a human being.

Because most thermostats control HVAC systems that do not offer infinitely variable output, traditional thermostats are designed to permit the temperature as seen by the thermostat to vary above and below the setpoint to prevent the HVAC system from constantly and rapidly cycling on and off, which is inefficient and harmful to the HVAC system. The temperature range in which the thermostat allows the controlled environment to drift is known as both the dead zone and, more formally, the hysteresis zone. The hysteresis zone is frequently set at +/−1 degree Fahrenheit. Thus if the setpoint is 68 degrees, in the heating context the thermostat will allow the inside temperature to fall to 67 degrees before turning the heating system on, and will allow it to rise to 69 degrees before turning it off again.

As energy prices rise, more attention is being paid to ways of reducing energy consumption. Because energy consumption is directly proportional to setpoint—that is, the further a given setpoint diverges from the balance point (the inside temperature assuming no HVAC activity) in a given house under given conditions, the higher energy consumption will be to maintain temperature at that setpoint), energy will be saved by virtually any strategy that over a given time frame lowers the average heating setpoint or raises the cooling setpoint. Conventional programmable thermostats allow homeowners to save money and energy by pre-programming setpoint changes based upon comfort or schedule. For example, in the summer, allowing the setpoint to rise by several degrees (or even shutting off the air conditioner) when the home is unoccupied will generally save significantly on energy. But such thermostats have proven to be only minimally effective in practice. Because they have such primitive user interfaces, they are difficult to program, and so many users never bother at all, or set them up once and do not alter the programming even if their schedules change.

In the hotel industry, the heating and cooling decisions made in hundred or even thousands of individual rooms with independently controlled HVAC systems are aggregated into a single energy bill, so hotel owners and managers are sensitive to energy consumption by those systems. Hotel guests often turn the air conditioner to a low temperature setting and then leave the room for hours at a time, thereby wasting considerable energy. An approach commonly used outside of the United States to combat this problem is to use a keycard to control the HVAC system, such that guests place the keycard into a slot mounted on the wall near the door of the room which then triggers the lights and HVAC system to power up, and turn them off when the guest removes the card upon leaving the room. However, because most hotels give each guest two cards, it is easy to simply leave the extra card in the slot, thus defeating the purpose of the system. Recently, systems have been introduced in which a motion sensor is connected to the control circuitry for the HVAC system. If no motion is detected in the room for some predetermined interval, the system concludes that the room is unoccupied, and turns off or alters the setpoint of the HVAC system to a more economical level. When the motion sensor detects motion (which is assumed to coincide with the return of the guest), the HVAC system resets to the guest's chosen setting.

Adding occupancy detection capability to residential HVAC systems could also add considerable value in the form of energy savings without significant tradeoff in terms of comfort. But the systems used in hotels do not easily transfer to the single-family residential context. Hotel rooms tend to be small enough that a single motion sensor is sufficient to determine with a high degree of accuracy whether or not the

room is occupied. A single motion sensor in the average home today would have limited value because there are likely to be many places one or more people could be home and active yet invisible to the motion sensor. The most economical way to include a motion sensor in a traditional programmable thermostat would be to build it into the thermostat itself. But thermostats are generally located in hallways, and thus are unlikely to be exposed to the areas where people tend to spend their time. Wiring a home with multiple motion sensors in order to maximize the chances of detecting occupants would involve considerable expense, both for the sensors themselves and for the considerable cost of installation, especially in the retrofit market. Yet if control is ceded to a single-sensor system that cannot reliably detect presence, the resulting errors would likely lead the homeowner to reject the system.

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.

SUMMARY OF THE INVENTION

In one embodiment, the invention comprises a thermostat attached to an HVAC system, a local network connecting the thermostat to a larger network such as the Internet, and one or more computers attached to the network, and a server in bi-directional communication with a plurality of such thermostats and computers. The server pairs each thermostat with one or more computers or other consumer electronic devices which are determined to be associated with the home in which the thermostat is located. The server logs the ambient temperature sensed by each thermostat vs. time and the signals sent by the thermostats to their HVAC systems. The server also monitors and logs activity on the computers or other consumer electronic devices associated with each thermostat. Based on the activity patterns evidenced by keystrokes, cursor movement or other inputs, or lack thereof, the server instructs the thermostat to change temperature settings between those optimized for occupied and unoccupied states.

At least one embodiment of the invention comprises the steps of determining whether one or more networked electronic devices inside a structure are in use; determining whether said use of said networked electronic devices indicates occupancy of said structure; and adjusting the temperature setpoint on a thermostatic controller for an HVAC system for said structure based upon whether or not said structure is deemed to be occupied.

At least one embodiment of the invention comprises at least one said thermostat having at least one temperature setting associated with the presence of one or more occupants in said structure, and at least one temperature setting associated with the absence of occupants in said structure; one or more electronic devices having at least a user interface; where said electronic devices and said thermostat are connected to a network; where said setpoint on said thermostat is adjusted between said temperature setting associated with the presence of one or more occupants in said structure and said temperature setting associated with the absence of occupants in said structure based upon the use of said user interface for said electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an example of an overall environment in which an embodiment of the invention may be used.

FIG. **2** shows a high-level illustration of the architecture of a network showing the relationship between the major elements of one embodiment of the subject invention.

FIG. **3** shows an embodiment of the website to be used as part of the subject invention.

FIG. **4** shows a high-level schematic of the thermostat used as part of the subject invention.

FIG. **5** shows one embodiment of the database structure used as part of the subject invention.

FIG. **6** shows the browser as seen on the display of the computer used as part of the subject invention.

FIG. **7** is a flowchart showing the steps involved in the operation of one embodiment of the subject invention.

FIG. **8** is a flowchart that shows how the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the computer attached to the system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** shows an example of an overall environment **100** in which an embodiment of the invention may be used. The environment **100** includes an interactive communication network **102** with computers **104** connected thereto. Also connected to network **102** are one or more server computers **106**, which store information and make the information available to computers **104**. The network **102** allows communication between and among the computers **104** and **106**.

Presently preferred network **102** comprises a collection of interconnected public and/or private networks that are linked to together by a set of standard protocols to form a distributed network. While network **102** is intended to refer to what is now commonly referred to as the Internet, it is also intended to encompass variations which may be made in the future, including changes additions to existing standard protocols.

When a user of the subject invention wishes to access information on network **102**, the buyer initiates connection from his computer **104**. For example, the user invokes a browser, which executes on computer **104**. The browser, in turn, establishes a communication link with network **102**. Once connected to network **102**, the user can direct the browser to access information on server **106**.

One popular part of the Internet is the World Wide Web. The World Wide Web contains a large number of computers **104** and servers **106**, which store HyperText Markup Language (HTML) documents capable of displaying graphical and textual information. HTML is a standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents.

The servers **106** that provide offerings on the World Wide Web are typically called websites. A website is often defined by an Internet address that has an associated electronic page. Generally, an electronic page is a document that organizes the presentation of text graphical images, audio and video.

In addition to the Internet, the network **102** can comprise a wide variety of interactive communication media. For example, network **102** can include local area networks, interactive television networks, telephone networks, wireless data systems, two-way cable systems, and the like.

In one embodiment, computers **104** and servers **106** are conventional computers that are equipped with communications hardware such as modem or a network interface card. The computers include processors such as those sold by Intel and AMD. Other processors may also be used, including general-purpose processors, multi-chip processors, embedded processors and the like.

Computers **104** can also be handheld and wireless devices such as personal digital assistants (PDAs), cellular telephones and other devices capable of accessing the network. Computers **104** can also be microprocessor-controlled home entertainment equipment including advanced televisions, televisions paired with home entertainment/media centers, and wireless remote controls.

Computers **104** may utilize a browser configured to interact with the World Wide Web. Such browsers may include Microsoft Explorer, Mozilla, Firefox, Opera or Safari. They may also include browsers or similar software used on handheld, home entertainment and wireless devices. The storage medium may comprise any method of storing information. It may comprise random access memory (RAM), electronically erasable programmable read only memory (EEPROM), read only memory (ROM), hard disk, floppy disk, CD-ROM, optical memory, or other method of storing data. Computers **104** and **106** may use an operating system such as Microsoft Windows, Apple Mac OS, Linux, Unix or the like. Computers **106** may include a range of devices that provide information, sound, graphics and text, and may use a variety of operating systems and software optimized for distribution of content via networks.

FIG. **2** illustrates in further detail the architecture of the specific components connected to network **102** showing the relationship between the major elements of one embodiment of the subject invention. Attached to the network are thermostats **108** and computers **104** of various users. Connected to thermostats **108** are HVAC units **110**. The HVAC units may be conventional air conditioners, heat pumps, or other devices for transferring heat into or out of a building. Each user is connected to the server **106** via wired or wireless connection such as Ethernet or a wireless protocol such as IEEE 802.11, a gateway **110** that connects the computer and thermostat to the Internet via a broadband connection such as a digital subscriber line (DSL) or other form of broadband connection to the World Wide Web. Server **106** contains the content to be served as web pages and viewed by computers **104**, as well as databases containing information used by the servers.

In the currently preferred embodiment, the website **200** includes a number of components accessible to the user, as shown in FIG. **3**. Those components may include a means to enter temperature settings **202**, a means to enter information about the user's home **204**, a means to enter the user's electricity bills **206**, means to calculate energy savings that could result from various thermostat-setting strategies **208**, and means to enable and choose between various arrangements **210** for demand reduction with their electric utility provider as intermediated by the demand reduction service provider.

FIG. **4** shows a high-level block diagram of thermostat **108** used as part of the subject invention. Thermostat **108** includes temperature sensing means **252**, which may be a thermistor, thermal diode or other means commonly used in the design of electronic thermostats. It includes a microprocessor **254**, memory **256**, a display **258**, a power source **260**, a relay **262**, which turns the HVAC system on an and off in response to a signal from the microprocessor, and contacts by which the relay is connected to the wires that lead to the HVAC system. To allow the thermostat to communicate bi-directionally with the computer network, the thermostat also includes means **264** to connect the thermostat to a local computer or to a wireless network. Such means could be in the form of Ethernet, wireless protocols such as IEEE 802.11, IEEE 802.15.4, Bluetooth, cellular systems such as CDMA, GSM and GPRS, or other wireless protocols. The thermostat **250** may also include controls **266** allowing users to change settings directly at the thermostat, but such controls are not necessary to allow the thermostat to function.

The data used to generate the content delivered in the form of the website is stored on one or more servers **106** within one or more databases. As shown in FIG. **5**, the overall database structure **300** may include temperature database **400**, thermostat settings database **500**, energy bill database **600**, HVAC hardware database **700**, weather database **800**, user database **900**, transaction database **1000**, product and service database **1100** and such other databases as may be needed to support these and additional features.

The website **200** will allow users of connected thermostats **250** to create personal accounts. Each user's account will store information in database **900**, which tracks various attributes relative to users of the site. Such attributes may include the make and model of the specific HVAC equipment in the user's home; the age and square footage of the home, the solar orientation of the home, the location of the thermostat in the home, the user's preferred temperature settings, whether the user is a participant in a demand reduction program, etc.

As shown in FIG. **3**, the website **200** will permit thermostat users to perform through the web browser substantially all of the programming functions traditionally performed directly at the physical thermostat, such as temperature set points, the time at which the thermostat should be at each set point, etc. Preferably the website will also allow users to accomplish more advanced tasks such as allow users to program in vacation settings for times when the HVAC system may be turned off or run at more economical settings, and set macros that will allow changing the settings of the temperature for all periods with a single gesture such as a mouse click.

FIG. **6** represents the screen of a computer or other device **104** using a graphical user interface connected to the Internet. The screen shows that a browser **1200** is displayed on computer **104**. In one embodiment, a background application installed on computer **104** detects activity by a user of the computer, such as cursor movement, keystrokes or otherwise, and signals the application running on server **106** that activity has been detected. Server **106** may then, depending on context, (a) transmit a signal to thermostat **108** changing setpoint because occupancy has been detected at a time when the system did not expect occupancy; (b) signal the background application running on computer **104** to trigger a software routine that instantiates a pop-up window **1202** that asks the user if the server should change the current setpoint, alter the overall programming of the system based upon a new occupancy pattern, etc. The user can respond by clicking the cursor on "yes" button **1204** or "No" button **1206**. Equilvalent means of signalling activity may be employed with interactive television programming, gaming systems, etc.

FIG. **7** represents a flowchart showing the steps involved in the operation of one embodiment of the subject invention. In step **1302**, computer **104** transmits a message to server **106** via the Internet indicating that there is user activity on computer **104**. This activity can be in the form of keystrokes, cursor movement, input via a television remote control, etc. In step **1304** the application queries database **300** to retrieve setting information for the HVAC system. In step **1306** the application determines whether the current HVAC program is intended to apply when the home is occupied or unoccupied. If the HVAC settings then in effect are intended to apply for an occupied home, then the application terminates for a specified interval. If the HVAC settings then in effect are intended to apply when the home is unoccupied, then in step **1308** the application will retrieve from database **300** the user's specific preferences for how to handle this situation. If the user has

previously specified (at the time that the program was initially set up or subsequently modified) that the user prefers that the system automatically change settings under such circumstances, the application then proceeds to step **1316**, in which it changes the programmed setpoint for the thermostat to the setting intended for the house when occupied. If the user has previously specified that the application should not make such changes without further user input, then in step **1310** the application transmits a command to computer **104** directing the browser to display a message informing the user that the current setting assumes an unoccupied house and asking the user in step **1312** to choose whether to either keep the current settings or revert to the pre-selected setting for an occupied home. If the user selects to retain the current setting, then in step **1314** the application will write to database **300** the fact that the users has so elected and terminate. If the user elects to change the setting, then in step **1316** the application transmits the revised setpoint to the thermostat. In step **1314** the application writes the updated setting information to database **300**.

FIG. **8** is a flowchart that shows how the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the computer attached to the system. In step **1402** computer **104** transmits to server **106** information regarding the type of activity detected on computer **104**. Such information could include the specific program or channel being watched if, for example, computer **104** is used to watch television. The information matching, for example, TV channel 7 at 4:00 PM on a given date to specific content may be made by referring to Internet-based or other widely available scheduling sources for such content. In step **1404** server **106** retrieves from database **300** previously logged data regarding viewed programs. In step **1406** server **106** retrieves previously stored data regarding the residents of the house. For example, upon initiating the service, one or more users may have filled out online questionnaires sharing their age, gender, schedules, viewing preferences, etc. In step **1408**, server **106** compares the received information about user activity to previously stored information retrieved from database **300** about the occupants and their viewing preferences. For example, if computer **104** indicates to server **106** that the computer is being used to watch golf, the server may conclude that an adult male is watching; if computer **104** indicates that it is being used to watch children's programming, server **106** may conclude that a child is watching. In step **1410** the server transmits a query to the user in order to verify the match, asking, in effect, "Is that you. Bob?" In step **1412**, based upon the user's response, the application determines whether the correct user has been identified. If the answer is no, then the application proceeds to step **1416**. If the answer is yes, then in step **1414** the application retrieves the temperature settings for the identified occupant. In step **1416** the application writes to database **300** the programming information and information regarding matching of users to that programming.

In an alternative embodiment, the application running on computer **104** may respond to general user inputs (that is, inputs not specifically intended to instantiate communication with the remote server) by querying the user whether a given action should be taken. For example, in a system in which the computer **104** is a web-enabled television or web-enabled set-top device connected to a television as a display, software running on computer **104** detects user activity, and transmits a message indicating such activity to server **106**. The trigger for this signal may be general, such as changing channels or adjusting volume with the remote control or a power-on event. Upon receipt by server **104** of this trigger, server **104** transmits instructions to computer **104** causing it to display a dialog box asking the user whether the user wishes to change HVAC settings.

What is claimed is:

1. A method for varying temperature setpoints for an HVAC system comprising:

storing at least a first HVAC temperature setpoint associated with a structure that is deemed to be non-occupied and at least a second HVAC temperature setpoint associated with said structure deemed to be occupied;

determining whether one or more networked electronic devices inside said structure are in use, wherein said networked electronic devices comprise a graphic user interface comprising a display, wherein said networked electronic devices receive input from one or more users and wherein use of said networked electronic devices comprises at least one of cursor movement, keystrokes or other user interface actions intended to alter a state of one or more of said networked electronic devices by one or more users;

in response to use of said one or more networked devices, determining that said HVAC system is set to said first HVAC temperature setpoint indicating that said structure is deemed to be non occupied;

determining that said one or more users has previously indicated a preference that said user's input be obtained before automatically changing said first HVAC temperature setpoint to said second HVAC temperature setpoint indicating that said structure is deemed to be occupied;

prompting said one or more users based on said determining that said one or more of said user's input should be obtained, wherein said prompting sends a message to at least one of said networked electronic devices that said first HVAC system is set for a non-occupied structure and whether to change said first HVAC temperature setpoint to said second HVAC temperature setpoint associated with occupancy of said structure;

in response to said prompting, receiving input from said one or more users to keep said first HVAC temperature setpoint; and

keeping said first HVAC temperature setpoint based upon said input from said one or more users.

2. The method of claim **1** in which at least one of said networked electronic devices is a television.

3. The method of claim **1** in which at least one of said networked electronic devices is a personal computer.

4. The method of claim **1** in which at least one of said networked electronic devices is connected to the Internet.

5. The method of claim **1** in which programming being watched or listened to using at least one of said networked electronic devices is used to determine which occupant of said structure is likely to be present, and the second HVAC temperature setpoint for said thermostatic controller is selected based upon the preferences of the occupant, determined to be using said at least one networked electronic device.

6. The method of claim **1** in which at least one of said networked electronic devices is a game console.

7. The method of claim **1** in which at least one of said networked electronic devices communicates with a remote server.

8. The method of claim **1** further comprising adjusting said temperature setpoint with a remote computer.

9. The method of claim **1** in which said first HVAC temperature setpoint is varied automatically based on said input from said one or more users.

10. A system for altering the setpoint on a thermostat for space conditioning of a structure comprising:

at least one thermostat having at least a first temperature setpoint associated with a non-occupied structure, and at least a second temperature setpoint associated with the existence of occupants in said structure;

one or more electronic devices having at least a graphic user interface comprising a display wherein said electronic devices receive input from one or more users and wherein use of said electronic devices comprises at least one of cursor movement, keystrokes or other user interface actions intended to alter a state of one or more of said electronic devices by one or more users wherein activity of one or more networked electronic devices indicates whether said thermostat should be changed from said first temperature setpoint to said second temperature setpoint;

wherein said electronic devices and said thermostat are connected to a network;

an application comprising one or more computer processors in communication with said network, wherein said application determines whether said one or more electronic devices are in use and in response, whether said thermostat is set to said first temperature setpoint that indicates said structure is not occupied,

said application determining that said one or more users has previously indicated a preference that said user's input be obtained before automatically changing said first HVAC temperature setpoint to said second HVAC temperature setpoint indicating that said structure is deemed to be occupied;

said application prompting said one or more users based on said determining that said one or more of said user's input should be obtained,

wherein said application provides electronic notice to one or more of said users of said electronic devices that said thermostat is set for a non-occupied structure and whether to keep said first temperature setpoint or change to said second temperature setpoint; and

wherein said application in response to said prompting, receives input from said one or more users to keep said first HVAC temperature setpoint; and

wherein said thermostat is kept at said first temperature setpoint based upon said input from said one or more users.

11. The system of claim **10** in which at least one of said electronic devices is a television.

12. The system of claim **10** in which at least one of said electronic devices is a personal computer.

13. The system of claim **10** in which at least one of said electronic devices is connected to the Internet.

14. The system of claim **10** in which the programming being watched or listened to using said electronic devices is used to determine which occupant of said structure is likely to be using at least one of said electronic devices, and the setpoint for said thermostatic controller is selected based upon the preferences of the occupant determined to be using said at least one electronic device.

15. The system of claim **10** in which at least one of said electronic devices is a game console.

16. The system of claim **10** in which at least one of said electronic devices communicates with a remote server.

17. The system of claim **10** further comprising a remote computer that varies said first temperature setpoint.

18. The system of claim **10** in which said first temperature setpoint is varied automatically based on said input from said one or more users.

* * * * *

Exhibit 2

US008412488B2

(12) **United States Patent**
Steinberg et al.

(10) **Patent No.: US 8,412,488 B2**
(45) **Date of Patent: *Apr. 2, 2013**

(54) **SYSTEM AND METHOD FOR USING A NETWORK OF THERMOSTATS AS TOOL TO VERIFY PEAK DEMAND REDUCTION**

(75) Inventors: **John Douglas Steinberg**, Millbrae, CA (US); **Scott Douglas Hublou**, Redwood City, CA (US)

(73) Assignee: **EcoFactor, Inc.**, Millbrae, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/409,697**

(22) Filed: **Mar. 1, 2012**

(65) **Prior Publication Data**

US 2012/0221294 A1 Aug. 30, 2012

Related U.S. Application Data

(63) Continuation of application No. 13/037,162, filed on Feb. 28, 2011, now Pat. No. 8,131,506, which is a continuation of application No. 12/183,949, filed on Jul. 31, 2008, now Pat. No. 7,908,116.

(60) Provisional application No. 60/963,183, filed on Aug. 3, 2007, provisional application No. 60/994,011, filed on Sep. 17, 2007.

(51) **Int. Cl.**
G01B 15/00 (2006.01)

(52) **U.S. Cl.** ..... **702/182**; 702/176; 702/183; 702/184; 700/276; 700/278; 236/1 C; 236/46 A; 236/46 R; 165/238; 165/239

(58) **Field of Classification Search** ..... 702/176, 702/182–184; 700/276, 278; 236/1 C, 46 A, 236/46 R; 165/236, 239
See application file for complete search history.

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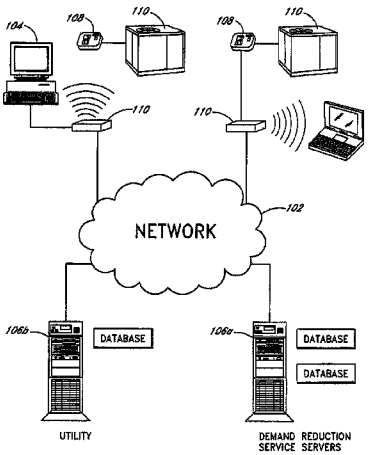
(57) **ABSTRACT**

The invention comprises systems and methods for estimating the rate of change in temperature inside a structure. At least one thermostat located is inside the structure and is used to control an climate control system in the structure. At least one remote processor is in communication with said thermostat and at least one database stores data reported by the thermostat. At least one processor compares the outside temperature at least one location and at least one point in time to information reported to the remote processor from the thermostat. The processor uses the relationship between the inside temperature and the outside temperature to determine whether the climate control system is "on" or "off".

16 Claims, 10 Drawing Sheets



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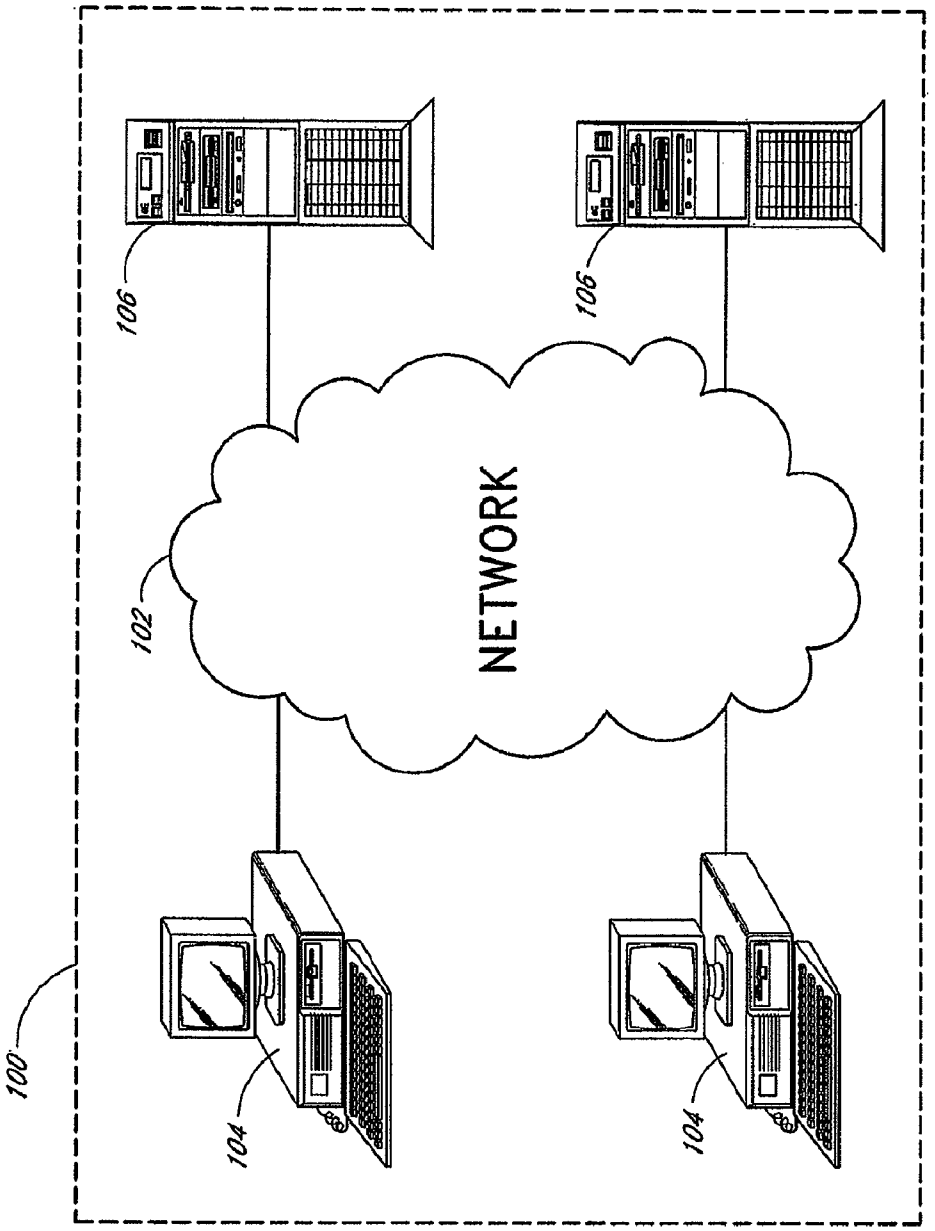
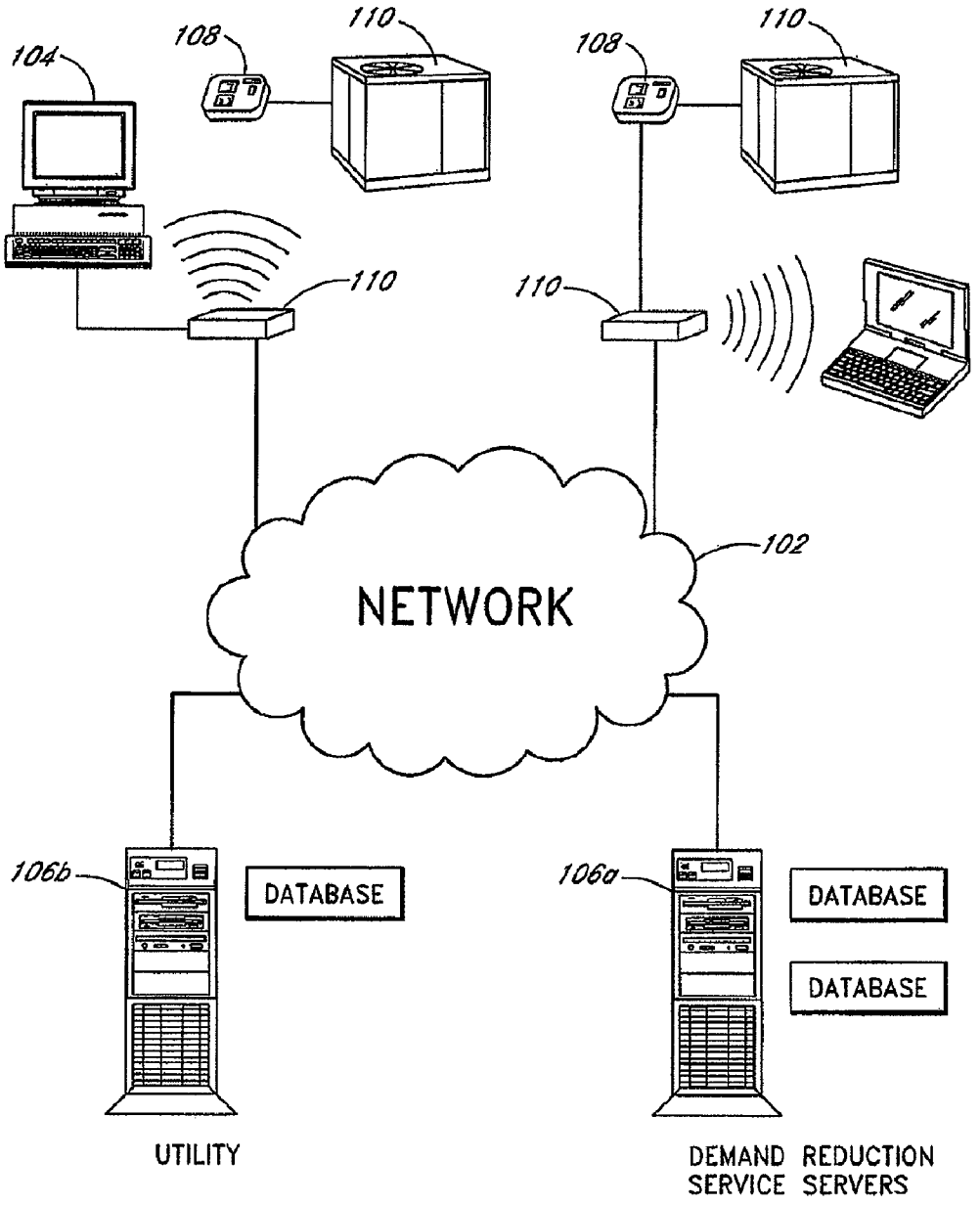


FIG. 1


104
108
110
108
110
110
110
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102
106b
DATABASE
106a
DATABASE
DATABASE
UTILITY
DEMAND REDUCTION
SERVICE SERVERS

FIG. 2

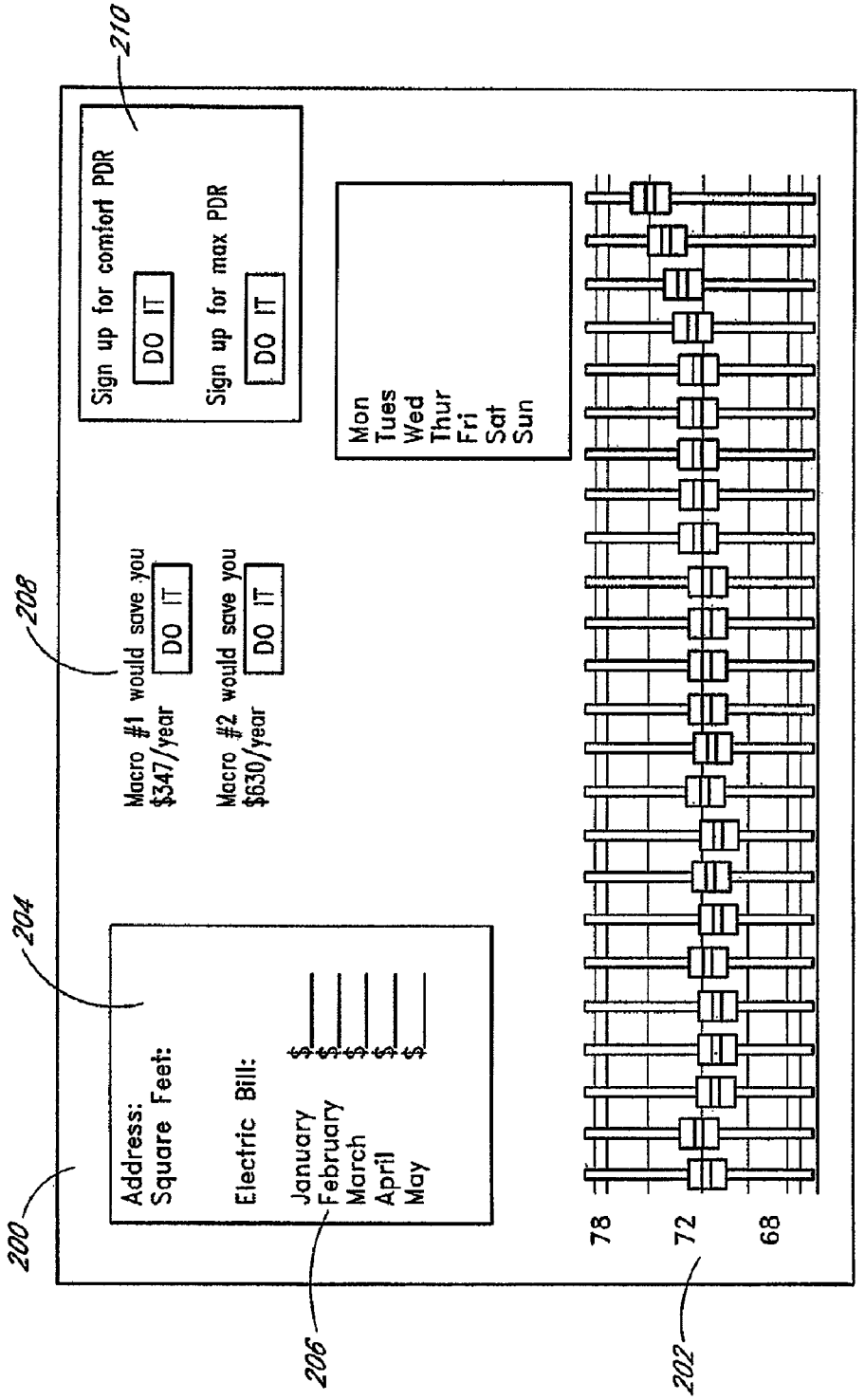
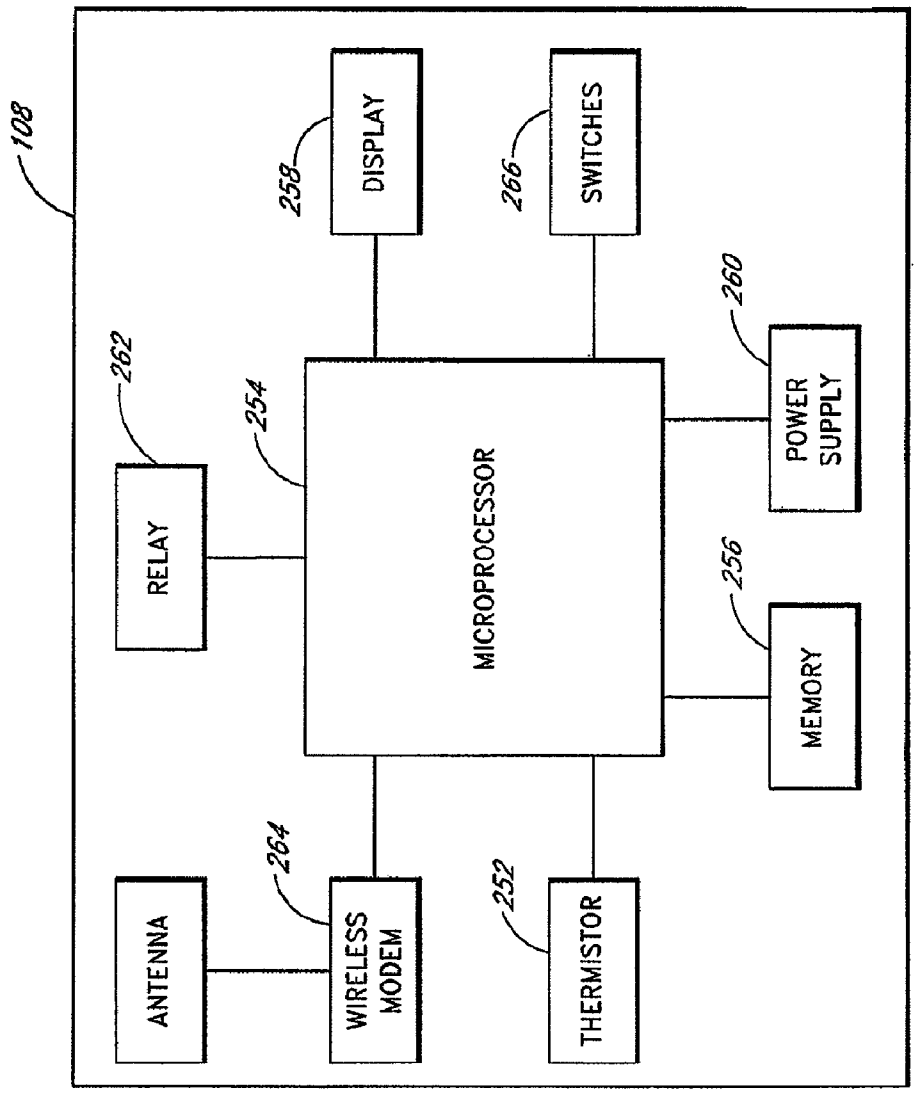

210
Sign up for comfort PDR
DO IT
Sign up for max PDR
DO IT
Mon
Tues
Wed
Thur
Fri
Sat
Sun
208
Macro #1 would save you $347/year
DO IT
Macro #2 would save you $630/year
DO IT
204
Address:
Square Feet:
Electric Bill:
January
February
March
April
May
200
206
78
72
68
202

FIG. 3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DISPLAY
258
SWITCHES
266
260
POWER SUPPLY
262
254
RELAY
MICROPROCESSOR
256
MEMORY
264
ANTENNA
WIRELESS MODEM
252
THERMISTOR

FIG. 4

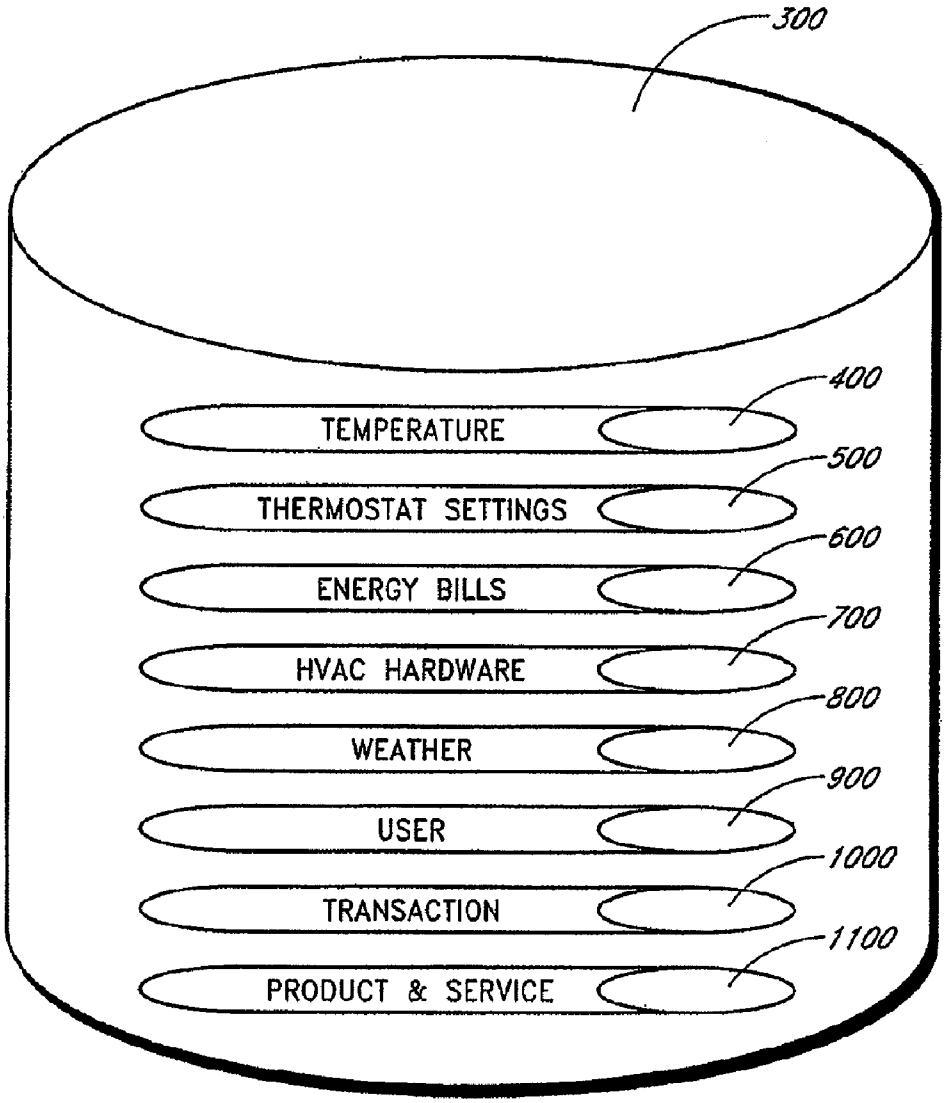
300
400
TEMPERATURE
500
THERMOSTAT SETTINGS
600
ENERGY BILLS
700
HVAC HARDWARE
800
WEATHER
900
USER
1000
TRANSACTION
1100
PRODUCT & SERVICE

FIG. 5

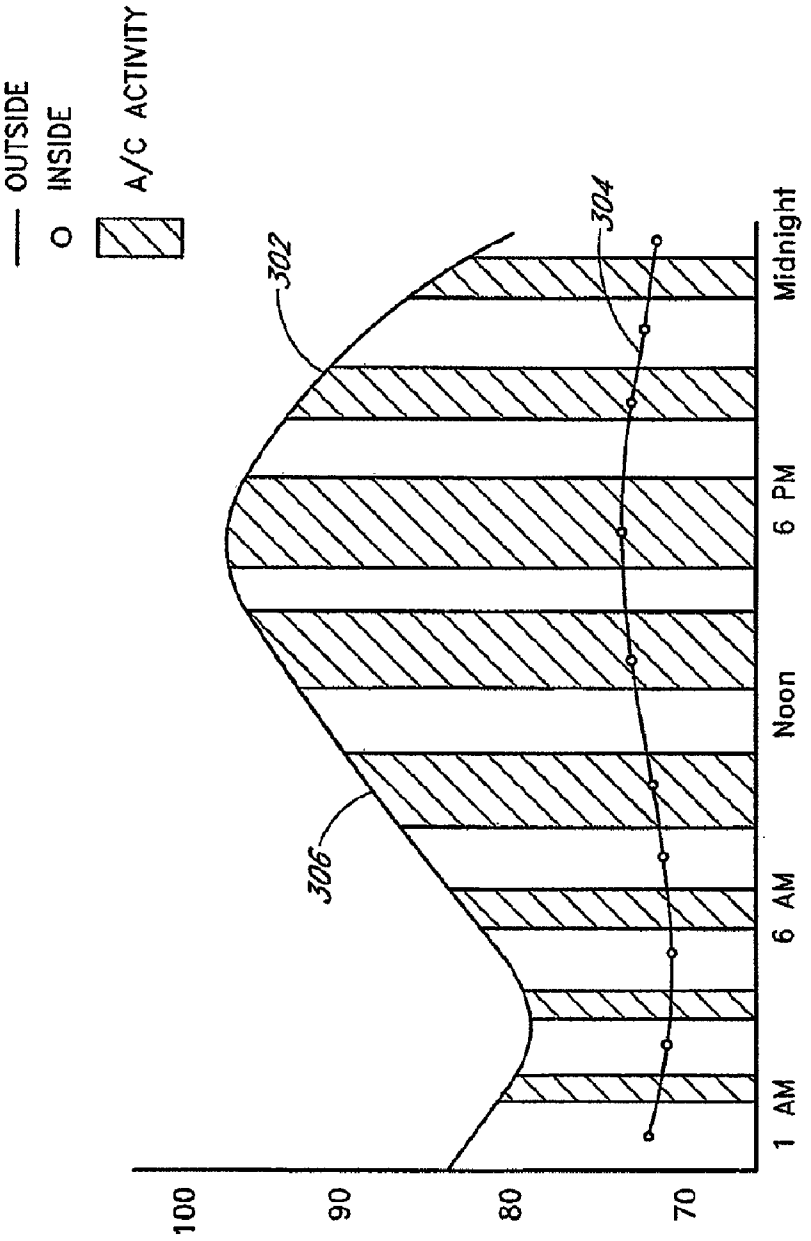
OUTSIDE
INSIDE
A/C ACTIVITY
302
304
306
Midnight
6 PM
Noon
6 AM
1 AM
100
90
80
70

FIG. 6A

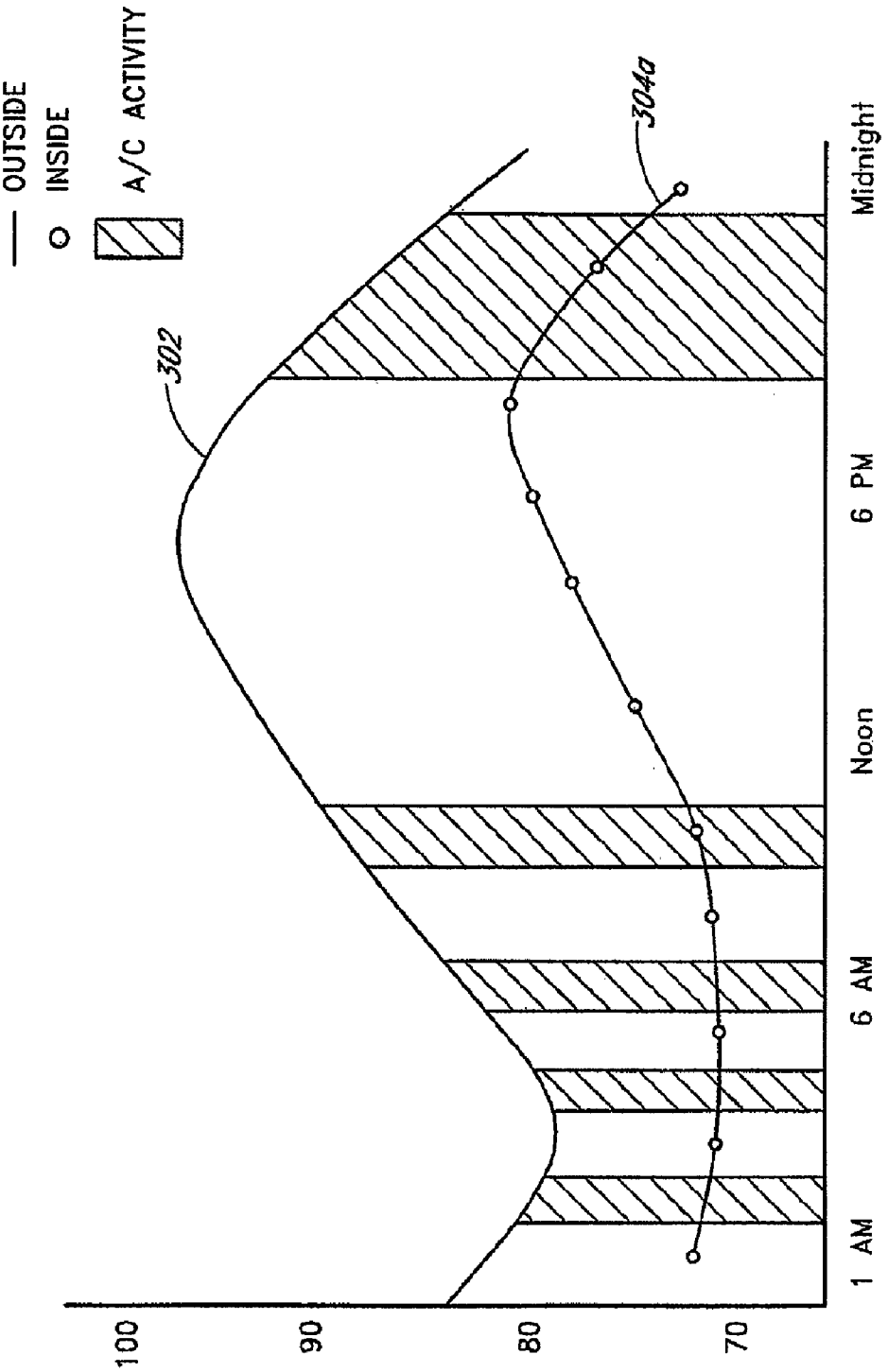
OUTSIDE
INSIDE
A/C ACTIVITY
302
304a
Midnight
6 PM
Noon
6 AM
1 AM
100
90
80
70

FIG. 6B

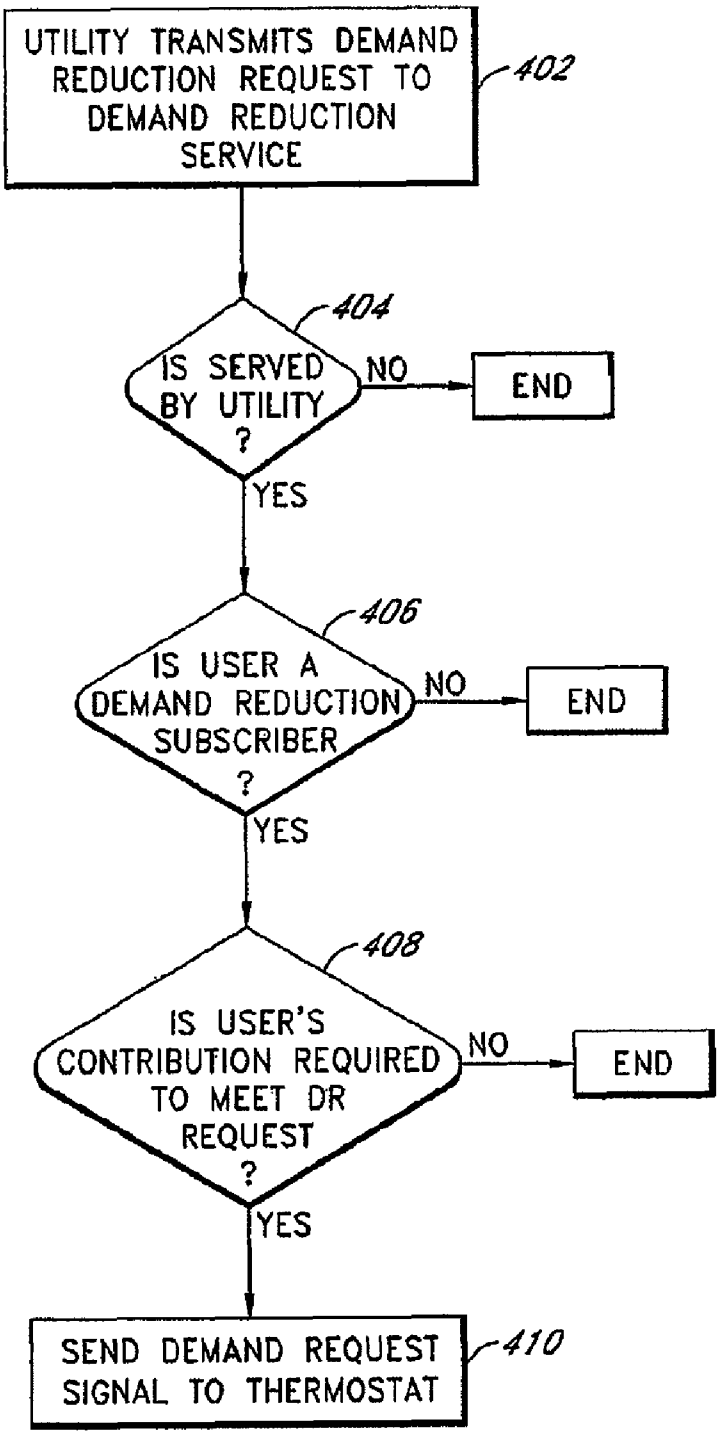
UTILITY TRANSMITS DEMAND REDUCTION REQUEST TO DEMAND REDUCTION SERVICE
402
404
IS SERVED BY UTILITY ?
NO
END
YES
406
IS USER A DEMAND REDUCTION SUBSCRIBER ?
NO
END
YES
408
IS USER'S CONTRIBUTION REQUIRED TO MEET DR REQUEST ?
NO
END
YES
SEND DEMAND REQUEST SIGNAL TO THERMOSTAT
410

FIG. 7

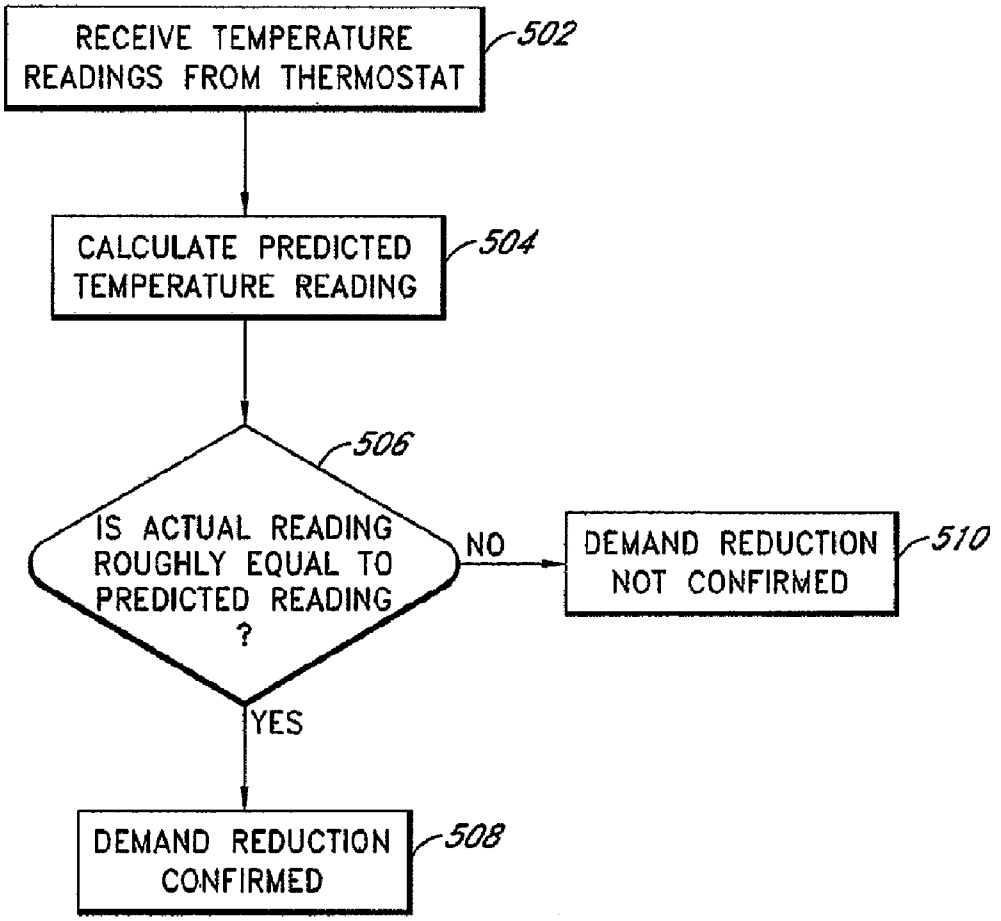
RECEIVE TEMPERATURE READINGS FROM THERMOSTAT
502
CALCULATE PREDICTED TEMPERATURE READING
504
506
IS ACTUAL READING ROUGHLY EQUAL TO PREDICTED READING ?
NO
DEMAND REDUCTION NOT CONFIRMED
510
YES
DEMAND REDUCTION CONFIRMED
508

FIG. 8

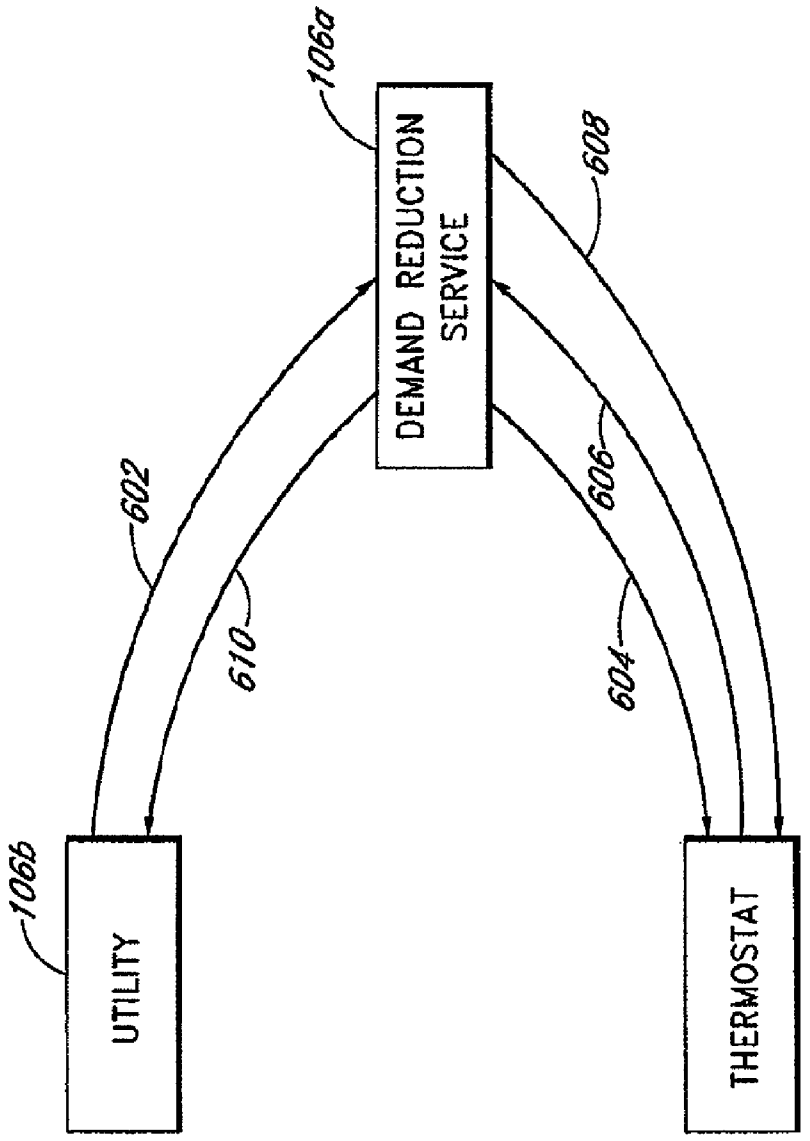
106a
DEMAND REDUCTION SERVICE
608
602
606
610
604
106b
UTILITY
THERMOSTAT

FIG. 9

SYSTEM AND METHOD FOR USING A NETWORK OF THERMOSTATS AS TOOL TO VERIFY PEAK DEMAND REDUCTION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 13/037,162, filed Feb. 28, 2011, now U.S. Pat. No. 8,131,506 which is a continuation of U.S. patent application Ser. No. 12/183,949, filed Jul. 31, 2008, now U.S. Pat. No. 7,908,116, issued on Mar. 15, 2011, which claims the benefit of priority under 35 U.S.C. §119(e) to both U.S. Provisional Application 60/963,183, filed Aug. 3, 2007; and U.S. Provisional Application No. 60/994,011, filed Sep. 17, 2007, the entireties of which are incorporated herein by reference and are to be considered part of this specification.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the use of thermostatic HVAC controls that are connected to a computer network as a part of a system for offering peak demand reduction to electric utilities. More specifically, the present invention pertains to use of communicating thermostat combined with a computer network to verify that demand reduction has occurred.

2. Background

Climate control systems such as heating and cooling systems for buildings (heating, ventilation and cooling, or HVAC systems) have been controlled for decades by thermostats. At the most basic level, a thermostat includes a means to allow a user to set a desired temperature, a means to sense actual temperature, and a means to signal the heating and/or cooling devices to turn on or off in order to try to change the actual temperature to equal the desired temperature. The most basic versions of thermostats use components such as a coiled bi-metallic spring to measure actual temperature and a mercury switch that opens or completes a circuit when the spring coils or uncoils with temperature changes. More recently, electronic digital thermostats have become prevalent. These thermostats use solid-state devices such as thermistors or thermal diodes to measure temperature, and microprocessor-based circuitry to control the switch and to store and operate based upon user-determined protocols for temperature vs. time.

These programmable thermostats generally offer a very restrictive user interface, limited by the cost of the devices, the limited real estate of the small wall-mounted boxes, and the inability to take into account more than two variables: the desired temperature set by the user, and the ambient temperature sensed by the thermostat. Users can generally only set one series of commands per day, and to change one parameter (e.g., to change the late-night temperature) the user often has to cycle through several other parameters by repeatedly pressing one or two buttons.

As both the cost of energy and the demand for electricity have increased, utilities supplying electricity increasingly face unpleasant choices. The demand for electricity is not smooth over time. In so-called "summer peaking" locations, on the hottest days of the year, peak loads may be twice as high as average loads. During such peak load periods (generally in the late afternoon), air conditioning can be the largest single element of demand.

Utilities and their customers generally see reductions of supply (brownouts and blackouts) as an unacceptable outcome. But their other options can be almost as distasteful. In the long term, they can build additional generating capacity, but that approach is very expensive given the fact that such capacity may be needed for only a few hours a year. And this option is of course unavailable in the short term. When confronted with an immediate potential shortfall, a utility may have reserve capacity it can choose to bring online. But because utilities are assumed to try to operate as efficiently as possible, the reserve capacity is likely to be the least efficient and most expensive and/or more polluting plants to operate. Alternatively, the utility may seek to purchase additional power on the open market. But the spot market for electricity, which cannot efficiently be stored, is extremely volatile, which means that spot prices during peak events may be as much as 10× the average price.

More recently, many utilities have begun to enter into agreements with certain customers to reduce demand, as opposed to increasing supply. In essence, these customers agree to reduce usage during a few critical periods in exchange for incentives from the utility. Those incentives may take the form of a fixed contract payment in exchange for the right to cut the amount of power supplied at specified times, or a reduced overall price per kilowatt-hour, or a rebate each time power is reduced, or some other method.

The bulk of these peak demand reduction (PDR) contracts have been entered into with large commercial and industrial customers. This bias is in large part due to the fact that transaction costs are much lower today for a single contract with a factory that can offer demand reduction of 50 megawatts than they would be for the equivalent from residential customers—it could take 25,000 or more homes to equal that reduction if these homes went without air conditioning.

But residential air conditioning is the largest single component of peak demand in California, and is a large percentage in many other places. There are numerous reasons why it would be economically advantageous to deploy PDR in the residential market. Whereas cutting energy consumption at a large factory could require shutting down or curtailing production, which has direct economic costs, cutting consumption for a couple of hours in residences is likely to have no economic cost, and may only result in minor discomfort—or none at all if no one is at home at the time.

Residential PDR has been attempted. But there have been numerous command and control issues with these implementations. The standard approach to residential PDR has been to attach a radio-controlled switch to the control circuitry located outside the dwelling. These switches are designed to receive a signal from a transmitter that signals the compressor to shut off during a PDR call.

There are a number of technical complications with this approach. There is some evidence that "hard cycling" the compressor in this manner can damage the air conditioning system. There are also serious issues resulting from the fact that the communication system is unidirectional. When utilities contract for PDR, they expect verification of compliance. One-way pagers allow the utility to send a signal that will shut of the A/C, but the pager cannot confirm to the utility that the NC unit has in fact been shut off. If a consumer tampers with the system so that the A/C can be used anyway, the utility will not be able to detect it, absent additional verification systems.

One way in which some utilities are seeking to address this issue is to combine the pager-controlled thermostat with so-called advanced metering infrastructure (AMI). This approach relies on the deployment of "smart meters"—electric meters that are more sophisticated than the traditional meter with its mechanical odometer mechanism for logging only cumulative energy use. Smart meters generally include a means for communicating instantaneous readings. That com-

munication may in the form of a signal sent over the power lines themselves, or a wireless communication over a data network arranged by the utility. These meters allow utilities to accomplish a number of goals, including offering pricing that varies by time of day in order to encourage customers to move consumption away from peak demand hours. These smart meters can cost hundreds of dollars, however, and require both a "truck roll"—a visit from a trained service person—and most likely the scheduling of an appointment with the occupants, because swapping the meter will require turning off power to the house.

If the utility installs a smart meter at each house that contracts to participate in a PDR program, it may be possible to verify that the A/C is in fact switched off. But this approach requires two separate pieces of hardware, two separate communications systems, and the ability to match them for verification purposes.

It would be desirable to have a system that could both implement and verify residential peak demand reduction with reduced expenses.

SUMMARY OF THE INVENTION

At least one embodiment of the invention that includes system for predicting the rate of change in temperature inside a structure comprising at least one thermostat located inside the structure and controlling an HVAC system in said structure; at least one remote processor that is in communication with said thermostat; at least one database for storing data reported by said thermostat; at least one processor that compares outside temperature at least location and at least one point in time to information reported to said remote processor from said thermostat, and wherein said processor uses the relationship between the inside temperature and the outside temperature over time to derive a first prediction for the rate of change in inside temperature assuming that the operating status of the HVAC system is "on"; and said processor uses the relationship between the inside temperature and the outside temperature over time to derive a second prediction for the rate of change in inside temperature assuming that the operating status of the HVAC system is "off"; and said processor compares at least one of the first prediction and the second prediction to the actual inside temperature recorded inside the structure to determine whether the actual inside temperature is closer to the first prediction or the second prediction.

In one embodiment, the invention comprises a thermostat attached to an HVAC system, a local network connecting the thermostat to a larger network such as the Internet, one or more additional thermostats attached to the network and to other HVAC systems, and a server in bi-directional communication with the thermostats. The server logs the ambient temperature sensed by each thermostat vs. time and the signals sent by the thermostats to the HVAC systems to which they are attached. The server preferably also logs outside temperature and humidity data for the geographic locations for the buildings served by the connected HVAC systems. Such information is widely available from various sources that publish detailed weather information based on geographic areas such as by ZIP code. The server also stores other data affecting the load upon the system, such as specific model of HVAC system, occupancy, building characteristics, etc. Some of this data may be supplied by the individual users of the system, while other data may come from commercial sources such as the electric and other utilities who supply energy to those users.

By using these multiple data streams to compare the performance of one system versus another, and one system versus the same system at other times, the server is able to estimate the effective thermal mass of the structure, and thereby predict the expected thermal performance of a given structure in response to changes in outside temperature. Thus, for example, if the air conditioning is shut off on a hot afternoon, given a known outside temperature, it will be possible to predict how quickly the temperature in the house should rise. If the actual temperature change is significantly different from the predicted rate of change, or does not change at all, it is possible to infer that the air conditioning has not, in fact been shut off.

This and other advantages of the present invention are explained in the detailed description and claims that make reference to the accompanying diagrams and flowcharts.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an example of an overall environment in which an embodiment of the invention may be used.

FIG. **2** shows a high-level illustration of the architecture of a network showing the relationship between the major elements of one embodiment of the subject invention.

FIG. **3** shows an embodiment of the website to be used as part of the subject invention.

FIG. **4** shows a high-level schematic of the thermostat used as part of the subject invention.

FIG. **5** shows one embodiment of the database structure used as part of the subject invention

FIGS. **6**A and **6**B show a graphical representation of the manner in which the subject invention may be used to verify that a demand reduction event has occurred.

FIG. **7** is a flow chart illustrating the steps involved in generating a demand reduction event for a given subscriber.

FIG. **8** is a flow chart illustrating the steps involved in confirming that a demand reduction event has taken place.

FIG. **9** is a representation of the movement of messages and information between the components of the subject invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows an example of an overall environment **100** in which an embodiment of the invention may be used. The environment **100** includes an interactive communication network **102** with computers **104** connected thereto. Also connected to network **102** are one or more server computers **106**, which store information and make the information available to computers **104**. The network **102** allows communication between and among the computers **104** and **106**.

Presently preferred network **102** comprises a collection of interconnected public and/or private networks that are linked to together by a set of standard protocols to form a distributed network. While network **102** is intended to refer to what is now commonly referred to as the Internet, it is also intended to encompass variations which may be made in the future, including changes additions to existing standard protocols.

When a user of the subject invention wishes to access information on network **102**, the buyer initiates connection from his computer **104**. For example, the user invokes a browser, which executes on computer **104**. The browser, in turn, establishes a communication link with network **102**. Once connected to network **102**, the user can direct the browser to access information on server **106**.

One popular part of the Internet is the World Wide Web. The World Wide Web contains a large number of computers **104** and servers **106**, which store HyperText Markup Language (HTML) documents capable of displaying graphical and textual information. HTML is a standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents.

The servers **106** that provide offerings on the World Wide Web are typically called websites. A website is often defined by an Internet address that has an associated electronic page. Generally, an electronic page is a document that organizes the presentation of text graphical images, audio and video.

In addition to the Internet, the network **102** can comprise a wide variety of interactive communication media. For example, network **102** can include local area networks, interactive television networks, telephone networks, wireless data systems, two-way cable systems, and the like.

In one embodiment, computers **104** and servers **106** are conventional computers that are equipped with communications hardware such as modem or a network interface card. The computers include processors such as those sold by Intel and AMD. Other processors may also be used, including general-purpose processors, multi-chip processors, embedded processors and the like.

Computers **104** can also be handheld and wireless devices such as personal digital assistants (PDAs), cellular telephones and other devices capable of accessing the network.

Computers **104** utilize a browser configured to interact with the World Wide Web. Such browsers may include Microsoft Explorer, Mozilla, Firefox, Opera or Safari. They may also include browsers used on handheld and wireless devices.

The storage medium may comprise any method of storing information. It may comprise random access memory (RAM), electronically erasable programmable read only memory (EEPROM), read only memory (ROM), hard disk, floppy disk, CD-ROM, optical memory, or other method of storing data.

Computers **104** and **106** may use an operating system such as Microsoft Windows, Apple Mac OS, Linux, Unix or the like.

Computers **106** may include a range of devices that provide information, sound, graphics and text, and may use a variety of operating systems and software optimized for distribution of content via networks.

FIG. **2** illustrates in further detail the architecture of the specific components connected to network **102** showing the relationship between the major elements of one embodiment of the subject invention. Attached to the network are thermostats **108** and computers **104** of various users. Connected to thermostats **108** are HVAC units **110**. The HVAC units may be conventional air conditioners, heat pumps, or other devices for transferring heat into or out of a building. Each user is connected to the servers **106***a* via wired or wireless connection such as Ethernet or a wireless protocol such as IEEE 802.11, a gateway **110** that connects the computer and thermostat to the Internet via a broadband connection such as a digital subscriber line (DSL) or other form of broadband connection to the World Wide Web. In one embodiment, electric utility server **106***a* and demand reduction service server **106***b* are in communication with the network **102**. Servers **106***a* and **106***b* contain the content to be served as web pages and viewed by computers **104**, as well as databases containing information used by the servers. Also connected to the servers **106***a* via the Internet are computers located at one or more electrical utilities **106***b*.

In the currently preferred embodiment, the website **200** includes a number of components accessible to the user, as shown in FIG. **3**. Those components may include a means to store temperature settings **202**, a means to enter information about the user's home **204**, a means to enter the user's electricity bills **206**, means to calculate energy savings that could result from various thermostat-setting strategies **208**, and means to enable and choose between various arrangements **210** for demand reduction with their electric utility provider as intermediated by the demand reduction service provider.

FIG. **4** shows a high-level block diagram of thermostat **108** used as part of the subject invention. Thermostat **108** includes temperature sensing means **252**, which may be a thermistor, thermal diode or other means commonly used in the design of electronic thermostats. It includes a microprocessor **254**, memory **256**, a display **258**, a power source **260**, a relay **262**, which turns the HVAC system on and off in response to a signal from the microprocessor, and contacts by which the relay is connected to the wires that lead to the HVAC system. To allow the thermostat to communicate bi-directionally with the computer network, the thermostat also includes means **264** to connect the thermostat to a local computer or to a wireless network. Such means could be in the form of Ethernet, wireless protocols such as IEEE 802.11, IEEE 802.15.4, Bluetooth, or other wireless protocols. (Other components as needed) The thermostat **250** may also include controls **266** allowing users to change settings directly at the thermostat, but such controls are not necessary to allow the thermostat to function.

The data used to generate the content delivered in the form of the website is stored on one or more servers **106** within one or more databases. As shown in FIG. **5**, the overall database structure **300** may include temperature database **400**, thermostat settings database **500**, energy bill database **600**, HVAC hardware database **700**, weather database **800**, user database **900**, transaction database **1000**, product and service database **1100** and such other databases as may be needed to support these and additional features.

The website will allow users of connected thermostats **250** to create personal accounts. Each user's account will store information in database **900**, which tracks various attributes relative to users of the site. Such attributes may include the make and model of the specific HVAC equipment in the user's home; the age and square footage of the home, the solar orientation of the home, the location of the thermostat in the home, the user's preferred temperature settings, whether the user is a participant in a demand reduction program, etc.

As shown in FIG. **3**, the website **200** will permit thermostat users to perform through the web browser substantially all of the programming functions traditionally performed directly at the physical thermostat, such as temperature set points, the time at which the thermostat should be at each set point, etc. Preferably the website will also allow users to accomplish more advanced tasks such as allow users to program in vacation settings for times when the HVAC system may be turned off or run at more economical settings, and set macros that will allow changing the settings of the temperature for all periods with a single gesture such as a mouse click.

In addition to using the system to allow better signaling and control of the HVAC system, which relies primarily on communication running from the server to the thermostat, the bi-directional communication will also allow the thermostat **108** to regularly measure and send to the server information about the temperature in the building. By comparing outside temperature, inside temperature, thermostat settings, cycling behavior of the HVAC system, and other variables, the system

will be capable of numerous diagnostic and controlling functions beyond those of a standard thermostat.

For example, FIG. **6***a* shows a graph of inside temperature, outside temperature and HVAC activity for a 24 hour period. When outside temperature **302** increases, inside temperature **304** follows, but with some delay because of the thermal mass of the building, unless the air conditioning **306** operates to counteract this effect. When the air conditioning turns on, the inside temperature stays constant (or rises at a much lower rate) despite the rising outside temperature. In this example, frequent and heavy use of the air conditioning results in only a very slight temperature increase inside o the house of 4 degrees, from 72 to 76 degrees, despite the increase in outside temperature from 80 to 100 degrees.

FIG. **6***b* shows a graph of the same house on the same day, but assumes that the air conditioning is turned off from noon to 7 PM. As expected, the inside temperature **304***a* rises with increasing outside temperatures **302** for most of that period, reaching 88 degrees at 7 PM.

Because server **106***a* logs the temperature readings from inside each house (whether once per minute or over some other interval), as well as the timing and duration of air conditioning cycles, database **300** will contain a history of the thermal performance of each house. That performance data will allow the server **106***a* to calculate an effective thermal mass for each such structure—that is, the speed with the temperature inside a given building will change in response to changes in outside temperature. Because the server will also log these inputs against other inputs including time of day, humidity, etc. the server will be able to predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures.

As shown in FIG. **3**, website **200** will allow the users to opt **210** into a plan that offers incentives such as cash or rebates in exchange for reduced air conditioning use during peak load periods.

FIG. **7** shows the steps followed in order to initiate air conditioner shutoff. When a summer peak demand situation occurs, the utility will transmit an email **402** or other signal to server **106***a* requesting a reduction in load. Server **106***a* will determine **404** if the user's house is served by the utility seeking reduction; determine **406** if a given user has agreed to reduce peak demand; and determine **408** if a reduction of consumption by the user is required or desirable in order to achieve the reduction in demand requested by the utility. The server will transmit **410** a signal to the user's thermostat **108** signaling the thermostat to shut off the air conditioner **110**.

FIG. **8** shows the steps followed in order to verify that the air conditioner has in fact been shut off. Server **106***a* will receive and monitor **502** the temperature readings sent by the user's thermostat **108**. The server then calculates **504** the temperature reading to be expected for that thermostat given inputs such as current and recent outside temperature, recent inside temperature readings, the calculated thermal mass of the structure, temperature readings in other houses, etc. The server will compare **506** the predicted reading with the actual reading. If the server determines that the temperature inside the house is rising at the rate predicted if the air conditioning is shut off, then the server confirms **508** that the air conditioning has been shut off. If the temperature reading from the thermostat shows no increase, or significantly less increase than predicted by the model, then the server concludes **510** that the air conditioning was not switched off, and that no contribution to the demand response request was made.

For example, assume that on at 3 PM on date Y utility X wishes to trigger a demand reduction event. A server at utility X transmits a message to the server at demand reduction service provider Z requesting W megawatts of demand reduction. Demand reduction service provider server determines that it will turn off the air conditioner at house A in order to achieve the required demand reduction. At the time the event is triggered, the inside temperature as reported by the thermostat in house A is 72 degrees F. The outside temperature near house A is 96 degrees Fahrenheit. The inside temperature at House B, which is not part of the demand reduction program, but is both connected to the demand reduction service server and located geographically proximate to House A, is 74 F. Because the A/C in house A has been turned off, the temperature inside House A begins to rise, so that at 4 PM it has increased to 79 F. Because the server is aware of the outside temperature, which remains at 96 F, and of the rate of temperature rise inside house A on previous days on which temperatures have been at or near 96 F, and the temperature in house B, which has risen only to 75 F because the air conditioning in house B continues to operate normally, the server is able to confirm with a high degree of certainty that the A/C in house A has indeed been shut off.

In contrast, if the HVAC system at house A has been tampered with, so that a demand reduction signal from the server does not actually result in shutting off the A/C in house A, when the server compares the rate of temperature change at house A against the other data points, the server will receive data inconsistent with the rate of increase predicted. As a result, it will conclude that the A/C has not been shut off in house A as expected, and will not credit house A with the financial credit that would be associated with demand reduction compliance, or may trigger a business process that could result in termination of house A's participation in the demand reduction program.

FIG. **9** illustrates the movement of signals and information between the components of the subject invention to trigger and verify a demand reduction response. In step **602** the electric utility server **106***b* transmits a message to demand reduction service server **106***a* requesting a demand reduction of a specified duration and size. Demand reduction service server **106***a* uses database **300** to determine which subscribers should be included in the demand reduction event. For each included subscriber, the server then sends a signal **604** to the subscriber's thermostat instructing it (a) to shut down at the appropriate time or (b) to allow the temperature as measured by the thermostat to increase to a certain temperature at the specified time, depending upon the agreement between the homeowner and the demand reduction aggregator. The server then receives **606** temperature signals from the subscriber's thermostat. At the conclusion of the demand reduction event, the server transmits a signal **608** to the thermostat permitting the thermostat to signal its attached HVAC system to resume cooling, if the system has been shut off, or to reduce the target temperature to its pre-demand reduction setting, if the target temperature was merely increased. After determining the total number of subscribers actually participating in the DR event, the server then calculates the total demand reduction achieved and sends a message **610** to the electric utility confirming such reduction.

Additional steps may be included in the process. For example, if the subscriber has previously requested that notice be provided when a peak demand reduction event occurs, the server will also send an alert, which may be in the form of an email message or an update to the personalized web page for that user, or both. If the server determines that a given home has (or has not) complied with the terms of its demand reduction agreement, the server will send a message to the subscriber confirming that fact.

It should also be noted that in some climate zones, peak demand events occur during extreme cold weather rather than (or in addition to) during hot weather. The same process as discussed above could be employed to reduce demand by shutting off electric heaters and monitoring the rate at which temperatures fall.

It should also be noted that the peak demand reduction service can be performed directly by a power utility, so that the functions of server **106***a* can be combined with the functions of server **106***b*.

The system installed in a subscriber's home may optionally include additional temperature sensors at different locations within the building. These additional sensors may we connected to the rest of the system via a wireless system such as 802.11 or 802.15.4, or may be connected via wires. Additional temperature and/or humidity sensors may allow increased accuracy of the system, which can in turn increase user comfort, energy savings or both.

While particular embodiments of the present invention have been shown and described, it is apparent that changes and modifications may be made without departing from the invention in its broader aspects and, therefore, the invention may carried out in other ways without departing from the true spirit and scope. These and other equivalents are intended to be covered by the following claims:

What is claimed is:

1. A system for monitoring the operational status of an HVAC system comprising:

at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system;

one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system,

wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time to derive an estimation for the rate of change in inside temperature of said first structure in response to outside temperature, and

wherein said one or more processors compare an inside temperature recorded inside the first structure with said estimation for the rate of change in inside temperature of said first structure to determine whether the first HVAC system is on or off.

2. A system as in claim **1** in which said one or more processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC system.

3. A system as in claim **1** in which said HVAC system is located within a single family dwelling.

4. A system as in claim **1** in which said HVAC system comprises a programmable thermostat.

5. A system as in claim **1** in which said HVAC system comprises a programmable thermostat that communicates with a mesh networking protocol.

6. A system as in claim **1** in which said HVAC system comprises a programmable thermostat that communicates with a network.

7. A system as in claim **1** in which said one or more processors communicate with said HVAC system using a network that includes an electricity meter.

8. A system as in claim **1** in which said estimation is a prediction about the future rate of change in temperature inside said structure.

9. A method for monitoring the operation of an HVAC system comprising:

receiving temperature measurements from at least one HVAC control system associated with a first structure conditioned by at least one HVAC system;

receiving at one or more processors, measurements of outside temperatures from at least one source other than said HVAC system;

comparing with said one or more processors the inside temperature of said first structure and the outside temperature over time to derive an estimation for the rate of change in inside temperature of said first structure in response to outside temperature, and

comparing with said one or more processors, an inside temperature recorded inside the first structure with said estimation for the rate of change in inside temperature of said first structure to determine whether the first HVAC system is on or off.

10. A method as in claim **9** in which said one or more processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than said HVAC system.

11. A method as in claim **9** in which said HVAC system is located within a single family dwelling.

12. A method as in claim **9** in which said HVAC system comprises a programmable thermostat.

13. A method as in claim **9** in which said HVAC system comprises a programmable thermostat that communicates with a mesh networking protocol.

14. A method as in claim **9** in which said HVAC system comprises a programmable thermostat that communicates with a network.

15. A method as in claim **9** in which said one or more processors communicate with said HVAC system using a network that includes an electricity meter.

16. A method as in claim **9** in which said estimation is a prediction about the future rate of change in temperature inside said structure.

* * * * *

Exhibit 3

US008738327B2

(12) **United States Patent**
Steinberg et al.

(10) **Patent No.: US 8,738,327 B2**
(45) **Date of Patent: *May 27, 2014**

(54) **SYSTEM AND METHOD FOR USING A NETWORK OF THERMOSTATS AS TOOL TO VERIFY PEAK DEMAND REDUCTION**

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(73) Assignee: **EcoFactor, Inc.**, Mlllbrae, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(22) Filed: **Mar. 28, 2013**

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Related U.S. Application Data

(63) Continuation of application No. 13/409,697, filed on Mar. 1, 2012, now Pat. No. 8,412,488, which is a continuation of application No. 13/037,162, filed on Feb. 28, 2011, now Pat. No. 8,131,506, which is a continuation of application No. 12/183,949, filed on Jul. 31, 2008, now Pat. No. 7,908,116.

(60) Provisional application No. 60/963,183, filed on Aug. 3, 2007, provisional application No. 60/994,011, filed on Sep. 17, 2007.

(51) **Int. Cl.**

G06F 11/30	(2006.01)
G21C 17/00	(2006.01)
G01M 1/38	(2006.01)
G05B 13/00	(2006.01)
G05B 15/00	(2006.01)
G05D 23/00	(2006.01)
F24F 11/053	(2006.01)
G05D 23/12	(2006.01)
G05D 23/185	(2006.01)
G05D 23/19	(2006.01)

(52) **U.S. Cl.**
USPC ..... **702/182**; 700/276; 700/278; 236/1 C; 165/238; 165/239

(58) **Field of Classification Search**
USPC ..... 702/176, 182–184; 700/276, 278; 236/1 C, 46 A, 46 R; 165/238, 239
See application file for complete search history.

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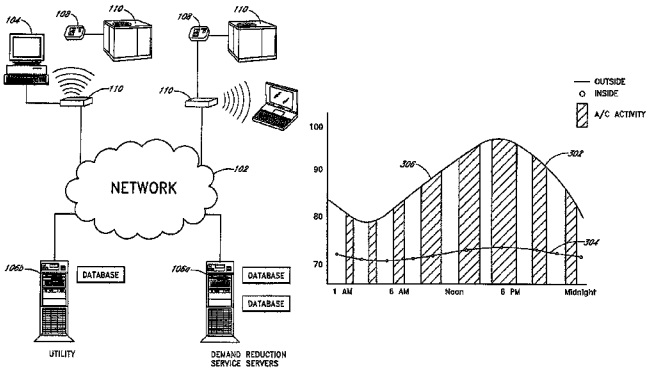
Primary Examiner — John Breene
Assistant Examiner — Manuel Rivera Vargas
(74) *Attorney, Agent, or Firm* — Knobbe, Martens, Olson & Bear, LLP

(57) **ABSTRACT**

The invention comprises systems and methods for estimating the rate of change in temperature inside a structure. At least one thermostat located is inside the structure and is used to control an climate control system in the structure. At least one remote processor is in communication with said thermostat and at least one database stores data reported by the thermostat. At least one processor compares the outside temperature at at least one location and at least one point in time to information reported to the remote processor from the thermostat. The processor uses the relationship between the inside temperature and the outside temperature to determine whether the climate control system is "on" or "off".

19 Claims, 10 Drawing Sheets



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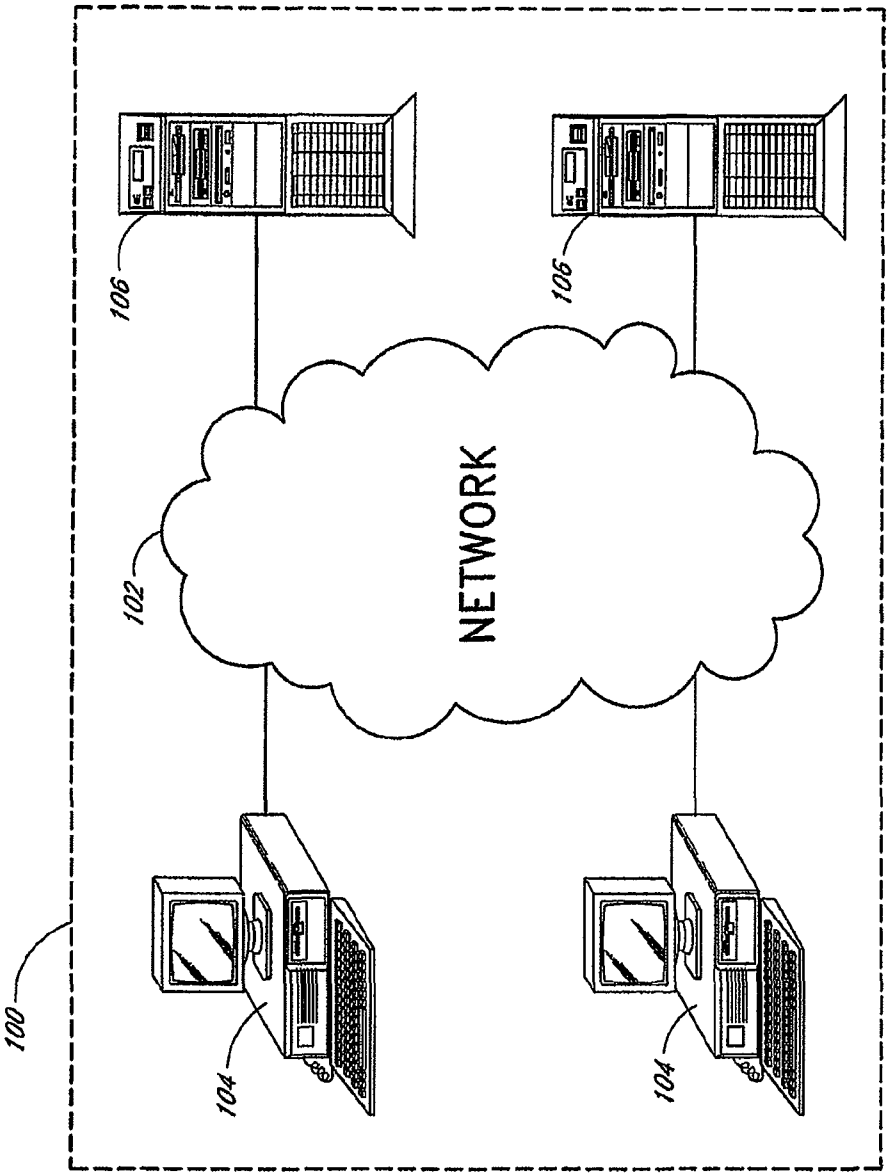

FIG. 1

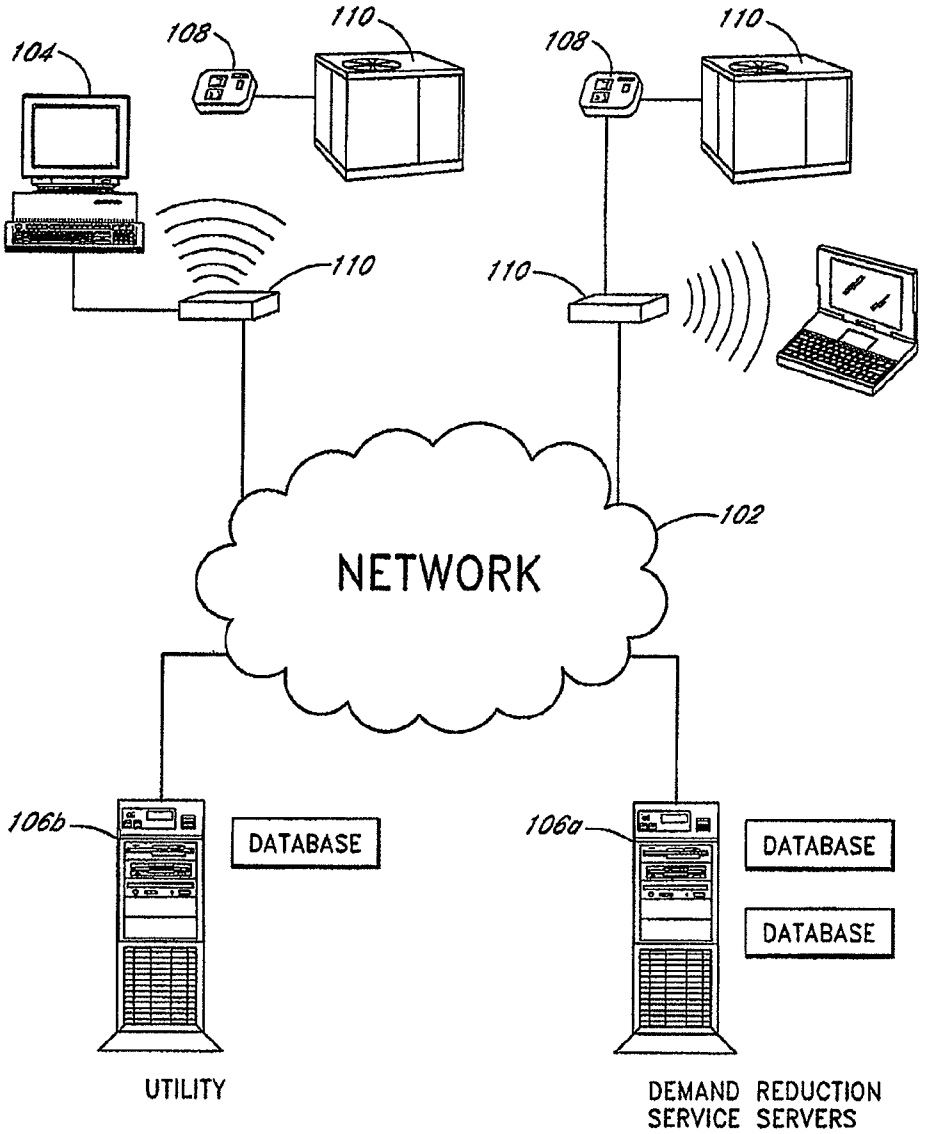
104
108
110
108
110
110
110
NETWORK
102
106b
DATABASE
106a
DATABASE
DATABASE
UTILITY
DEMAND REDUCTION SERVICE SERVERS

FIG. 2

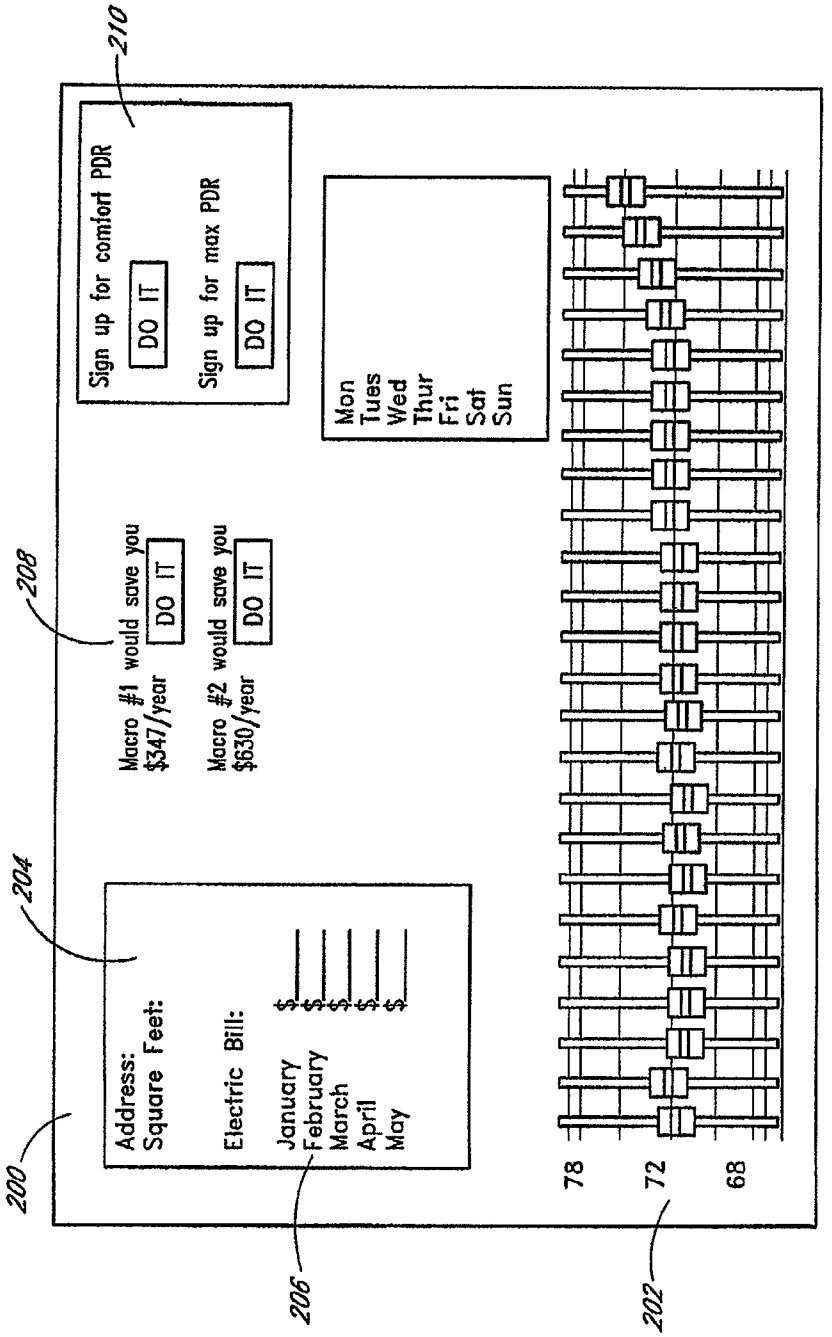
210
Sign up for comfort PDR
DO IT
Sign up for max PDR
DO IT
Mon
Tues
Wed
Thur
Fri
Sat
Sun
208
Macro #1 would save you $347/year
DO IT
Macro #2 would save you $630/year
DO IT
204
Address:
Square Feet:
Electric Bill:
January
February
March
April
May
200
206
78
72
68
202

FIG. 3

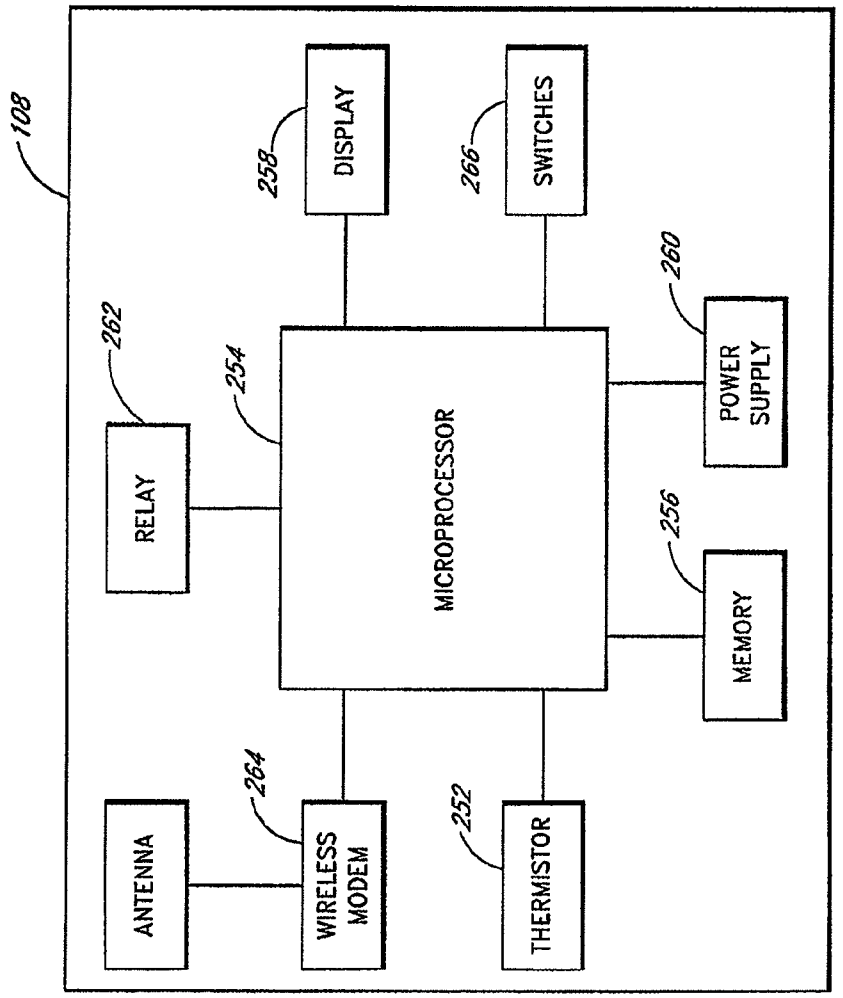
108
DISPLAY
258
SWITCHES
266
260
POWER SUPPLY
262
254
MICROPROCESSOR
RELAY
256
MEMORY
264
ANTENNA
WIRELESS MODEM
252
THERMISTOR

FIG. 4

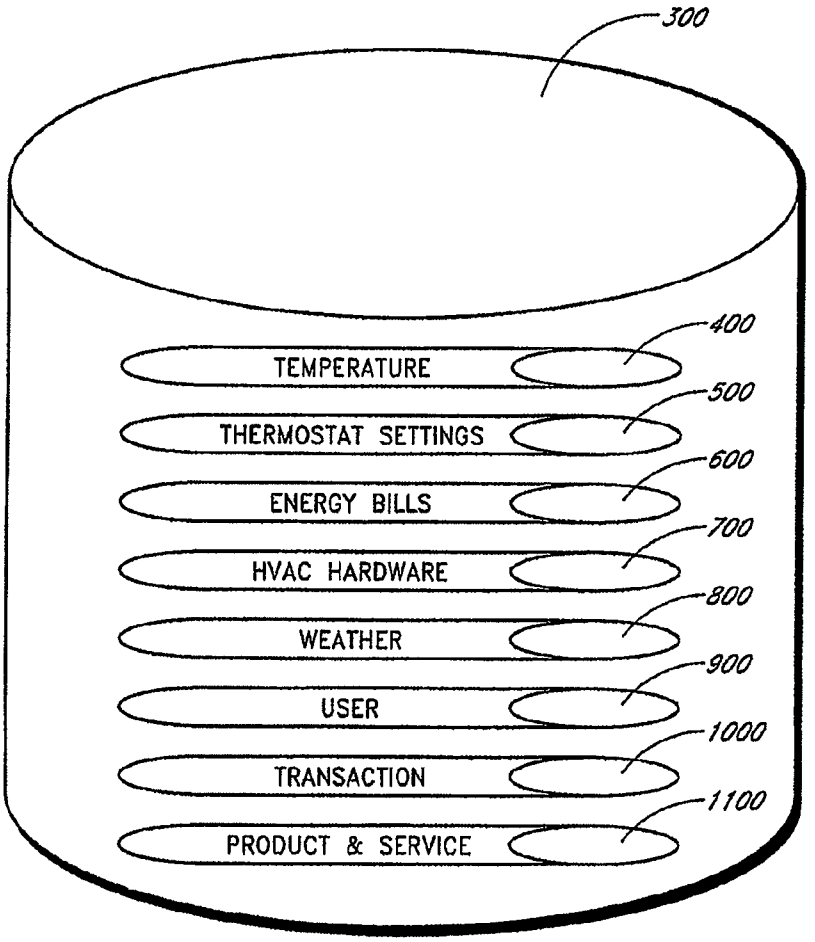
300
400
TEMPERATURE
500
THERMOSTAT SETTINGS
600
ENERGY BILLS
700
HVAC HARDWARE
800
WEATHER
900
USER
1000
TRANSACTION
1100
PRODUCT & SERVICE

FIG. 5

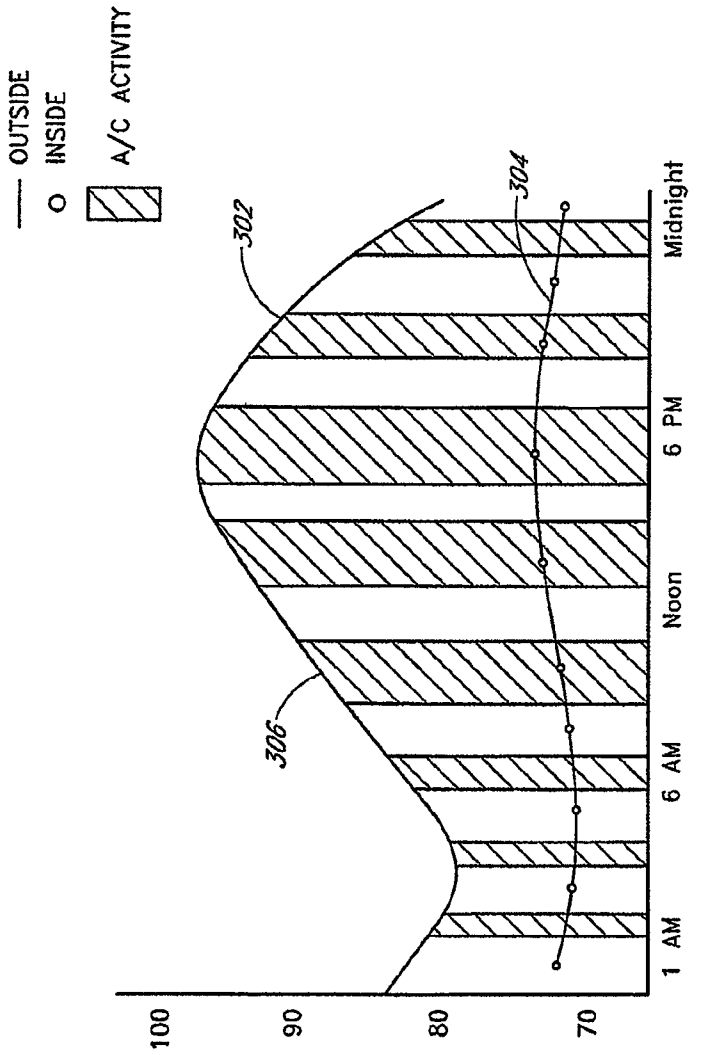
OUTSIDE
INSIDE
A/C ACTIVITY
302
304
306
Midnight
6 PM
Noon
6 AM
1 AM
100
90
80
70

FIG. 6A

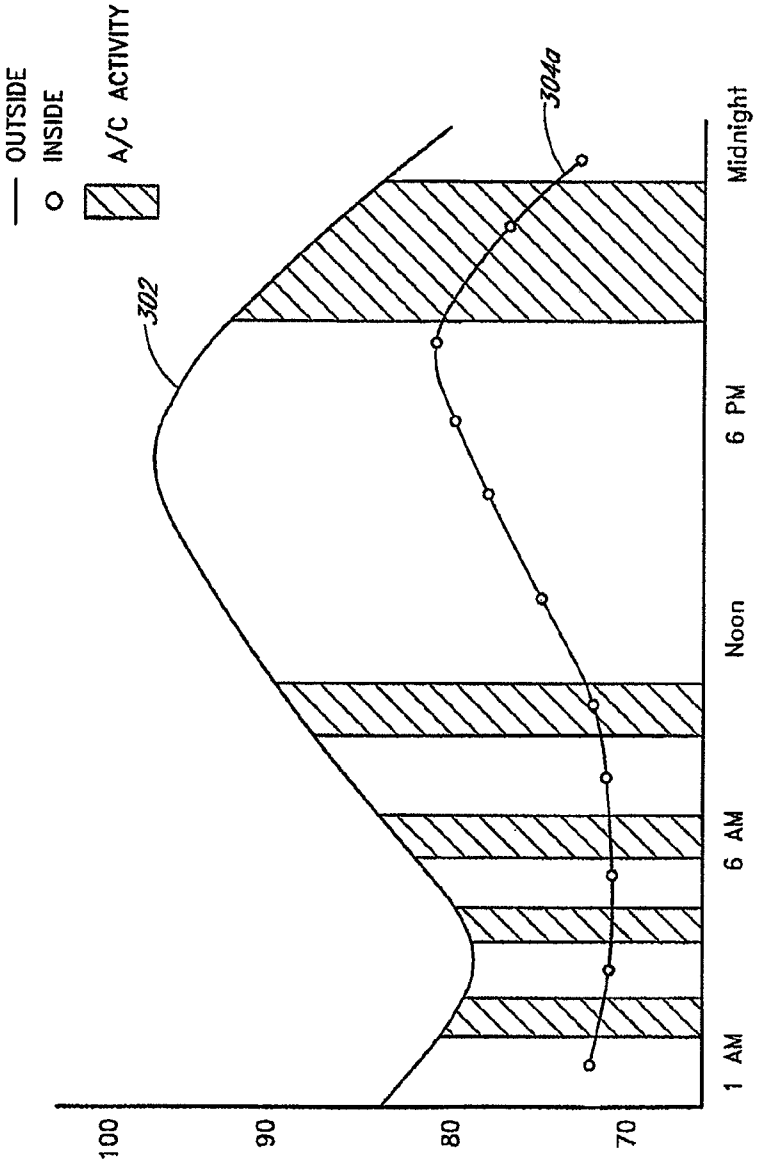
OUTSIDE
INSIDE
A/C ACTIVITY
302
304a
Midnight
6 PM
Noon
6 AM
1 AM
100
90
80
70

FIG. 6B

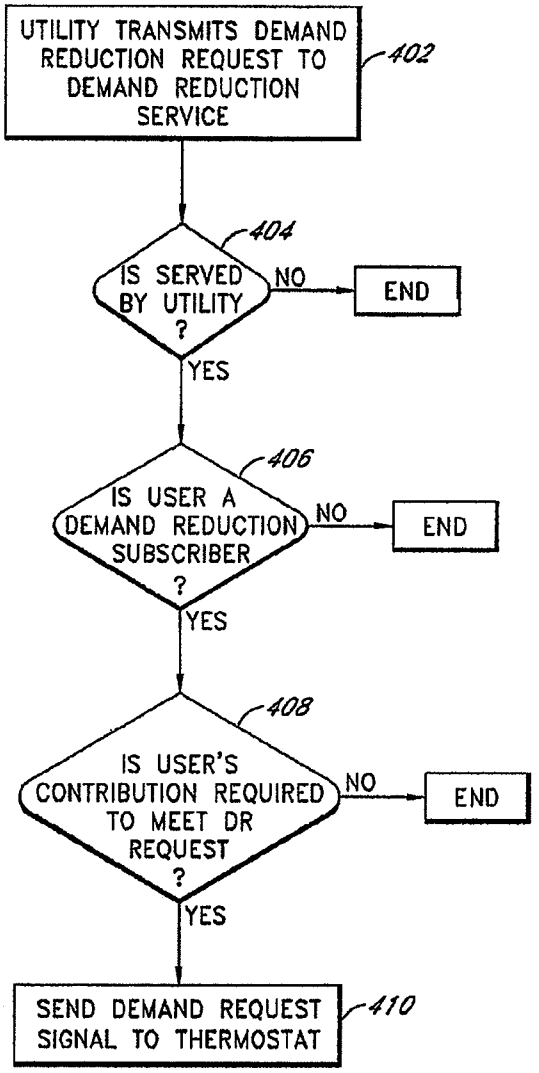
UTILITY TRANSMITS DEMAND REDUCTION REQUEST TO DEMAND REDUCTION SERVICE
402
IS SERVED BY UTILITY ?
404
NO
END
YES
IS USER A DEMAND REDUCTION SUBSCRIBER ?
406
NO
END
YES
IS USER'S CONTRIBUTION REQUIRED TO MEET DR REQUEST ?
408
NO
END
YES
SEND DEMAND REQUEST SIGNAL TO THERMOSTAT
410

FIG. 7

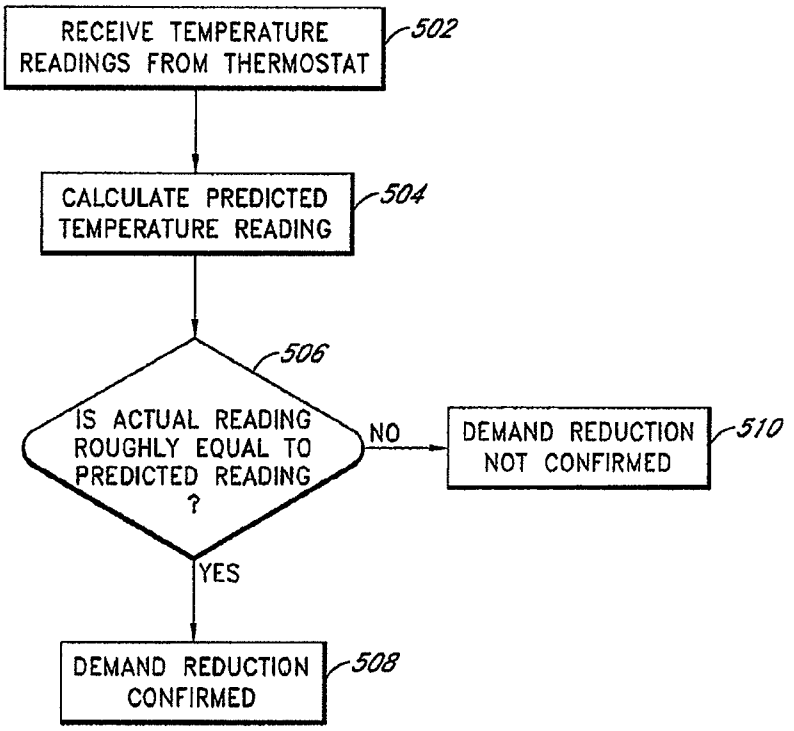
RECEIVE TEMPERATURE READINGS FROM THERMOSTAT
502
CALCULATE PREDICTED TEMPERATURE READING
504
506
IS ACTUAL READING ROUGHLY EQUAL TO PREDICTED READING ?
NO
DEMAND REDUCTION NOT CONFIRMED
510
YES
DEMAND REDUCTION CONFIRMED
508

FIG. 8

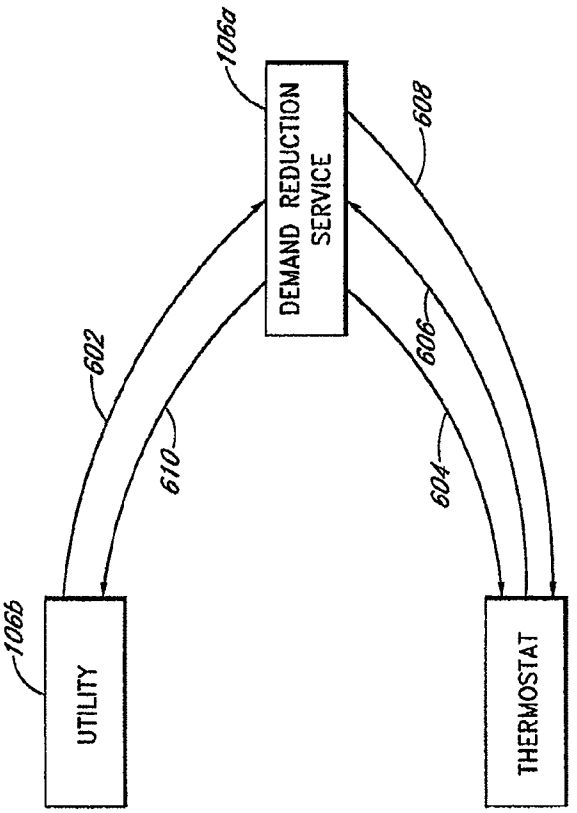
106a
DEMAND REDUCTION SERVICE
608
602
606
610
604
106b
UTILITY
THERMOSTAT

FIG. 9

SYSTEM AND METHOD FOR USING A NETWORK OF THERMOSTATS AS TOOL TO VERIFY PEAK DEMAND REDUCTION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 13/409,697, filed Mar. 1, 2012, which is a continuation of U.S. patent application Ser. No. 13/037,162, filed Feb. 28, 2011, which is a continuation of U.S. patent application Ser. No. 12/183,949, filed Jul. 31, 2008, which claims the benefit of priority under 35 U.S.C. §119(e) to both U.S. Provisional Application 60/963,183, filed Aug. 3, 2007; and U.S. Provisional Application No. 60/994,011, filed Sep. 17, 2007, the entireties of which are incorporated herein by reference and are to be considered part of this specification.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the use of thermostatic HVAC controls that are connected to a computer network as a part of a system for offering peak demand reduction to electric utilities. More specifically, the present invention pertains to use of communicating thermostat combined with a computer network to verify that demand reduction has occurred.

2. Background

Climate control systems such as heating and cooling systems for buildings (heating, ventilation and cooling, or HVAC systems) have been controlled for decades by thermostats. At the most basic level, a thermostat includes a means to allow a user to set a desired temperature, a means to sense actual temperature, and a means to signal the heating and/or cooling devices to turn on or off in order to try to change the actual temperature to equal the desired temperature. The most basic versions of thermostats use components such as a coiled bi-metallic spring to measure actual temperature and a mercury switch that opens or completes a circuit when the spring coils or uncoils with temperature changes. More recently, electronic digital thermostats have become prevalent. These thermostats use solid-state devices such as thermistors or thermal diodes to measure temperature, and microprocessor-based circuitry to control the switch and to store and operate based upon user-determined protocols for temperature vs. time.

These programmable thermostats generally offer a very restrictive user interface, limited by the cost of the devices, the limited real estate of the small wall-mounted boxes, and the inability to take into account more than two variables: the desired temperature set by the user, and the ambient temperature sensed by the thermostat. Users can generally only set one series of commands per day, and to change one parameter (e.g., to change the late-night temperature) the user often has to cycle through several other parameters by repeatedly pressing one or two buttons.

As both the cost of energy and the demand for electricity have increased, utilities supplying electricity increasingly face unpleasant choices. The demand for electricity is not smooth over time. In so-called "summer peaking" locations, on the hottest days of the year, peak loads may be twice as high as average loads. During such peak load periods (generally in the late afternoon), air conditioning can be the largest single element of demand.

Utilities and their customers generally see reductions of supply (brownouts and blackouts) as an unacceptable outcome. But their other options can be almost as distasteful. In the long term, they can build additional generating capacity, but that approach is very expensive given the fact that such capacity may be needed for only a few hours a year. And this option is of course unavailable in the short term. When confronted with an immediate potential shortfall, a utility may have reserve capacity it can choose to bring online. But because utilities are assumed to try to operate as efficiently as possible, the reserve capacity is likely to be the least efficient and most expensive and/or more polluting plants to operate. Alternatively, the utility may seek to purchase additional power on the open market. But the spot market for electricity, which cannot efficiently be stored, is extremely volatile, which means that spot prices during peak events may be as much as 10× the average price.

More recently, many utilities have begun to enter into agreements with certain customers to reduce demand, as opposed to increasing supply. In essence, these customers agree to reduce usage during a few critical periods in exchange for incentives from the utility. Those incentives may take the form of a fixed contract payment in exchange for the right to cut the amount of power supplied at specified times, or a reduced overall price per kilowatt-hour, or a rebate each time power is reduced, or some other method.

The bulk of these peak demand reduction (PDR) contracts have been entered into with large commercial and industrial customers. This bias is in large part due to the fact that transaction costs are much lower today for a single contract with a factory that can offer demand reduction of 50 megawatts than they would be for the equivalent from residential customers—it could take 25,000 or more homes to equal that reduction if these homes went without air conditioning.

But residential air conditioning is the largest single component of peak demand in California, and is a large percentage in many other places. There are numerous reasons why it would be economically advantageous to deploy PDR in the residential market. Whereas cutting energy consumption at a large factory could require shutting down or curtailing production, which has direct economic costs, cutting consumption for a couple of hours in residences is likely to have no economic cost, and may only result in minor discomfort—or none at all if no one is at home at the time.

Residential PDR has been attempted. But there have been numerous command and control issues with these implementations. The standard approach to residential PDR has been to attach a radio-controlled switch to the control circuitry located outside the dwelling. These switches are designed to receive a signal from a transmitter that signals the compressor to shut off during a PDR call.

There are a number of technical complications with this approach. There is some evidence that "hard cycling" the compressor in this manner can damage the air conditioning system. There are also serious issues resulting from the fact that the communication system is unidirectional. When utilities contract for PDR, they expect verification of compliance. One-way pagers allow the utility to send a signal that will shut of the NC, but the pager cannot confirm to the utility that the NC unit has in fact been shut off. If a consumer tampers with the system so that the NC can be used anyway, the utility will not be able to detect it, absent additional verification systems.

One way in which some utilities are seeking to address this issue is to combine the pager-controlled thermostat with so-called advanced metering infrastructure (AMI). This approach relies on the deployment of "smart meters"—electric meters that are more sophisticated than the traditional meter with its mechanical odometer mechanism for logging only cumulative energy use. Smart meters generally include a means for communicating instantaneous readings. That com-

munication may in the form of a signal sent over the power lines themselves, or a wireless communication over a data network arranged by the utility. These meters allow utilities to accomplish a number of goals, including offering pricing that varies by time of day in order to encourage customers to move consumption away from peak demand hours. These smart meters can cost hundreds of dollars, however, and require both a "truck roll"—a visit from a trained service person—and most likely the scheduling of an appointment with the occupants, because swapping the meter will require turning off power to the house.

If the utility installs a smart meter at each house that contracts to participate in a PDR program, it may be possible to verify that the NC is in fact switched off. But this approach requires two separate pieces of hardware, two separate communications systems, and the ability to match them for verification purposes.

It would be desirable to have a system that could both implement and verify residential peak demand reduction with reduced expenses.

SUMMARY OF THE INVENTION

At least one embodiment of the invention that includes system for predicting the rate of change in temperature inside a structure comprising at least one thermostat located inside the structure and controlling an HVAC system in said structure; at least one remote processor that is in communication with said thermostat; at least one database for storing data reported by said thermostat; at least one processor that compares outside temperature at at least location and at least one point in time to information reported to said remote processor from said thermostat, and wherein said processor uses the relationship between the inside temperature and the outside temperature over time to derive a first prediction for the rate of change in inside temperature assuming that the operating status of the HVAC system is "on"; and said processor uses the relationship between the inside temperature and the outside temperature over time to derive a second prediction for the rate of change in inside temperature assuming that the operating status of the HVAC system is "off"; and said processor compares at least one of the first prediction and the second prediction to the actual inside temperature recorded inside the structure to determine whether the actual inside temperature is closer to the first prediction or the second prediction.

In one embodiment, the invention comprises a thermostat attached to an HVAC system, a local network connecting the thermostat to a larger network such as the Internet, one or more additional thermostats attached to the network and to other HVAC systems, and a server in bi-directional communication with the thermostats. The server logs the ambient temperature sensed by each thermostat vs. time and the signals sent by the thermostats to the HVAC systems to which they are attached. The server preferably also logs outside temperature and humidity data for the geographic locations for the buildings served by the connected HVAC systems. Such information is widely available from various sources that publish detailed weather information based on geographic areas such as by ZIP code. The server also stores other data affecting the load upon the system, such as specific model of HVAC system, occupancy, building characteristics, etc. Some of this data may be supplied by the individual users of the system, while other data may come from commercial sources such as the electric and other utilities who supply energy to those users.

By using these multiple data streams to compare the performance of one system versus another, and one system versus the same system at other times, the server is able to estimate the effective thermal mass of the structure, and thereby predict the expected thermal performance of a given structure in response to changes in outside temperature. Thus, for example, if the air conditioning is shut off on a hot afternoon, given a known outside temperature, it will be possible to predict how quickly the temperature in the house should rise. If the actual temperature change is significantly different from the predicted rate of change, or does not change at all, it is possible to infer that the air conditioning has not, in fact been shut off.

This and other advantages of the present invention are explained in the detailed description and claims that make reference to the accompanying diagrams and flowcharts.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an example of an overall environment in which an embodiment of the invention may be used.

FIG. **2** shows a high-level illustration of the architecture of a network showing the relationship between the major elements of one embodiment of the subject invention.

FIG. **3** shows an embodiment of the website to be used as part of the subject invention.

FIG. **4** shows a high-level schematic of the thermostat used as part of the subject invention.

FIG. **5** shows one embodiment of the database structure used as part of the subject invention

FIGS. **6**A and **6**B show a graphical representation of the manner in which the subject invention may be used to verify that a demand reduction event has occurred.

FIG. **7** is a flow chart illustrating the steps involved in generating a demand reduction event for a given subscriber.

FIG. **8** is a flow chart illustrating the steps involved in confirming that a demand reduction event has taken place.

FIG. **9** is a representation of the movement of messages and information between the components of the subject invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. **1** shows an example of an overall environment **100** in which an embodiment of the invention may be used. The environment **100** includes an interactive communication network **102** with computers **104** connected thereto. Also connected to network **102** are one or more server computers **106**, which store information and make the information available to computers **104**. The network **102** allows communication between and among the computers **104** and **106**.

Presently preferred network **102** comprises a collection of interconnected public and/or private networks that are linked to together by a set of standard protocols to form a distributed network. While network **102** is intended to refer to what is now commonly referred to as the Internet, it is also intended to encompass variations which may be made in the future, including changes additions to existing standard protocols.

When a user of the subject invention wishes to access information on network **102**, the buyer initiates connection from his computer **104**. For example, the user invokes a browser, which executes on computer **104**. The browser, in turn, establishes a communication link with network **102**. Once connected to network **102**, the user can direct the browser to access information on server **106**.

One popular part of the Internet is the World Wide Web. The World Wide Web contains a large number of computers **104** and servers **106**, which store HyperText Markup Language (HTML) documents capable of displaying graphical and textual information. HTML is a standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents.

The servers **106** that provide offerings on the World Wide Web are typically called websites. A website is often defined by an Internet address that has an associated electronic page. Generally, an electronic page is a document that organizes the presentation of text graphical images, audio and video.

In addition to the Internet, the network **102** can comprise a wide variety of interactive communication media. For example, network **102** can include local area networks, interactive television networks, telephone networks, wireless data systems, two-way cable systems, and the like.

In one embodiment, computers **104** and servers **106** are conventional computers that are equipped with communications hardware such as modem or a network interface card. The computers include processors such as those sold by Intel and AMD. Other processors may also be used, including general-purpose processors, multi-chip processors, embedded processors and the like.

Computers **104** can also be handheld and wireless devices such as personal digital assistants (PDAs), cellular telephones and other devices capable of accessing the network.

Computers **104** utilize a browser configured to interact with the World Wide Web. Such browsers may include Microsoft Explorer, Mozilla, Firefox, Opera or Safari. They may also include browsers used on handheld and wireless devices.

The storage medium may comprise any method of storing information. It may comprise random access memory (RAM), electronically erasable programmable read only memory (EEPROM), read only memory (ROM), hard disk, floppy disk, CD-ROM, optical memory, or other method of storing data.

Computers **104** and **106** may use an operating system such as Microsoft Windows, Apple Mac OS, Linux, Unix or the like.

Computers **106** may include a range of devices that provide information, sound, graphics and text, and may use a variety of operating systems and software optimized for distribution of content via networks.

FIG. **2** illustrates in further detail the architecture of the specific components connected to network **102** showing the relationship between the major elements of one embodiment of the subject invention. Attached to the network are thermostats **108** and computers **104** of various users. Connected to thermostats **108** are HVAC units **110**. The HVAC units may be conventional air conditioners, heat pumps, or other devices for transferring heat into or out of a building. Each user is connected to the servers **106***a* via wired or wireless connection such as Ethernet or a wireless protocol such as IEEE 802.11, a gateway **110** that connects the computer and thermostat to the Internet via a broadband connection such as a digital subscriber line (DSL) or other form of broadband connection to the World Wide Web. In one embodiment, electric utility server **106***a* and demand reduction service server **106***b* are in communication with the network **102**. Servers **106***a* and **106***b* contain the content to be served as web pages and viewed by computers **104**, as well as databases containing information used by the servers. Also connected to the servers **106***a* via the Internet are computers located at one or more electrical utilities **106***b*.

In the currently preferred embodiment, the website **200** includes a number of components accessible to the user, as shown in FIG. **3**. Those components may include a means to store temperature settings **202**, a means to enter information about the user's home **204**, a means to enter the user's electricity bills **206**, means to calculate energy savings that could result from various thermostat-setting strategies **208**, and means to enable and choose between various arrangements **210** for demand reduction with their electric utility provider as intermediated by the demand reduction service provider.

FIG. **4** shows a high-level block diagram of thermostat **108** used as part of the subject invention. Thermostat **108** includes temperature sensing means **252**, which may be a thermistor, thermal diode or other means commonly used in the design of electronic thermostats. It includes a microprocessor **254**, memory **256**, a display **258**, a power source **260**, a relay **262**, which turns the HVAC system on and off in response to a signal from the microprocessor, and contacts by which the relay is connected to the wires that lead to the HVAC system. To allow the thermostat to communicate bi-directionally with the computer network, the thermostat also includes means **264** to connect the thermostat to a local computer or to a wireless network. Such means could be in the form of Ethernet, wireless protocols such as IEEE 802.11, IEEE 802.15.4, Bluetooth, or other wireless protocols. (Other components as needed) The thermostat **250** may also include controls **266** allowing users to change settings directly at the thermostat, but such controls are not necessary to allow the thermostat to function.

The data used to generate the content delivered in the form of the website is stored on one or more servers **106** within one or more databases. As shown in FIG. **5**, the overall database structure **300** may include temperature database **400**, thermostat settings database **500**, energy bill database **600**, HVAC hardware database **700**, weather database **800**, user database **900**, transaction database **1000**, product and service database **1100** and such other databases as may be needed to support these and additional features.

The website will allow users of connected thermostats **250** to create personal accounts. Each user's account will store information in database **900**, which tracks various attributes relative to users of the site. Such attributes may include the make and model of the specific HVAC equipment in the user's home; the age and square footage of the home, the solar orientation of the home, the location of the thermostat in the home, the user's preferred temperature settings, whether the user is a participant in a demand reduction program, etc.

As shown in FIG. **3**, the website **200** will permit thermostat users to perform through the web browser substantially all of the programming functions traditionally performed directly at the physical thermostat, such as temperature set points, the time at which the thermostat should be at each set point, etc. Preferably the website will also allow users to accomplish more advanced tasks such as allow users to program in vacation settings for times when the HVAC system may be turned off or run at more economical settings, and set macros that will allow changing the settings of the temperature for all periods with a single gesture such as a mouse click.

In addition to using the system to allow better signaling and control of the HVAC system, which relies primarily on communication running from the server to the thermostat, the bi-directional communication will also allow the thermostat **108** to regularly measure and send to the server information about the temperature in the building. By comparing outside temperature, inside temperature, thermostat settings, cycling behavior of the HVAC system, and other variables, the system

will be capable of numerous diagnostic and controlling functions beyond those of a standard thermostat.

For example, FIG. **6***a* shows a graph of inside temperature, outside temperature and HVAC activity for a 24 hour period. When outside temperature **302** increases, inside temperature **304** follows, but with some delay because of the thermal mass of the building, unless the air conditioning **306** operates to counteract this effect. When the air conditioning turns on, the inside temperature stays constant (or rises at a much lower rate) despite the rising outside temperature. In this example, frequent and heavy use of the air conditioning results in only a very slight temperature increase inside o the house of 4 degrees, from 72 to 76 degrees, despite the increase in outside temperature from 80 to 100 degrees.

FIG. **6***b* shows a graph of the same house on the same day, but assumes that the air conditioning is turned off from noon to 7 PM. As expected, the inside temperature **304***a* rises with increasing outside temperatures **302** for most of that period, reaching 88 degrees at 7 PM.

Because server **106***a* logs the temperature readings from inside each house (whether once per minute or over some other interval), as well as the timing and duration of air conditioning cycles, database **300** will contain a history of the thermal performance of each house. That performance data will allow the server **106***a* to calculate an effective thermal mass for each such structure—that is, the speed with the temperature inside a given building will change in response to changes in outside temperature. Because the server will also log these inputs against other inputs including time of day, humidity, etc. the server will be able to predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures.

As shown in FIG. **3**, website **200** will allow the users to opt **210** into a plan that offers incentives such as cash or rebates in exchange for reduced air conditioning use during peak load periods.

FIG. **7** shows the steps followed in order to initiate air conditioner shutoff. When a summer peak demand situation occurs, the utility will transmit an email **402** or other signal to server **106***a* requesting a reduction in load. Server **106***a* will determine **404** if the user's house is served by the utility seeking reduction; determine **406** if a given user has agreed to reduce peak demand; and determine **408** if a reduction of consumption by the user is required or desirable in order to achieve the reduction in demand requested by the utility. The server will transmit **410** a signal to the user's thermostat **108** signaling the thermostat to shut off the air conditioner **110**.

FIG. **8** shows the steps followed in order to verify that the air conditioner has in fact been shut off. Server **106***a* will receive and monitor **502** the temperature readings sent by the user's thermostat **108**. The server then calculates **504** the temperature reading to be expected for that thermostat given inputs such as current and recent outside temperature, recent inside temperature readings, the calculated thermal mass of the structure, temperature readings in other houses, etc. The server will compare **506** the predicted reading with the actual reading. If the server determines that the temperature inside the house is rising at the rate predicted if the air conditioning is shut off, then the server confirms **508** that the air conditioning has been shut off. If the temperature reading from the thermostat shows no increase, or significantly less increase than predicted by the model, then the server concludes **510** that the air conditioning was not switched off, and that no contribution to the demand response request was made.

For example, assume that on at 3 PM on date Y utility X wishes to trigger a demand reduction event. A server at utility X transmits a message to the server at demand reduction service provider Z requesting W megawatts of demand reduction. Demand reduction service provider server determines that it will turn off the air conditioner at house A in order to achieve the required demand reduction. At the time the event is triggered, the inside temperature as reported by the thermostat in house A is 72 degrees F. The outside temperature near house A is 96 degrees Fahrenheit. The inside temperature at House B, which is not part of the demand reduction program, but is both connected to the demand reduction service server and located geographically proximate to House A, is 74 F. Because the A/C in house A has been turned off, the temperature inside House A begins to rise, so that at 4 PM it has increased to 79 F. Because the server is aware of the outside temperature, which remains at 96 F., and of the rate of temperature rise inside house A on previous days on which temperatures have been at or near 96 F., and the temperature in house B, which has risen only to 75 F. because the air conditioning in house B continues to operate normally, the server is able to confirm with a high degree of certainty that the A/C in house A has indeed been shut off.

In contrast, if the HVAC system at house A has been tampered with, so that a demand reduction signal from the server does not actually result in shutting off the A/C in house A, when the server compares the rate of temperature change at house A against the other data points, the server will receive data inconsistent with the rate of increase predicted. As a result, it will conclude that the A/C has not been shut off in house A as expected, and will not credit house A with the financial credit that would be associated with demand reduction compliance, or may trigger a business process that could result in termination of house A's participation in the demand reduction program.

FIG. **9** illustrates the movement of signals and information between the components of the subject invention to trigger and verify a demand reduction response. In step **602** the electric utility server **106***b* transmits a message to demand reduction service server **106***a* requesting a demand reduction of a specified duration and size. Demand reduction service server **106***a* uses database **300** to determine which subscribers should be included in the demand reduction event. For each included subscriber, the server then sends a signal **604** to the subscriber's thermostat instructing it (a) to shut down at the appropriate time or (b) to allow the temperature as measured by the thermostat to increase to a certain temperature at the specified time, depending upon the agreement between the homeowner and the demand reduction aggregator. The server then receives **606** temperature signals from the subscriber's thermostat. At the conclusion of the demand reduction event, the server transmits a signal **608** to the thermostat permitting the thermostat to signal its attached HVAC system to resume cooling, if the system has been shut off, or to reduce the target temperature to its pre-demand reduction setting, if the target temperature was merely increased. After determining the total number of subscribers actually participating in the DR event, the server then calculates the total demand reduction achieved and sends a message **610** to the electric utility confirming such reduction.

Additional steps may be included in the process. For example, if the subscriber has previously requested that notice be provided when a peak demand reduction event occurs, the server will also send an alert, which may be in the form of an email message or an update to the personalized web page for that user, or both. If the server determines that a given home has (or has not) complied with the terms of its demand reduction agreement, the server will send a message to the subscriber confirming that fact.

It should also be noted that in some climate zones, peak demand events occur during extreme cold weather rather than (or in addition to) during hot weather. The same process as discussed above could be employed to reduce demand by shutting off electric heaters and monitoring the rate at which temperatures fall.

It should also be noted that the peak demand reduction service can be performed directly by a power utility, so that the functions of server **106***a* can be combined with the functions of server **106***b*.

The system installed in a subscriber's home may optionally include additional temperature sensors at different locations within the building. These additional sensors may we connected to the rest of the system via a wireless system such as 802.11 or 802.15.4, or may be connected via wires. Additional temperature and/or humidity sensors may allow increased accuracy of the system, which can in turn increase user comfort, energy savings or both.

While particular embodiments of the present invention have been shown and described, it is apparent that changes and modifications may be made without departing from the invention in its broader aspects and, therefore, the invention may carried out in other ways without departing from the true spirit and scope. These and other equivalents are intended to be covered by the following claims:

What is claimed is:

1. A system for controlling the operational status of an HVAC system comprising:

at least one thermostat associated with a structure that receives temperature measurements from inside the structure, the structure conditioned by at least one HVAC system, the thermostat having at least a first setting stored therein;

one or more servers located remotely from the structure, the one or more servers configured to receive measurements of outside temperatures from at least one source other than the HVAC system,

the one or more servers are further configured to communicate with the thermostat via a network, wherein the one or more servers receive inside temperatures from the thermostat and compares the inside temperatures of the structure and the outside temperatures over time to derive an estimation for the rate of change in inside temperature of the structure in response to outside temperature,

the one or more servers are further configured to receive a demand reduction request and determine whether the structure is associated with demand rejection request, and

based on the determination that the structure is associated with the demand reduction request, the one or more servers are further configured to send a signal to the thermostat to change the setting to a second setting to reduce electricity demand by the HVAC system.

2. The system as in claim **1** in which the one or more servers receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than the HVAC system.

3. The system as in claim **1** in which the thermostat comprises a programmable thermostat that communicates with a mesh networking protocol.

4. The system as in claim **1** in which the one or more servers communicate with the HVAC system using a network that includes an electricity meter.

5. The system as in claim **1** in which the estimation is a prediction about the future rate of change in temperature inside the structure.

6. The system as in claim **1** wherein the signal sent by the one or more servers directs the thermostat to shut down the HVAC system.

7. The system as in claim **1** wherein the signal identifies a time.

8. The system as in claim **1** wherein the second setting allows the inside temperature of the structure to increase to a certain temperature during a specified time interval.

9. The system as in claim **1** wherein the second setting is based on an agreement between a homeowner and a demand reduction aggregator.

10. The system as in claim **1** wherein the one or more servers are further configured to send an alert to a user associated with the structure.

11. A method for controlling the operation of an HVAC system comprising:

receiving temperature measurements inside a structure from at least one thermostat, the structure conditioned by at least one HVAC system, the thermostat having at least a first setting stored therein;

receiving at one or more servers located remotely from the structure, measurements of outside temperatures from at least one source other than the HVAC system;

the one or more servers communicating with the thermostat via a network;

receiving at the one or more servers, inside temperatures from the thermostat;

comparing with the one or more servers, the inside temperatures of the structure and the outside temperatures over time to derive an estimation for the rate of change in inside temperature of the structure in response to outside temperature;

receiving a demand reduction request and determining whether the structure is associated with demand rejection request; and

based on the determination that the structure is associated with the demand reduction request, sending with the one or more servers a signal to the thermostat to change the first setting to a second setting to reduce electricity demand by the HVAC system.

12. The method as in claim **11** in which the one or more processors receive measurements of outside temperatures for geographic regions such as ZIP codes from sources other than the HVAC system.

13. The method as in claim **11** in which the thermostat comprises a programmable thermostat that communicates with a mesh networking protocol.

14. The method as in claim **11** in which the one or more servers communicate with the HVAC system using a network that includes an electricity meter.

15. The method as in claim **11** in which the estimation is a prediction about the future rate of change in temperature inside the structure.

16. The method as in claim **11** wherein the signal sent by the one or more servers directs the thermostat to shut down the HVAC system.

17. The method as in claim **11** wherein the signal identifies a time.

18. The method as in claim **11** wherein the second setting allows the inside temperature of the structure to increase to a certain temperature during a specified time interval.

19. The method as in claim **11** wherein the second setting is based on an agreement between a homeowner and a demand reduction aggregator.

* * * * *

Exhibit 4

US010534382B2

(12) **United States Patent**
Steinberg

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(54) **SYSTEM AND METHOD FOR USING A WIRELESS DEVICE AS A SENSOR FOR AN ENERGY MANAGEMENT SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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G08B 1/08 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***G05D 23/00*** (2013.01); ***F24F 11/30*** (2018.01); ***F24F 11/62*** (2018.01); ***F24F 11/70*** (2018.01);
(Continued)

(58) **Field of Classification Search**
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(Continued)

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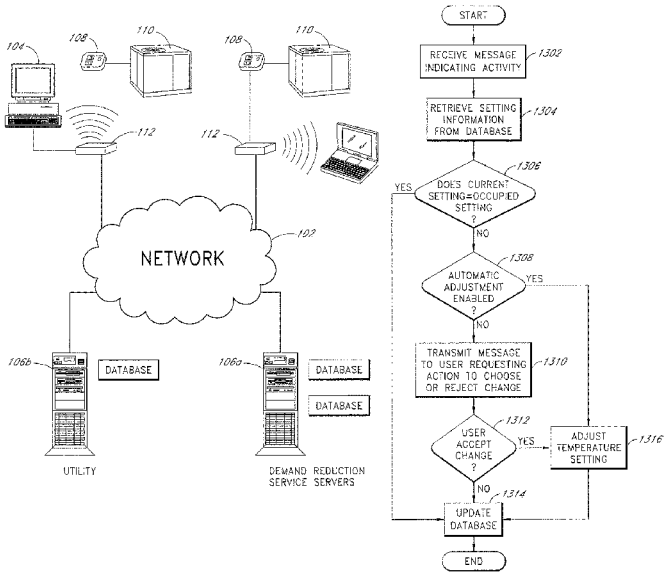
(57) **ABSTRACT**

The invention comprises systems and methods for detecting the use of networked consumer electronics devices as indications of occupancy of a structure for purposes of automatically adjusting the temperature setpoint on a thermostatic HVAC control. At least one thermostat is located inside a structure and is used to control an HVAC system in the structure. At least one networked electronic device is used to indicate the state of occupancy of the structure. The state of occupancy is used to alter the setpoint on the thermostatic HVAC control to reduce unneeded conditioning of unoccupied spaces.

20 Claims, 8 Drawing Sheets



Related U.S. Application Data

continuation of application No. 13/470,074, filed on May 11, 2012, now Pat. No. 9,244,470, which is a continuation of application No. 12/502,064, filed on Jul. 13, 2009, now Pat. No. 8,180,492.

(60) Provisional application No. 61/134,714, filed on Jul. 14, 2008.

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F24F 120/14	(2018.01)
F24F 140/60	(2018.01)
F24F 120/20	(2018.01)
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See application file for complete search history.

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* cited by examiner

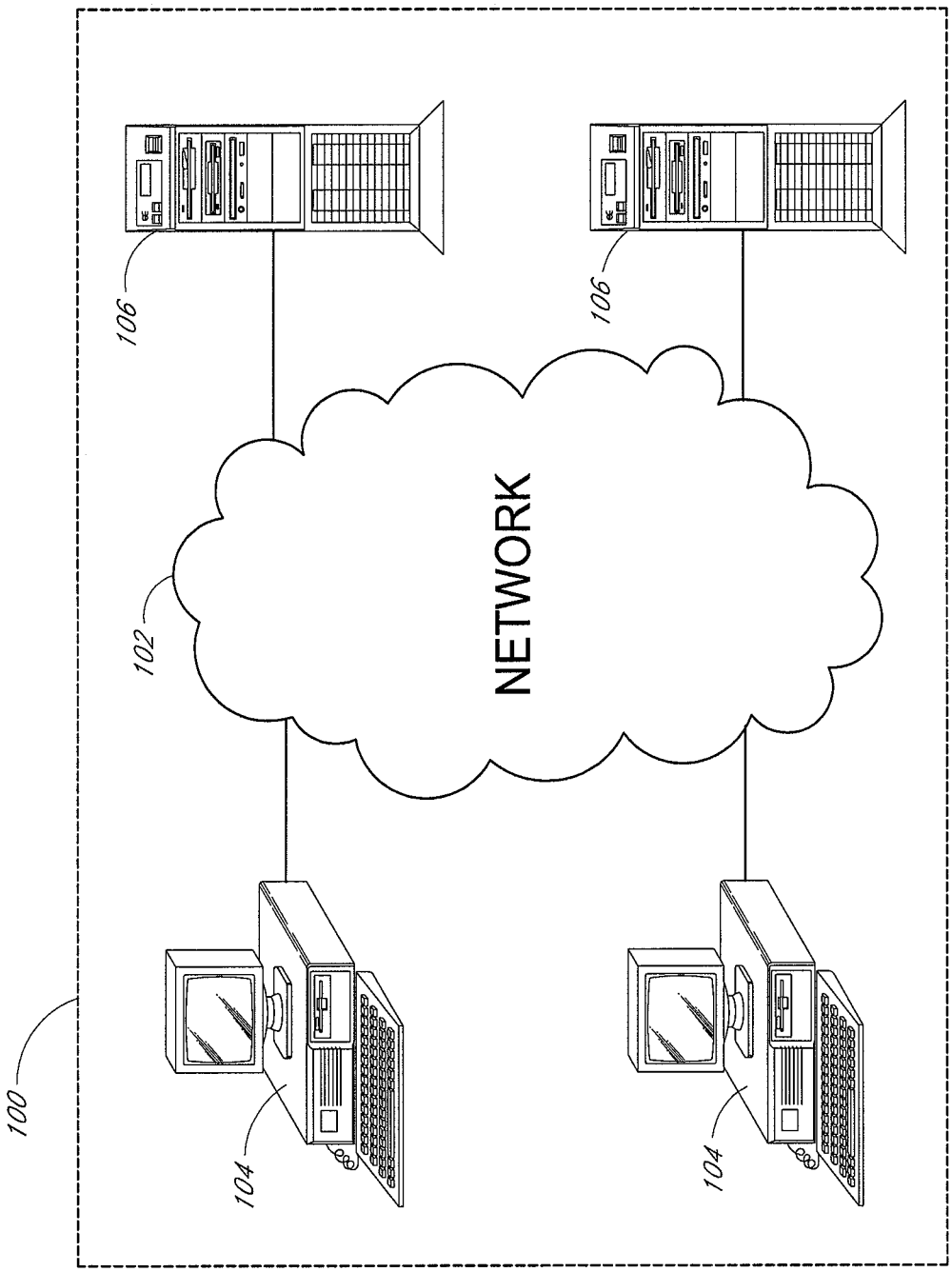

FIG. 1

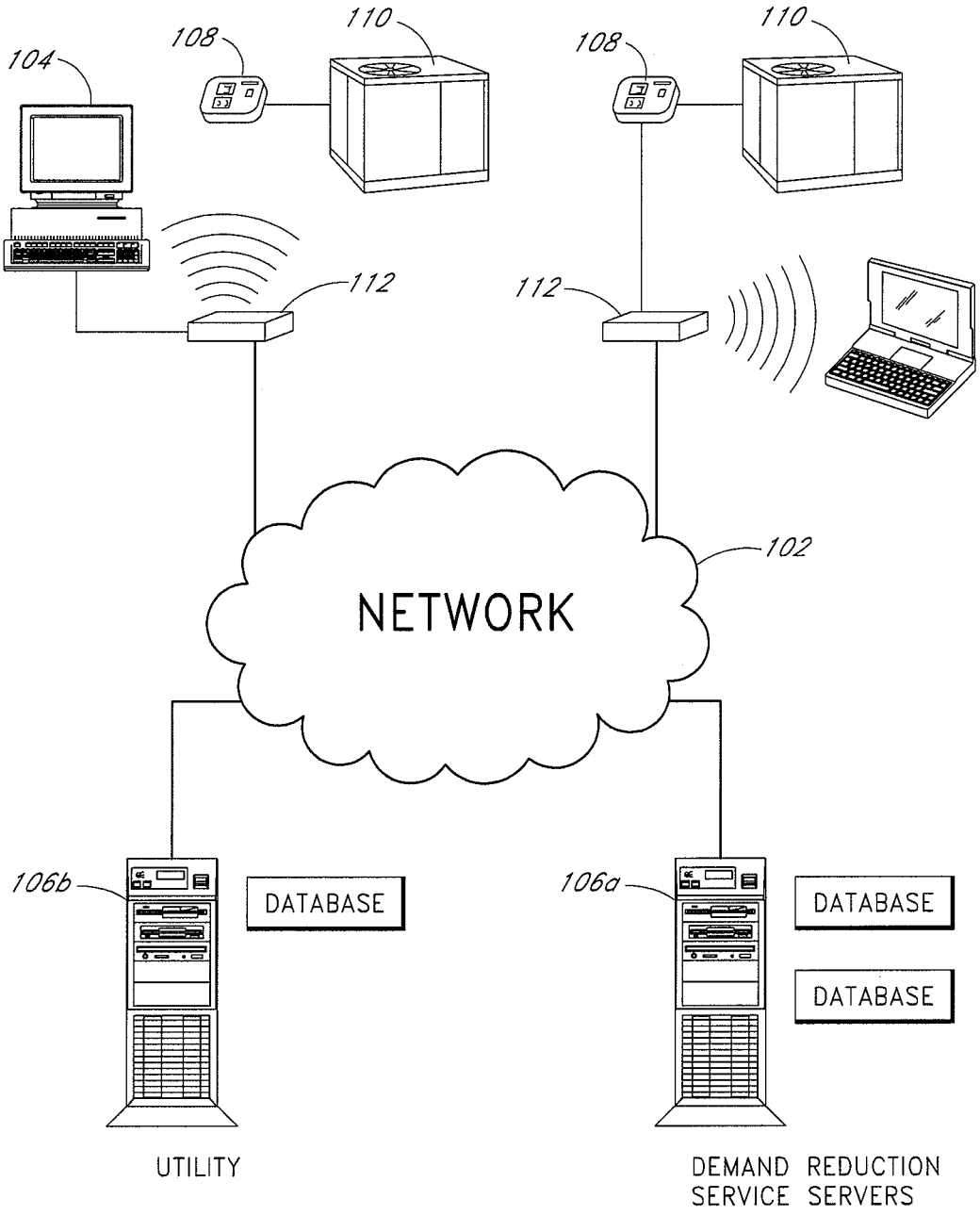
104
108
110
108
110
112
112
NETWORK
102
106b
DATABASE
106a
DATABASE
DATABASE
UTILITY
DEMAND REDUCTION SERVICE SERVERS

FIG. 2

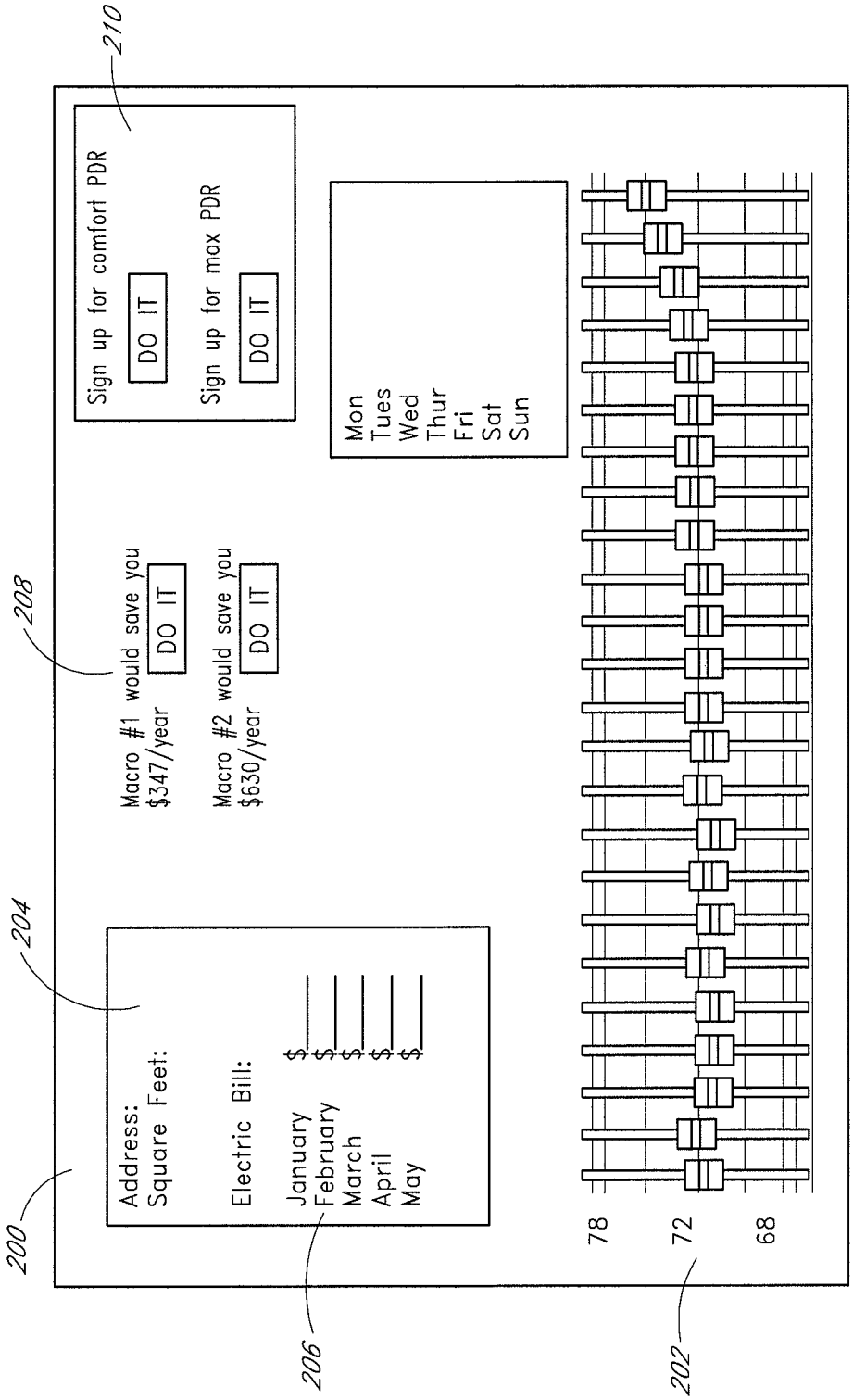
210
Sign up for comfort PDR
DO IT
Sign up for max PDR
DO IT
Mon
Tues
Wed
Thur
Fri
Sat
Sun
208
Macro #1 would save you $347/year
DO IT
Macro #2 would save you $630/year
DO IT
204
Address:
Square Feet:
Electric Bill:
January
February
March
April
May
$
$
$
$
$
78
72
68
200
206
202

FIG. 3

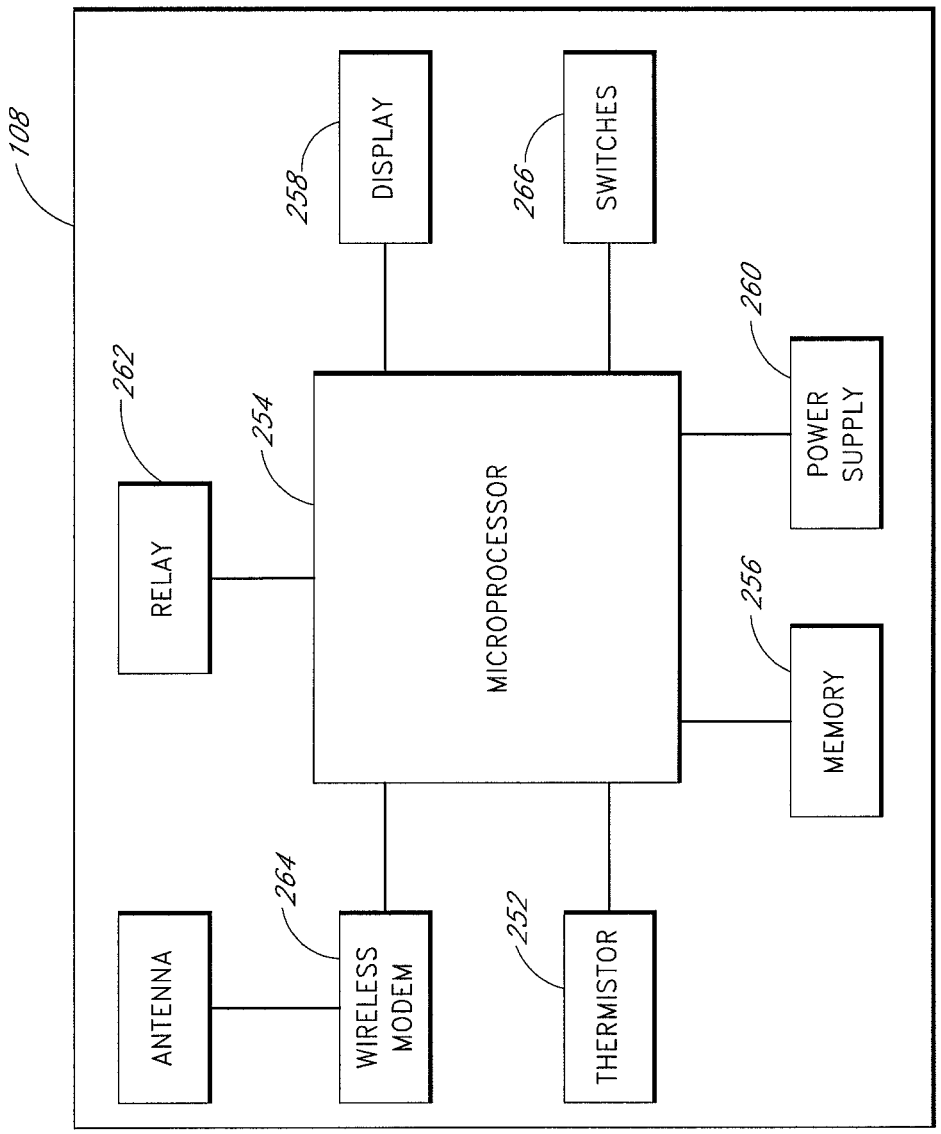
108
DISPLAY
258
SWITCHES
266
260
POWER SUPPLY
262
254
RELAY
MICROPROCESSOR
256
MEMORY
264
ANTENNA
WIRELESS MODEM
252
THERMISTOR

FIG. 4

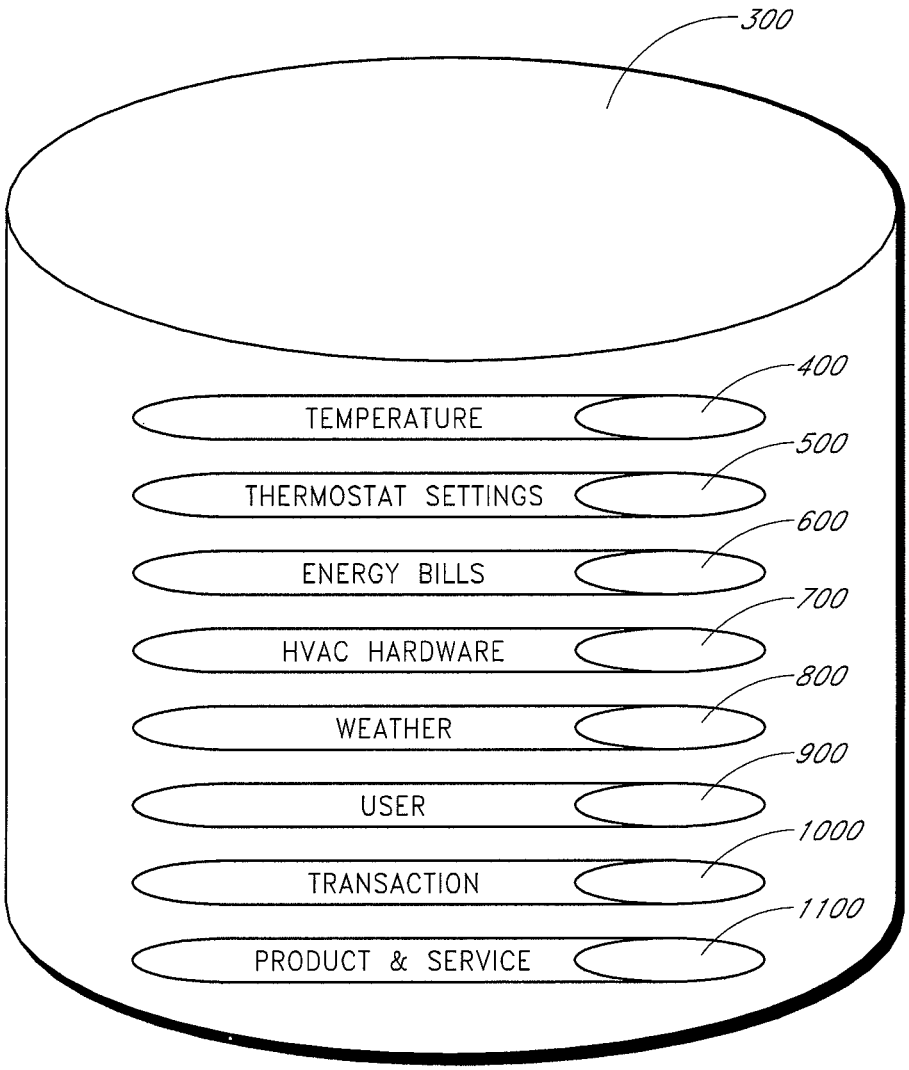
300
400
TEMPERATURE
500
THERMOSTAT SETTINGS
600
ENERGY BILLS
700
HVAC HARDWARE
800
WEATHER
900
USER
1000
TRANSACTION
1100
PRODUCT & SERVICE

FIG. 5

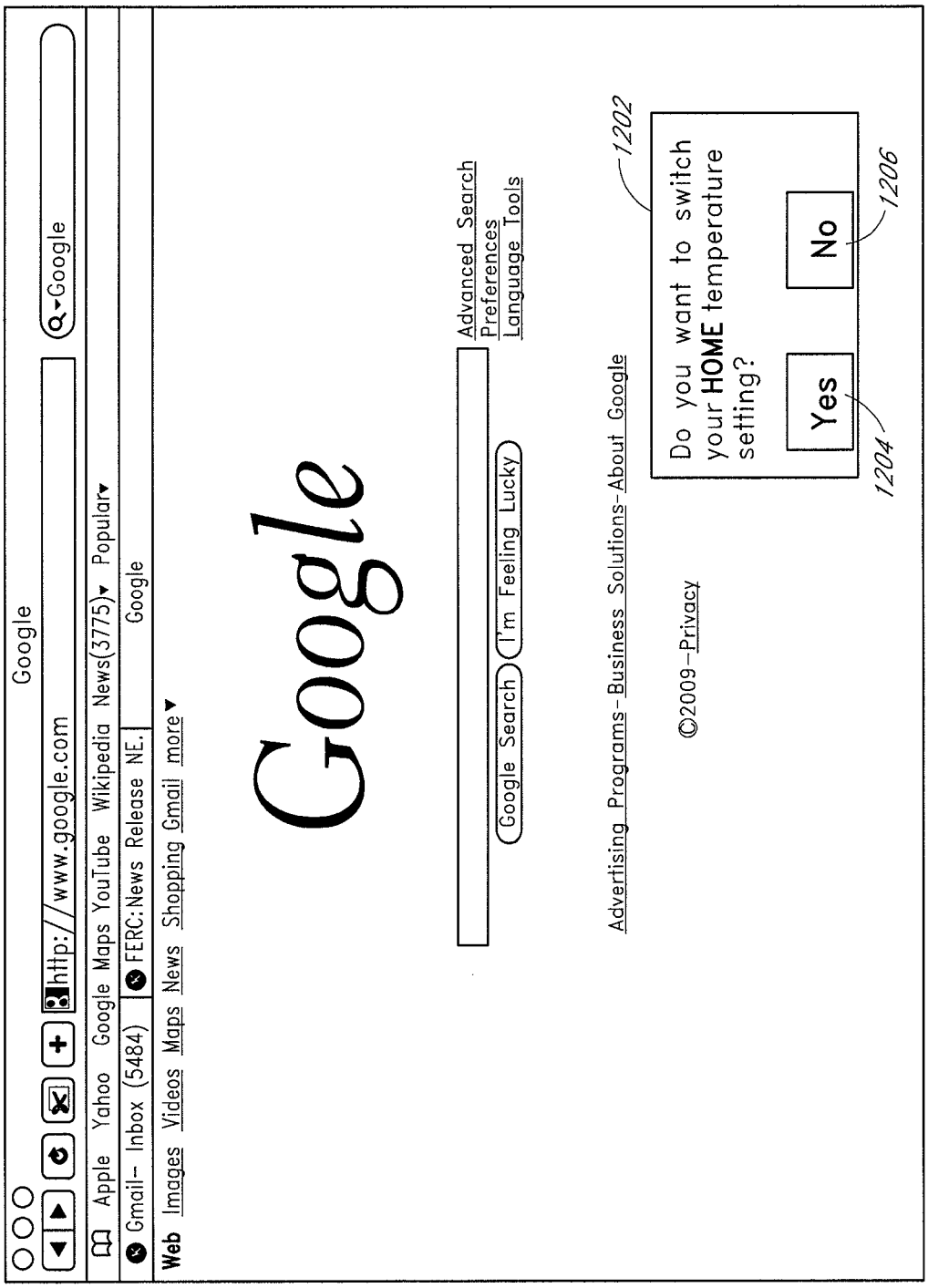
Google
http://www.google.com
Google
Apple Yahoo Google Maps YouTube Wikipedia News(3775) Popular
Gmail- Inbox (5484) FERC: News Release NE. Google
Web Images Videos Maps News Shopping Gmail more
Google
Advanced Search
Preferences
Language Tools
Google Search
I'm Feeling Lucky
Advertising Programs - Business Solutions - About Google
©2009 - Privacy
1202
Do you want to switch your HOME temperature setting?
Yes
No
1204
1206

FIG. 6

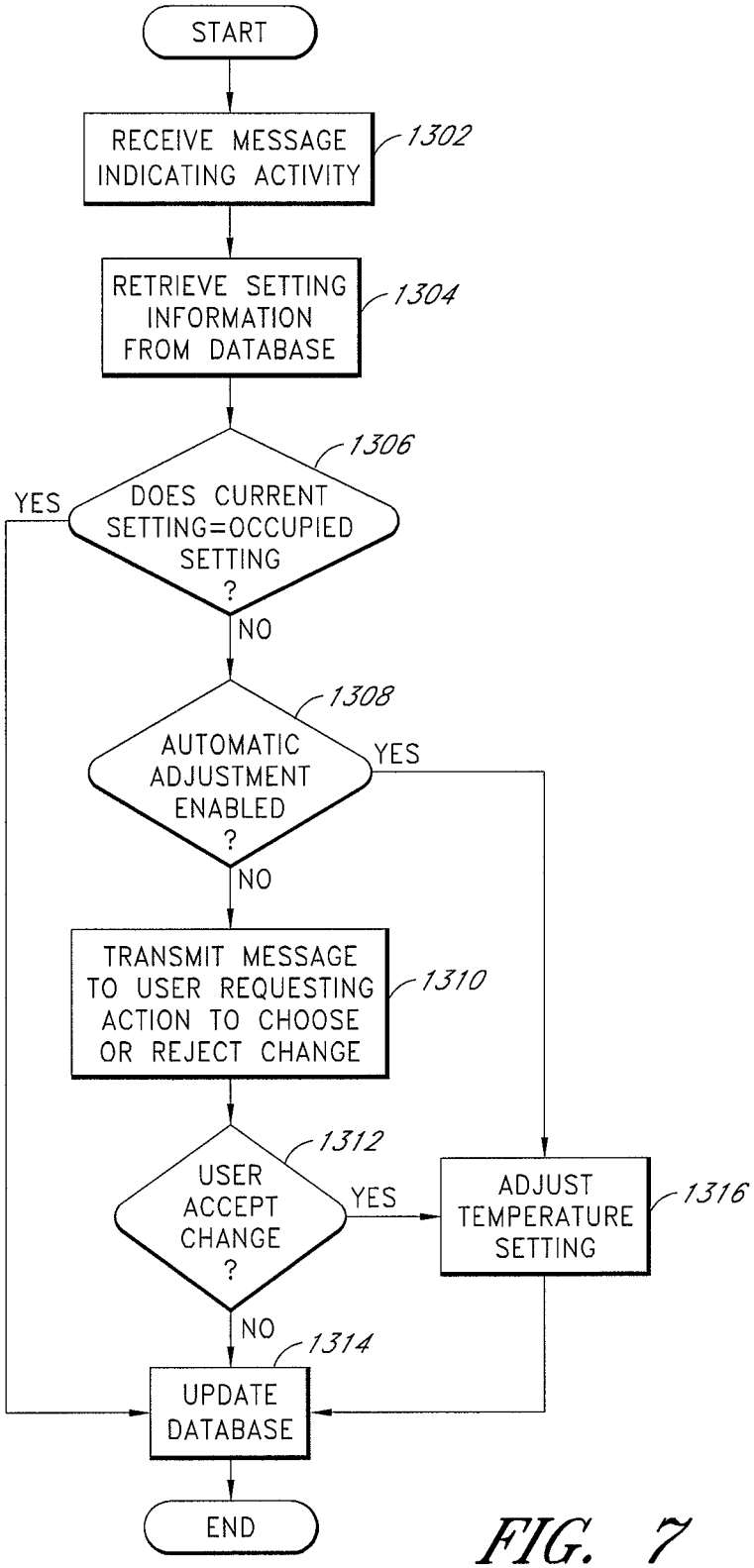
START
RECEIVE MESSAGE INDICATING ACTIVITY
1302
RETRIEVE SETTING INFORMATION FROM DATABASE
1304
DOES CURRENT SETTING=OCCUPIED SETTING ?
1306
YES
NO
AUTOMATIC ADJUSTMENT ENABLED ?
1308
YES
NO
TRANSMIT MESSAGE TO USER REQUESTING ACTION TO CHOOSE OR REJECT CHANGE
1310
USER ACCEPT CHANGE ?
1312
YES
ADJUST TEMPERATURE SETTING
1316
NO
1314
UPDATE DATABASE
END

FIG. 7

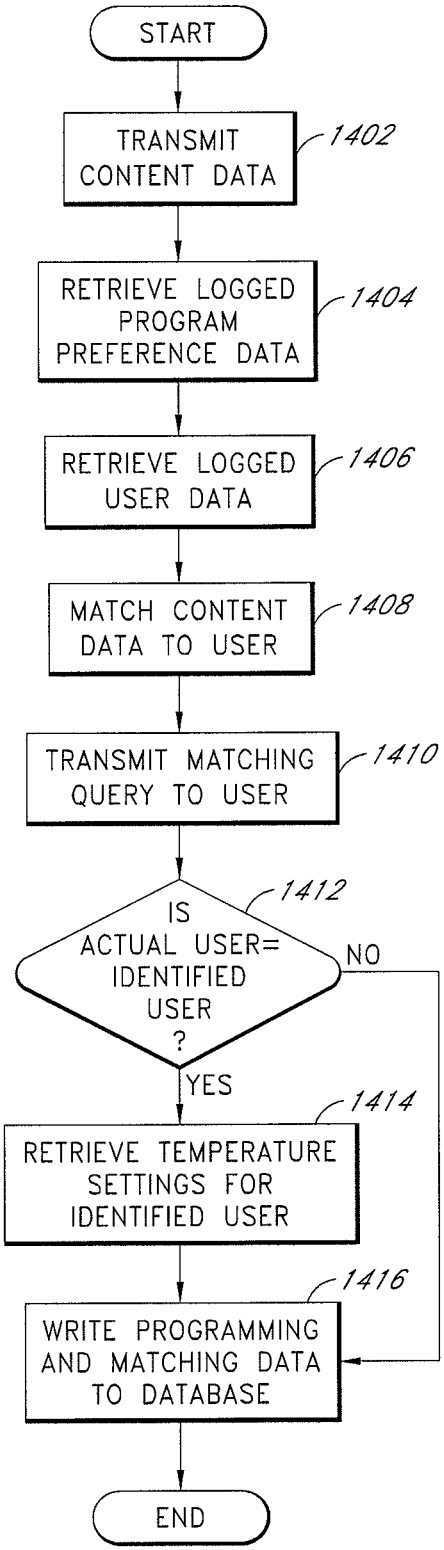
START
TRANSMIT CONTENT DATA
1402
RETRIEVE LOGGED PROGRAM PREFERENCE DATA
1404
RETRIEVE LOGGED USER DATA
1406
MATCH CONTENT DATA TO USER
1408
TRANSMIT MATCHING QUERY TO USER
1410
IS ACTUAL USER= IDENTIFIED USER ?
1412
NO
YES
RETRIEVE TEMPERATURE SETTINGS FOR IDENTIFIED USER
1414
WRITE PROGRAMMING AND MATCHING DATA TO DATABASE
1416
END

FIG. 8

SYSTEM AND METHOD FOR USING A WIRELESS DEVICE AS A SENSOR FOR AN ENERGY MANAGEMENT SYSTEM

RELATED APPLICATIONS

Any and all applications for which a foreign or domestic priority claim is identified in the Application Data Sheet, or any correction thereto, are hereby incorporated by reference into this application under 37 CFR 1.57.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to the use of thermostatic HVAC and other energy management controls that are connected to a computer network. More specifically, the present invention pertains 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.

Heating and cooling systems for buildings (heating, ventilation and cooling, or HVAC systems) have been controlled for decades by thermostats. At the most basic level, a thermostat includes a means to allow a user to set a desired temperature, a means to sense actual temperature, and a means to signal the heating and/or cooling devices to turn on or off in order to try to change the actual temperature to equal the desired temperature. The most basic versions of thermostats use components such as a coiled bi-metallic spring to measure actual temperature and a mercury switch that opens or completes a circuit when the spring coils or uncoils with temperature changes. More recently, electronic digital thermostats have become prevalent. These thermostats use solid-state devices such as thermistors or thermal diodes to measure temperature, and microprocessor-based circuitry to control the switch and to store and operate based upon user-determined protocols for temperature vs. time.

These programmable thermostats generally offer a very restrictive user interface, limited by the cost of the devices, the limited real estate of the small wall-mounted boxes, and the inability to take into account more than two variables: the desired temperature set by the user, and the ambient temperature sensed by the thermostat. Users can generally only set one series of commands per day, and in order to change one parameter (e.g., to change the late-night temperature) the user often has to cycle through several other parameters by repeatedly pressing one or two buttons.

Because the interface of programmable thermostats is so poor, the significant theoretical savings that are possible with them (sometimes cited as 25% of heating and cooling costs) are rarely realized. In practice, studies have found that more than 50% of users never program their thermostats at all. Significant percentages of the thermostats that are programmed are programmed sub-optimally, in part because, once programmed, people tend to not to re-invest the time needed to change the settings very often.

A second problem with standard programmable thermostats is that they represent only a small evolutionary step beyond the first, purely mechanical thermostats. Like the first thermostats, they only have two input signals—ambient temperature and the preset desired temperature. The entire advance with programmable thermostats is that they can shift between multiple present temperatures at different times without real-time involvement of a human being.

Because most thermostats control HVAC systems that do not offer infinitely variable output, traditional thermostats are designed to permit the temperature as seen by the thermostat to vary above and below the setpoint to prevent the HVAC system from constantly and rapidly cycling on and off, which is inefficient and harmful to the HVAC system. The temperature range in which the thermostat allows the controlled environment to drift is known as both the dead zone and, more formally, the hysteresis zone. The hysteresis zone is frequently set at +/−1 degree Fahrenheit. Thus if the setpoint is 68 degrees, in the heating context the thermostat will allow the inside temperature to fall to 67 degrees before turning the heating system on, and will allow it to rise to 69 degrees before turning it off again.

As energy prices rise, more attention is being paid to ways of reducing energy consumption. Because energy consumption is directly proportional to setpoint—that is, the further a given setpoint diverges from the balance point (the inside temperature assuming no HVAC activity) in a given house under given conditions, the higher energy consumption will be to maintain temperature at that setpoint), energy will be saved by virtually any strategy that over a given time frame lowers the average heating setpoint or raises the cooling setpoint. Conventional programmable thermostats allow homeowners to save money and energy by pre-programming setpoint changes based upon comfort or schedule. For example, in the summer, allowing the setpoint to rise by several degrees (or even shutting off the air conditioner) when the home is unoccupied will generally save significantly on energy. But such thermostats have proven to be only minimally effective in practice. Because they have such primitive user interfaces, they are difficult to program, and so many users never bother at all, or set them up once and do not alter the programming even if their schedules change.

In the hotel industry, the heating and cooling decisions made in hundred or even thousands of individual rooms with independently controlled HVAC systems are aggregated into a single energy bill, so hotel owners and managers are sensitive to energy consumption by those systems. Hotel guests often turn the air conditioner to a low temperature setting and then leave the room for hours at a time, thereby wasting considerable energy. An approach commonly used outside of the United States to combat this problem is to use a keycard to control the HVAC system, such that guests place the keycard into a slot mounted on the wall near the door of the room which then triggers the lights and HVAC system to power up, and turn them off when the guest removes the card upon leaving the room. However, because most hotels give each guest two cards, it is easy to simply leave the extra card in the slot, thus defeating the purpose of the system. Recently, systems have been introduced in which a motion sensor is connected to the control circuitry for the HVAC system. If no motion is detected in the room for some predetermined interval, the system concludes that the room is unoccupied, and turns off or alters the setpoint of the HVAC system to a more economical level. When the motion sensor detects motion (which is assumed to coincide with the return of the guest), the HVAC system resets to the guest's chosen setting.

Adding occupancy detection capability to residential HVAC systems could also add considerable value in the form of energy savings without significant tradeoff in terms of comfort. But the systems used in hotels do not easily transfer to the single-family residential context. Hotel rooms tend to be small enough that a single motion sensor is sufficient to determine with a high degree of accuracy whether or not the room is occupied. A single motion sensor

in the average home today would have limited value because there are likely to be many places one or more people could be home and active yet invisible to the motion sensor. The most economical way to include a motion sensor in a traditional programmable thermostat would be to build it into the thermostat itself. But thermostats are generally located in hallways, and thus are unlikely to be exposed to the areas where people tend to spend their time. Wiring a home with multiple motion sensors in order to maximize the chances of detecting occupants would involve considerable expense, both for the sensors themselves and for the considerable cost of installation, especially in the retrofit market. Yet if control is ceded to a single-sensor system that cannot reliably detect presence, the resulting errors would likely lead the homeowner to reject the system.

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.

SUMMARY OF THE INVENTION

In one embodiment, the invention comprises a thermostat attached to an HVAC system, a local network connecting the thermostat to a larger network such as the Internet, and one or more computers attached to the network, and a server in bi-directional communication with a plurality of such thermostats and computers. The server pairs each thermostat with one or more computers or other consumer electronic devices which are determined to be associated with the home in which the thermostat is located. The server logs the ambient temperature sensed by each thermostat vs. time and the signals sent by the thermostats to their HVAC systems. The server also monitors and logs activity on the computers or other consumer electronic devices associated with each thermostat. Based on the activity patterns evidenced by keystrokes, cursor movement or other inputs, or lack thereof, the server instructs the thermostat to change temperature settings between those optimized for occupied and unoccupied states.

At least one embodiment of the invention comprises the steps of determining whether one or more networked electronic devices inside a structure are in use; determining whether said use of said networked electronic devices indicates occupancy of said structure; and adjusting the temperature setpoint on a thermostatic controller for an HVAC system for said structure based upon whether or not said structure is deemed to be occupied.

At least one embodiment of the invention comprises at least one said thermostat having at least one temperature setting associated with the presence of one or more occupants in said structure, and at least one temperature setting associated with the absence of occupants in said structure; one or more electronic devices having at least a user interface; where said electronic devices and said thermostat are connected to a network; where said setpoint on said thermostat is adjusted between said temperature setting associated with the presence of one or more occupants in said structure and said temperature setting associated with the absence of occupants in said structure based upon the use of said user interface for said electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an example of an overall environment in which an embodiment of the invention may be used.

FIG. **2** shows a high-level illustration of the architecture of a network showing the relationship between the major elements of one embodiment of the subject invention.

FIG. **3** shows an embodiment of the website to be used as part of the subject invention.

FIG. **4** shows a high-level schematic of the thermostat used as part of the subject invention.

FIG. **5** shows one embodiment of the database structure used as part of the subject invention.

FIG. **6** shows the browser as seen on the display of the computer used as part of the subject invention.

FIG. **7** is a flowchart showing the steps involved in the operation of one embodiment of the subject invention.

FIG. **8** is a flowchart that shows how the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the computer attached to the system.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** shows an example of an overall environment **100** in which an embodiment of the invention may be used. The environment **100** includes an interactive communication network **102** with computers **104** connected thereto. Also connected to network **102** are one or more server computers **106**, which store information and make the information available to computers **104**. The network **102** allows communication between and among the computers **104** and **106**.

Presently preferred network **102** comprises a collection of interconnected public and/or private networks that are linked to together by a set of standard protocols to form a distributed network. While network **102** is intended to refer to what is now commonly referred to as the Internet, it is also intended to encompass variations which may be made in the future, including changes additions to existing standard protocols.

When a user of the subject invention wishes to access information on network **102**, the buyer initiates connection from his computer **104**. For example, the user invokes a browser, which executes on computer **104**. The browser, in turn, establishes a communication link with network **102**. Once connected to network **102**, the user can direct the browser to access information on server **106**.

One popular part of the Internet is the World Wide Web. The World Wide Web contains a large number of computers **104** and servers **106**, which store HyperText Markup Language (HTML) documents capable of displaying graphical and textual information. HTML is a standard coding convention and set of codes for attaching presentation and linking attributes to informational content within documents.

The servers **106** that provide offerings on the World Wide Web are typically called websites. A website is often defined by an Internet address that has an associated electronic page. Generally, an electronic page is a document that organizes the presentation of text graphical images, audio and video.

In addition to the Internet, the network **102** can comprise a wide variety of interactive communication media. For example, network **102** can include local area networks, interactive television networks, telephone networks, wireless data systems, two-way cable systems, and the like.

In one embodiment, computers **104** and servers **106** are conventional computers that are equipped with communications hardware such as modem or a network interface card. The computers include processors such as those sold by Intel and AMD. Other processors may also be used,

including general-purpose processors, multi-chip processors, embedded processors and the like.

Computers **104** can also be handheld and wireless devices such as personal digital assistants (PDAs), cellular telephones and other devices capable of accessing the network. Computers **104** can also be microprocessor-controlled home entertainment equipment including advanced televisions, televisions paired with home entertainment/media centers, and wireless remote controls.

Computers **104** may utilize a browser configured to interact with the World Wide Web. Such browsers may include Microsoft Explorer, Mozilla, Firefox, Opera or Safari. They may also include browsers or similar software used on handheld, home entertainment and wireless devices. The storage medium may comprise any method of storing information. It may comprise random access memory (RAM), electronically erasable programmable read only memory (EEPROM), read only memory (ROM), hard disk, floppy disk, CD-ROM, optical memory, or other method of storing data. Computers **104** and **106** may use an operating system such as Microsoft Windows, Apple Mac OS, Linux, Unix or the like. Computers **106** may include a range of devices that provide information, sound, graphics and text, and may use a variety of operating systems and software optimized for distribution of content via networks.

FIG. **2** illustrates in further detail the architecture of the specific components connected to network **102** showing the relationship between the major elements of one embodiment of the subject invention. Attached to the network are thermostats **108** and computers **104** of various users. Connected to thermostats **108** are HVAC units **110**. The HVAC units may be conventional air conditioners, heat pumps, or other devices for transferring heat into or out of a building. Each user is connected to the server **106** via wired or wireless connection such as Ethernet or a wireless protocol such as IEEE 802.11, a gateway **112** that connects the computer and thermostat to the Internet via a broadband connection such as a digital subscriber line (DSL) or other form of broadband connection to the World Wide Web. Server **106** contains the content to be served as web pages and viewed by computers **104**, as well as databases containing information used by the servers.

In the currently preferred embodiment, the website **200** includes a number of components accessible to the user, as shown in FIG. **3**. Those components may include a means to enter temperature settings **202**, a means to enter information about the user's home **204**, a means to enter the user's electricity bills **206**, means to calculate energy savings that could result from various thermostat-setting strategies **208**, and means to enable and choose between various arrangements **210** for demand reduction with their electric utility provider as intermediated by the demand reduction service provider.

FIG. **4** shows a high-level block diagram of thermostat **108** used as part of the subject invention. Thermostat **108** includes temperature sensing means **252**, which may be a thermistor, thermal diode or other means commonly used in the design of electronic thermostats. It includes a microprocessor **254**, memory **256**, a display **258**, a power source **260**, a relay **262**, which turns the HVAC system on an and off in response to a signal from the microprocessor, and contacts by which the relay is connected to the wires that lead to the HVAC system. To allow the thermostat to communicate bi-directionally with the computer network, the thermostat also includes means **264** to connect the thermostat to a local computer or to a wireless network. Such means could be in the form of Ethernet, wireless protocols such as IEEE 802.11, IEEE 802.15.4, Bluetooth, cellular systems such as CDMA, GSM and GPRS, or other wireless protocols. The thermostat **250** may also include controls **266** allowing users to change settings directly at the thermostat, but such controls are not necessary to allow the thermostat to function.

The data used to generate the content delivered in the form of the website is stored on one or more servers **106** within one or more databases. As shown in FIG. **5**, the overall database structure **300** may include temperature database **400**, thermostat settings database **500**, energy bill database **600**, HVAC hardware database **700**, weather database **800**, user database **900**, transaction database **1000**, product and service database **1100** and such other databases as may be needed to support these and additional features.

The website **200** will allow users of connected thermostats **250** to create personal accounts. Each user's account will store information in database **900**, which tracks various attributes relative to users of the site. Such attributes may include the make and model of the specific HVAC equipment in the user's home; the age and square footage of the home, the solar orientation of the home, the location of the thermostat in the home, the user's preferred temperature settings, whether the user is a participant in a demand reduction program, etc.

As shown in FIG. **3**, the website **200** will permit thermostat users to perform through the web browser substantially all of the programming functions traditionally performed directly at the physical thermostat, such as temperature set points, the time at which the thermostat should be at each set point, etc. Preferably the website will also allow users to accomplish more advanced tasks such as allow users to program in vacation settings for times when the HVAC system may be turned off or run at more economical settings, and set macros that will allow changing the settings of the temperature for all periods with a single gesture such as a mouse click.

FIG. **6** represents the screen of a computer or other device **104** using a graphical user interface connected to the Internet. The screen shows that a browser **1200** is displayed on computer **104**. In one embodiment, a background application installed on computer **104** detects activity by a user of the computer, such as cursor movement, keystrokes or otherwise, and signals the application running on server **106** that activity has been detected. Server **106** may then, depending on context, (a) transmit a signal to thermostat **108** changing setpoint because occupancy has been detected at a time when the system did not expect occupancy; (b) signal the background application running on computer **104** to trigger a software routine that instantiates a pop-up window **1202** that asks the user if the server should change the current setpoint, alter the overall programming of the system based upon a new occupancy pattern, etc. The user can respond by clicking the cursor on "yes" button **1204** or "No" button **1206**. Equilvalent means of signalling activity may be employed with interactive television programming, gaming systems, etc.

FIG. **7** represents a flowchart showing the steps involved in the operation of one embodiment of the subject invention. In step **1302**, computer **104** transmits a message to server **106** via the Internet indicating that there is user activity on computer **104**. This activity can be in the form of keystrokes, cursor movement, input via a television remote control, etc. In step **1304** the application queries database **300** to retrieve setting information for the HVAC system. In step **1306** the application determines whether the current HVAC program is intended to apply when the home is occupied or unoccu-

pied. If the HVAC settings then in effect are intended to apply for an occupied home, then the application terminates for a specified interval. If the HVAC settings then in effect are intended to apply when the home is unoccupied, then in step **1308** the application will retrieve from database **300** the user's specific preferences for how to handle this situation. If the user has previously specified (at the time that the program was initially set up or subsequently modified) that the user prefers that the system automatically change settings under such circumstances, the application then proceeds to step **1316**, in which it changes the programmed setpoint for the thermostat to the setting intended for the house when occupied. If the user has previously specified that the application should not make such changes without further user input, then in step **1310** the application transmits a command to computer **104** directing the browser to display a message informing the user that the current setting assumes an unoccupied house and asking the user in step **1312** to choose whether to either keep the current settings or revert to the pre-selected setting for an occupied home. If the user selects to retain the current setting, then in step **1314** the application will write to database **300** the fact that the users has so elected and terminate. If the user elects to change the setting, then in step **1316** the application transmits the revised setpoint to the thermostat. In step **1314** the application writes the updated setting information to database **300**.

FIG. **8** is a flowchart that shows how the invention can be used to select different HVAC settings based upon its ability to identify which of multiple potential occupants is using the computer attached to the system. In step **1402** computer **104** transmits to server **106** information regarding the type of activity detected on computer **104**. Such information could include the specific program or channel being watched if, for example, computer **104** is used to watch television. The information matching, for example, TV channel 7 at 4:00 PM on a given date to specific content may be made by referring to Internet-based or other widely available scheduling sources for such content. In step **1404** server **106** retrieves from database **300** previously logged data regarding viewed programs. In step **1406** server **106** retrieves previously stored data regarding the residents of the house. For example, upon initiating the service, one or more users may have filled out online questionnaires sharing their age, gender, schedules, viewing preferences, etc. In step **1408**, server **106** compares the received information about user activity to previously stored information retrieved from database **300** about the occupants and their viewing preferences. For example, if computer **104** indicates to server **106** that the computer is being used to watch golf, the server may conclude that an adult male is watching; if computer **104** indicates that it is being used to watch children's programming, server **106** may conclude that a child is watching. In step **1410** the server transmits a query to the user in order to verify the match, asking, in effect, "Is that you. Bob?" In step **1412**, based upon the user's response, the application determines whether the correct user has been identified. If the answer is no, then the application proceeds to step **1416**. If the answer is yes, then in step **1414** the application retrieves the temperature settings for the identified occupant. In step **1416** the application writes to database **300** the programming information and information regarding matching of users to that programming.

In an alternative embodiment, the application running on computer **104** may respond to general user inputs (that is, inputs not specifically intended to instantiate communication with the remote server) by querying the user whether a given action should be taken. For example, in a system in which the computer **104** is a web-enabled television or web-enabled set-top device connected to a television as a display, software running on computer **104** detects user activity, and transmits a message indicating such activity to server **106**. The trigger for this signal may be general, such as changing channels or adjusting volume with the remote control or a power-on event. Upon receipt by server **104** of this trigger, server **104** transmits instructions to computer **104** causing it to display a dialog box asking the user whether the user wishes to change HVAC settings.

What is claimed is:

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

a memory; and

one or more processors with circuitry and code designed to execute instructions;

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;

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 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;

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;

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;

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;

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;

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.

2. The system of claim 1, wherein the operational temperature is the second temperature setpoint for the building corresponding to a desired temperature setting when the building is unoccupied, in the event the one or more processors with circuitry and code designed to execute instructions determines that the building is unoccupied.

3. The system of claim 1, wherein the operational temperature is the first temperature setpoint for the building corresponding to a desired temperature setting when the building is occupied, in the event the one or more processors with circuitry and code designed to execute instructions determines that the building is occupied.

4. The system of claim 2, wherein the first data from the at least one sensor comprises a measurement of the current temperature of the building by the sensor.

5. The system of claim 4, wherein the second data from the network connection comprises a measurement of the current outdoor temperature.

6. The system of claim 4, wherein the one or more processors with circuitry and code designed to execute instructions queries the user to confirm whether to change to a different temperature setpoint after determining whether the building is occupied or unoccupied.

7. The system of claim 1, wherein the one or more processors with circuitry and code designed to execute instructions receives at least one setting of the HVAC system.

8. The system of claim 7, wherein the at least one setting of the HVAC system comprises whether the HVAC system is currently on or off.

9. The system of claim 7, wherein the at least one setting of the HVAC system comprises whether the HVAC system is operating in a cooling mode or a heating mode.

10. The system of claim 4, wherein the determination of whether the building is occupied or unoccupied by the one or more processors is based on a third data received from a motion sensor.

11. The system of claim 1, wherein the network connection is based on the IEEE 802.11 wireless protocol.

12. The system of claim 1, wherein the determination of whether the building is occupied or unoccupied by is performed by the first processor.

13. The 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.

14. The system of claim 1, wherein the first data from the at least one sensor is provided by a sensor that is not electrically connected to the first processor.

15. The system of claim 7, wherein the interface is configured to allow the user to turn the HVAC system on or off.

16. The system of claim 7, wherein the interface is configured to allow the user to input that the building is currently unoccupied.

17. A system for controlling an HVAC system at a user's building, the system comprising:

a memory; and

one or more processors with circuitry and code designed to execute instructions;

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 the current temperature of the building by the sensor;

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 and comprises outdoor temperature, 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 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;

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;

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 via on mobile, wireless device running software application code via the Internet;

the one or more processors with circuitry and code designed to execute instructions to receive a third data from a motion sensor, and is further configured to determine whether the building is occupied or unoccupied based at least in part on the third data;

the one or more processors with circuitry and code designed to execute instructions to control the HVAC system based on the determination that the building is occupied to provide heating or cooling to the building effective to reach the first temperature setpoint for the building corresponding to a desired temperature setting when the building is occupied;

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;

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.

18. The system of claim 17, wherein the first data from the at least one sensor is provided by a sensor that is not electrically connected to the first processor.

19. The system of claim 1, wherein the one or more processors with circuitry and code designed to execute instructions controls the HVAC system to provide heating or cooling to the building at an operational temperature based at least in part on the historical values of the first and second data.

20. The system of claim 17, wherein the one or more processors with circuitry and code designed to execute instructions controls the HVAC system to provide heating or cooling to the building at an operational temperature based at least in part on the historical values of the first and second data.

* * * * *

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC., Plaintiff, v. GOOGLE LLC, Defendant	Case No. 6:20-cv-00075-ADA **JURY TRIAL DEMANDED**

DECLARATION OF SHANNON SHAPER IN SUPPORT OF GOOGLE LLC'S MOTION TO TRANSFER

I, Shannon Shaper, declare as follows:

1. I am the Global Head of Reporting and Insights, People Operations at Defendant Google LLC ("Google"). I have been a Google employee since 2007. I work in Mountain View, California. I have access to and am familiar with relevant information about Google's operations, staff, and physical presences, including activities relating to the Google Nest Learning Thermostat. If called as a witness, I could and would testify competently to the facts stated herein.

2. I provide this declaration in support of Google's motion to transfer venue to the Northern District of California. I submit this declaration based upon my knowledge of Google's corporate structure, including Nest's operations, and Google's investigation of the location of witnesses and evidence relevant to Plaintiff EcoFactor, Inc.'s ("Plaintiff") complaint in this action, which focuses on the Google Nest Learning

Thermostat.

3. Google LLC is a Delaware corporation with its principal place of business in Mountain View, California, in the Northern District of California. Google has been headquartered in Northern California since its founding in 1998, and in Mountain View since 2003.

4. Google's Mountain View headquarters, which includes offices in neighboring Sunnyvale and Palo Alto (collectively referred to as "Mountain View" herein), is the strategic center of Google's business. [redacted]

5. The Nest Learning Thermostat originated from Nest Labs. Nest Labs was a company that launched in 2010 with headquarters in Palo Alto, in the Northern District of California. In 2014, Alphabet Inc. (the parent company of Google LLC) acquired Nest Labs. In 2018, the Nest product division became part of Google LLC under the new "Google Nest" brand.

6. Since Nest Labs launched, including after it merged with Google, the majority of people, facilities, and product development activities for the Nest Learning Thermostat have been, and continue to be, located in the San Francisco Bay Area.

CONFIDENTIAL MATERIAL OMITTED

7. The vast majority of the research, design, and development activities related to the Nest Learning Thermostat, as well as the vast majority of the marketing, sales, pricing, and finance decisions related to the Nest Learning Thermostat, have occurred and continue to occur in Mountain View.

[redacted]

9. I understand Plaintiff accuses Google of patent infringement and has defined the "Accused Products" to include the "Google Nest Learning Thermostat."

[redacted]

[redacted]

11. Google maintains much smaller offices in Austin, in the Western District of Texas, and Dallas, in the Northern District of Texas. [redacted]

12. Based on my investigation, all personnel with relevant knowledge regarding the marketing or finance of the Nest Learning Thermostat are based in Mountain View. I am aware of no Google employees involved in the marketing or finance of the Nest Learning Thermostat who reside or work in Texas.

13. Based on my investigation, management personnel with relevant knowledge regarding the sales and distribution of the Nest Learning Thermostat are based in Mountain View. Only one Google employee involved in the sales of Nest Learning Thermostat works within the Western District of Texas (Austin, Texas) and one

additional Google employee involved in the sales of all Google devices and services, including Nest Learning Thermostat, works within the Northern District of Texas (Dallas, Texas). No other Google employees involved in the sales and distribution of Nest Learning Thermostat are located in Texas.

14. Based on my investigation, management personnel with relevant knowledge regarding customer support of the Nest Learning Thermostat are based in Mountain View. Only four Google employees involved in the customer support of all Google devices and services, including Nest Learning Thermostat, work within the Western District of Texas (Austin, Texas). No other Google employees involved in the customer support of Nest Learning Thermostat are located in Texas.

15. These six Google employees in Texas all ultimately report to management in Mountain View, California. The six employees in Texas did not work on any of the Nest Learning Thermostat functionality.

16. As a matter of Google practice, documents in Google's possession about its products and services are normally created and maintained by the employees working on those products and services. As discussed above, for the Nest product division, the employees with relevant knowledge of this litigation are located primarily in Mountain View, and no such employees are in the Western District of Texas, meaning the relevant documents here would be created and maintained in Mountain View.

17. Specifically, the employees and management ultimately responsible for product development, operations, marketing, finance, sales, distribution and customer support for the Nest Learning Thermostat are located primarily in Mountain View. The

relevant Google documents about the Nest Learning Thermostat are created and maintained by these employees in Mountain View, including the following types of documents and items:

a. Documents related to the development, design and operation of the Nest Learning Thermostat;

b. Prototypes and designs for the Nest Learning Thermostat;

c. Documents related to the business, financial planning, and performance for the Nest product division;

d. Documents related to marketing and promotion of Nest products;

I declare under penalty of perjury that the foregoing is true and correct. Executed on this _26_th day in May, 2020, in Menlo Park, California.

Shannon Shaper

CONFIDENTIAL MATERIAL OMITTED

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC., Plaintiff, v. GOOGLE LLC, Defendant	Case No. 6:20-cv-00075-ADA **JURY TRIAL DEMANDED** **FILED UNDER SEAL**

DECLARATION OF BIJAL VAKIL IN SUPPORT OF GOOGLE LLC'S MOTION TO TRANSFER VENUE TO THE NORTHERN DISTRICT OF CALIFORNIA

I, Bijal Vakil, declare as follows:

1. I am a partner at White & Case LLP, counsel to Defendant Google LLC ("Google") in this case. I provide this declaration in support of Google's motion to transfer venue to the Northern District of California. If called as a witness, I could and would testify competently to the facts stated herein.

2. Attached as Exhibit 1 is a true and correct copy of LexisNexis search results for the California Secretary of State's records for EcoFactor, Inc.

3. Attached as Exhibit 2 is a true and correct copy of a March 11, 2020 Form D from EcoFactor, Inc., obtained from the U.S. Securities and Exchange Commission's website, available at https://www.sec.gov/Archives/edgar.

4. Attached as Exhibit 3 are true and correct copies of the attorneys of record listed in the U.S. Patent and Trademark Office's PAIR database for U.S. Patent Nos. 8,180,492, 8,412,488, 8,738,327, and 10,534,382, available at https://portal.uspto.gov/pair.

5. Attached as Exhibit 4 is a true and correct copy of a [redacted] dated August 24, 2017.

6. Attached as Exhibit 5 is a true and correct copy of a [redacted]

dated August 14, 2017.

7. Attached as Exhibit 6 is a true and correct copy of a May 1, 2020 e-mail from Matthew Aichele, counsel for EcoFactor, Inc. in Investigation No. 337-TA-1185 at the International Trade Commission, to James Gagen, counsel for Google in the same case.

8. Attached as Exhibit 7 is a true and correct copy of the LinkedIn profile for John Steinberg, available at http://www.linkedin.com/in/johnsteinberg.

9. Attached as Exhibit 8 is a true and correct copy of the California State Bar membership profile for John Steinberg, available at members.calbar.ca.gov/fal/Licensee/Detail/126403.

10. Attached as Exhibit 9 is a true and correct copy of a document titled "Integrated Demand Side Management Using a 2-Way Communicating Thermostat."

11. Attached as Exhibit 10 is a true and correct copy of a document titled "Enabling Technologies Development Grant Program, Final Report 2002-2015," available at https://ww2.energy.ca.gov/2016publications/CEC-500-2016-011/CEC-500-2016-011.pdf.

12. Attached as Exhibit 11 is a true and correct copy of a document titled "Demand Response Enabling Technology Development," available at https://escholarship.org/content/qt0971h43j/qt0971h43j.pdf?t=lpystq.

13. Attached as Exhibit 12 is a true and correct copy of a document titled "The Application of Wireless Sensor Networks to Residential Energy Efficiency and Demand Response," obtained through ProQuest Information and Learning Company.

14. Attached as Exhibit 13 is a true and correct copy of the public version of the complaint in *Certain Smart Thermostats, Smart HVAC Systems, and Components Thereof*, Inv. No. 337-TA-1185, filed with the International Trade Commission.

15. Attached as Exhibit 14 is a true and correct copy of patent case statistics from Docket Navigator for the Western District of Texas and the Northern District of California, as of May 27, 2020.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 27, 2020.

/s/ Bijal Vakil
Bijal Vakil

Exhibit 1

1 OF 1 RECORD(S)

Report Created: March 4, 2020 - Wednesday 1:59 PM

California Secretary of State

Corporate Filing 1

Business Information

Filing Type: CURRENT
Filing Number: C2888781
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD MAILING Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL MAILING Address: 1450 VETERANS BLVD. SUITE #100
REDWOOD CITY, CA 94063
US

Business Type: FOREIGN CORPORATION
Filing Type: STATEMENT & DESIGNATION BY FOREIGN CORPORATION
Status: ACTIVE
Foreign State of Incorporation: DELAWARE
Place Incorporated: CALIFORNIA
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 07/11/2006
Terms: PERPETUAL
Partnership: NO
Tax Program: NOT SUSPENDED-IN GOOD STANDING
Date Last Seen: 01/07/2020

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619

Corporate Filing 2

Business Information

Filing Type: HISTORICAL
Filing Number: C2888781
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD MAILING Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL MAILING Address: 1450 VETERAN'S BLVD SUITE 100
REDWOOD CITY, CA 94063
US

Business Type: FOREIGN CORPORATION
Filing Type: STATEMENT & DESIGNATION BY FOREIGN CORPORATION
Status: ACTIVE
Foreign State of Incorporation: DELAWARE

Corporate Filing 2

Place Incorporated: CALIFORNIA
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 07/11/2006
Terms: PERPETUAL
Partnership: NO
Tax Program: NOT SUSPENDED-IN GOOD STANDING
Date Last Seen: 09/05/2017

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619

Stock Information

Stock

Change In Stock: 0
Voting Rights: NO
Converted: 0
Additional Information: STOCK

Officers

Name: SHAYAN, HABIB
Contact Type:CHIEF EXECUTIVE OFFICER

Standard Address: Type:CONTACT
1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
Original Address: 1450 VETERANS BLVD. SUITE #100
REDWOOD CITY, CA 94063
US

Filing History

Filing Date: 09/12/2017
Filing Type: FILING
Ref No: FQ92998
Description: STATEMENT OF OFFICERS INFORMATION

Filing Date: 05/06/2016
Filing Type: FILING
Ref No: FD54205
Description: STATEMENT OF OFFICERS INFORMATION

Filing Date: 05/09/2007
Filing Type: FILING TRANSACTION DATE
Ref No: A0661015
Corp No.: C2888781
Description: AMENDED STATEMENT AND DESIGNATION BY FOREIGN CORPORATION;NAME CHANGE FROM:, OLD NAME: GREENDEEDS, INC.

Colorado Secretary of State

Corporate Filing 1

Business Information

Filing Type: CURRENT
Filing Number: 20131196089

Corporate Filing 1

Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL BUSINESS Address: 1450 VETERANS BLVD SUITE 100
REDWOOD CITY, CA 94063
US

Address: US

Business Type: FOREIGN PROFIT
Status: WITHDRAWN
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
For Profit: TRUE
Partnership: NO
Date Last Seen: 02/26/2020

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 2

Business Information

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL BUSINESS Address: 1450 VETERANS BLVD SUITE 100
REDWOOD CITY, CA 94063
US

Business Type: FOREIGN PROFIT
Status: WITHDRAWN
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
For Profit: TRUE
Partnership: NO
Date Last Seen: 08/28/2019

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 3

Business Information

Corporate Filing 3

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL BUSINESS Address: 1450 VETERANS BLVD SUITE 100
REDWOOD CITY, CA 94063

Business Type: FOREIGN PROFIT
Status: WITHDRAWN
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 02/08/2017

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 4

Business Information

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL BUSINESS Address: 1450 VETERANS BLVD SUITE 100
REDWOOD CITY, CA 94063

Address: REDWOOD CITY, CA 94063

Business Type: FOREIGN PROFIT
Status: WITHDRAWN
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 07/06/2016

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 5

Business Information

Filing Type: HISTORICAL
Filing Number: 20131196089

Corporate Filing 5

Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL BUSINESS Address: 1450 VETERANS BLVD SUITE 100
SUITE 100
REDWOOD CITY
CA
94063

Business Type: FOREIGN PROFIT
Status: WITHDRAWN
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 06/01/2016

Registered Agent

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 6

Business Information

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
ORIGINAL BUSINESS Address: 1450 VETERANS BLVD SUITE 100
SUITE 100
REDWOOD CITY
CA
94063

Business Type: FOREIGN PROFIT
Status: GOOD STANDING
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 03/09/2016

Registered Agent

Name: THE CORPORATION COMPANY
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 7

Business Information

Corporate Filing 7

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
ORIGINAL BUSINESS Address: 720 BAY ROAD SUITE #201
SUITE #201
REDWOOD CITY
CA
94063

Business Type: FOREIGN PROFIT
Status: NONCOMPLIANT
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 07/29/2015

Registered Agent

Name: THE CORPORATION COMPANY
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 8

Business Information

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
ORIGINAL BUSINESS Address: 720 BAY ROAD SUITE #201
SUITE #201
REDWOOD CITY
CA
94063

Business Type: FOREIGN PROFIT CORPORATION
Status: NONCOMPLIANT
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 07/01/2015

Registered Agent

Name: THE CORPORATION COMPANY
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Corporate Filing 9

Corporate Filing 9

Business Information

Filing Type: HISTORICAL
Filing Number: 20131196089
Name: ECOFACTOR, INC.
Name Type: LEGAL
STANDARD BUSINESS Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
ORIGINAL BUSINESS Address: 720 BAY ROAD SUITE #201
SUITE #201
REDWOOD CITY
CA
94063

Business Type: FOREIGN PROFIT CORPORATION
Status: GOOD STANDING
Foreign State of Incorporation: CALIFORNIA
Place Incorporated: COLORADO
Foreign/Domestic: FOREIGN
Foreign Incorporation Date: 03/26/2013
Terms: PERPETUAL
Partnership: NO
Date Last Seen: 05/27/2015

Registered Agent

Name: THE CORPORATION COMPANY
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Historical Registered Agents

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Name: SHAYAN, HABIB
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Name: THE CORPORATION COMPANY
Registered Agent Address 1675 BROADWAY
DENVER, CO 80202-4675

Annual Report Filings

Filing 1

Filed Date: 08/01/2015
Comments: CHANGE IN STATUS: DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT; ENTITY HAS BECOME DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT

Filing 2

Filed Date: 08/01/2015
Comments: CHANGE IN STATUS: DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT; ENTITY HAS BECOME DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT

Filing 3

Filed Date: 07/30/2015

Annual Report Filings

Comments: CHANGE IN STATUS IN ONE WEEK: DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT; ONE WEEK UNTIL DELINQUENT: 07/31/2015

Filing 4

Filed Date: 07/30/2015
Comments: CHANGE IN STATUS IN ONE WEEK: DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT; ONE WEEK UNTIL DELINQUENT: 07/31/2015

Filing 5

Filed Date: 07/24/2015
Comments: CHANGE IN STATUS IN ONE WEEK: DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT; ONE WEEK UNTIL DELINQUENT: 07/31/2015

Filing 6

Filed Date: 07/24/2015
Comments: CHANGE IN STATUS IN ONE WEEK: DELINQUENT FOR FAILURE TO FILE PERIODIC REPORT; ONE WEEK UNTIL DELINQUENT: 07/31/2015

Filing 7

Filed Date: 06/01/2015
Comments: CHANGE IN STATUS: NONCOMPLIANT FOR FAILURE TO FILE PERIODIC REPORT; ENTITY NONCOMPLIANT AND WILL BECOME DELINQUENT ON: 07/31/2015

Filing 8

Filed Date: 06/01/2015
Comments: CHANGE IN STATUS: NONCOMPLIANT FOR FAILURE TO FILE PERIODIC REPORT; ENTITY NONCOMPLIANT AND WILL BECOME DELINQUENT ON: 07/31/2015

Filing 9

Filed Date: 05/24/2015
Comments: PERIODIC REPORT DUE IN ONE WEEK; PERIODIC REPORT DUE BY: 05/31/2015

Filing 10

Filed Date: 02/23/2015
Comments: PERIODIC REPORT DUE; PERIODIC REPORT DUE BY: 05/31/2015

Filing 11

Filed Date: 05/28/2014
Filing Number: 20141332888
Comments: FILE REPORT

Filing 12

Filed Date: 05/24/2014
Comments: PERIODIC REPORT DUE IN ONE WEEK; PERIODIC REPORT DUE BY: 05/31/2014

Filing 13

Filed Date: 02/23/2014
Comments: PERIODIC REPORT DUE; PERIODIC REPORT DUE BY: 05/31/2014

Filing History

Filing History

Filing Date: 03/10/2016
Ref No: 20161177173
Description: WITHDRAW FOREIGN ENTITY AUTHORITY;ENTITY HAS WITHDRAWN ITS AUTHORITY TO TRANSACT BUSINESS OR CONDUCT ACTIVITIES. OTHER INFORMATION MAY HAVE CHANGED; REVIEW DOCUMENT.

Filing Date: 03/10/2016
Ref No: 20161177173
Description: WITHDRAW FOREIGN ENTITY AUTHORITY;ENTITY HAS WITHDRAWN ITS AUTHORITY TO TRANSACT BUSINESS OR CONDUCT ACTIVITIES. OTHER INFORMATION MAY HAVE CHANGED; REVIEW DOCUMENT.

Filing Date: 08/03/2015
Ref No: 20151505280
Description: STATEMENT CURING DELINQUENCY

Filing Date: 05/28/2014
Ref No: 20141332888
Description: FILE REPORT

Filing Date: 03/26/2013
Ref No: 20131196089
Description: APPLY FOR FOREIGN ENTITY AUTHORITY TO TRANSACT BUSINESS IN C

NEW YORK JUDGMENT AND LIEN FILINGS

This data is for informational purposes only.

Debtor Information

Name: ECOFACTOR INC
Address: 1450 VETERANS BLVD #100
REDWOOD CITY, CA 94063-2619
SAN MATEO COUNTY

Creditor Information

Name: CITY OF NEW YORK

Filing Information

Filing State: NEW YORK
Filing Date: 01/14/2020
Amount: $52

Filing 1

Filing Number: 3939430
Filing Type: CITY TAX LIEN
Filing Date: 01/14/2020
Filing Court: NEW YORK COUNTY COURT
Filing County: NEW YORK
Filing Office: NY

NEW YORK JUDGMENT AND LIEN FILINGS

This data is for informational purposes only.

Debtor Information

Name: ECOFACTOR INC
Address: 1450 VETERANS BLVD #100
REDWOOD CITY, CA 94063-2619
SAN MATEO COUNTY

Creditor Information

Name: CITY OF NEW YORK

Filing Information

Filing State: NEW YORK
Original Filing Number: 3809684
Filing Date: 01/09/2019
Amount: $27
Release Date: 03/12/2019

Filing 1

Filing Number: 3809684
Filing Type: CITY TAX LIEN
Filing Date: 01/09/2019
Filing Court: NEW YORK COUNTY CLERK
Filing County: NEW YORK
Filing Office: NY

Filing 2

Filing Number: 3809684
Filing Type: CITY TAX LIEN RELEASE
Filing Date: 01/09/2019
Filing Court: NEW YORK COUNTY CLERK
Filing County: NEW YORK
Filing Office: NY

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2019

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)
DBA ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: ECOFACTOR INCORPORATED
Original Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY

Property Information

Original Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO

Estimated Roll Certification Date: 07/01/2019

Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001
Legal Description: TRACT: 100

Assessment Information

Assessment Year: 2019
Assessed Improvement Value: $158,008
Total Assessed Value: $158,008

Tax Information

Tax Rate Code: 9-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2018

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)
DBA ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: ECOFACTOR INCORPORATED
Original Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY

Property Information

Original Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001
Legal Description: TRACT: 100

Assessment Information

Assessment Year: 2018
Assessed Improvement Value: $184,355
Total Assessed Value: $184,355

Tax Information

Tax Rate Code: 9-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2017

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)
DBA ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: ECOFACTOR INCORPORATED
Original Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY

Property Information

Original Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001
Legal Description: TRACT: 100

Assessment Information

Assessment Year: 2017
Assessed Improvement Value: $245,609
Total Assessed Value: $245,609

Tax Information

Tax Rate Code: 9-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2016

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)
DBA ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: DBA ECOFACTOR INC
ECOFACTOR INC
Original Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2619

Standardized Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY

Property Information

Original Property Address: 1450 VETERANS BLVD

Estimated Roll Certification Date: 07/01/2016

REDWOOD CITY, CA 94063-2619

Standardized Property Address: 1450 VETERANS BLVD
REDWOOD CITY, CA 94063-2617
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001
Legal Description: TRACT: 100

Assessment Information

Assessment Year: 2016
Assessed Improvement Value: $279,163
Total Assessed Value: $279,163

Tax Information

Tax Rate Code: 9-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2015

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)
DBA ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: DBA ECOFACTOR INC
ECOFACTOR INC
Original Address: 1450 VETERANS BLVD #100
REDWOOD CITY, CA 94063-2619

Standardized Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
SAN MATEO COUNTY

Property Information

Original Property Address: 1450 VETERANS BLVD #100
REDWOOD CITY, CA 94063-2619

Standardized Property Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001

Assessment Information

Assessment Year: 2015
Assessed Improvement Value: $462,983

Estimated Roll Certification Date: 07/01/2015

Total Assessed Value: $462,983

Tax Information

Tax Rate Code: 9-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2014

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)
DBA ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: ECOFACTOR INCORPORATED
C/O: TAX DEPT
Original Address: 720 BAY RD #201
REDWOOD CITY, CA 94063-2479

Standardized Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
SAN MATEO COUNTY

Property Information

Original Property Address: 720 BAY RD #201
REDWOOD CITY, CA 94063-2479

Standardized Property Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001

Assessment Information

Assessment Year: 2014
Assessed Improvement Value: $484,313
Total Assessed Value: $484,313

Tax Information

Tax Rate Code: 9-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2013

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: ECOFACTOR INCORPORATED
Original Address: 720 BAY RD #STE 20
REDWOOD CITY, CA 94063-2479

Estimated Roll Certification Date: 07/01/2013

Standardized Address: 720 BAY RD STE 20
REDWOOD CITY, CA 94063-2479
SAN MATEO COUNTY

Property Information

Original Property Address: 720 BAY RD #STE 20
REDWOOD CITY, CA 94063

Standardized Property Address: 720 BAY RD STE 20
REDWOOD CITY, CA 94063-2479
SAN MATEO COUNTY
Land Use: EQUIPMENT/SUPPLIES
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 0411440001

Assessment Information

Assessment Year: 2013
Assessed Improvement Value: $424,865
Total Assessed Value: $424,865

Tax Information

Tax Rate Code: 09-091

Assessment Record

This data is for informational purposes only.

Estimated Roll Certification Date: 07/01/2012

Owner Information

Original Name: ECOFACTOR INC (COMPANY/CORPORATION)

Standardized Name: ECOFACTOR INCORPORATED
Original Address: 1775 WOODSIDE RD #100
REDWOOD CITY, CA 94061

Standardized Address: 1775 WOODSIDE RD
REDWOOD CITY, CA 94061-3436
SAN MATEO COUNTY

Property Information

Original Property Address: 1775 WOODSIDE RD #100
REDWOOD CITY, CA 94061

Standardized Property Address: 1775 WOODSIDE RD
REDWOOD CITY, CA 94061-3436
SAN MATEO COUNTY
Land Use: BUSINESS PERSONAL PROPERTY (GENERAL)
County: SAN MATEO
Data Source: B

Legal Information

Assessor's Parcel Number: 411-440-001

Estimated Roll Certification Date: 07/01/2012

Assessment Information

Assessment Year: 2012
Assessed Improvement Value: $142,124
Total Assessed Value: $142,124

Tax Information

Tax Rate Code: 9-056

UCC Filings

This data is for informational purposes only.

1:Delaware UCC Record

Debtor Information

Name: ECOFACTOR, INC.
Standardized Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
Original Address: 1450 VETERANS BLVD., SUITE 100
REDWOOD CITY, CA 94063-2619

Secured Party Information

Name: COSTELLA KIRSCH VI, LP
Standardized Address: 3500 ALAMEDA DE LAS PULGAS STE 150
MENLO PARK, CA 94025-6569
Original Address: 3500 ALAMEDA DE LAS PULGAS, SUITE 150
MENLO PARK, CA 94025-6569

Filing Information

Original Filing Number: 2017 1484440
Original Filing Date: 03/06/2017
Filing Agency: SECRETARY OF STATE/UCC DIVISION
Filing Agency Address: FEDERAL & DUKE OF YORK STS
DOVER, DE 19901

Filing Type: INITIAL FILING
Filing Number: 2017 1484440
Filing Date: 03/06/2017
Vendor Entry Date: 04/19/2017
Vendor Update Date: 2017

Filing Type: AMENDMENT
Filing Number: 2019 1465801
Filing Date: 03/01/2019
Vendor Entry Date: 04/05/2019
Vendor Update Date: 2019

Collateral

Collateral Description: 03/06/2017 2017 1484440 - ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;CHATTEL PAPER INCLUDING PROCEEDS AND PRODUCTS;CONTRACT RIGHTS INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;FARM PRODUCTS/CROPS INCLUDING PROCEEDS AND PRODUCTS;ASSETS INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND

1:Delaware UCC Record

PRODUCTS;COMPUTER EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS

UCC Filings

This data is for informational purposes only.

1:Delaware UCC Record

Debtor Information

Debtor 1

Name: ECOFACTOR, INC.

Debtor 2

Name: ECOFACTOR, INC.
Standardized Address: 1775 WOODSIDE RD STE 100
REDWOOD CITY, CA 94061-3436
Original Address: 1775 WOODSIDE ROAD, SUITE 100
REDWOOD CITY, CA 94061-3436

Secured Party Information

Secured 1

Name: SILICON VALLEY BANK
Standardized Address: 3003 TASMAN DR
SANTA CLARA, CA 95054-1191
Original Address: 3003 TASMAN DRIVE
SANTA CLARA, CA 95054-1191

Secured 2

Name: SILICON VALLEY BANK

Filing Information

Original Filing Number: 2012 2210203
Original Filing Date: 06/08/2012
Filing Agency: SECRETARY OF STATE/UCC DIVISION
Filing Agency Address: FEDERAL & DUKE OF YORK STS
DOVER, DE 19901

Filing Type: INITIAL FILING
Filing Number: 2012 2210203
Filing Date: 06/08/2012
Vendor Entry Date: 08/07/2012
Vendor Update Date: 2018

Filing Type: AMENDMENT
Filing Number: 2013 4320819
Filing Date: 11/04/2013
Vendor Entry Date: 12/28/2013
Vendor Update Date: 2018

Filing Type: TERMINATION
Filing Number: 20171241832
Filing Date: 02/23/2017
Vendor Entry Date: 04/13/2017
Vendor Update Date: 2018

1:Delaware UCC Record

Collateral

Collateral 1

Collateral Description: 11/04/2013 2013 4320819 - ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;CONTRACT RIGHTS INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;NEGOTIABLE INSTRUMENTS INCLUDING PROCEEDS AND PRODUCTS;CHATTEL PAPER INCLUDING PROCEEDS AND PRODUCTS;ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;ASSETS INCLUDING PROCEEDS AND PRODUCTS;MACHINERY INCLUDING PROC

Collateral 2

Collateral Description: 06/08/2012 2012 2210203 - ASSETS INCLUDING PROCEEDS AND PRODUCTS;ACCOUNT(S) INCLUDING PROCEEDS AND PRODUCTS;EQUIPMENT INCLUDING PROCEEDS AND PRODUCTS;INVENTORY INCLUDING PROCEEDS AND PRODUCTS;CONTRACT RIGHTS INCLUDING PROCEEDS AND PRODUCTS;GENERAL INTANGIBLE(S) INCLUDING PROCEEDS AND PRODUCTS;NEGOTIABLE INSTRUMENTS INCLUDING PROCEEDS AND PRODUCTS;CHATTEL PAPER INCLUDING PROCEEDS AND PRODUCTS;ACCOUNTS RECEIVABLE INCLUDING PROCEEDS AND PRODUCTS;FIXTURES INCLUDING PROCEEDS AND PRODUCTS;MACHINERY INCLUDING PROC

UCC Filings

This data is for informational purposes only.

1:Delaware UCC Record

Debtor Information

Name: ECOFACTOR, INC.
Standardized Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
Original Address: 720 BAY ROAD, SUITE 201
REDWOOD CITY, CA 94063-2480

Secured Party Information

Name: SILICON VALLEY BANK

Filing Information

Original Filing Number: 2012 2210203
Filing Agency: SECRETARY OF STATE/UCC DIVISION
Filing Agency Address: FEDERAL & DUKE OF YORK STS
DOVER, DE 19901

Filing Type: AMENDMENT
Filing Number: 2013 1030296
Filing Date: 03/18/2013
Vendor Entry Date: 05/04/2013
Vendor Update Date: 2018

FEIN Records

This data is for informational purposes only.

TIN: 22-3937554
Company Name: ECOFACTOR INC

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665
Coverage Start Date: 07/16/2014

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665
Carrier Number: 0

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665
Carrier Number: 0
Coverage Start Date: 09/01/2015

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665
Coverage Start Date: 09/01/2015

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
Classification: 8810

Policy 1

Carrier Name: HARTFORD INSURANCE COMPANY OF THE MIDWEST
Carrier Number: 37478
Group Name: HARTFORD FIRE AND CASUALTY GROUP
Group Number: 91
Coverage Start Date: 07/31/2014

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 57WECDR5518
Carrier Name: HARTFORD INSURANCE COMPANY OF THE MIDWEST
Carrier Number: 37478
Group Name: HARTFORD FIRE AND CASUALTY GROUP
Group Number: 91
Coverage Start Date: 07/31/2014

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 57WECDR5518
Carrier Name: HARTFORD INSURANCE COMPANY OF THE MIDWEST
Carrier Number: 37478
Group Name: HARTFORD FIRE AND CASUALTY GROUP
Group Number: 91
Coverage Start Date: 07/31/2014

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201

REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665
Carrier Number: 0
Group Number: 0
Coverage Start Date: 07/16/2014

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECO FACTOR
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 826665

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
Classification: 8810

Policy 1

Carrier Name: HARTFORD INSURANCE COMPANY OF THE MIDWEST
Carrier Number: 37478
Group Name: HARTFORD FIRE AND CASUALTY GROUP
Group Number: 91
Coverage Start Date: 07/31/2013

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480

Policy 1

Policy Number: 57WECDR5518
Carrier Name: HARTFORD INSURANCE COMPANY OF THE MIDWEST
Carrier Number: 37478
Group Name: HARTFORD FIRE AND CASUALTY GROUP
Group Number: 91
Coverage Start Date: 07/31/2013

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
Classification: 8803

Policy 1

Policy Number: WC094179824
Carrier Name: NEW HAMPSHIRE INSURANCE COMPANY
Carrier Number: 23841
Group Name: AMERICAN INTERNATIONAL GROUP
Group Number: 12
Coverage Start Date: 07/01/2015

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619

Policy 1

Policy Number: 826665
Coverage Start Date: 07/16/2014

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619

Policy 1

Policy Number: WC014267901
Carrier Name: INSURANCE COMPANY OF THE STATE OF PENNSYLVANIA
Carrier Number: 19429
Group Name: AMERICAN INTERNATIONAL GROUP
Group Number: 12
Coverage Start Date: 09/01/2015

Workers Compensation Record

This data is for informational purposes only.

Company Name: ECOFACTOR INC
Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
Classification: 8803

Policy 1

Policy Number: WC094179824
Carrier Name: NEW HAMPSHIRE INSURANCE COMPANY
Carrier Number: 23841
Group Name: AMERICAN INTERNATIONAL GROUP
Group Number: 12
Coverage Start Date: 07/01/2014

Experian Business Data

This data is for informational purposes only.

Business Information

Experian Company Number: 871384878
Company Name: ECOFACTOR, INC
Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
SAN MATEO COUNTY
Phone: 415-625-8555
Business Type: CORPORATION
Business Description: Business Consulting Services, Nec
SIC Code: 8748
Years In Business: 20
Sales: $218,000
Number of Employees: 2
Fiscal Year End Month: 0
Profit Range: 0
Net Worth: 0
In Building Since Year: 0
Building Square Feet: 0
Active Customer Count: 0
Officer Name: HABIB, SHAYAN
HUBLOU, SCOTT
JOHNSON, R
JOHNSON, ROY
PLANTE, MATTHEW
STEINBERG, JOHN
Date First Seen: 07/2007
Date Last Seen: 09/09/2019
Last Updated Date: 09/12/2019
File Establish Date: 07/2007

Trade Payment Details(Trade Lines with an * after the date are newly reported)

Payment Detail

Business Category: AIR TRANS
Reported Date: 05/01/2019
Activity Date: 01/2019
Payment Terms: OTHER
Recent High Credit: $8,300
Balance: $100

DBT Percentages

Current: 100%
Day 1-30: 0%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 0%

Trade Quarterly Details

Quarter 2

Year: 19
DBT: 93
Balance: $2,500

DBT Percentages

Current: 6%
Day 1-30: 6%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 88%

Quarter 1

Year: 19
DBT: 76

Balance: $7,700

DBT Percentages

Current: 1%
Day 1-30: 9%
Day 31-60: 20%
Day 61-90: 27%
Day 91-plus: 43%

Quarter 4

Year: 18
DBT: 9
Balance: $7,400

DBT Percentages

Current: 43%
Day 1-30: 57%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 0%

Quarter 3

Year: 18
DBT: 0
Balance: $700

DBT Percentages

Current: 100%
Day 1-30: 0%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 0%

Quarter 2

Year: 18
DBT: 0
Balance: $0

DBT Percentages

Current: 0%
Day 1-30: 0%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 0%

Public Records

Uniform Commercial Code (UCC) Filings:

1.

Type: UCC-AMENDED
Document Number: 2019 1465801
File Location: SEC OF STATE DE
File Number: 2017 14844
Date Filed: 03/01/2019

2.

Type: UCC-FILED
Document Number: 2017 1484440
File Location: SEC OF STATE DE
File Number: 2017 14844
Date Filed: 03/06/2017

3.

Type: UCC-FILED
Document Number: 2017 1484440
File Location: SEC OF STATE DE
File Number: 2017 14844
Date Filed: 03/06/2017

4.

Type: UCC-AMENDED
Document Number: 2013 1030296
File Location: SEC OF STATE DELAWAR
File Number: 2012 22102
Date Filed: 03/18/2013

5.

Type: UCC-AMENDED
Document Number: 2013 1030296
File Location: SEC OF STATE DE
File Number: 2012 22102
Date Filed: 03/18/2013

6.

Type: UCC-FILED
Document Number: 2012 2210203
File Location: SEC OF STATE DELAWAR
File Number: 2012 22102
Date Filed: 06/08/2012

7.

Type: UCC-FILED
Document Number: 2012 2210203
File Location: SEC OF STATE DELAWAR
File Number: 2012 22102
Date Filed: 06/08/2012

8.

Type: UCC-FILED
Document Number: 2012 2210203
File Location: SEC OF STATE DE
File Number: 2012 22102
Date Filed: 06/08/2012

9.

Type: UCC-AMENDED
Document Number: 2013 4320819
File Location: SEC OF STATE DE
File Number: 2012 22102
Date Filed: 06/08/2012

UCC Collateral Counts:

Company has 1 Filings with 2 collateral item(s).
Collateral Code: 6
Collateral Description: INVENTORY
Collateral Code: 9
Collateral Description: HEREAFTER ACQUIRED PROP

Demographic 5600

SIC Codes: 8748 (Business Consulting Services, Nec)
4226 (Warehousing & Storage, Special, Ne)
7372 (Computer Software, Prepackaged)
1711 (Plumbing, Heating & A/C Contractor)
Years In Business: 20
Sales: $218,000
Employee Size: 1 - 5
Business Type: CORPORATION

Demographic 5610

Officer Title: PRES
Officer Name: HABIB, SHAYAN
HUBLOU, SCOTT
JOHNSON, R
JOHNSON, ROY
PLANTE, MATTHEW
STEINBERG, JOHN
Original Officer Name: HABIB, SHAYAN
HUBLOU, SCOTT
JOHNSON, R
JOHNSON, ROY
PLANTE, MATTHEW
STEINBERG, JOHN

Experian Business Data

This data is for informational purposes only.

Business Information

Experian Company Number: 923282075
Company Name: ECOFACTOR, INC
Address: 423 BROADWAY
MILLBRAE, CA 94030-1905
SAN MATEO COUNTY
Business Type: CORPORATION
Years In Business: 0
Number of Employees: 0
Date First Seen: 09/2009
Date Last Seen: 09/06/2010
Last Updated Date: 09/08/2010
File Establish Date: 09/2009

Trade Payment Details(Trade Lines with an * after the date are newly reported)

Payment Detail
Business Category: BANK CARD
Reported Date: 06/21/2010
Activity Date: 2000
Payment Terms: REVOLVE
Recent High Credit: $19,000
Balance: $6,100
DBT Percentages
Current: 100%
Day 1-30: 0%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 0%

Demographic 5600

Business Type: CORPORATION

Experian Business Data

This data is for informational purposes only.

Business Information

Experian Company Number: 946711613
Company Name: ECOFACTOR, INC
Address: 1775 WOODSIDE RD STE 100
REDWOOD CITY, CA 94061-3436
SAN MATEO COUNTY
Phone: 650-681-4627
Business Type: CORPORATION
Years In Business: 0
Number of Employees: 0
Fiscal Year End Month: 0
Profit Range: 0
Net Worth: 0
In Building Since Year: 0
Building Square Feet: 0
Active Customer Count: 0
Officer Name: STEINBERG, JOHN
Date First Seen: 03/2011
Date Last Seen: 09/05/2011
Last Updated Date: 09/08/2011
File Establish Date: 03/2011

Trade Payment Details(Trade Lines with an * after the date are newly reported)

Payment Detail
Business Category: BUS SERVCS
Reported Date: 08/31/2011
Activity Date: 2000
Payment Terms: VARIED
Recent High Credit: $200
Balance: $200
DBT Percentages
Current: 100%
Day 1-30: 0%
Day 31-60: 0%
Day 61-90: 0%
Day 91-plus: 0%

Demographic 5600

Business Type: CORPORATION

Demographic 5610

Officer Name: STEINBERG, JOHN
Original Officer Name: STEINBERG, JOHN

Experian Business Data

This data is for informational purposes only.

Business Information

Experian Company Number: 977797594
Company Name: ECOSACTOR, INC
Address: 720 BAY RD

REDWOOD CITY, CA 94063-2479
SAN MATEO COUNTY
Business Type: CORPORATION
Years In Business: 0
Number of Employees: 0
Date First Seen: 10/2013
Date Last Seen: 03/07/2018
Last Updated Date: 03/08/2018
File Establish Date: 10/2013

Demographic 5600

Business Type: CORPORATION

Business Registration Records

This data is for informational purposes only.

Business Information

Filing Number: 20131196089
Company Name: ECOFACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
Mailing Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
Corporation Code: Secretary of State
Status: Good Standing
Filing Date: 03/26/2013

Experian

This data is for informational purposes only.

Summary

Name: ECOFACTOR, INC
Address: 1450 VETERANS BLVD STE 100
REDWOOD CITY, CA 94063-2619
SAN MATEO COUNTY
Experian File Number: 871384878
File Established: 07/10/2007
URL: www.ecofactor.com
Contents: Business Description

Business Description

Industry: SERVICES
SIC: 8748(BUSINESS CONSULTING, NEC)
Years in Business (ACTUAL): OVER 10 YEARS
Employees: 2
Business Type: CORPORATION
Owner Type: PRIVATE
Location: HEADQUARTERS
Officers: PLANTE, MATTHEW, PRES

Experian

This data is for informational purposes only.

Summary

Name: ECO FACTOR INC
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
SAN MATEO COUNTY
Experian File Number: 954983048
File Established: 01/06/2012
URL: ecofactor.com
Contents: Business Description

Business Description

Industry: CONSTRUCTION
SIC: 1711(PLUMBING, HEATING, AIR-CONDITIONING)
Years in Business (ACTUAL): 1 YEAR
Employees: 4
Business Type: CORPORATION
Owner Type: PRIVATE
Location: SINGLE ENTITY
Officers: JOHNSON, ROY, CEO

Experian

This data is for informational purposes only.

Summary

Name: ECOSACTOR, INC
Address: 720 BAY RD
REDWOOD CITY, CA 94063-2479
SAN MATEO COUNTY
Experian File Number: 977797594
File Established: 10/16/2013
Contents: Business Description

Business Description

Years in Business (ACTUAL): 2 YEARS
Employees: 0
Business Type: CORPORATION
Owner Type: PRIVATE
Location: SINGLE ENTITY

LNCA Records

This data is for informational purposes only.

Business Information

Company Name: EcoFactor, Inc.
Address: 720 BAY RD STE 201
REDWOOD CITY, CA 94063-2480
06081 COUNTY
Phone: 650-716-4760
Email: info@ecofactor.com
URL: www.ecofactor.com

Business Description: Automated Energy Storage Services
Sic Codes: 4226: Special Warehousing & Storage, NEC
Number of Employees: 0
Process Date: 12/26/2019
Contacts: Abe Yokell: CEO
Doug Sinclair: CFO
John Steinberg: Exec VP-Bus Dev
Matthew Plante: CEO
Mohsin Hussain: CTO
Roy Johnson: CEO
Scott Hublou: Sr VP-Customer Ops
Shayan Habib: CFO & COO
Executives: YOKELL, ABE
SINCLAIR, DOUG
STEINBERG, JOHN
PLANTE, MATTHEW
HUSSAIN, MOHSIN
JOHNSON, ROY
HUBLOU, SCOTT
HABIB, SHAYAN

Diversity Certifications Report

This data is for informational purposes only.

Business Information

Business Id: 47414876
Id Value: 2991675
Business Name: ECOFACTOR, INC.
Duns Number: 020116519
Address: 873 HACIENDA WAY
MILLBRAE, CA 94030-1151

BusinessFirmographics

Regions: 127360
County: 081

Certification

Certification Type: SMALL BUSINESS ADMINISTRATION HISTORICALLY UNDERUTILIZED BUSINESS

Certification

Certification Type: SMALL BUSINESS ENTERPRISE

California Business Registrations

This data is for informational purposes only.

General Information

Company Name: , ECOFACTOR, INC.
Company Org Structure: CORPORATION
Address: 1775 WOODSIDE RD STE 100
REDWOOD CITY, CA 94061-3436
Incorporation Date: 01/01/2007

California Business Registrations

This data is for informational purposes only.

General Information

Company Name: , ECOFACTOR, INC.
Company Org Structure: CORPORATION
Industry Description: CONSTRUCTION CONTRACTORS AND MANUFACTURERS AND WHOLESALERS OF BUILDING MATERIAL
Address: 1775 WOODSIDE RD STE 100
REDWOOD CITY, CA 94061-3436
Incorporation Date: 01/01/2007

NAICS Codes

Code: 238220
Description: Plumbing, Heating, and Air-Conditioning Contractors

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End of Document

Exhibit 2

The Securities and Exchange Commission has not necessarily reviewed the information in this filing and has not determined if it is accurate and complete.
The reader should not assume that the information is accurate and complete.

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM D

Notice of Exempt Offering of Securities

OMB APPROVAL	
OMB Number:	3235-0076
Estimated average burden hours per response:	4.00

1. Issuer's Identity

CIK (Filer ID Number)
0001478912

Previous Names
☐ None
GreenDeeds, Inc.

Entity Type
☒ Corporation
☐ Limited Partnership
☐ Limited Liability Company
☐ General Partnership
☐ Business Trust
☐ Other (Specify)

Name of Issuer
EcoFactor, Inc.

Jurisdiction of Incorporation/Organization
DELAWARE

Year of Incorporation/Organization
☐ Over Five Years Ago
☒ Within Last Five Years (Specify Year) 2006
☐ Yet to Be Formed

2. Principal Place of Business and Contact Information

Name of Issuer
EcoFactor, Inc.

Street Address 1
990 Industrial Road, Suite 210

Street Address 2

City	State/Province/Country	ZIP/PostalCode	Phone Number of Issuer
San Carlos	CA	94070	(650) 873-0829

3. Related Persons

Last Name	First Name	Middle Name
Steinberg	John	

Street Address 1
990 Industrial Road, Suite 210

Street Address 2

City	State/Province/Country	ZIP/PostalCode
San Carlos	CA	94070

Relationship: ☒ Executive Officer ☒ Director ☐ Promoter

Clarification of Response (if Necessary):

Last Name	First Name	Middle Name
Hublou	Scott	

Street Address 1

Street Address 2

990 Industrial Road, Suite 210

City	State/Province/Country	ZIP/PostalCode
San Carlos	CA	94070

Relationship: [X] Executive Officer [X] Director [ ] Promoter

Clarification of Response (if Necessary):

Last Name	First Name	Middle Name
Goldhaber	Nat	

Street Address 1	Street Address 2
300 Frank H. Ogawa Plaza, Suite 350	

City	State/Province/Country	ZIP/PostalCode
Oakland	CA	94612

Relationship: [ ] Executive Officer [X] Director [ ] Promoter

Clarification of Response (if Necessary):

Last Name	First Name	Middle Name
Yokell	Abe	

Street Address 1	Street Address 2
160 Federal Street, 18th Floor	

City	State/Province/Country	ZIP/PostalCode
Boston	MA	02110

Relationship: [ ] Executive Officer [X] Director [ ] Promoter

Clarification of Response (if Necessary):

Last Name	First Name	Middle Name
Saltzman	Eric	

Street Address 1	Street Address 2
990 Industrial Road, Suite 210	

City	State/Province/Country	ZIP/PostalCode
San Carlos	CA	94070

Relationship: [X] Executive Officer [ ] Director [ ] Promoter

Clarification of Response (if Necessary):

---

4. Industry Group

[ ] Agriculture

Banking & Financial Services

- [ ] Commercial Banking
- [ ] Insurance
- [ ] Investing
- [ ] Investment Banking
- [ ] Pooled Investment Fund

Is the issuer registered as an investment company under

Health Care

- [ ] Biotechnology
- [ ] Health Insurance
- [ ] Hospitals & Physicians
- [ ] Pharmaceuticals
- [ ] Other Health Care

[ ] Manufacturing

Real Estate

[ ] Retailing

[ ] Restaurants

Technology

- [ ] Computers
- [ ] Telecommunications
- [ ] Other Technology

Travel

- [ ] Airlines & Airports

the Investment Company Act of 1940?

- [ ] Yes
- [ ] No

- [ ] Other Banking & Financial Services
- [ ] Business Services

Energy

- [ ] Coal Mining
- [ ] Electric Utilities
- [X] Energy Conservation
- [ ] Environmental Services
- [ ] Oil & Gas
- [ ] Other Energy

- [ ] Commercial
- [ ] Construction
- [ ] REITS & Finance
- [ ] Residential
- [ ] Other Real Estate

- [ ] Lodging & Conventions
- [ ] Tourism & Travel Services
- [ ] Other Travel
- [ ] Other

5. Issuer Size

Revenue Range	OR	Aggregate Net Asset Value Range
[ ] No Revenues		[ ] No Aggregate Net Asset Value
[ ] $1 - $1,000,000		[ ] $1 - $5,000,000
[ ] $1,000,001 - $5,000,000		[ ] $5,000,001 - $25,000,000
[ ] $5,000,001 - $25,000,000		[ ] $25,000,001 - $50,000,000
[ ] $25,000,001 - $100,000,000		[ ] $50,000,001 - $100,000,000
[ ] Over $100,000,000		[ ] Over $100,000,000
[X] Decline to Disclose		[ ] Decline to Disclose
[ ] Not Applicable		[ ] Not Applicable

6. Federal Exemption(s) and Exclusion(s) Claimed (select all that apply)

- [ ] Rule 504(b)(1) (not (i), (ii) or (iii))
- [ ] Rule 504 (b)(1)(i)
- [ ] Rule 504 (b)(1)(ii)
- [ ] Rule 504 (b)(1)(iii)
- [ ] Rule 505
- [X] Rule 506
- [ ] Securities Act Section 4(5)
- [ ] Investment Company Act Section 3(c)
  - [ ] Section 3(c)(1)
  - [ ] Section 3(c)(2)
  - [ ] Section 3(c)(3)
  - [ ] Section 3(c)(4)
  - [ ] Section 3(c)(5)
  - [ ] Section 3(c)(6)
  - [ ] Section 3(c)(7)
  - [ ] Section 3(c)(9)
  - [ ] Section 3(c)(10)
  - [ ] Section 3(c)(11)
  - [ ] Section 3(c)(12)
  - [ ] Section 3(c)(13)
  - [ ] Section 3(c)(14)

7. Type of Filing

☐ New Notice Date of First Sale 2009-12-22 ☐ First Sale Yet to Occur

☒ Amendment

8. Duration of Offering

Does the Issuer intend this offering to last more than one year? ☐ Yes ☒ No

9. Type(s) of Securities Offered (select all that apply)

☒ Equity	☐ Pooled Investment Fund Interests
☐ Debt	☐ Tenant-in-Common Securities
☐ Option, Warrant or Other Right to Acquire Another Security	☐ Mineral Property Securities
☐ Security to be Acquired Upon Exercise of Option, Warrant or Other Right to Acquire Security	☐ Other (describe)

10. Business Combination Transaction

Is this offering being made in connection with a business combination transaction, such as a merger, acquisition or exchange offer? ☐ Yes ☒ No

Clarification of Response (if Necessary):

11. Minimum Investment

Minimum investment accepted from any outside investor $1 USD

12. Sales Compensation

Recipient

Recipient CRD Number ☒ None

(Associated) Broker or Dealer ☒ None

(Associated) Broker or Dealer CRD Number ☒ None

Street Address 1

Street Address 2

City

State/Province/Country

ZIP/Postal Code

State(s) of Solicitation (select all that apply)
Check “All States” or check individual States

☐ All States

☐ Foreign/non-US

13. Offering and Sales Amounts

Total Offering Amount	$5,894,996 USD	or ☐ Indefinite
Total Amount Sold	$5,894,996 USD	
Total Remaining to be Sold	$0 USD	or ☐ Indefinite

Clarification of Response (if Necessary):

14. Investors

☐ Select if securities in the offering have been or may be sold to persons who do not qualify as accredited investors, and enter the number of such non-accredited investors who already have invested in the offering.

Regardless of whether securities in the offering have been or may be sold to persons who do not

quality as accredited investors, enter the total number of investors who already have invested in the offering: 9

15. Sales Commissions & Finder's Fees Expenses

Provide separately the amounts of sales commissions and finders fees expenses, if any. If the amount of an expenditure is not known, provide an estimate and check the box next to the amount.

Sales Commissions $0 USD ☐ Estimate

Finders' Fees $0 USD ☐ Estimate

Clarification of Response (if Necessary):

16. Use of Proceeds

Provide the amount of the gross proceeds of the offering that has been or is proposed to be used for payments to any of the persons required to be named as executive officers, directors or promoters in response to Item 3 above. If the amount is unknown, provide an estimate and check the box next to the amount.

$0 USD ☒ Estimate

Clarification of Response (if Necessary):

Signature and Submission

Please verify the information you have entered and review the Terms of Submission below before signing and clicking SUBMIT below to file this notice.

Terms of Submission

In submitting this notice, each issuer named above is:

- Notifying the SEC and/or each State in which this notice is filed of the offering of securities described and undertaking to furnish them, upon written request, in the accordance with applicable law, the information furnished to offerees.*
- Irrevocably appointing each of the Secretary of the SEC and, the Securities Administrator or other legally designated officer of the State in which the issuer maintains its principal place of business and any State in which this notice is filed, as its agents for service of process, and agreeing that these persons may accept service on its behalf, of any notice, process or pleading, and further agreeing that such service may be made by registered or certified mail, in any Federal or state action, administrative proceeding, or arbitration brought against the issuer in any place subject to the jurisdiction of the United States, if the action, proceeding or arbitration (a) arises out of any activity in connection with the offering of securities that is the subject of this notice, and (b) is founded, directly or indirectly, upon the provisions of: (i) the Securities Act of 1933, the Securities Exchange Act of 1934, the Trust Indenture Act of 1939, the Investment Company Act of 1940, or the Investment Advisers Act of 1940, or any rule or regulation under any of these statutes, or (ii) the laws of the State in which the issuer maintains its principal place of business or any State in which this notice is filed.
- Certifying that, if the issuer is claiming a Rule 505 exemption, the issuer is not disqualified from relying on Rule 505 for one of the reasons stated in Rule 505(b)(2)(iii).

Each Issuer identified above has read this notice, knows the contents to be true, and has duly caused this notice to be signed on its behalf by the undersigned duly authorized person.

For signature, type in the signer's name or other letters or characters adopted or authorized as the signer's signature.

Issuer	Signature	Name of Signer	Title	Date
EcoFactor, Inc.	John Steinberg	John Steinberg	President	2010-04-06

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB number.

This undertaking does not affect any limits Section 102(a) of the National Securities Markets Improvement Act of 1996 ("NSMIA") [Pub. L. No. 104-290, 110 Stat. 3416 (Oct. 11, 1996)] imposes on the ability of States to require information. As a result, if the securities that are the subject of this Form D are "covered securities" for purposes of NSMIA, whether in all instances or due to the nature of the offering that is the subject of this Form D, States cannot routinely require offering materials under this undertaking or otherwise and can require offering materials only to the extent NSMIA permits them to do so under NSMIA's preservation of their anti-fraud authority.

Exhibit 3

12/502,064	SYSTEM AND METHOD FOR USING A NETWORKED ELECTRONIC DEVICE AS AN OCCUPANCY SENSOR FOR AN ENERGY MANAGEMENT SYSTEM	EFACT.011A	03-11-2020::19:14:30

Attorney/Agent Correspondence Information

Correspondence Address

Name:	KNOBBE MARTENS OLSON & BEAR LLP
Address:	2040 MAIN STREET FOURTEENTH FLOOR IRVINE CA 92614
Customer Number:	20995

Attorney/Agent Information

No Attorney/Agent Data Found.

Close Window

13/409,697	SYSTEM AND METHOD FOR USING A NETWORK OF THERMOSTATS AS TOOL TO VERIFY PEAK DEMAND REDUCTION	EFACT.004C2	03-11-2020::19:16:35

Attorney/Agent Correspondence Information

Correspondence Address

Name:	KNOBBE MARTENS OLSON & BEAR LLP
Address:	2040 MAIN STREET FOURTEENTH FLOOR IRVINE CA 92614
Customer Number:	20995

Attorney/Agent Information

Reg #	Name	Phone
43458	Abumeri, Mark	858-836-9000
75684	Achtsam, Jessica	949-760-0404
68306	Adams, William	949-760-0404
41394	Akhtar, Adeel	415-954-4114
34115	Altman, Daniel	949-760-0404
65290	Ambrosius, Sean	949-760-0404
75686	Anapol, Jeremy	949-721-2806
40574	Anderson, Maria	206-405-2000
62207	Anger, Benjamin	858-707-4000
67884	Bachand, Jonathan	202-640-6400
39901	Bartfeld, Neil	858-707-4202
66226	Bayles, Derek	949-760-0404
46547	Bellinger, Matthew	949-760-0404
44531	Benedict, Mark	949-760-0404
68005	Bhargava, Vikas	949-760-0404
52648	Brand, Nira	949-721-7606
58474	Bunker, Jared	949-760-0404
55030	Burgess, Cheryl	949-721-2935
64664	Burns, Michael	949-760-0404
55036	Cannon, Ted	949-760-0404
75717	Carney, Jeremy	949-760-0404
34303	Carson, John	858-707-4000
70611	Cassidy, Karen Marie	949-721-5302
68316	Champion, Jason	949-760-0404
66385	Chan, Joan	949-760-0404
65642	Cheek, Andrea	202-640-6400
76821	Choi, Charles	858-707-4000
69282	Choi, Heungsoo	858-707-4000
57505	Christensen, Michael	949-760-0404
52742	Chun, Amy	949-760-0404
63051	Claassen, Brian	949-760-0404
64970	Coates, Morgan	949-760-0404

77499	Cockriel, Samuel	949-760-0404
76314	Cohen, David	949-760-0404
44087	Conover, Paul	949-760-0404
68578	Cowan, Thomas	858-707-4000
70875	Cox, Jordan	702-469-0472
65066	Cromar, Scott	949-721-2812
77014	Culbertson, Justin	202-640-6400
61569	Dai, Qian	858-707-4000
65562	Dailey, Derek	858-707-4000
62027	Davis, Aaron	415-954-4114
74368	Davis, Mark	949-760-0404
44058	Delaney, Karoline	949-760-0404
46670	Dosier, Curtiss	949-760-0404
51212	Douglas, Andrew	949-760-0404
72250	Dremann, Angela	949-760-0404
65026	DuFour, Devanie	202-640-6400
59362	Essig, Lincoln	202-640-6400
60659	Everton, Benjamin	949-760-0404
74752	Feinstein, Aryeh	202-640-6408
68043	Fischer, Daniel	949-760-0404
78620	Flynn, Brian	858-707-4187
73513	Forbes, Michael	206-405-2014
L1188	Fujiwara, Tomohisa	949-529-7769
36516	Fuller, Michael	858-707-4000
45664	Furman, Eric	858-707-4000
76775	Furtado, Ryan	858-707-4000
43622	Gallagher, Mark	949-760-0404
65890	Gersting, Jason	949-760-0404
68329	Gibson, Daniel	949-760-0404
59967	Gilbert, Adam	949-760-0404
72882	Gill, Noorean	949-721-2852
71099	Gillett, Justin	949-760-0404
62280	Gillies, Ian	858-707-4000
60295	Gingrich, Brenden	858-707-4000
69670	Gore, Vijay	858-707-4000
71933	Gottdank, Jordan	858-707-4000
72423	Graham, Brian	415-814-6161
74373	Grant, David	202-640-6400
51754	Green, Christy	949-760-0404
42610	Grover, John	949-760-0404
42611	Guiliana, Michael	949-760-0404
44139	Gurka, Jon	949-760-0404
76238	Hadley, Mitchell	212-849-3013
63934	Hallstrom, Jeffery	949-760-0404

61513	Heideman, Colin	206-405-2000
75150	Henson, Clayton	858-707-4000
51241	Herkenhoff, James	858-707-4000
53018	Hermanson, Gregory	858-707-4000
70224	Hilton, Robert	858-707-4000
L1334	Hirai, Yusuke	949-760-0404
L1154	Hong, Jun Hyuk	212-849-3015
70256	Howard, Damien	949-760-0404
72043	Hsu, Kendrick	949-721-5255
48877	Huffmire, Curtis	949-760-0404
76592	Hughes, Daniel	858-707-4000
47677	Itchkawitz, Bruce	949-760-0404
43691	Jankowski, David	949-760-0404
61805	Jardine, Jason	858-707-4000
54198	Jeide, Russell	949-760-0404
40664	Jennings, Joseph	949-760-0404
35556	Jensen, Stephen	949-760-0404
74164	Johnson, Aaron	949-395-4097
77244	Johnson, Bryan	415-954-4114
55310	Juang, Agnes	949-760-0404
53084	Kachner, Mark	310-551-3450
71679	Kamkar, Daniel	858-707-4180
53102	Katzenellenbogen, Benjamin	949-760-0404
56553	Keller, Lauren	949-721-6365
57046	Kesler, Jarom	949-760-0404
51306	Kim, Mincheol	949-721-5290
78119	Kim, Sean	--
58855	Kimmel, Andrew	949-760-0404
34362	King, John	949-760-0404
63035	Koch, Kregg	310-551-3450
77503	Kowallis, Karl	703-862-5375
68587	Lakshmanan, Viswanathan	415-954-4114
65614	Lam, Shannon	949-760-0404
63635	Laquer, Alan	949-760-0404
69133	Larson, Stephen	949-760-0404
51922	Lateef, Irfan	949-721-7672
72722	Law, Peter	858-707-4243
62005	Lee, Andrew	949-721-5389
75560	Lee, Nathan	949-721-0404
43745	Lee, Sabing	949-760-0404
54618	Lenker, Karen	949-760-0404
74998	Li, Josepher	212-300-5796
63106	Lim, Chang	949-760-0404
68912	Lim, Keith	822-301-6 5040

51240	Liu, Linda	949-760-0404
66766	Lloyd, Andrew	949-760-0404
54715	Loots, Eli	415-954-4114
68430	Lozan, Vladimir	949-721-2828
63160	Luman, Nathanael	858-836-9000
39287	Mallon, Joseph	858-707-4000
57871	Marsden, Mark	858-707-4000
75319	Martinez, Alexander	949-760-0404
62933	Matthaei, Christie	206-405-2000
71587	Mayer, Hans	949-760-0404
70780	McWhorter, Bryan	206-405-2000
58621	Melnick, Ryan	858-707-4000
67720	Merani, Salima	949-760-0404
53317	Merickel, Andrew	415-954-4114
71797	Metzke, Mark	949-721-5205
61749	Miller, Kimberly	858-707-4000
67249	Min, Kyu	415-954-4114
63737	Morrell, Andrew	202-640-6400
42018	Muehlhauser, Douglas	949-760-0404
L1089	Munchinsky, Gregory	858-707-4247
53371	Narula, Rabinder	949-760-0404
37688	Nataupsky, Steven	949-760-0404
61595	Natland, Susan	949-760-0404
62676	Nelson, Philip	949-760-0404
66619	Nishimura, Tsuneaki	949-721-5284
52082	Oldham, Perry	949-721-2961
54355	Paik, John	858-707-4000
61546	Papagiannis, Theodore	949-760-0404
65096	Peterson, Jacob	949-760-0404
61224	Pitzel Cruz, Carol	206-405-2000
70367	Powell, Adam	650-752-1100
60771	Razai, Ali	949-760-0404
31291	Re, Joseph	949-760-0404
77806	Reeves, Nathan	206-405-2000
43878	Reisman, Joseph	858-707-4000
44304	Roby, Robert	949-760-0404
60934	Ross, Christopher	949-760-0404
70451	Rubinshtein, Mark	858-707-4000
37924	Salenieks, Raimond	858-707-4000
32297	Schlatter, Edward	949-760-0404
73126	Schmidt, David	949-721-6386
38297	Schoenbaum, Ronald	949-760-0404
72529	Schutte, Loni	858-707-4000
44328	Seelig, Melanie	206-405-2000

31302	Sganga, John Jr	949-760-0404
35678	Shreve, William	949-760-0404
73097	Shukla, Harnik	949-760-0404
66152	Smemoe, Lance	949-760-0404
55634	Smith, Raymond	949-760-0404
67824	Song, Hochan	949-760-0404
68287	Stellman, Paul	415-954-4114
57571	Stout, Maria	858-707-4000
64096	Stowell, Joshua	949-760-9562
73710	Sueiras, Albert	949-721-2903
31430	Summers, Craig	949-760-0404
53658	Swaroop, Sheila	949-760-0404
64420	Swartz, Jason	949-760-0404
75008	Tang, Sunyong	317-294-2262
43947	Taylor, Kerry	858-707-4000
68069	Teplitskiy, Vladislav	949-721-5308
40202	Thiessen, Rose	858-707-4000
59406	Trossen, David	415-954-4114
71691	Tsunozaki, Makoto	415-954-4114
59856	Tullis, Terry	949-760-0404
46206	Uribe, Mauricio	206-405-2000
54511	Villalta, Josue	949-760-0404
33043	Von Hoffmann, Gerard	949-760-0404
58878	Wahl, Bryan	949-760-0404
L1156	Wang, Xiaoyan	949-721-7618
75640	Wang, Xiaoyu	212-849-3012
41371	Weiss, David	310-551-3450
74897	Wentzel, Douglas	856-285-4688
58410	Wong, Zi	415-954-4114
71740	Xia, Qing	858-320-3310
40881	Yamato, Lori	949-760-0404
57013	Yee, Thomas	949-760-0404
77240	Young, Tiffany	626-353-1368
73564	Zeng, Alexander	949-721-5293
65994	Zoretic, Marko	949-760-0404
61557	Zovko, Nicholas	949-760-0404

Close Window

13/852,577	SYSTEM AND METHOD FOR USING A NETWORK OF THERMOSTATS AS TOOL TO VERIFY PEAK DEMAND REDUCTION	EFACT.004C3	03-11-2020::19:17:15

Attorney/Agent Correspondence Information

Correspondence Address

Name:	KNOBBE MARTENS OLSON & BEAR LLP
Address:	2040 MAIN STREET FOURTEENTH FLOOR IRVINE CA 92614
Customer Number:	20995

Attorney/Agent Information

Reg #	Name	Phone
43458	Abumeri, Mark	858-836-9000
75684	Achtsam, Jessica	949-760-0404
68306	Adams, William	949-760-0404
41394	Akhtar, Adeel	415-954-4114
34115	Altman, Daniel	949-760-0404
65290	Ambrosius, Sean	949-760-0404
75686	Anapol, Jeremy	949-721-2806
40574	Anderson, Maria	206-405-2000
62207	Anger, Benjamin	858-707-4000
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64420	Swartz, Jason	949-760-0404
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71691	Tsunozaki, Makoto	415-954-4114
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57013	Yee, Thomas	949-760-0404
77240	Young, Tiffany	626-353-1368
73564	Zeng, Alexander	949-721-5293
65994	Zoretic, Marko	949-760-0404
61557	Zovko, Nicholas	949-760-0404

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16/374,085	SYSTEM AND METHOD FOR USING A WIRELESS DEVICE AS A SENSOR FOR AN ENERGY MANAGEMENT SYSTEM	EFACT.011C3	03-11-2020::19:18:15

Attorney/Agent Correspondence Information

Correspondence Address

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43458	Abumeri, Mark	858-836-9000
75684	Achtsam, Jessica	949-760-0404
68306	Adams, William	949-760-0404
41394	Akhtar, Adeel	415-954-4114
34115	Altman, Daniel	949-760-0404
65290	Ambrosius, Sean	949-760-0404
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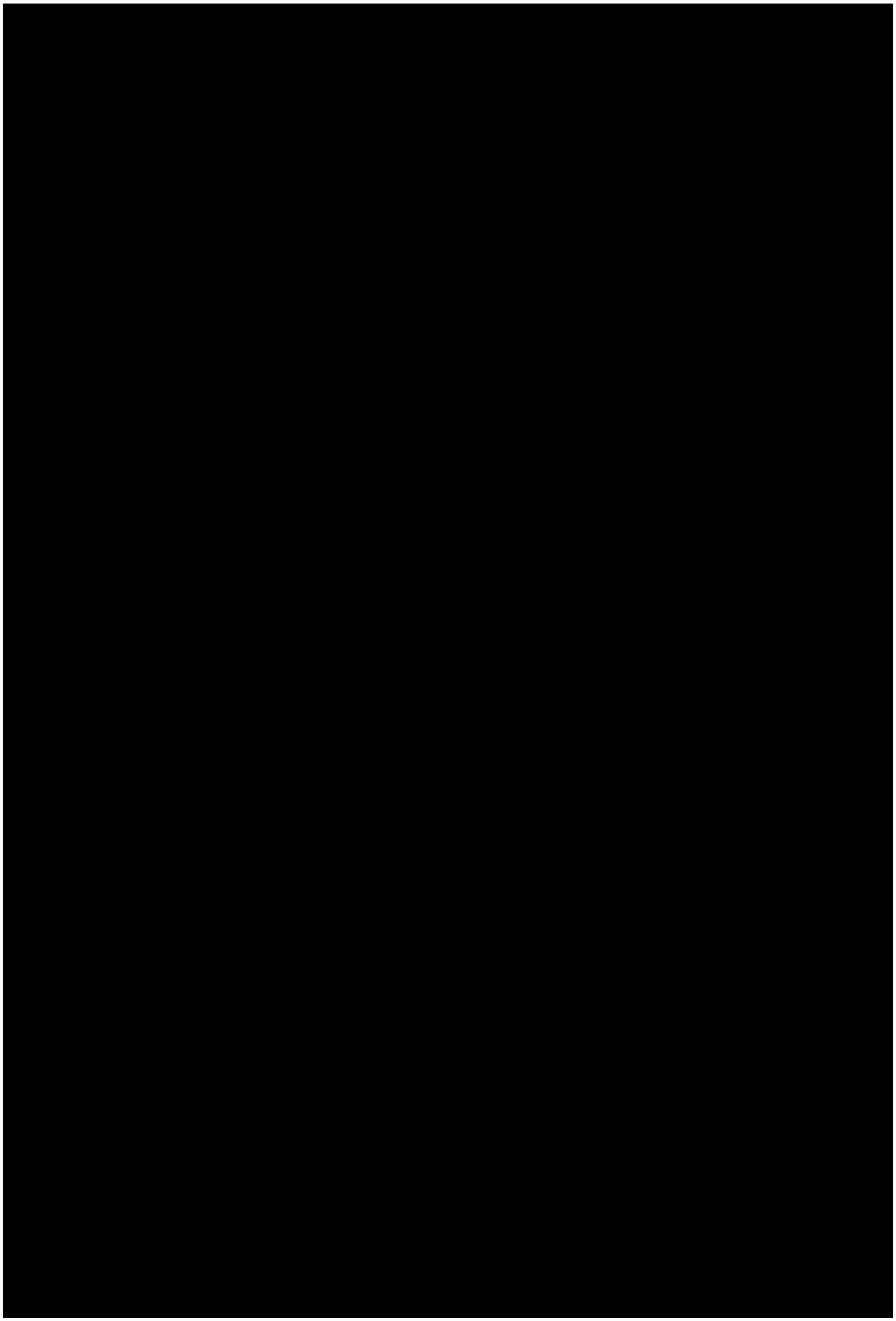

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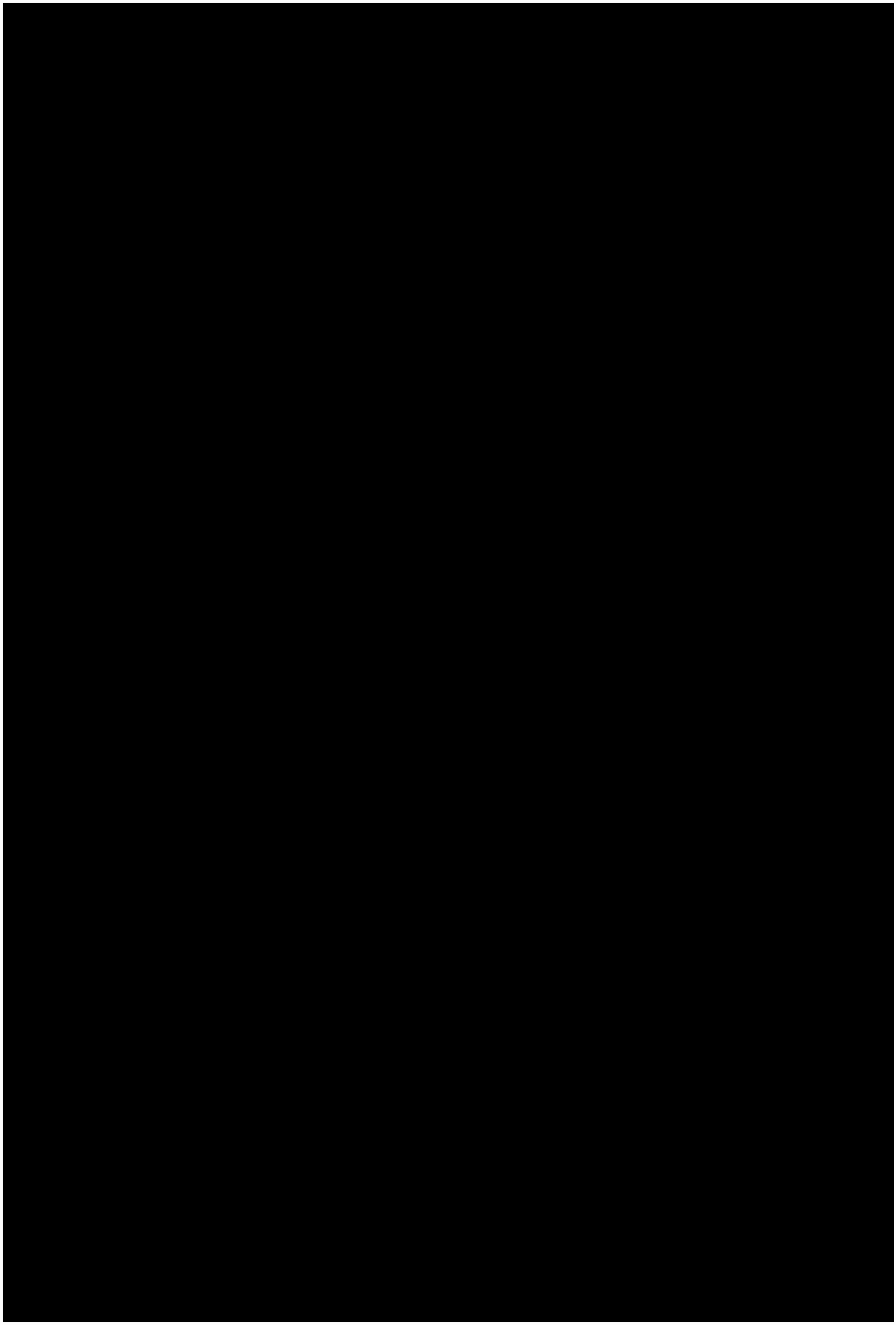

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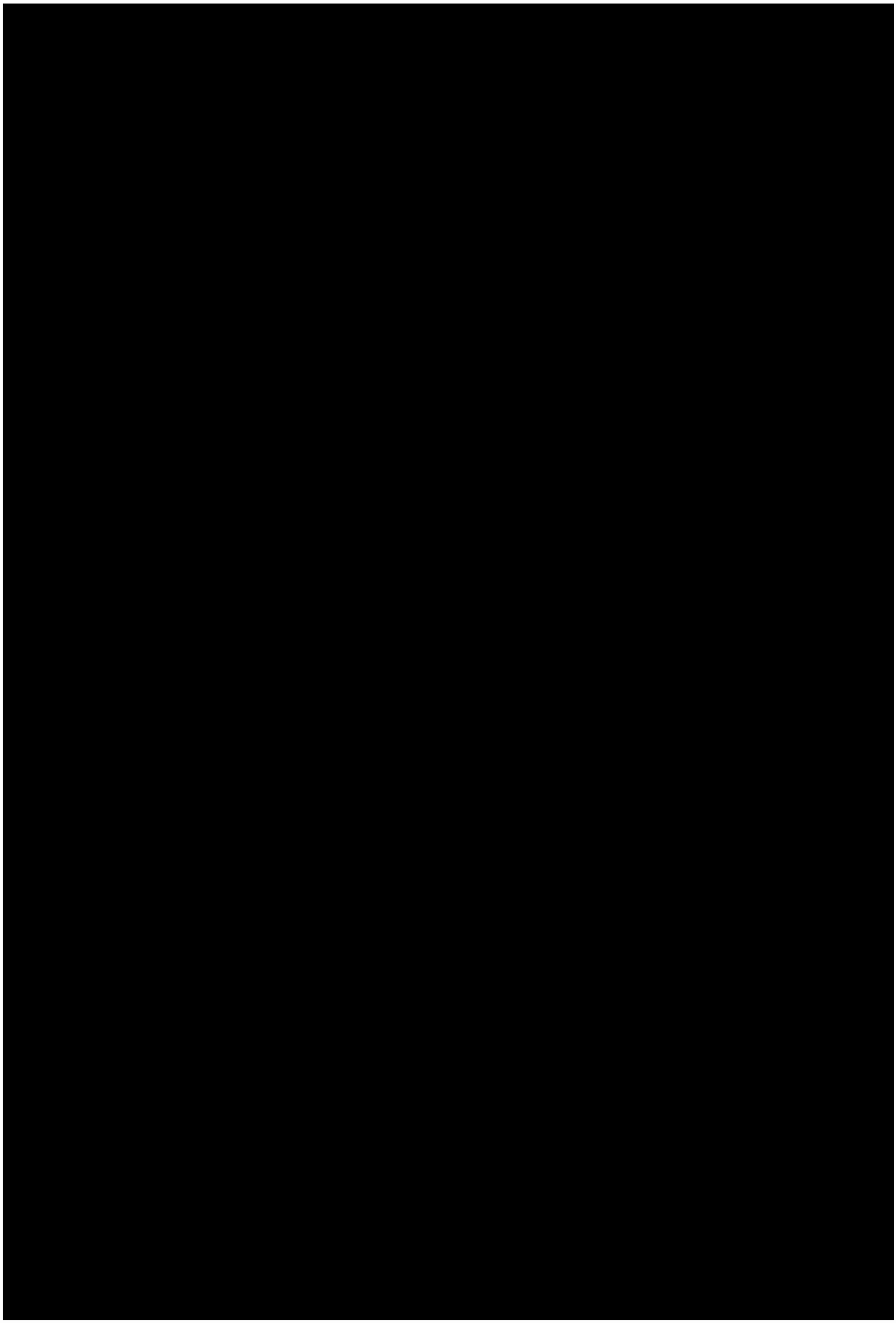

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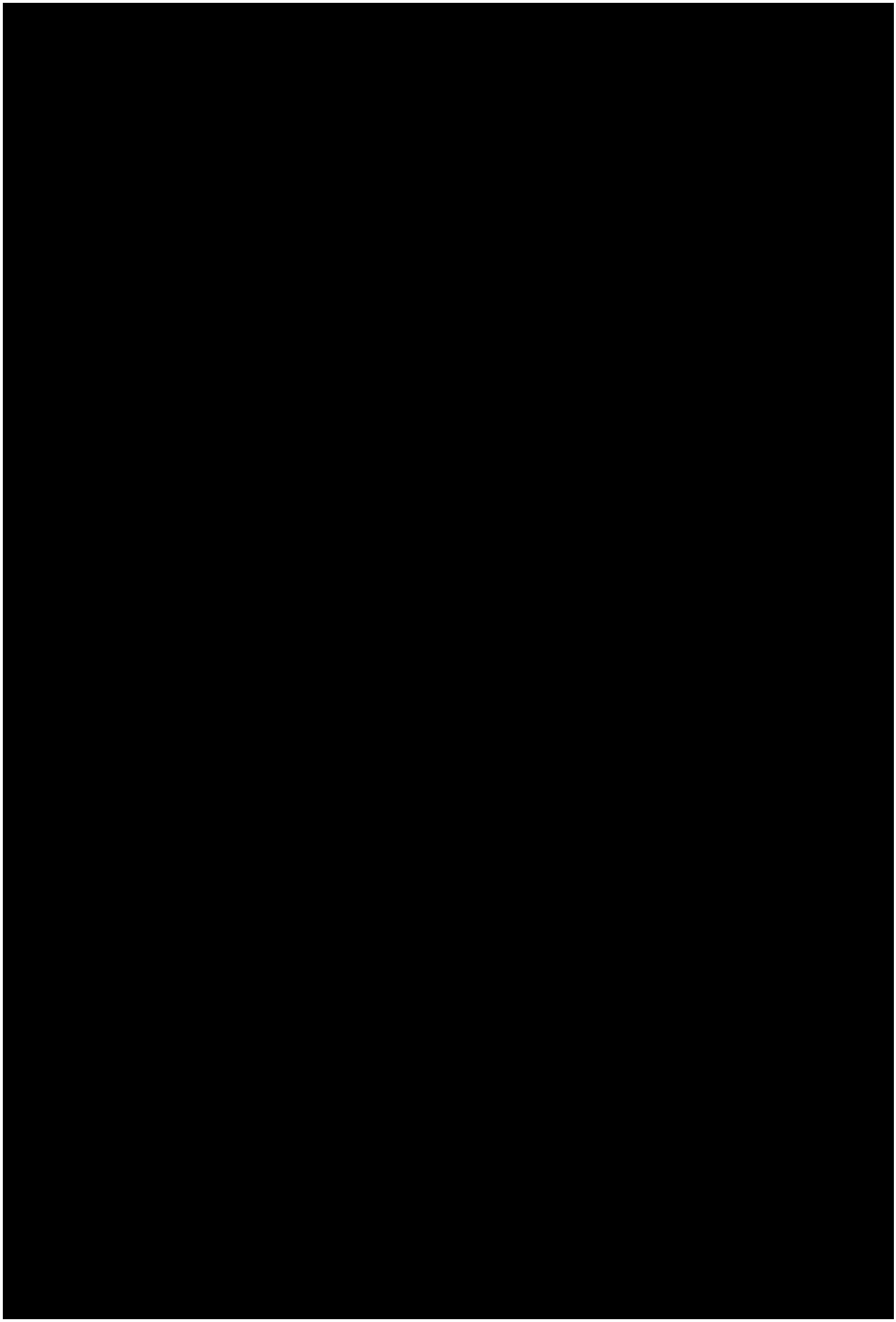

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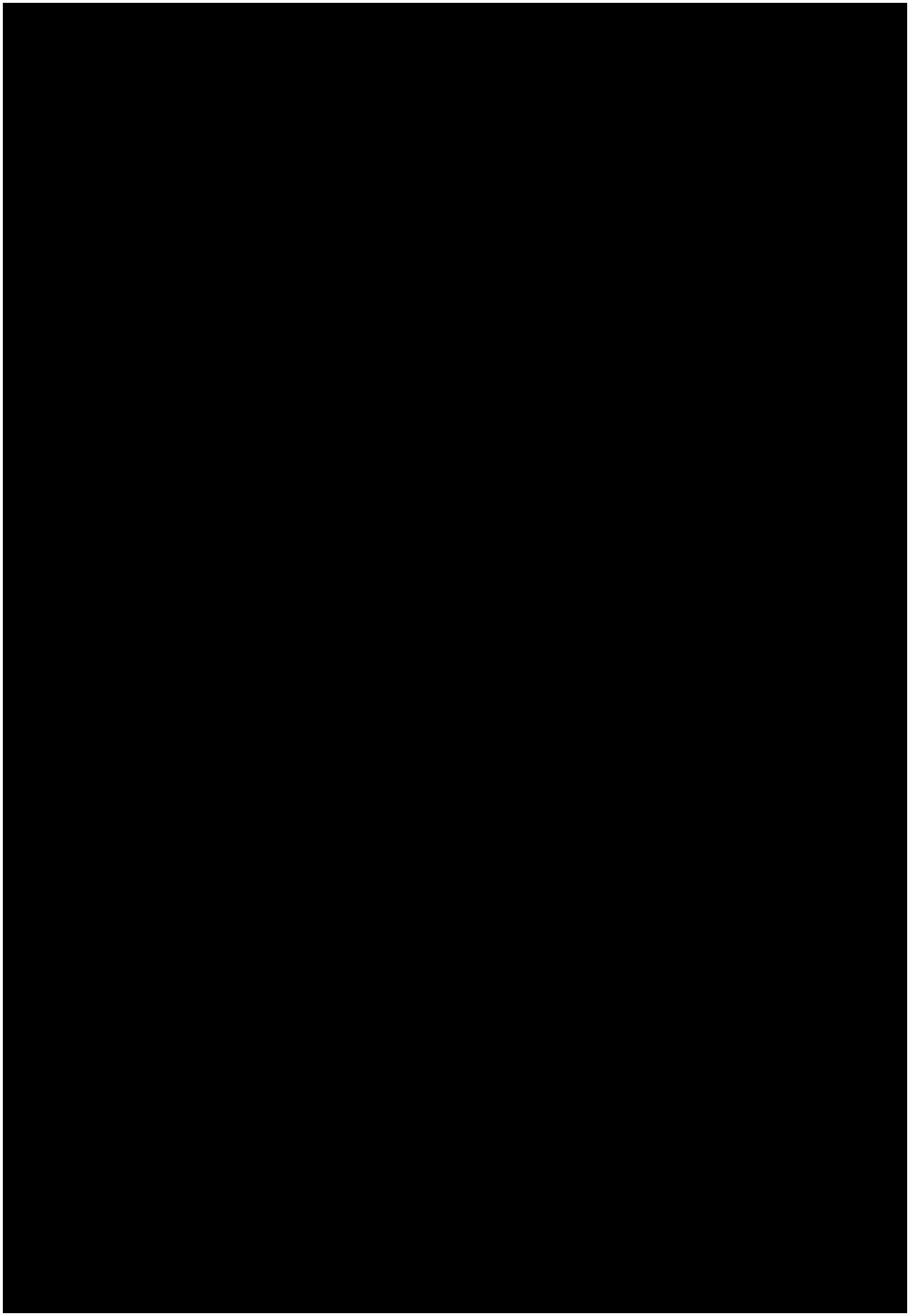

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[redacted] Each Party agrees to submit to the personal and exclusive jurisdiction of the courts located in Santa Clara County, California. [redacted]

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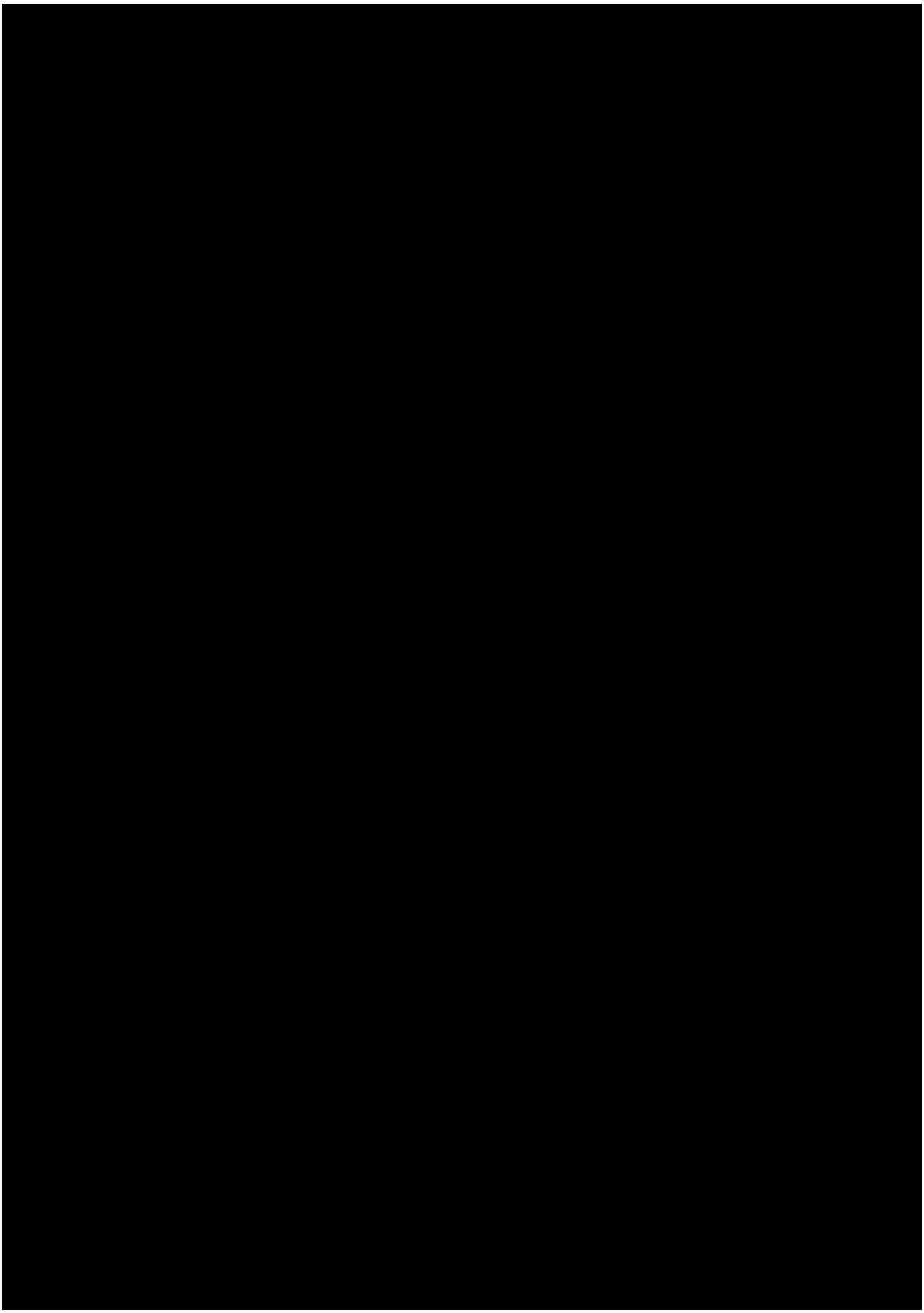

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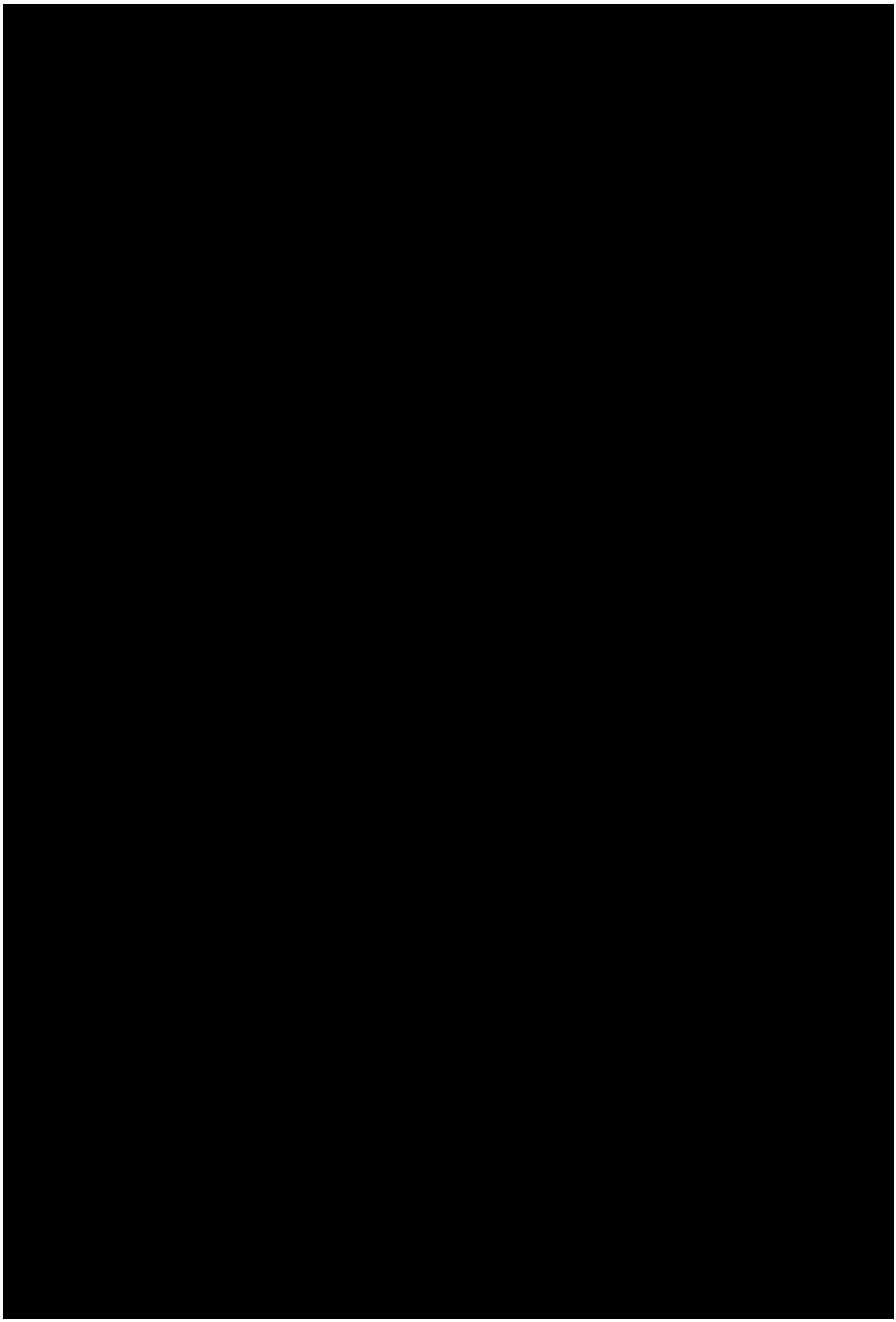

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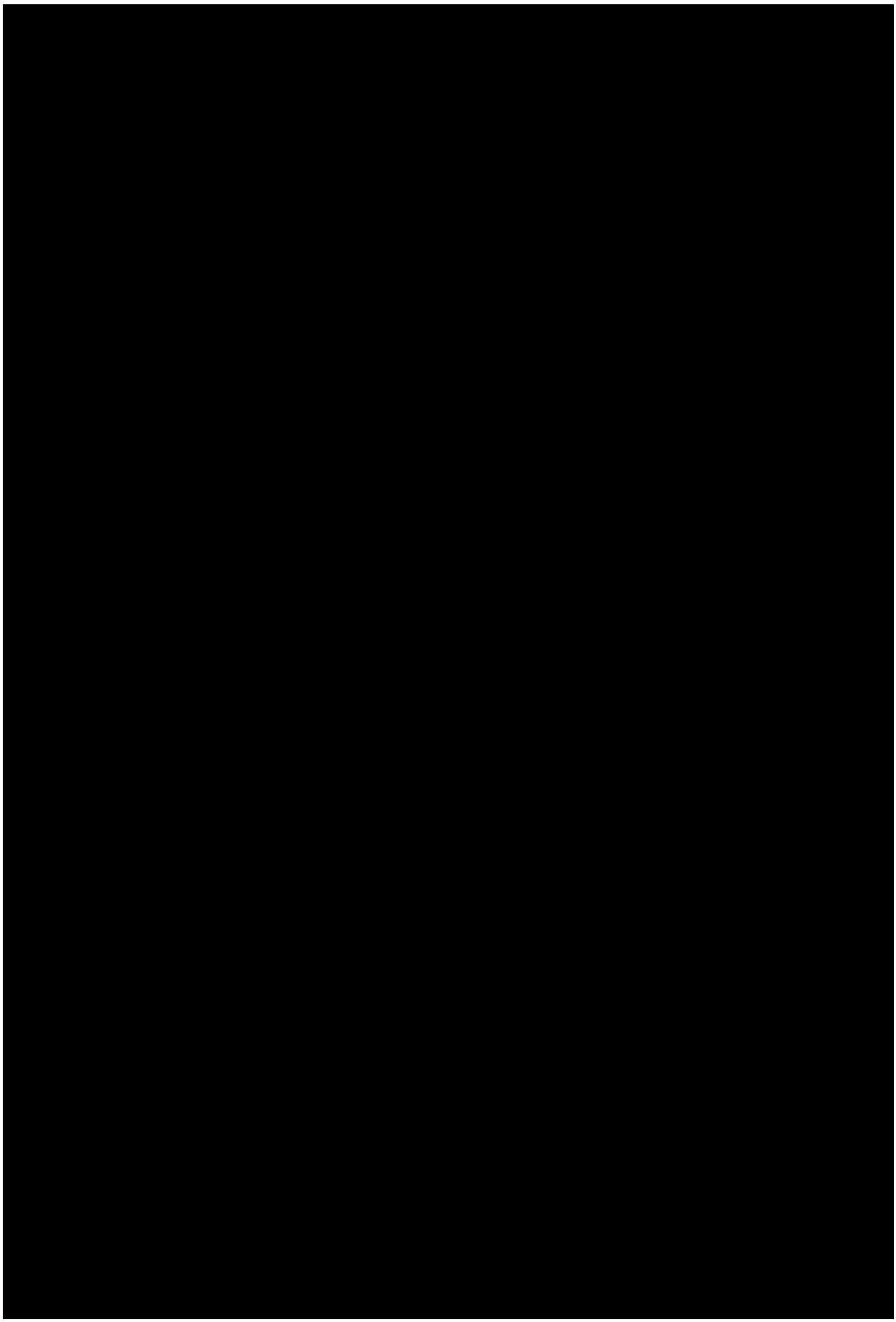

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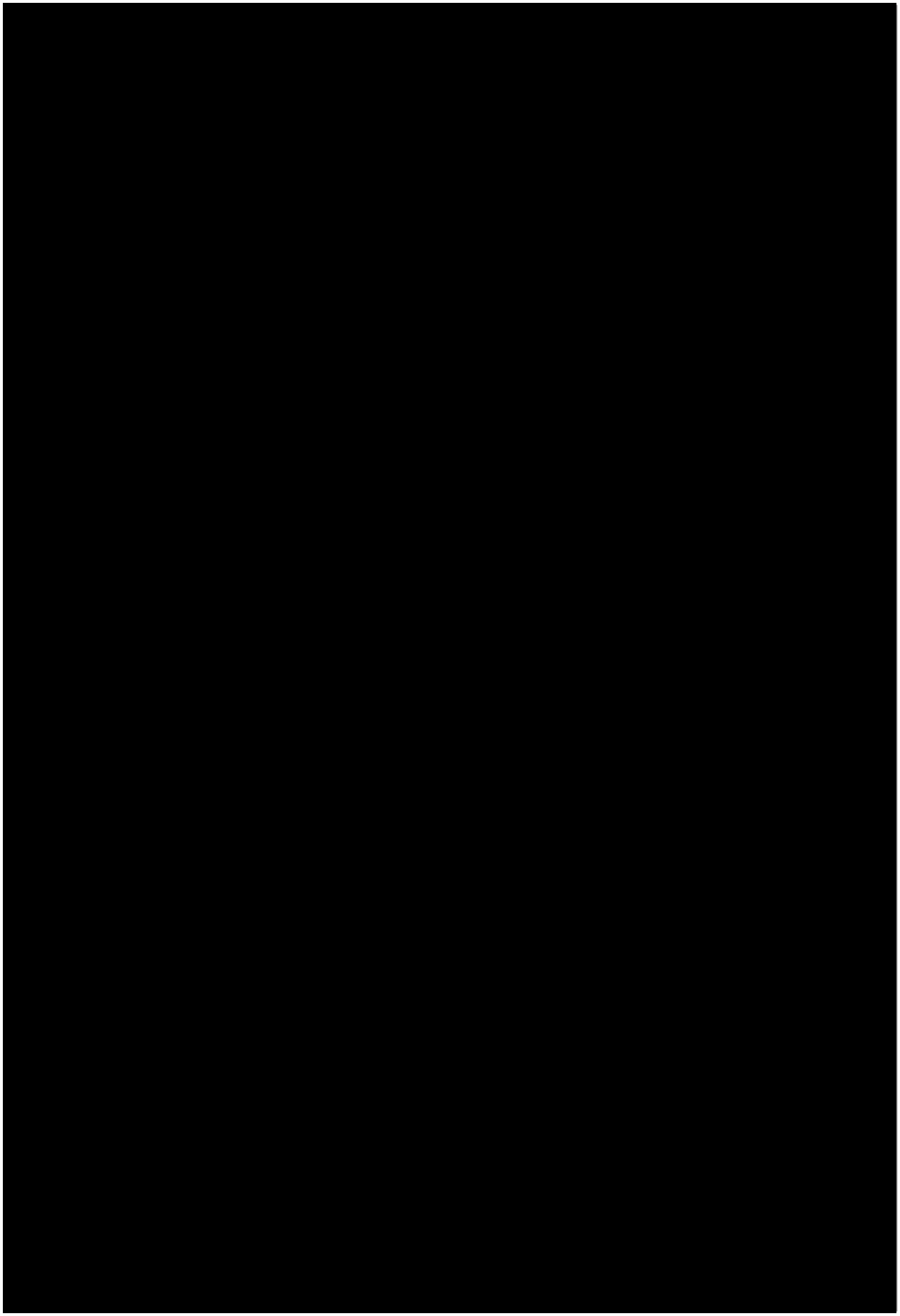

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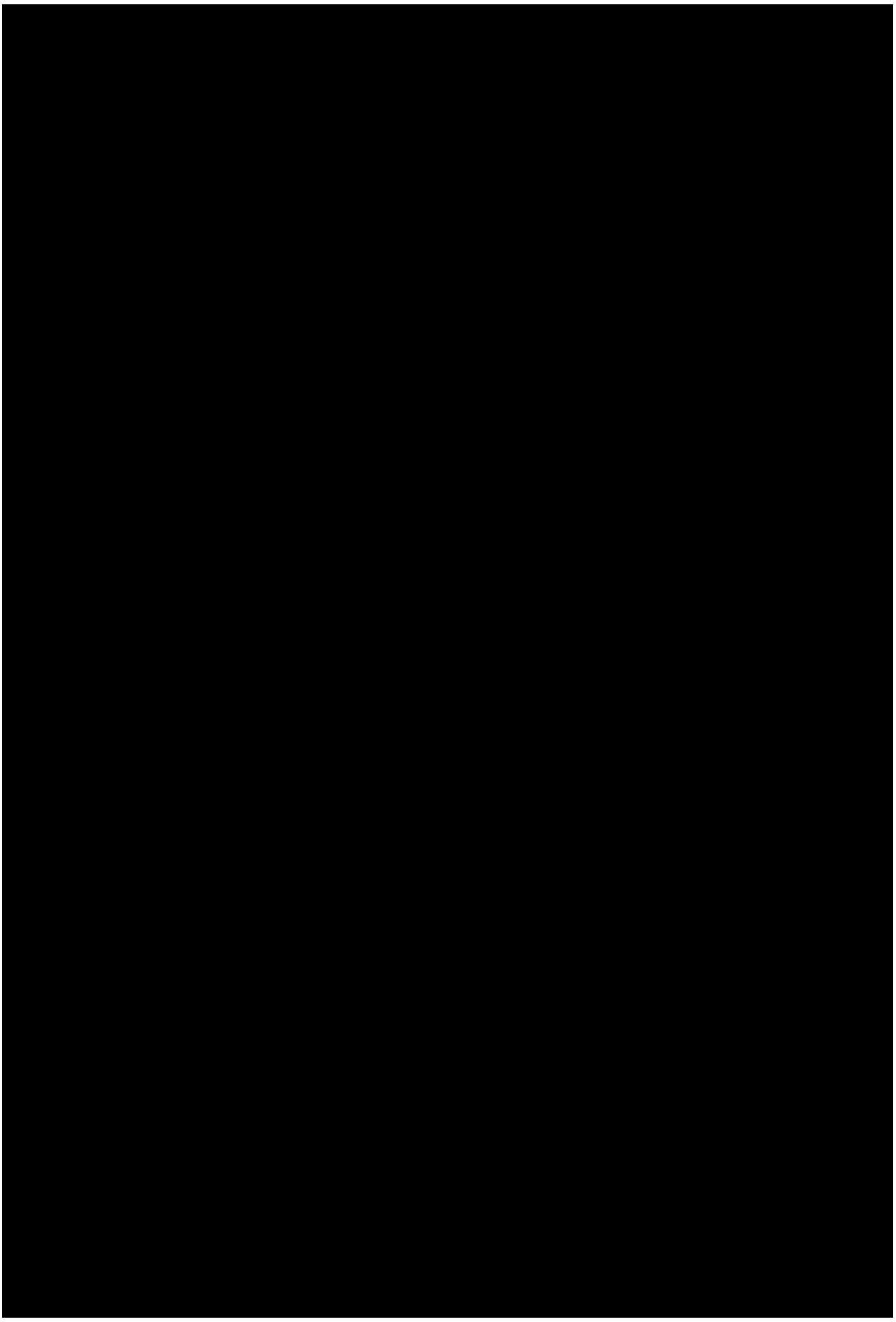

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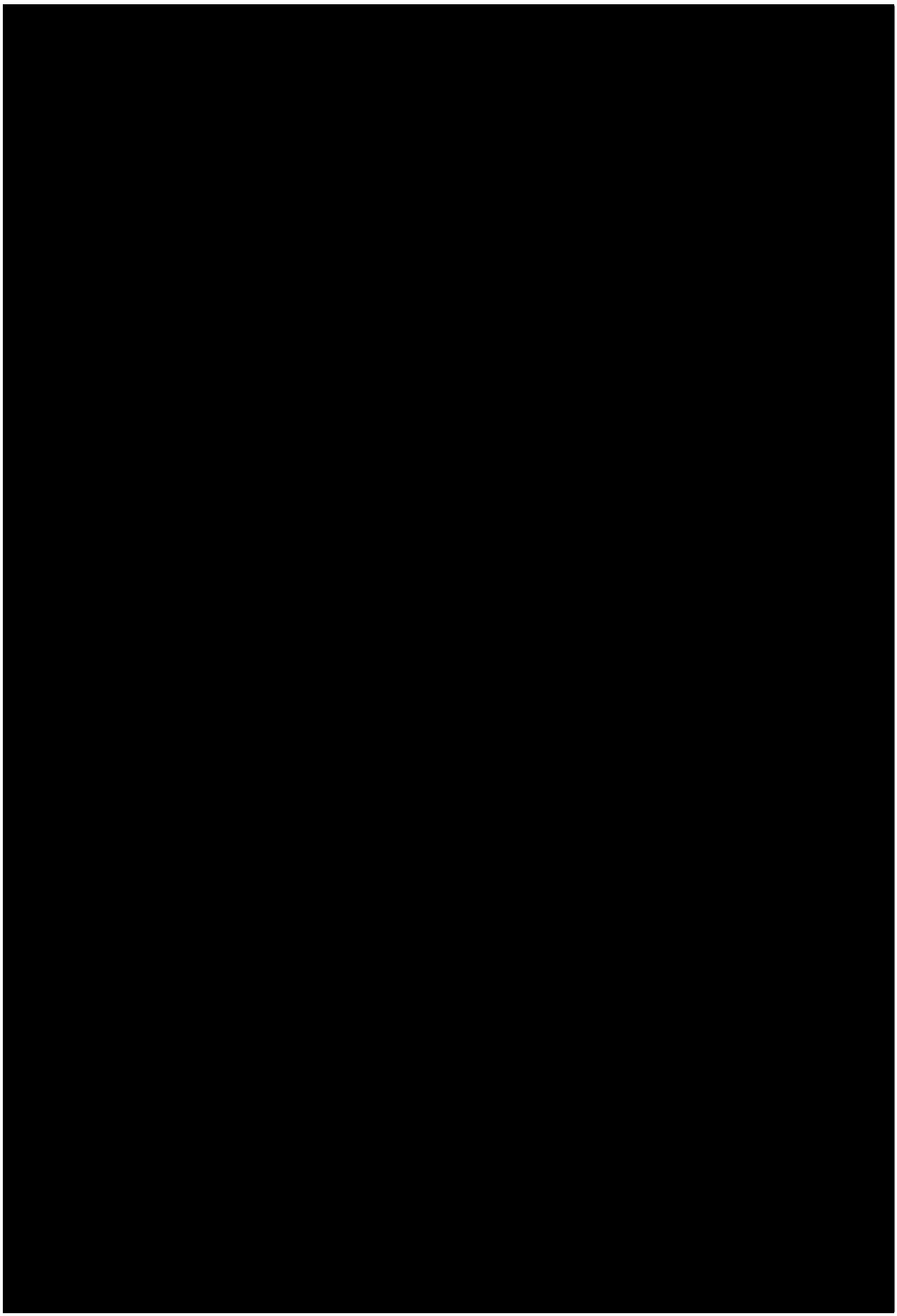

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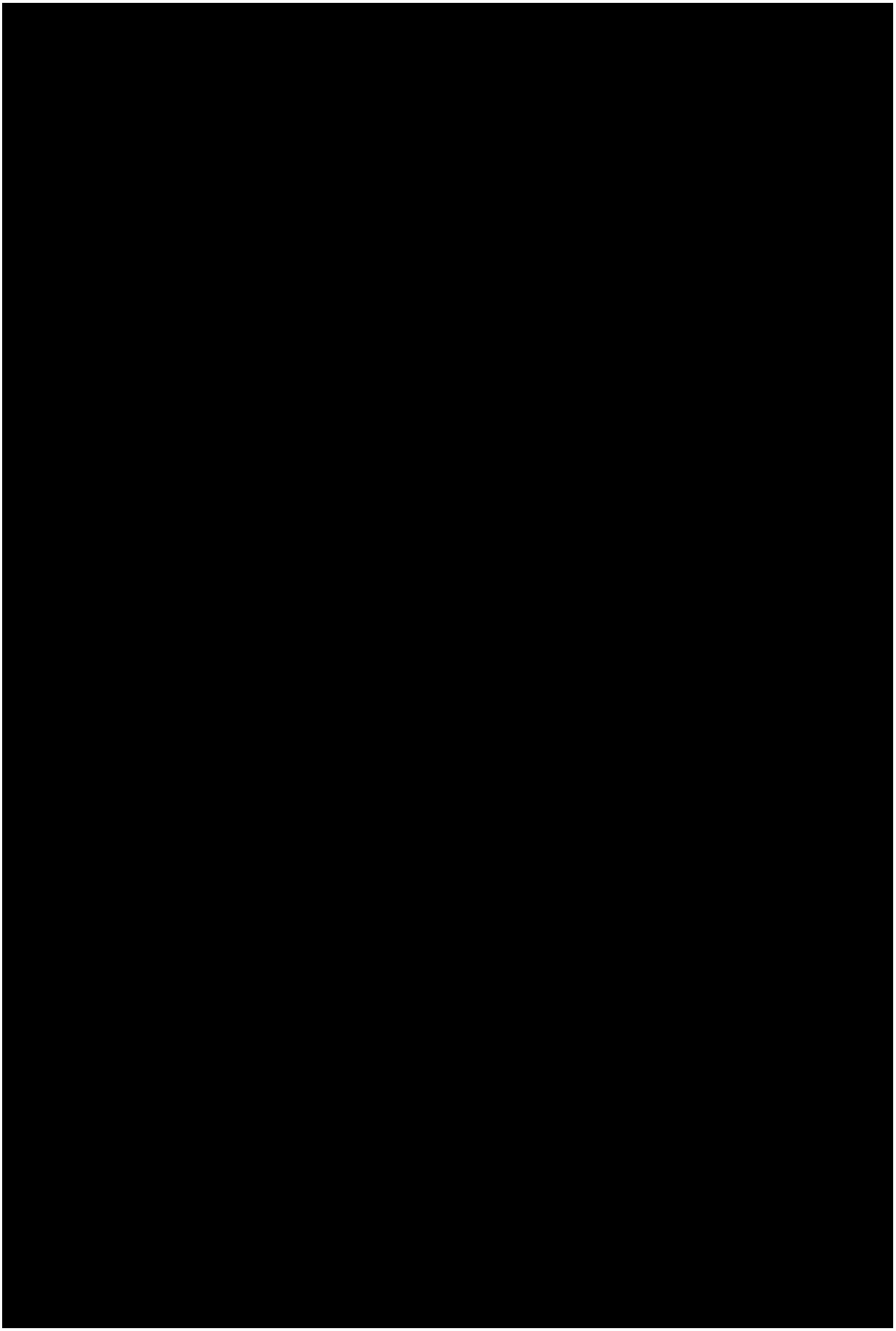

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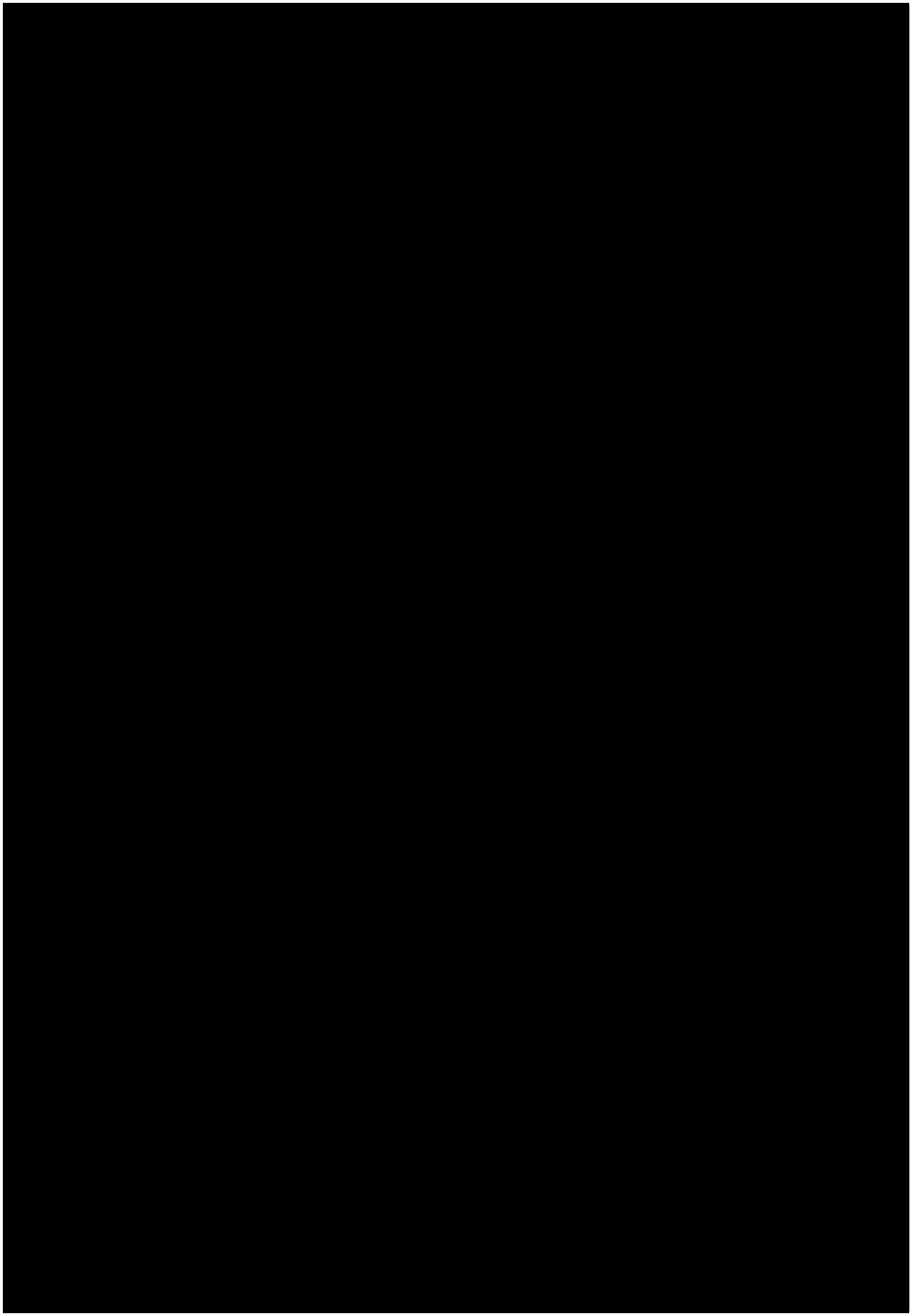

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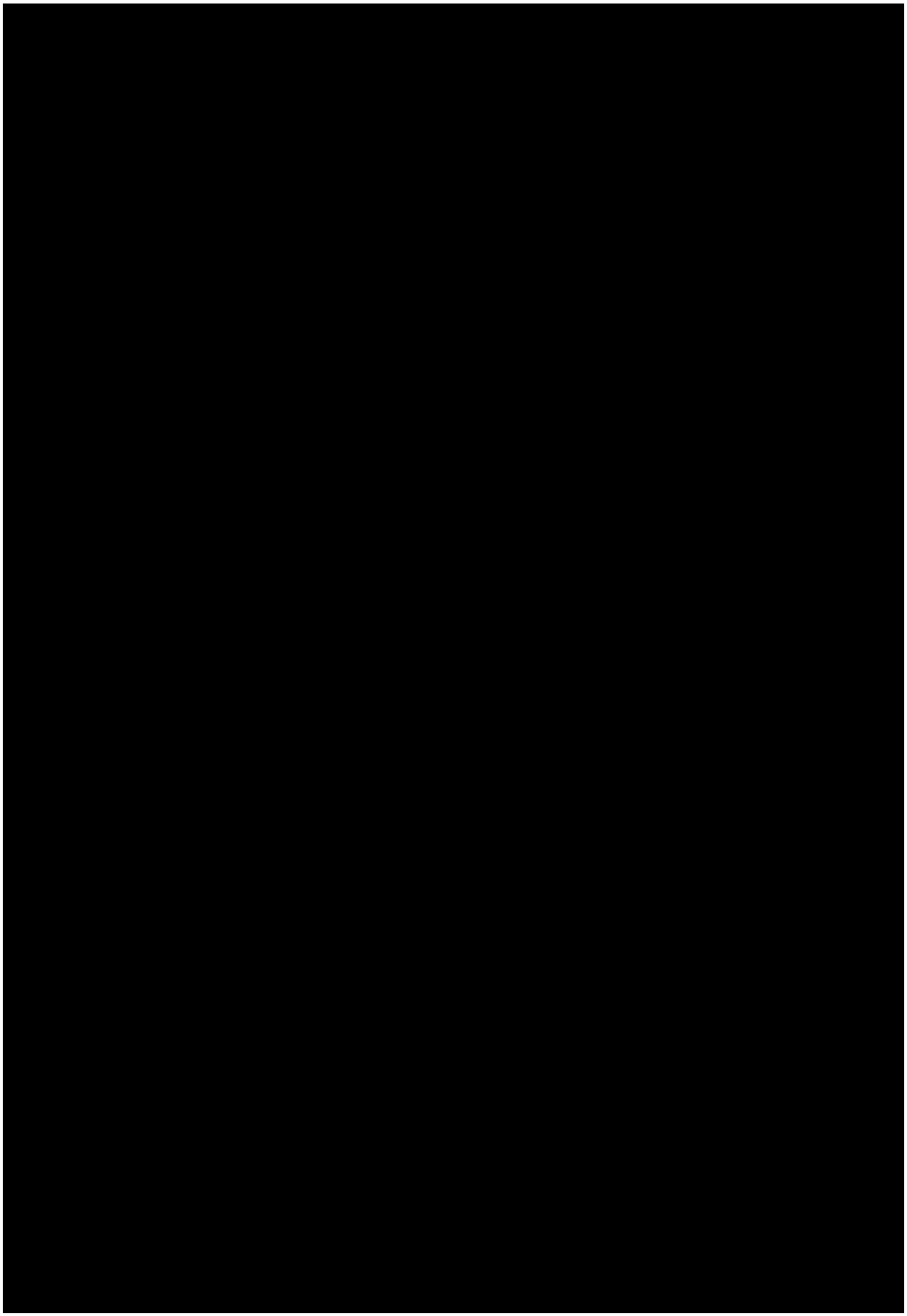

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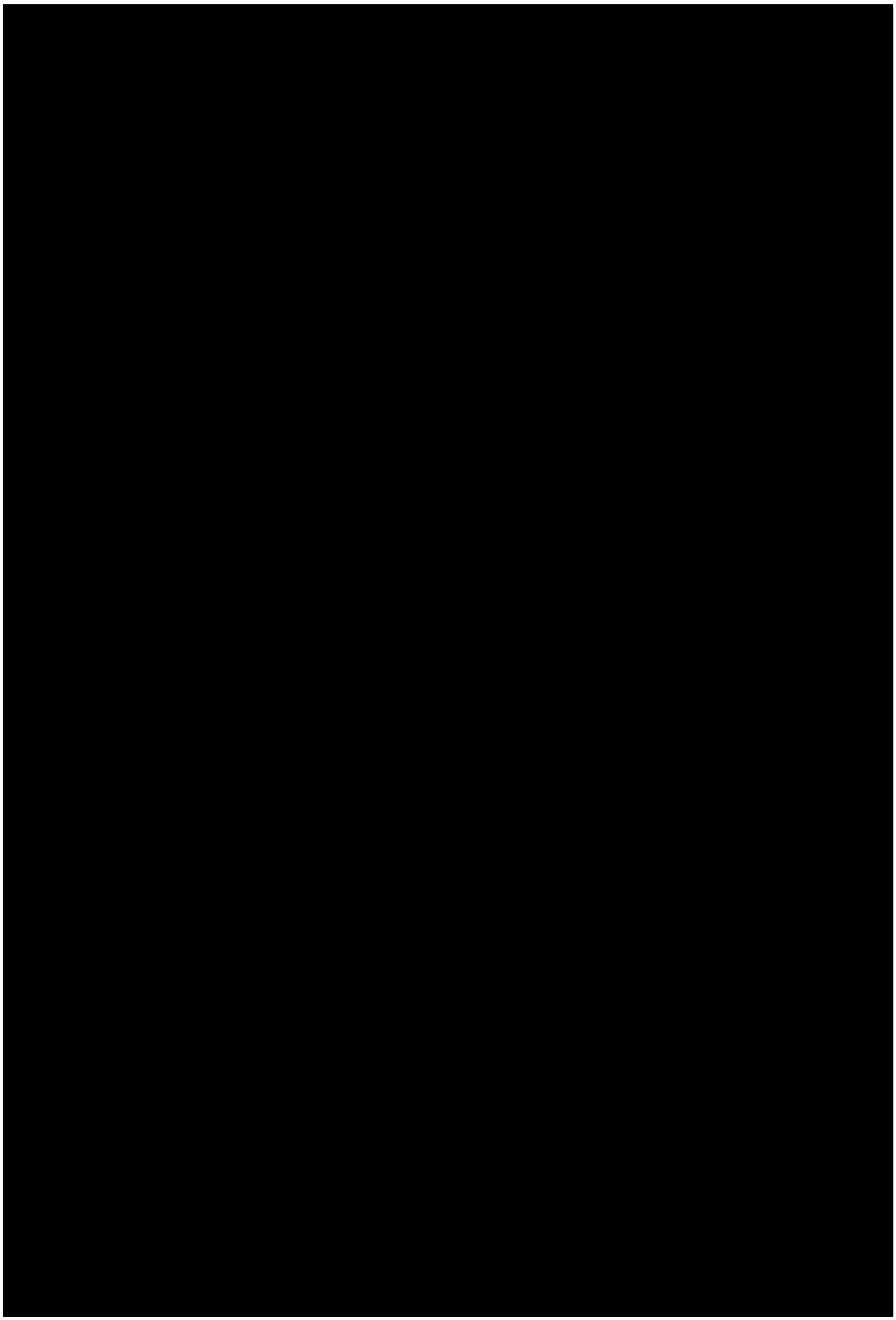

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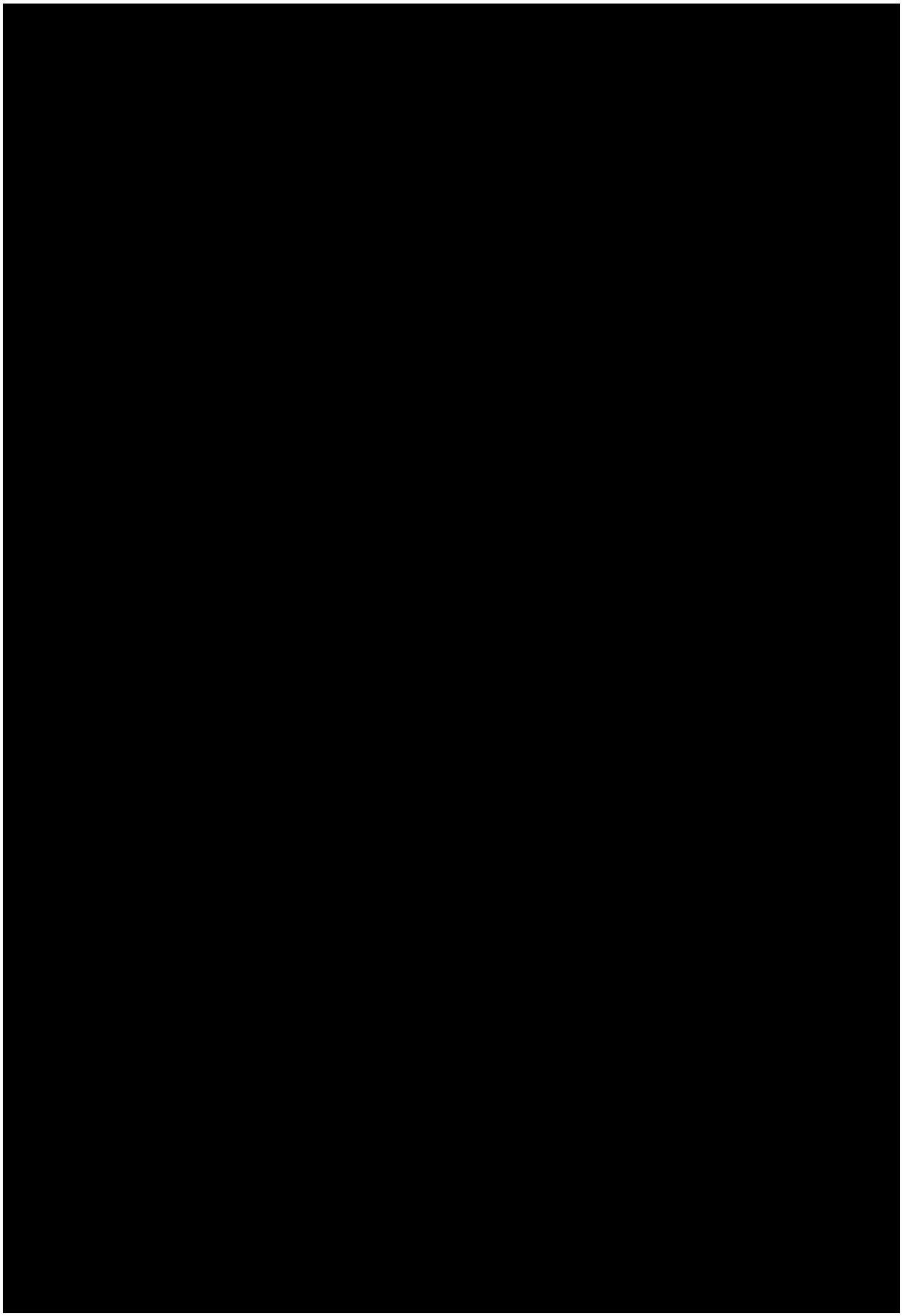

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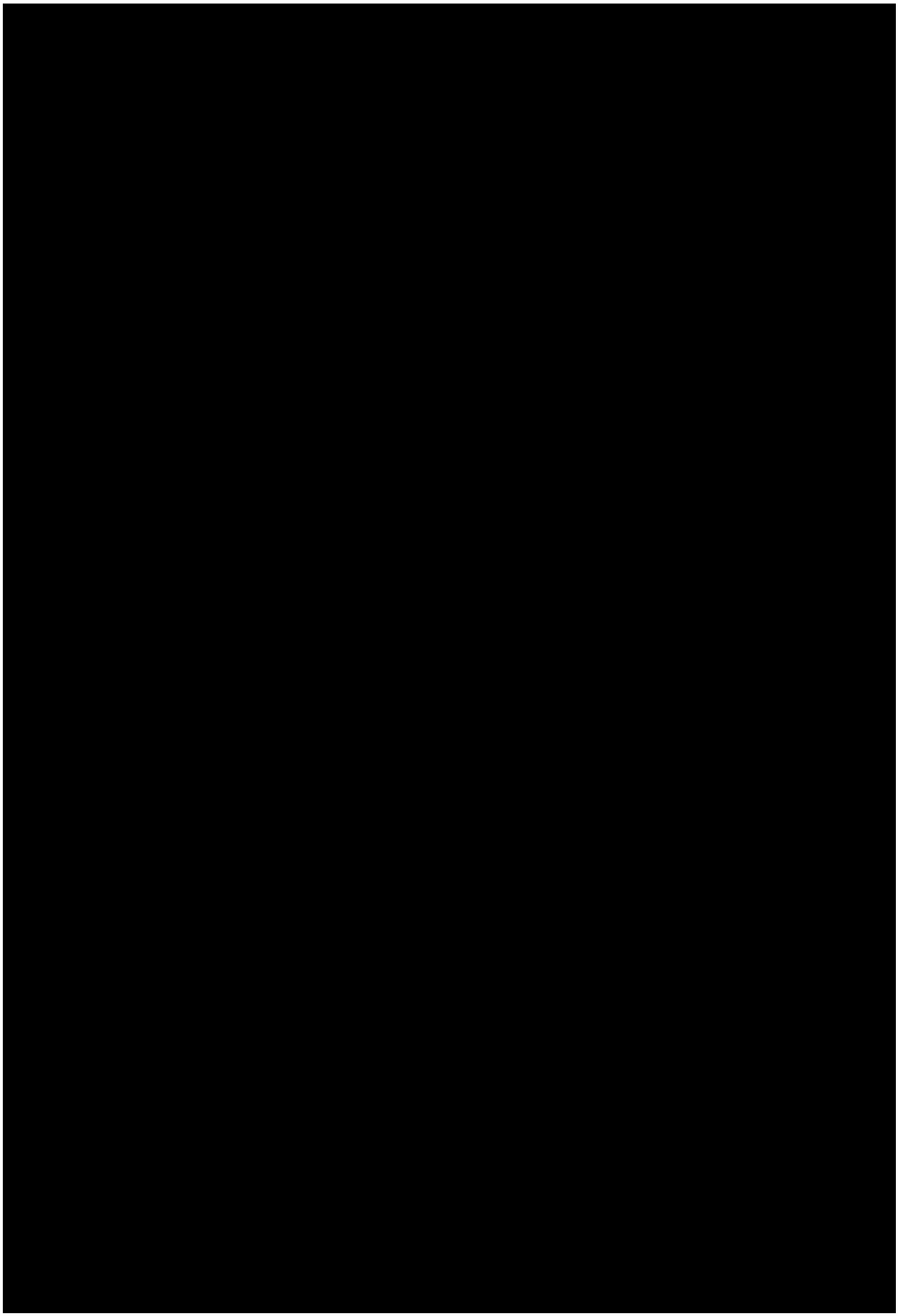

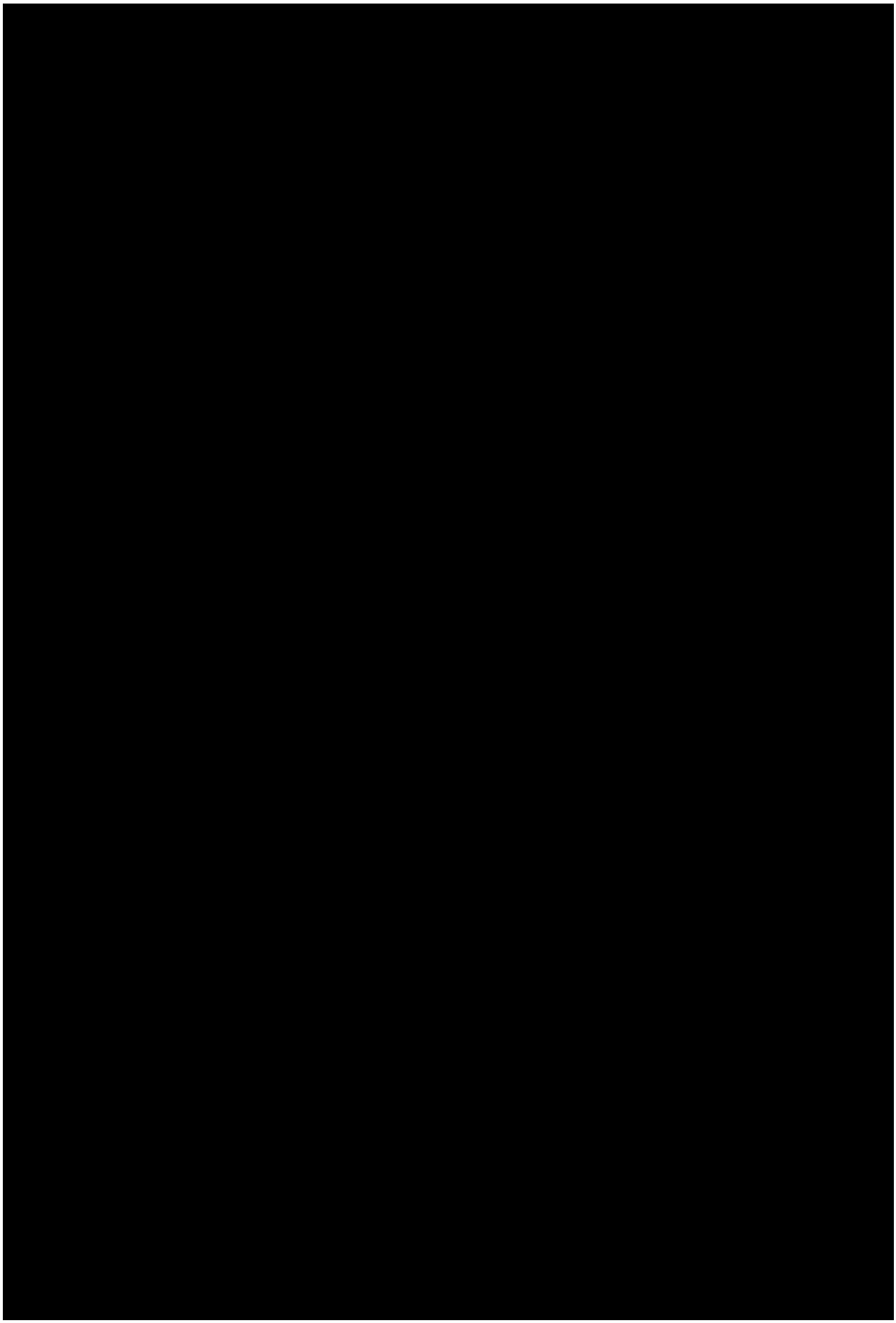

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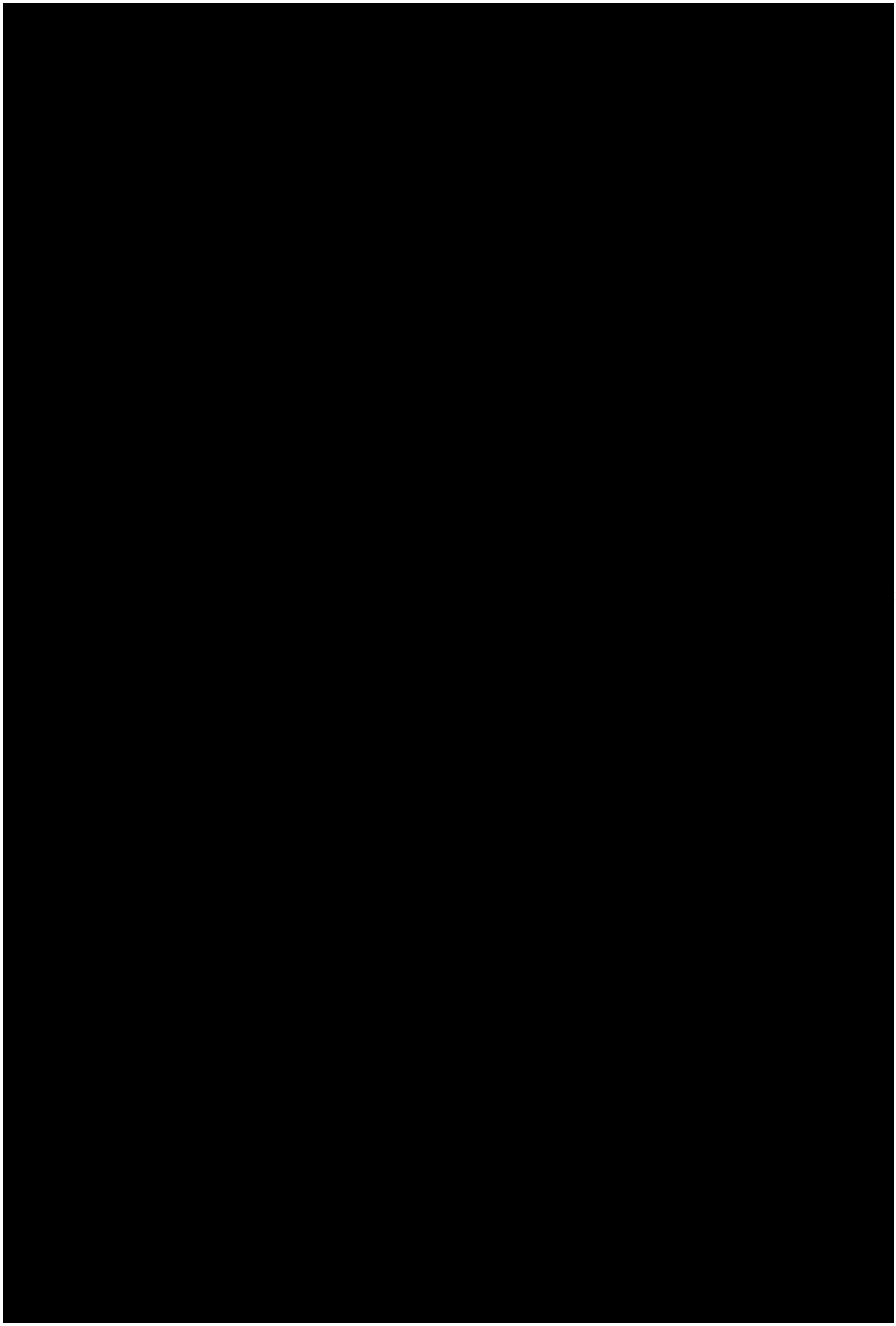

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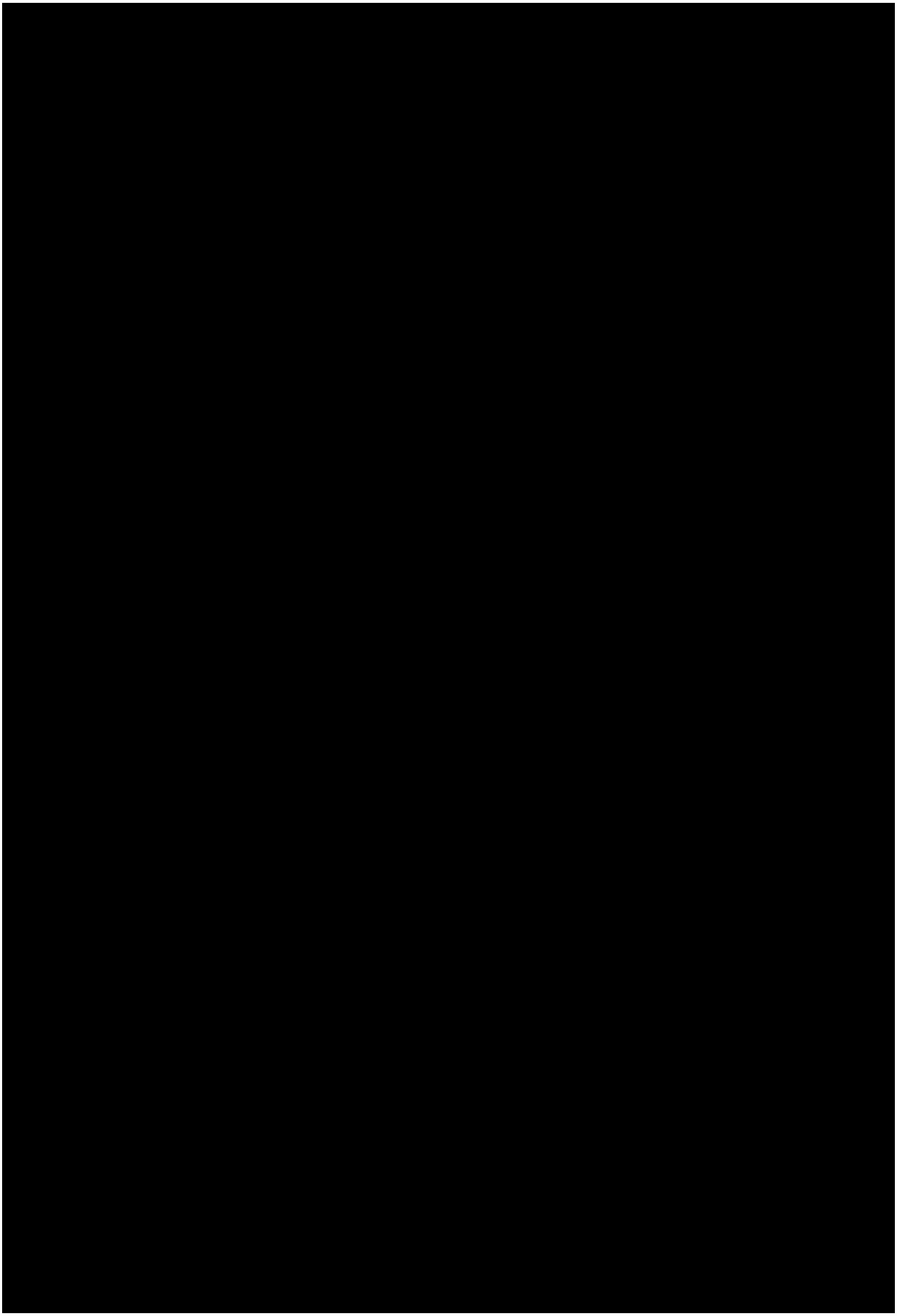

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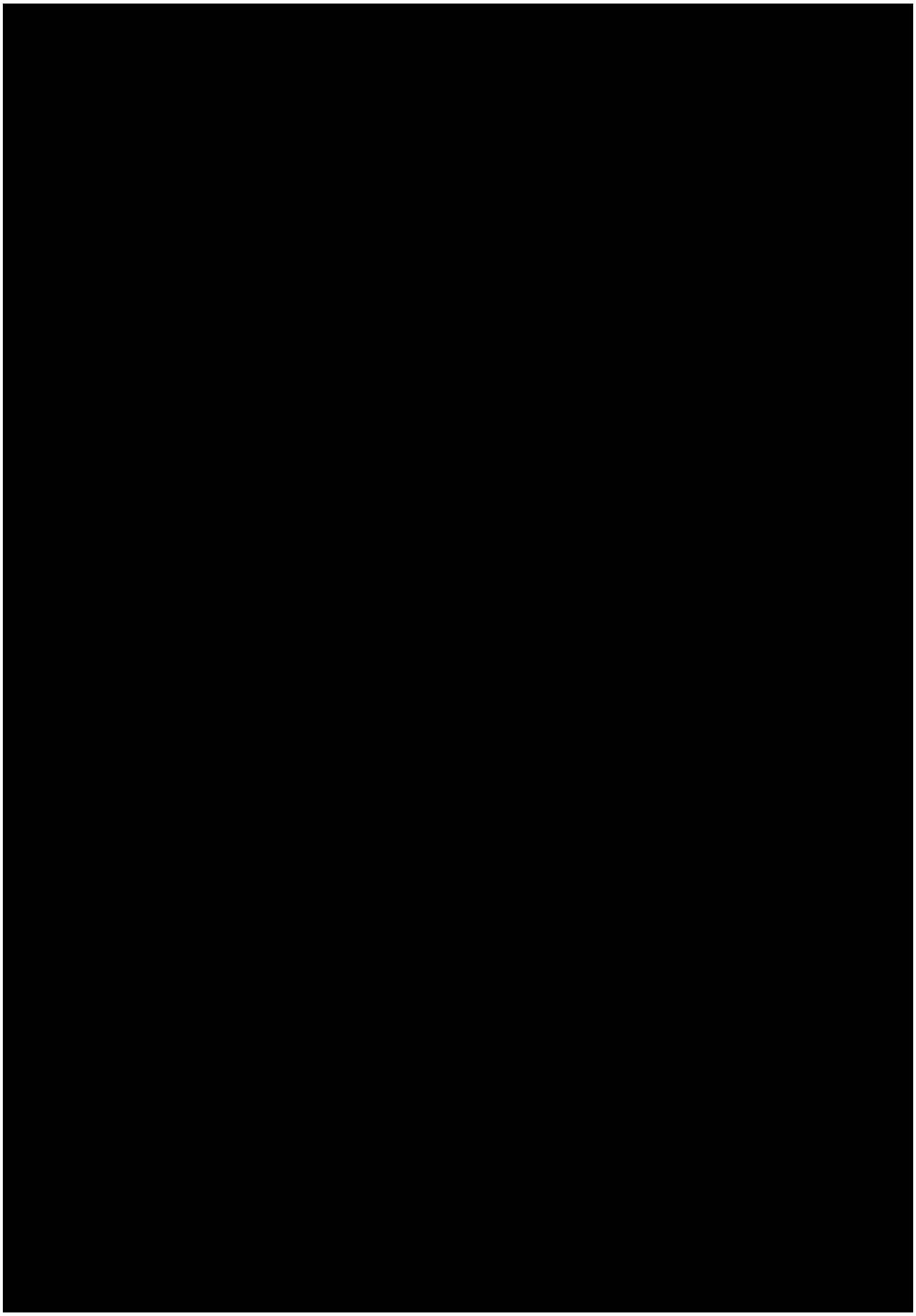
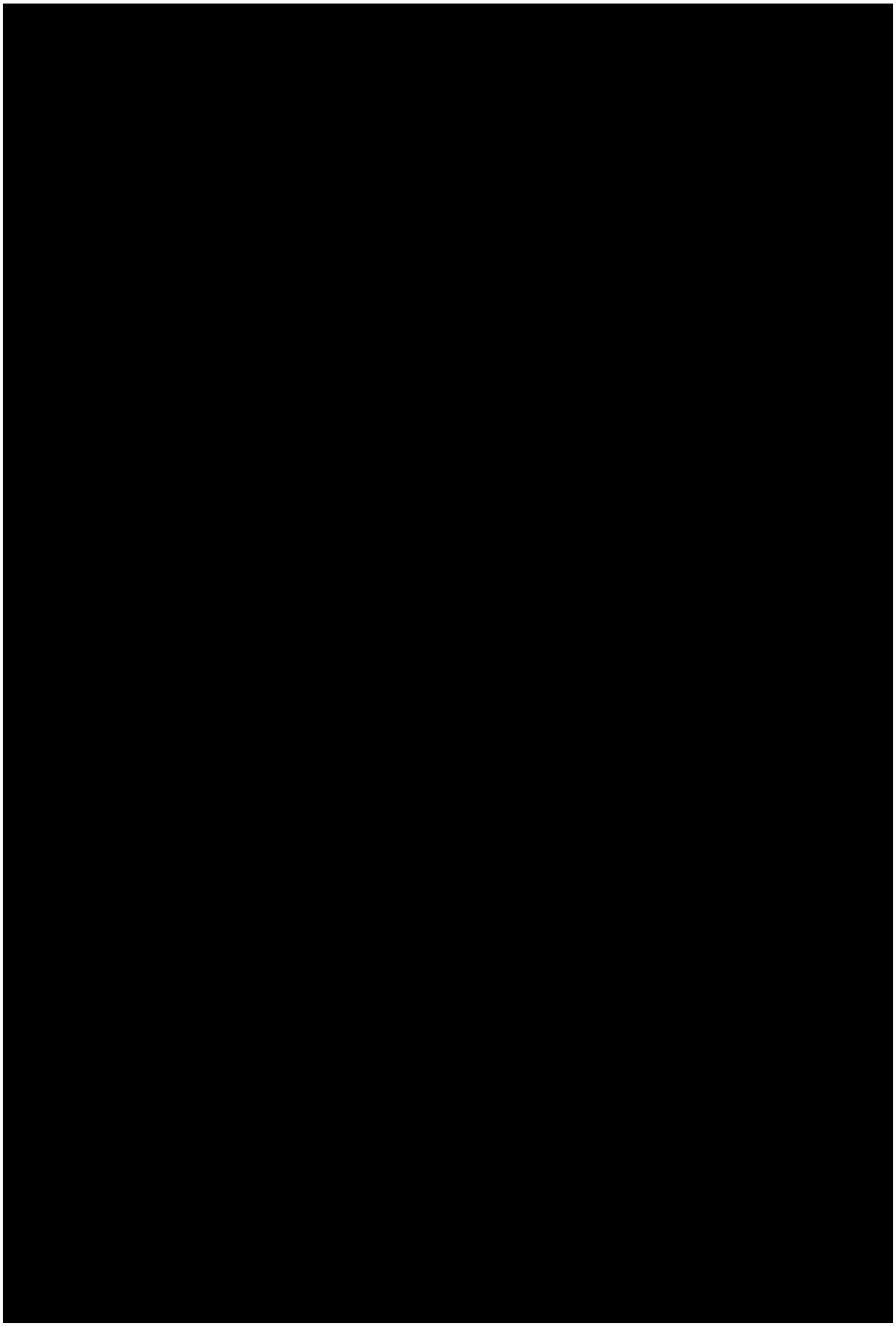
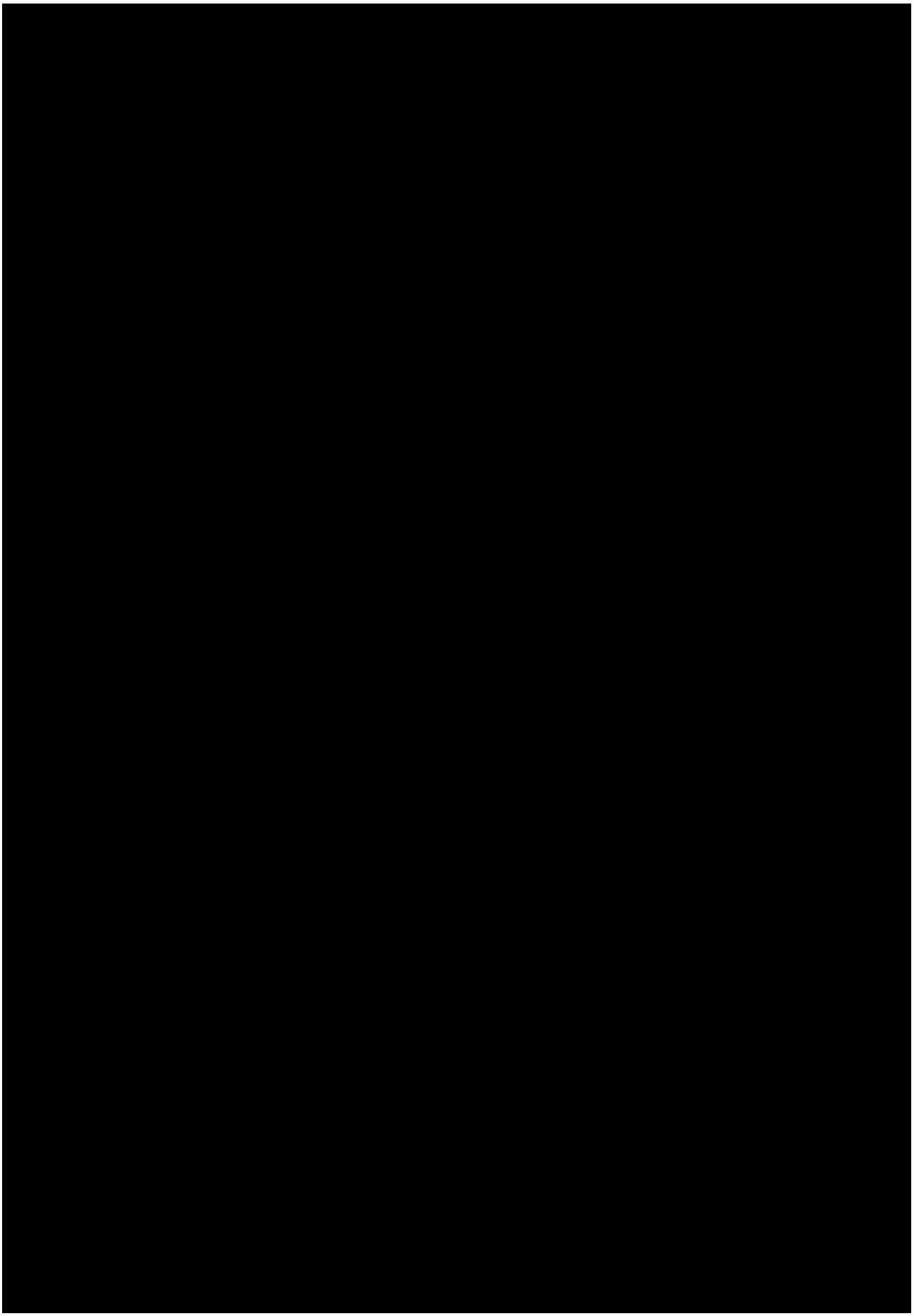


Exhibit 5
SEALED

CONFIDENTIAL MATERIAL OMITTED

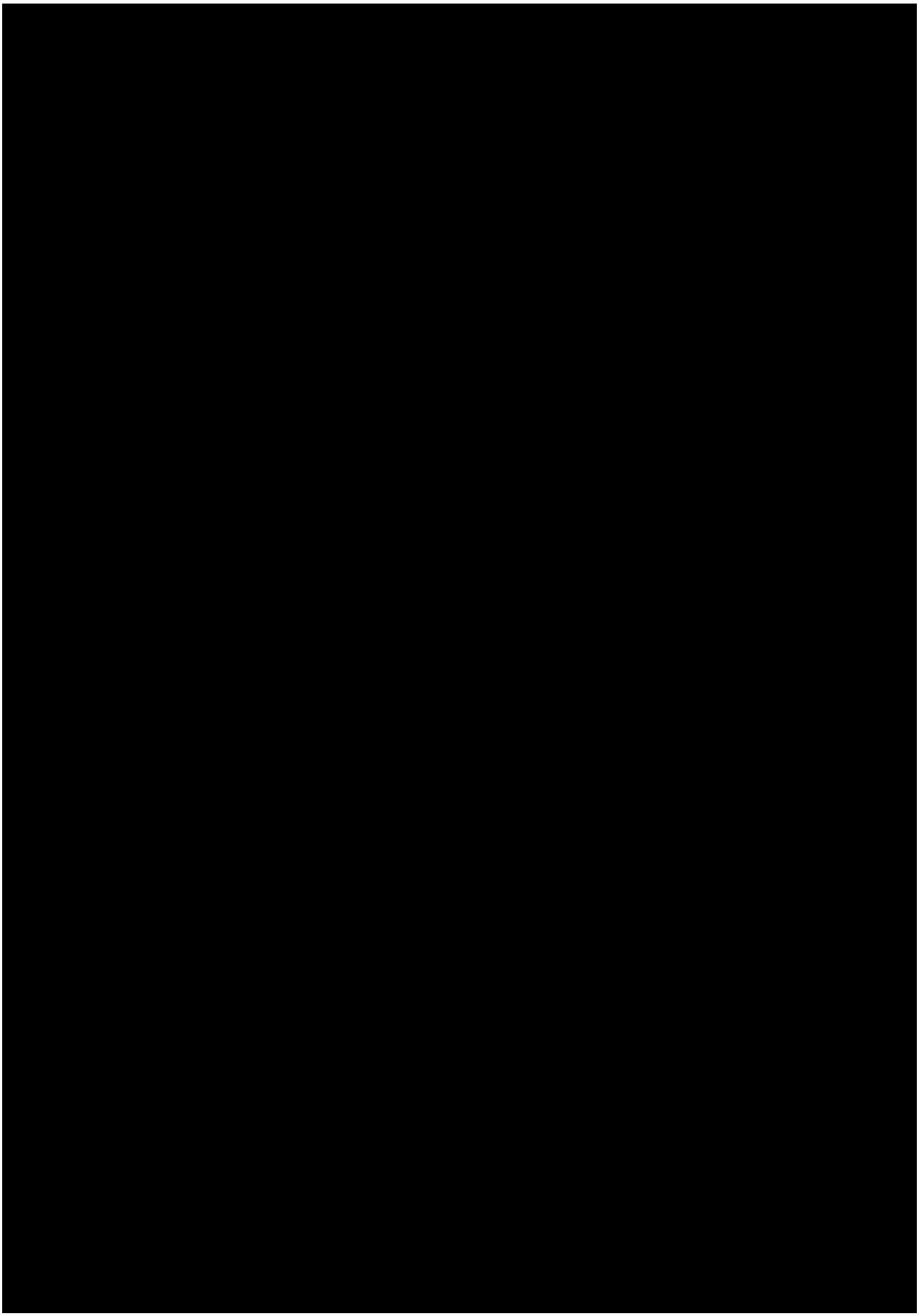




[redacted]

The parties agree that exclusive jurisdiction for any dispute arising out of or relating to this Agreement lies within the courts located in the county of Santa Clara, California.

[redacted]



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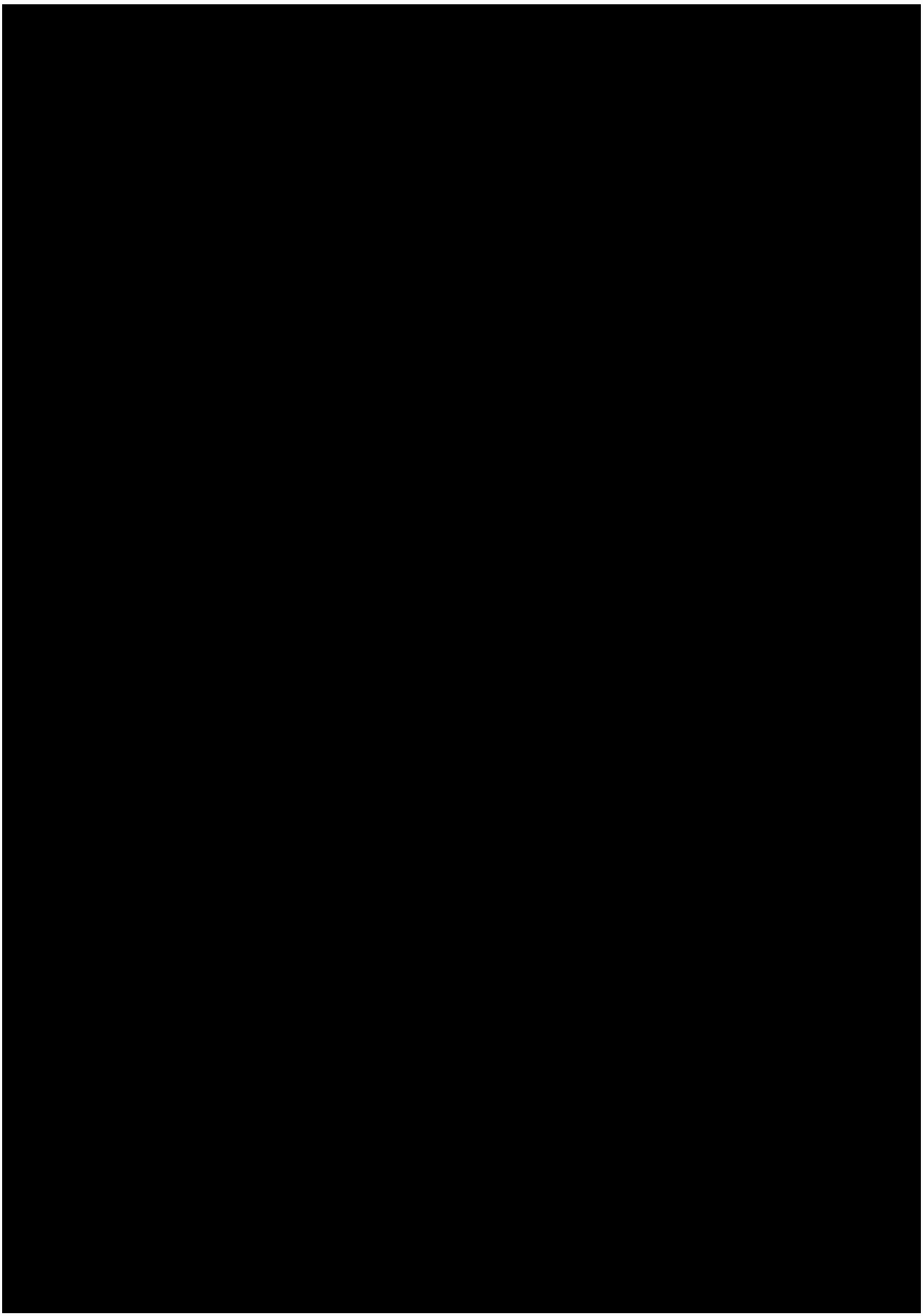

Exhibit 6
SEALED

From: Matthew Aichele <maichele@raklaw.com>
Sent: Friday, May 1, 2020 3:28 PM
To: Gagen, James
Cc: Brian Lewis; W&C Google ITC; ECOFACTOR LS; Jeffrey Hsu; Paul Gennari; ECOFACTOR RAK
Subject: Re: 337-TA-1185 - April 27 Meet and Confer

Jay,

Thank you for your email. Unfortunately, Google's offer to move its source Code from Palo Alto to DC "about a week before Complainants' Final Contentions are due" does not help solve any of the issues at dispute—it makes them worse. EcoFactor's source code reviewers are located in Silicon Valley, CA, which is where they have already reviewed Google Source Code in this Investigation. Indeed, Google itself represented in discovery responses that "Google will make certain source code available at the Palo Alto office of its outside counsel, White & Case LLP, located at 3000 El Camino Real, 2 Palo Alto Square, Suite 800, Palo Alto, CA 94306."

While we appreciate that the global pandemic has affected all of us and requires creative solutions, we do not believe requiring our source code reviewers to travel from California to DC, both of which are still under "shelter-in-place orders" is a realistic solution, particularly when the Source Code itself, and the reviewers, are already both in Silicon Valley.

We ask again that Google reconsider its demand that EcoFactor's source code reviewers violate shelter-in-place orders and social distancing guidelines for in-person source code review, and instead agree to permit, in this Investigation only, for the confidential and secure remote source code review the parties reasonably agreed to in the 1190 Investigation. As we stated previously, EcoFactor intends to move on Monday to amend the Protective Order to add those remote source code accommodations, and we hope Google will join that motion.

Best,

Matthew D. Aichele
Russ August & Kabat
800 Maine Avenue SW, Suite 200 | Washington, DC 20024
(202) 664-0623 | maichele@raklaw.com | www.raklaw.com

> On Apr 30, 2020, at 1:33 PM, Gagen, James <jgagen@whitecase.com> wrote:
>
> Brian:
>
> Google has always been willing to discuss source code review with you, but this Tuesday (i.e., about a week before Complainant's Final Contentions are due) is the first time since early-March we received any message or indication from Complainant that it intended to continue review of Google's source code. If Complainant had wanted to propose an entirely new remote source code review protocol, then it should have raised the issue far earlier, as the parties evidently did in the 1190 Investigation.

As for continuing your in-person review of Google's source code, we remain willing to discuss with you logistics for doing so consistent with the Amended Protective Order and the current situation. While White & Case's Palo Alto office remains closed, Google is willing to make source code available for inspection in White & Case's DC office subject to your agreement that the reviewers will comply with basic safety precautions, such as the use of a mask, and other such details that we can work out together. Please confirm this is acceptable and we can discuss those details. Assuming this is acceptable, the parties do not need to discuss the complexities of finalizing and implementing an entirely new remote source code review protocol at this stage of the Investigation.

As for the rest of your message, our correspondence speaks for itself and we decline to engage with your rhetoric on this issue. Please familiarize yourself with Section 18 of the Amended Protective Order so the parties can have more productive discussions on this subject going forward.

Regards,
Jay

James Gagen | Counsel
T +1 202 626 6496 **M** +1 646 398 4785 **E** jgagen@whitecase.com

---

From: Brian Lewis <blewis@raklaw.com>
Sent: Wednesday, April 29, 2020 11:05 PM
To: Gagen, James <jgagen@whitecase.com>
Cc: W&C Google ITC <WCGoogleITC@whitecase.com>; ecofactor-ls-1185@levisnotherly.com; jeffrey.hsu@usitc.gov; Paul.Gennari@usitc.gov; rak_ecofactor_itc@raklaw.com
Subject: Re: 337-TA-1185 - April 27 Meet and Confer

Jay,
We are glad Google is now willing to discuss the resumption of EcoFactor's review of Google Source Code, which EcoFactor has not been permitted to review since Google stopped making it available on March 16, 2020 in light of the circumstances surrounding COVID-19.
Regarding our proposal to implement remote review of source code, please take the time to review the protocol already adopted by ALJ Lord in the 1190 Investigation included in my email earlier today as well as those in my email below, and we can discuss it tomorrow. We are available any time tomorrow that works for Google and Staff.
Regarding our request to resume in-person review, Google first notified us this morning that it was willing to let EcoFactor resume such in-person review and we immediately asked for Google's permission to resume that review tomorrow. We understand from your email below that Google is refusing that request, and will only permit such review if we provide the three days notice set forth in the Protective Order, notwithstanding that Google, as the supplier, could waive that notice provision if it so chose. Your email below also mistakenly assumes that EcoFactor only wishes to review a "small remaining amount of server-side Google source code." That is incorrect - we wish to resume our review of all available Google Source Code, and expect all such code to be available at least throughout fact and expert discovery in this Investigation.
Lastly, your email below alleges a baseless violation of the Protective Order. This is now the second time you personally have baselessly and frivolously accused our firm and our experts of such a violation. Please refrain from such cavalier accusations in the future. *See Certain Thermoplastic-Encapsulated Electric Motors, Components Thereof, and Products and Vehicles Containing Same*, Inv. No. 337-TA-1052, Order Denying Complainant's Motion for Sanctions (Sep. 20, 2019) ("The Commission cautions counsel and parties that

presenting a baseless or otherwise frivolous allegation of a Protective Order breach…is subject to sanction under Commission Rules 210.4(c)and (d)").
Hope you and yours are staying safe.
Best,
Brian

Brian Lewis
Russ, August & Kabat
12424 Wilshire Boulevard, 12th Floor | Los Angeles, California 90025
Main +1 310 826 7474 | blewis@raklaw.com | www.raklaw.com

On Apr 29, 2020, at 5:53 PM, Gagen, James <jgagen@whitecase.com> wrote:

Brian:

Your proposal to review Google source code tomorrow morning, on less than 24 hours' notice, violates Section 18(C)(iv) of the Amended Protective Order. *See* Order No. 7 at 11. It is precisely this cavalier attitude towards the requirements of the Protective Order that I mentioned in my earlier message—that you cannot respect the notice requirements before accessing Google source code gives us no comfort that you will respect the other requirements during any "off-site" review.

If Complainant is interested in reaching a reasonable agreement on acceptable dates and locations for continuing its in-person review of the small remaining amount of server-side Google source code that we made available in early March, then please give me a call directly and I would be happy to discuss options.

As I mentioned in my message below, we are also happy to discuss and consider alternative remote source code review options, if you can justify the necessity for reviewing the server-side Google source code remotely, and can provide a complete proposal for Google to consider.

Regards,
Jay

James Gagen | Counsel
T +1 202 626 6496 **M** +1 646 398 4785 **E** jgagen@whitecase.com

---

From: Brian Lewis <blewis@raklaw.com>
Sent: Wednesday, April 29, 2020 7:40 PM
To: Gagen, James <jgagen@whitecase.com>; W&C Google ITC <WCGoogleITC@whitecase.com>
Cc: ecofactor-ls-1185@levisnotherly.com; jeffrey.hsu@usitc.gov; Paul.Gennari@usitc.gov; rak_ecofactor_itc@raklaw.com
Subject: Re: 337-TA-1185 - April 27 Meet and Confer

Jay,

I understood from our prior correspondence that Google's code was not available for review during the shelter-in-place orders. In light of your suggestion that we resume in-person review, EcoFactor proposes that Google make the code available again in White & Case's Palo Alto offices beginning tomorrow. I will arrive in the morning to commence review, and either I or Atif Hashmi, or both will continue our review from day to day thereafter until we provide notice otherwise. Please confirm that White & Case will make the code available.

Best,
Brian

Brian Lewis
Russ, August & Kabat
12424 Wilshire Boulevard, 12th Floor | Los Angeles, California 90025
Main +1 310 826 7474 | blewis@raklaw.com | www.raklaw.com

On Apr 29, 2020, at 8:16 AM, Gagen, James <jgagen@whitecase.com> wrote:

Brian:

Thank you. To clarify, your message incorrectly suggests that the parties discussed "off-site" source code review during our April 27 call, which we did not. This is the first time Google is seeing any proposal from Complainant on this subject.

The lack of specificity in the two proposed options masks a number of logistical and legal issues that need to be addressed, not least of which is how to ensure compliance with the provisions of the Amended Protective Order. Assurances that you and your reviewers would take security measures "very seriously" do not fill in these gaps, particularly in light of our experiences with your firm and experts in prior cases involving Google source code. Indeed, in this Investigation, we noted irregularities during your reviewer's inspection of Google's source code.

We are also concerned with the late timing of this proposal. If Complainant had intended to seek an entirely new source code review protocol, Complainant should have raised this issue far earlier. As you know, Google went to great lengths early in the Investigation to make available all relevant source code for the accused thermostats, and Complainant's reviewer already spent over 40 hours reviewing that

source code. No additional review of that device code (off-site or otherwise) is necessary. The only source code that Complainant's reviewer has not already spent significant time with is a small amount of server-side code that Google made available in early March to simplify discovery disputes, despite the fact that Complainant's deficient infringement contentions nowhere justify the relevance of that code. Facilitating Complainant's review of this small amount of remaining Google source code does not justify the negotiation of an entirely new source code review protocol at this stage of the investigation. We expect that the parties can agree on an acceptable date and location for in-person review of the remaining Google source code.

In light of this, we do not believe a call today on these two vague options would be productive or necessary, although we take no position on Complainant's review of other Respondents' source code. To the extent you can justify why an "off-site" review of the remaining Google server-side source code would be necessary, and can provide a more complete protocol that would ensure compliance with the Amended Protective Order, we are happy to discuss.

Regards,
Jay

James Gagen | Counsel
T +1 202 626 6496 **M** +1 646 398 4785 **E** jgagen@whitecase.com

---

From: Brian Lewis <blewis@raklaw.com>
Sent: Tuesday, April 28, 2020 2:50 PM
To: Marc Khadpe <mkhadpe@cravath.com>
Cc: Matthew Aichele <maichele@raklaw.com>; 1185-SchneiderITC-FH <1185-SchneiderITC-FH@finnegan.com>; *Client.Ecobee.ITC.US <Client.Ecobee.ITC.US@dentons.com>; DL_1185Schneider-JB@jenner.com; ecofactor-ls-1185@levisnotherly.com; ECOFACTORDAIKINITC.LWTEAM@lw.com; FM-Alarm-1185@fostermurphy.com; jeffrey.hsu@usitc.gov; MBVivintITC@mabr.com; Paul.Gennari@usitc.gov; rak_ecofactor_itc@raklaw.com; Service-CSM-Alarm-1185@cravath.com; Vivint-Service-1185@wsltrial.com; W&C Google ITC <WCGoogleITC@whitecase.com>
Subject: Re: 337-TA-1185 - April 27 Meet and Confer

Counsel for Respondents,

As discussed on our call yesterday and in light of the logistical challenges presented by COVID-19, EcoFactor proposes that the parties agree to allow off-site review of source code produced in the Investigation. Our source code reviewers are currently unable to travel to your firms (all or most of which are presently closed) to conduct on-site code review. Based on recent federal, state, and local governmental guidance, that may remain the case for months to come.
Of course, we take very seriously Respondents' concerns about the security of their source code, as does EcoFactor with respect to its own source code. We welcome your feedback on what security measures could be implemented to enable off-site code review. To that end, we have identified two potential options below. Please discuss

these options with your clients, as well as any additional or alternative measures that may help us reach a resolution. We propose that the private parties and the Staff discuss the issue of off-site code review tomorrow, Wednesday April 29, at 1:00 pacific (4pm eastern). Please confirm that you are available then or suggest an alternative time to discuss. We can use the following dial-in number: 202-991-5723.

Option 1: Encrypted Hard Drive
Under this option, the producing party would provide an encrypted hard drive containing its source code files to the receiving party's source code reviewer. Several of our source code reviewers have experience using encrypted hard drives to conduct off-site code review for litigation, including drives with source code produced by an opposing party. Our code reviewers have existing internal protocols for using such encrypted hard drives and physically locking away the drives when not in use. In accordance with the existing provisions of our Protective Order, reviewers could keep their review computers off network while the code is accessible or conduct code review using only network-disabled computers.

Option 2: Remote Desktop or VPN
Under this option, the producing party would allow its source code to be reviewed through a remote desktop or VPN solution (e.g., Google Chrome Remote Desktop). That solution could be configured and/or hosted by the producing party. At least one of our reviewers has experience using a VPN to review code that was hosted outside the United States on a remotely located source code computer. If it is not feasible for a producing party to provide such a VPN or remote desktop option, we could enlist the help of a third-party provider with experience in this area. For example, EscrowTech (https://www.escrowtech.com/) provides a secure remote escrow and review service for source code. They store the code on their secure server and provide a thin-client laptop that only allows viewing of the code on the secure server. Print requests are also able to be sent remotely to EscrowTech's facility. We would be happy to join a call with EscrowTech (or another provider) and all parties, if Respondents have any questions about their security measures.

Of course, the other security measures set forth in the Protective Order would also remain in place to safeguard any source code made available for inspection. Just as your experts and team members do, our professional reviewers take Protective Orders and source code security measures very seriously. They have conducted on-site code review in hundreds of litigation matters and have experience performing off-site review as well. We hope that Respondents will work with us to identify creative solutions that will allow the parties to complete source code discovery under these challenging circumstances. We look forward to your feedback and to discussing this with Respondents and the Staff.
Best,
Brian

Brian Lewis
Russ, August & Kabat
12424 Wilshire Boulevard, 12th Floor | Los Angeles, California 90025
Main +1 310 826 7474 | blewis@raklaw.com | www.raklaw.com

On Apr 28, 2020, at 6:35 AM, Marc Khadpe <mkhadpe@cravath.com> wrote:

Matthew,

Thank you for the call yesterday. We understand that

EcoFactor proposes to proceed on the current schedule and does not propose any modifications to those dates at this time. The respondents also intend to proceed under the current schedule. We further understand that EcoFactor will make a proposal relating to source code review. Respondents will confer among themselves and respond to EcoFactor's proposal after they receive it.

Best regards,

Marc J. Khadpe
Cravath, Swaine & Moore LLP
212-474-1382

From: Marc Khadpe/NYC/Cravath
To: <Michael.David@lw.com>
Cc: 1185-SchneiderITC-FH@finnegan.com, CBarquist@mabr.com, Client.Ecobee.ITC.US@dentons.com, DL_1185Schneider-JB@jenner.com, ecofactor-ls-1185@levisnotherly.com, ECOFACTORDAIKINITC.LWTEAM@lw.com, FM-Alarm-1185@fostermurphy.com, jeffrey.hsu@usitc.gov, MBVivintITC@mabr.com, Paul.Gennari@usitc.gov, rak_ecofactor_itc@raklaw.com, Service-CSM-Alarm-1185@cravath.com, tim.carroll@dentons.com, Vivint-Service-1185@wsltrial.com, WCGoogleITC@whitecase.com
Date: 04/27/2020 08:53 AM
Subject: RE: 337-TA-1185 - April 27 Meet and Confer

All parties have confirmed that 4 p.m. EDT today works. Let's use the below dial-in then. Thanks, everyone.

Tel#: 800-228-2770
Pass Code: 171 845 8914

From: <Michael.David@lw.com>
To: <tim.carroll@dentons.com>, <mkhadpe@cravath.com>
Cc: <CBarquist@mabr.com>, <1185-SchneiderITC-FH@finnegan.com>, <DL_1185Schneider-JB@jenner.com>, <Client.Ecobee.ITC.US@dentons.com>, <ecofactor-ls-1185@levisnotherly.com>, <ECOFACTORDAIKINITC.LWTEAM@lw.com>, <FM-Alarm-1185@fostermurphy.com>, <jeffrey.hsu@usitc.gov>, <MBVivintITC@mabr.com>, <Paul.Gennari@usitc.gov>, <rak_ecofactor_itc@raklaw.com>, <Service-CSM-Alarm-1185@cravath.com>, <Vivint-Service-1185@wsltrial.com>, <WCGoogleITC@whitecase.com>

Date: 04/27/2020 08:40 AM
Subject: RE: 337-TA-1185 - April 27 Meet and Confer

-----Original Message-----
From: Carroll, Tim <tim.carroll@dentons.com>
Sent: Saturday, April 25, 2020 9:20 PM
To: Marc Khadpe <mkhadpe@cravath.com>
Cc: Charles Barquist <CBarquist@mabr.com>; 1185-SchneiderITC-FH@finnegan.com;DL_1185Schneider-JB@jenner.com; *Client.Ecobee.ITC.US <Client.Ecobee.ITC.US@dentons.com>;ecofactor-ls-1185@levisnotherly.com; #C-M ECOFACTOR DAIKIN ITC - LW TEAM <ECOFACTORDAIKINITC.LWTEAM@lw.com> ; FM-Alarm-1185@fostermurphy.com; EXTERNAL-Jeffrey Hsu <jeffrey.hsu@usitc.gov>; MB Vivint ITC <MBVivintITC@mabr.com>;Paul.Gennari@usitc.gov; rak_ecofactor_itc@raklaw.com; Service-CSM-Alarm-1185@cravath.com; Vivint-Service-1185@wsltrial.com; WCGoogleITC@whitecase.com
Subject: Re: 337-TA-1185 - April 27 Meet and Confer

Works for ecobee.

[http://logo.dentons.com/dentons_logo.png]

Tim Carroll

Our COVID-19 Client Resources Hub<https://www.dentons.com/en/issues-and-opportunities/covid-19-coronavirus-hub> is available to the public, part of Dentons' global commitment to help our clients and our communities navigate this pandemic's legal and business challenges.

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tim.carroll@dentons.com<mailto:tim.carroll@dentons.com>
Bio<http://www.dentons.com/ch.aspx?email=tim.carroll@dentons.com&action=biolink> | Website<http://www.dentons.com>

Dentons US LLP

On Apr 25, 2020, at 10:34 AM, Marc Khadpe <mkhadpe@cravath.com> wrote:

[External Sender]
4 p.m. ET works for us.

From: "Charles Barquist" <CBarquist@mabr.com>

To: "Marc Khadpe" <mkhadpe@cravath.com>, "ecofactor-ls-1185@levisnotherly.com" <ecofactor-ls-1185@levisnotherly.com>, "rak_ecofactor_itc@raklaw.com" <rak_ecofactor_itc@raklaw.com>, "ECOFACTORDAIKINITC.LWTEAM@lw.com" <ECOFACTORDAIKINITC.LWTEAM@lw.com>, "ecobee.ITC@dentons.com" <ecobee.ITC@dentons.com>, "WCGoogleITC@whitecase.com" <WCGoogleITC@whitecase.com>, "1185-SchneiderITC-FH@finnegan.com" <1185-SchneiderITC-FH@finnegan.com>, "DL_1185Schneider-JB@jenner.com" <DL_1185Schneider-JB@jenner.com>, "Vivint-Service-1185@wsltrial.com" <Vivint-Service-1185@wsltrial.com>, "MB Vivint ITC" <MBVivintITC@mabr.com>, "Paul.Gennari@usitc.gov" <Paul.Gennari@usitc.gov>, "Jeffrey.Hsu@usitc.gov" <Jeffrey.Hsu@usitc.gov>
Cc: "Service-CSM-Alarm-1185@cravath.com" <Service-CSM-Alarm-1185@cravath.com>, "FM-Alarm-1185@fostermurphy.com" <FM-Alarm-1185@fostermurphy.com>
Date: 04/25/2020 10:29 AM
Subject: RE: 337-TA-1185 - April 27 Meet and Confer

Charles S. Barquist

Maschoff Brennan

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From: Marc Khadpe <mkhadpe@cravath.com>
Sent: Saturday, April 25, 2020 6:21 AM
To: ecofactor-ls-1185@levisnotherly.com; rak_ecofactor_itc@raklaw.com; ECOFACTORDAIKINITC.LWTEAM@lw.com; ecobee.ITC@dentons.com;WCGoogleITC@whitecase.com; 1185-SchneiderITC-FH@finnegan.com; DL_1185Schneider-

JB@jenner.com; Vivint-Service-1185@wsltrial.com; MB Vivint ITC <MBVivintITC@mabr.com>;Paul.Gennari@usitc.gov; Jeffrey.Hsu@usitc.gov
Cc: Service-CSM-Alarm-1185@cravath.com; FM-Alarm-1185@fostermurphy.com
Subject: 337-TA-1185 - April 27 Meet and Confer

Dear Counsel,

Pursuant to the Amended Procedural Schedule (Order No. 8), the private parties and Staff are to meet and confer regarding the remainder of the procedural schedule on Monday. We propose the parties confer via conference call at 3:00 p.m. EDT on Monday. If that does not work for any counsel, please let us know.

We can use the following dial-in:

Tel#: 800-228-2770
Pass Code: 171 845 8914

Best regards,

Marc J. Khadpe
Cravath, Swaine & Moore LLP
212-474-1382

---

communication will be processed in accordance with the firm's privacy notices and Global Privacy Standards available at www.lw.com.

Exhibit 7

Contact

www.linkedin.com/in/johnsteinberg (LinkedIn)
www.ecofactor.com (Company)

Top Skills

Start-ups
Business Development
Strategy

Languages

English (Native or Bilingual)
Legalese (Professional Working)

Honors-Awards

National Grand Prize
Utility Technology Challenge Winner
Smart Grid Innovation Award
Global Cleantech 100 Ones to Watch
Powergrid International Project of the Year (with NV Energy)

Publications

Smart Grid Trends: Deja Vu All Over Again?
A New Approach For Improving Demand Response Performance
How intelligent load shifting can solve two of the biggest problems in smart energy

John Steinberg

CEO at Taction Technology Inc.
San Francisco Bay Area

Summary

Founded a company to realize the previously unappreciated value in data collected from devices in the home – well before Big Data, the Internet of Things and the Connected Home were even buzzwords. Brought effortless, award-winning intelligent automation and learning algorithms to a hidebound industry, and signed up Fortune 100 partners to bring them to market. Pioneered the coupling of demand response and energy efficiency and made them cost-effective for industry partners and consumers alike. Built multi-party commercial partnerships to bring innovative energy efficiency and home automation solutions to market.

In short, I didn't just see the future – I helped create it.

LinkedIn connection requests: If we have not met or done business together, I probably will not accept a random request.

Experience

Taction Technology Inc.
CEO
October 2016 - Present (3 years 6 months)

Taction Transporters put the power of a 200-pound subwoofer into a one-ounce module that allows manufacturers of over-the-ear headphones to deliver powerful bass that is flat to 20Hz. In addition to making wearing headphones for music, gaming and VR more of an immersive, "you are there" experience, Taction Transporters also improve reaction times in video games by 20% by employing a faster signal path to the brain.

California College of the Arts
Adjunct Faculty, D-MBA Program
December 2015 - Present (4 years 4 months)

Venture IP Consulting
Principal
February 2015 - Present (5 years 2 months)

EcoFactor
8 years 10 months

Co-Founder, Exec VP, Biz Dev
December 2011 - January 2015 (3 years 2 months)
Silicon Valley

Owned relationships and negotiated commercial deals with:
-- Comcast (Fortune 50) -- First energy management SaaS deal with major home service provider in US
-- NV Energy -- First commercial-scale integrated demand side management deployment in US

Developed and managed growing portfolio of foundational Internet of Things, Home Automation, Big Data and Smart Energy IP (29 issued patents so far, many more pending)

Created strategies and evangelized, coaxed and prodded them into reality

Co-founder, CEO
April 2006 - November 2011 (5 years 8 months)
EcoFactor developed the most advanced energy management solution available, offering double-digit savings without sacrifice. I co-creating the concept, attracted the team, raised angel and venture capital, generated revenue and evangelized at conferences and to the media.

Electronics For Imaging
5 years 6 months

Director of Corporate Business Development
September 2004 - June 2005 (10 months)
Led & coordinated strategic M&A process, including acquisition of public and private companies, spin-off of segments to private investors; defined and implemented growth strategies in existing and new businesses; developed new technologies and business methods (7 patents issued).

Senior Manager, Business Development
January 2002 - September 2004 (2 years 9 months)

Manager, Business Development

April 2001 - January 2002 (10 months)

Manger, Strategic Relations
January 2000 - April 2001 (1 year 4 months)

Managed business relationships with major Japanese OEM customers; negotiated license, distribution and development agreements, manufacturing agreements, new business proposals; resolved customer, vendor and internal disputes.

Bebop Incorporated
Founder, President
1993 - 1999 (6 years)

Founded start-up, drafted business plan, raised capital; conceived, designed, launched and marketed successful line of bicycle components.

Education

Stanford University Law School
J.D., Law

Oberlin College
B.A. (with honors), Economics, Government

Exhibit 8

The State Bar of California

John D Steinberg #126403

License Status: Inactive

Address: 873 Hacienda Way, Millbrae, CA 94030-1151
County: San Mateo County
Phone Number: Not Available
Fax Number: Not Available
Email: Not Available
Law School: Stanford Univ Law School; Stanford CA

Below you will find all changes of license status due to both non-disciplinary administrative matters and disciplinary actions.

Date	License Status	Discipline	Administrative Action
Present	Inactive		
12/1/2007	Inactive		
10/18/2005	Active		
1/1/2002	Inactive		
7/19/1996	Active		
1/1/1995	Inactive		
12/11/1986	Admitted to The State Bar of California		

Additional Information:

- Explanation of licensee status
- Explanation of disciplinary system
- Explanation of disciplinary actions
- Copies of official licensee discipline records are available upon request

CLA Sections: None

California Lawyers Association (CLA) is an independent organization and is not part of The State Bar of California.

Exhibit 9

@ECO FACTOR

Integrated Demand Side Management Using a 2-Way Communicating Thermostat

1. We have leveraged PIER-sponsored research through the Center for the Built Environment at UC Berkeley and Professors David Auslander and Edward Arens to create a system that:

   a) Can reduce A/C compressor and furnace cycle times by 40% without compromising homeowner comfort
   b) Can automate consumer optimization for time-variant pricing
   c) Optimizes consumer control while delivering on utility DR and EE goals

2. These results can be achieved with just a basic 2-way communicating thermostat. Rather than increase the computing power (and thereby cost) of every thermostat, we:

   a) Leverage the growing infrastructure of the Internet
   b) Utilize a centrally located commercial grade software system to provide home-specific energy saving recommendations directly to the thermostat.
   c) Preserve consumer control of all parameters:

      i. Each homeowner decides if they want to manually implement the savings measures or if they want the savings strategies to be automatically implemented
      ii. At any time a simple push of the up or down button on the thermostat can override the recommendation

3. The science behind the system:

   a) The centrally located software analyzes the data provided by the 2-way communicating thermostat and determines the "dynamic signature" of each individual home under varying conditions, which allows us to accurately predict:

      i. How much energy and time it will take for the HVAC system to change the temperature inside the home by one degree
      ii. When the HVAC is turned off, how quickly that temperature change dissipates
      iii. HVAC cycling and inside temperatures 24 hours into the future, which allows us to model multiple programs to find the one that is most efficient for that house on that day, and to predict hourly HVAC energy consumption

b) Consumers are concerned about high utility bills. Energy management software can give homeowners unprecedented insight into WHY their bills are so high. Dynamic signature-based energy management software can distinguish between and quantify problems caused by:

   i. The energy efficiency of the structure (insulation, windows, etc.)
   ii. The size and current working condition of the HVAC system
   iii. The behavior of the homeowner (setback utilization, manual overrides, etc.)

c) The detailed profile of each home can be used to assign a letter grade for each of these contributors to energy consumption to let the homeowner know where improvement is needed and why their bills are high.

4. When managed properly, the same device (the communicating thermostat) that generates large Energy Efficiency/Conservation savings for the consumer can also deliver significant value back to the grid -- benefits that go well beyond simple centrally triggered setpoint changes. An optimized software service can:

   a) Improve AC load forecasting
   b) Drive greater adoption of residential DR because the consumer maintains control and can elect to participate, and if participating can choose to pre-cool or not
   c) Deliver increased yield of DR per AC unit through optimized pre-cooling (load shifting)
   d) Improve visibility and accounting for DR events through real-time reporting

5. These capabilities are not distant pipe dreams; not only can all of these things be done – EcoFactor can do them **right now**.

   a) EcoFactor has two current trial programs, one in the Northern Hemisphere in Minneapolis Minnesota and another in the Southern Hemisphere in Adelaide South Australia, which allows summer and winter testing simultaneously.
   b) EcoFactor has proven substantial energy savings and enhanced user comfort and satisfaction as well as the ability to effectively pre-cool single-family residences so that demand response is significantly enhanced.
   c) For more Information contact:

John Steinberg
John@ecofactor.com

Scott Hublou
scott@ecofactor.com

Remote Optimization of HVAC for Efficiency and Demand Response:

2007-2008 Global Field Trial Results of EcoFactor's Integrated Demand Side Management solution

EcoFactor, Inc
423 Broadway, Suite 801
Millbrae, CA

ABSTRACT

EcoFactor has developed a residential and small commercial energy management service that delivers both double-digit energy savings and significantly enhanced demand response, thereby achieving true integrated demand side management using only a two-way communicating thermostat. Field tests in Minnesota and South Australia have demonstrated that the EcoFactor service can optimize user behavior in ways that significantly reduce energy use; transparently deploy sophisticated control algorithms that decrease consumption without affecting comfort; accurately characterize the thermal behavior of individual houses; and deploy customized pre-cooling strategies that can save consumers money by optimizing for time of use rates and increase the demand response available from many homes by 20%.

SUMMARY

Problem Addressed

Electric utilities face significant and growing problems related to the imbalance between the demand for and supply of electricity, which varies dramatically between January and July, and between 4AM and 4PM. Historically, the only way utilities could meet peak demands was to buy or generate additional supply. Recently utilities have begun to resolve that imbalance more efficiently by paying customers to deliver "demand response" – to reduce electricity consumption on request during a handful of peak periods each season. The largest component of peak load is generally residential air conditioning, but first-generation demand response solutions have met with limited success as applied to the residential market.

At the same time, rising energy prices are motivating consumers to find ways to reduce overall consumption. Because space heating and cooling are the largest components of most energy bills, increasing the efficiency of the HVAC system can yield significantly greater savings than most other efficiency plays, such as compact fluorescent light bulbs.[i] Utilities are facing growing pressure from regulators to drive more efficient energy consumption, and to offer programs that integrate energy efficiency with demand response.

The EcoFactor Solution

EcoFactor addresses both of these critical needs. It provides more flexible, intelligent and efficient demand response during peak days, but also about provides consumers the tools to automate and refine their energy consumption year round. By combining these two benefits, it delivers a true Integrated Demand Side Management solution for electric utilities.

Our SaaS platform will work with any manufacturer's two-way communicating thermostat and has proven to increase the effectiveness of a utility-triggered DR event (that is, increases the effective DR yield per A/C system) by more than 20% by utilizing a pre-cooling/storage strategy customized for each participating home. And on non DR days, the EcoFactor service offers energy savings of as much as 40% (an average of $400/year) – *without* decreasing comfort and *without* requiring active energy management by the homeowner– through individualized and weather-specific optimization of HVAC usage.

The keys to EcoFactor's patent-pending service are the data we collect and what we are able to do with it. Traditional programmable thermostats may be thought of as glorified switches. EcoFactor gains access to a wealth of data by using the thermostat as a networked sensor. Like conventional unconnected devices, EcoFactor-enabled thermostats measure temperature. But EcoFactor combines that data with information from other sources to create a highly accurate window into the performance of the building and its HVAC system, as well as into the behavior and preferences of the occupants. By logging temperature and HVAC cycling behavior as reported by the thermostat every 60 seconds, EcoFactor is able to determine the "dynamic signature" of the home – its ability to store and reject heat under changing conditions. By logging all of the inputs to the system – including the changing preferences of the occupants as expressed each time the "up" and "down" buttons are pressed – we are able to learn about the preferences and schedules of the occupants, which will allow us to decrease energy consumption without decreasing comfort.

The Field Study

EcoFactor began field trials in December 2007. Ecofactor tested winter and summer algorithms simultaneously by deploying the service to twelve homes in Minnesota and ten in South Australia. These deployments have already confirmed EcoFactor's fundamental value proposition: that an optimized two-way communicating thermostat service can both deliver significant savings to consumers and provide an automated and verifiable means to increase the yield of DR per home while improving consumer acceptance.

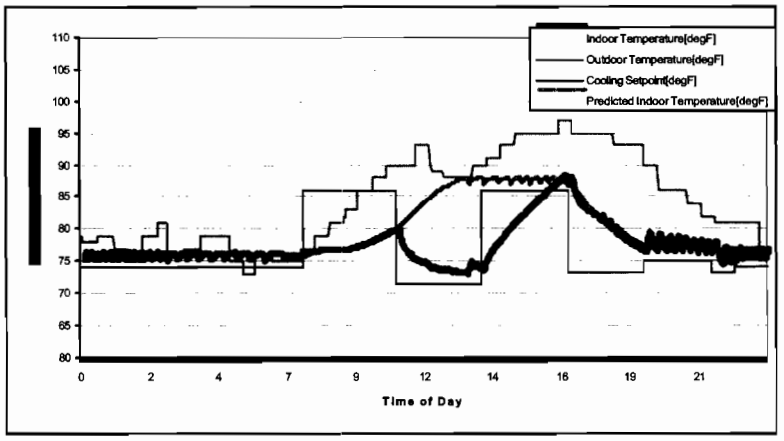
Significant findings include the following:

User acceptance: In Minnesota, 376 of 552 consumers surveyed volunteered to participate in the field trial, compared to the 1-2% opt-in rates typical of utility programs. As of May 10, 2008 all 12 Minnesota homes continue to use the service. 9 of 10 Adelaide users continue to use the service; the 10th sold his house, but asked to keep the system and plans to install the hardware in his new home. In traditional DR programs, large numbers of customers tend to seek to withdraw after each DR event.

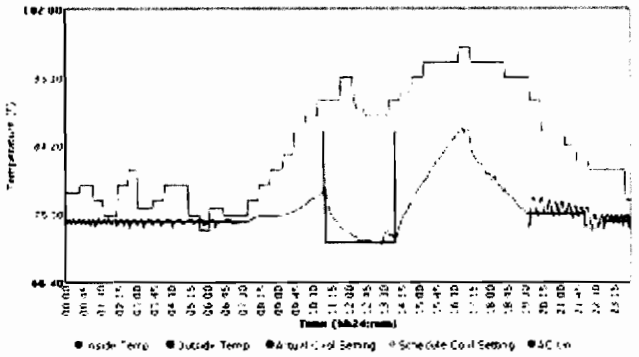
Behavior: EcoFactor demonstrated that consumer preferences as manifested in HVAC usage vary dramatically, and that those differences directly resulted in differences of as much as 25% in energy consumption between otherwise identical homes. EcoFactor also showed that its analytics can influence consumers to significantly alter their behavior. Those changes included adoption of recommended setback schedules that reduced manual thermostat over-rides by more than 90% and by adopting significantly more energy efficient setback schedules.

Dynamic Signature and Temperature Prediction: EcoFactor demonstrated the ability to determine the dynamic signatures (thermal mass as manifested under varying conditions) of individual structures, with a high degree of accuracy, using only a single sensor: a 2-way communicating thermostat. After only 3 days of monitoring a home, EcoFactor's dynamic signature algorithms can predict temperature several hours in advance with a margin of error of less than 2%.

"What if" modeling: EcoFactor demonstrated the ability to leverage its real data and algorithms by comparing results from each home to alternative heating/cooling strategies as they would affect each individual house. This ability to model future events and HVAC behavior also translates into the ability to forecast loads.



Pre-cooling: EcoFactor has show that, in a time-variant pricing environment, its intelligent pre-conditioning can save consumers significant energy costs and shift demand from higher to lower-priced periods. It was also shown the differences in dynamic signatures between homes make one-size-fits-all pre-cooling programs impractical. Load shifting works on many homes, but efficacy is highly dependent on weather conditions and occupant behavior. Using time-of-use price tiers from actual Pacific Gas & Electric tariffs, EcoFactor would have saved 5.5% of air conditioning costs on the days tested while shifting 100% of the air conditioning load out of the peak period. Applying TOU rates more conducive to pre-cooling (by eliminating the "part peak" shoulder immediately preceding the peak period) would increase the savings from pre-cooling to 16%.



Demand Response: EcoFactor proved that individualized pre-cooling strategies can improve the yield of kilowatts of DR per residential air conditioner by more than 20%.

Just-in-time Preconditioning: EcoFactor has demonstrated that it can predict with a high degree of accuracy what the temperature inside a home will be several hours into the future. EcoFactor leveraged that ability by pre-conditioning homes to a desired temperature at a desired time over a broad range of conditions to an accuracy of roughly one-half degree Fahrenheit, well below the generally accepted threshold of detectabilty.

Sawtooth algorithm: EcoFactor developed and deployed a "sawtooth" waveform algorithm that saved an average of 5.5% of heating costs in 9 Minnesota homes over a two-month period. The tests also demonstrated that the algorithm was well-tolerated and in fact apparently unnoticed by occupants under almost all circumstances.

Anomaly Detection: EcoFactor has demonstrated that its dynamic signature modeling is sufficiently precise that it can reliably detect anomalies such as open windows. By calculating the differential between "what should have been" and reality (open window) behavior can now be directly mapped into energy savings/loss.

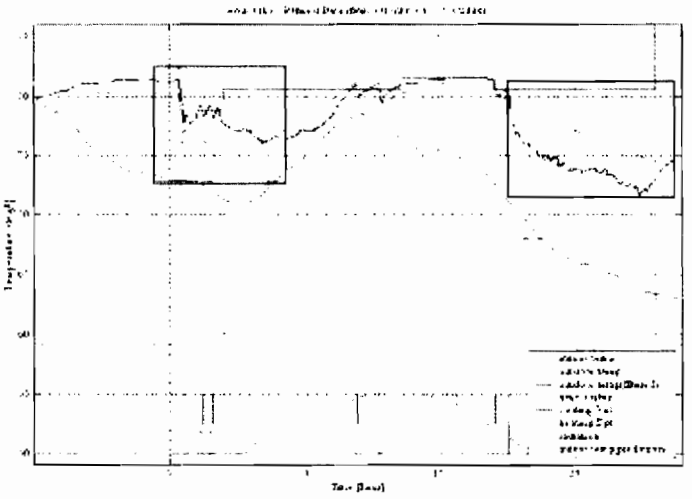


Exhibit 10

Energy Research and Development Division
FINAL PROJECT REPORT

ENABLING TECHNOLOGIES DEVELOPMENT GRANT PROGRAM

Final Report 2002–2015

Prepared for: California Energy Commission
Prepared by: California Institute for Energy and Environment
University of California

JUNE 2015
CEC-500-2016-011

California Institute for Energy and Environment

PREPARED BY:

Primary Author(s):
Therese Peffer
Gaymond Yee
Niall Mateer

California Institute for Energy and Environment
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2087 Addison Street, Second Floor
Berkeley, CA 94704-1103
510-289-4278 | Fax: 510-643-9324
http://uc-ciee.org

Contract Number: 500-01-043

Prepared for:

California Energy Commission

Matt Fung
Contract Manager

Fernando Pina
Office Manager
Energy Systems Research Office

Laurie ten Hope
Deputy Director
ENERGY RESEARCH AND DEVELOPMENT DIVISION

Robert P. Oglesby
Executive Director

ACKNOWLEDGEMENTS

The author wishes to thank the Enabling Technologies Development Grant Program's Energy Commission Contract Manager, Matt Fung and former Contract Manager, Consuelo Sichon, for their guidance, support, and responsiveness. Thanks also go to Ron Hofmann, consultant and advisor to the project.

Previous Energy Commission Contract Managers to the project also provided their guidance and support. The authors would like to thank them; Laurie ten Hope, Mike Gravely, Pedro Gomez, David Michel, Kristy Chew, Bryan Neff, and Mark Rawson (formerly with the Energy Commission).

Also appreciated is the advice provided by the project's volunteer Technical Advisory Committee (TAC). The authors wish to thank them for their time and efforts. The TAC members include:

TAC Members (current):

Mauro Dresti (Southern California Edison)
John Holmes (Sempra Utilities)
Belvin Louie (Consultant)
Charlie Middleton (Pacific Gas & Electric)
Larry Miller (California Institute for Energy and Environment)
Mary Ann Piette (Lawrence Berkeley National Laboratory)
Mukesh Khattar (Oracle Corporation)
Roger Levy (Consultant)
Terry Mohn (General Microgrids)
Chris Scruton (Consultant)

TAC Members (past):

Carl Besaw (Southern California Edison)
Joe Hughes (Electric Power Research Institute)
Steve Phillips (Pacific Gas and Electric)
Charles Glorioso (Consultant)
Mark Martinez (Southern California Edison)
Jeremy Laundergan (Southern California Edison)
Joe Desmond (Bright Source Energy)

TAC Members (posthumous):

Don Pezzolo
Don Aumann

PREFACE

The California Energy Commission Energy Research and Development Division supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

The Energy Research and Development Division conducts public interest research, development, and demonstration (RD&D) projects to benefit California.

The Energy Research and Development Division strives to conduct the most promising public interest energy research by partnering with RD&D entities, including individuals, businesses, utilities, and public or private research institutions.

Energy Research and Development Division funding efforts are focused on the following RD&D program areas:

- Buildings End-Use Energy Efficiency
- Energy Innovations Small Grants
- Energy-Related Environmental Research
- Energy Systems Integration
- Environmentally Preferred Advanced Generation
- Industrial/Agricultural/Water End-Use Energy Efficiency
- Renewable Energy Technologies
- Transportation

Enabling Technologies Development Grant Program: Final Report is the final report for the Enabling Technologies Development Grant Program project (contract number 500-01-043) conducted by the California Institute for Energy and Environment, University of California. The information from this project contributes to Energy Research and Development Division's Energy Systems Integration Program.

For more information about the Energy Research and Development Division, please visit the Energy Commission's website at www.energy.ca.gov/research/ or contact the Energy Commission at 916-327-1551.

ABSTRACT

The Enabling Technologies Development Grant Program addressed 3–5 year and 5–8 year energy-related research objectives. To meet specific public interest goals, grant awardees developed enabling technologies that can:

- Improve the reliability and quality of California's electricity by reducing service interruptions through expanded service options and new system-wide capabilities.
- Maximize market connection by reducing the installed cost of energy-related information, communication, and control technologies.
- Improve the energy cost and value of California's electricity by providing real-time information and a means to respond automatically to supply-side problems.

The University of California's California Institute for Energy and Environment managed the program and was responsible for proposal solicitations, pre-proposal screening, organizing proposal technical reviews, and presenting selected proposals to the Energy Commission for approval. The California Institute for Energy and Environment was also responsible for awarding the grants, monitoring the grant awardees for compliance with grant terms, and providing all necessary technical and administrative support.

This final report is a compilation of 22 final reports from research projects completed between 2002 and 2015 by the grant awardees.

Keywords: Public Interest Energy Research program, PIER, demand response, enabling technologies, network security, privacy, sensor networks, agile radios, business network, business processes, information models, systems integration, field simulation, collaboration exchange, intelligent agents, service-oriented software, wireless sensors, middleware, development environment, operating system, application programming interface.

Please use the following citation for this report:

Peffer, Therese, Gaymond Yee, Niall Mateer. California Institute for Energy and Environment, University of California. 2016. ***Enabling Technologies Development Grant Program: Final Report.*** California Energy Commission. Publication number: CEC-500-2016-011.

Exhibit 11

Title
Demand response enabling technology development

Authors
Arens, Edward A
Auslander, D.
Culler, D.
et al.

Publication Date
2006-04-04

Peer reviewed

Demand Response Enabling Technology Development

Phase I Report: June 2003-November 2005

Overview and Reports from the Four Project Groups:

Thermostat/Controls
Communications/Network
Metering/Sensors
Energy Scavenging

April 4, 2006

Edward Arens: Center for Built Environment, Architecture Dept.
David Auslander: Mechanical Engineering Dept.
David Culler: Electrical Engineering and Computer Science (EECS) Dept.
Cliff Federspiel: Center for the Built Environment, Architecture Dept.
Charlie Huizenga: Center for the Built Environment, Architecture Dept.
Jan Rabaey: Berkeley Wireless Research Center, EECS Dept.
Paul Wright: Mechanical Engineering Dept.
Dick White: Berkeley Sensor and Actuator Center, EECS Dept.

Graduate Student Researchers: Eric Carleton, Xue Chen, Alex Do, Jonathon Foster, Jaehwi Jang, Florian Jourda, Anna LaRue, Eli Leland, Nate Ota, Therese Peffer, Nate Pletcher, Andrew Redfern, Beth Reilly, Dan Steingard, William Watts

Undergraduate Student Researchers: Spencer Ahrens, Vikas Bhargava, Po-kai Chen, Randy Chen, Reman Child, Marc Ramirez, Duncan Wilson, Xin Yang, Yi Yuan

The UC Berkeley team formed an interdisciplinary alliance between the four sub-groups listed after the main title. Weekly interactions among and between the sub-groups enabled high-impact experimentally oriented research mission, while focusing on the common 10x10x10 goal of DR-ETD projects. (Namely 10x cheaper, 10x more capable and >10year life). Over the 2 year period we created early prototypes for the mesh networking of wireless meters, wireless thermostats and wireless temperature nodes. When in final production by commercial entities (in the mid-to-late part of this decade) the OEM costs for the meters and thermostats should be in the "few-dollars" range and the cost for the nodes in the "sub-one-dollar" range.

Exhibit 12

The Application of Wireless Sensor Networks to Residential Energy Efficiency and Demand Response

by

Nathan Ken Ota

B.S. (Carnegie Mellon University) 2001

M.S. (University of California, Berkeley) 2003

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Philosophy
in

Engineering-Mechanical Engineering
in the

GRADUATE DIVISION

of

THE UNIVERSITY OF CALIFORNIA, BERKELEY

Committee in charge:
Professor Paul K. Wright, Chair
Professor Alice Agogino
Professor Jan Rabaey

Spring 2007

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The Application of Wireless Sensor Networks to

Residential Energy Efficiency and Demand Response

by

Nathan Ken Ota

Abstract

The Application of Wireless Sensor Networks to

Residential Energy Efficiency and Demand Response

by

Nathan Ken Ota

Doctor of Philosophy in Mechanical Engineering

University of California, Berkeley

Professor Paul K. Wright, Chair

Rising residential energy consumption and electrical power demands continue to challenge suppliers and consumers. A broad survey of energy efficiency and load management approaches revealed an opportunity to address the thermostat. The conventional thermostat is a sensor-limited device. Wireless sensor networks provide an enabling technology to transform the thermostat into a disaggregated system of actuation, sensing, and computation. In doing so, the thermostat can leverage information about the distribution of environmental conditions throughout a house using spatially distributed sensors with multi-sensor control strategies while using the existing heating and air conditioning actuation.

Four temperature-based multi-sensor strategies and three comfort-based multi-sensor strategies were evaluated through simulations and a real-world deployment. Simulation data show multi-sensor strategies can reduce energy consumption without sacrificing comfort compared to a thermostat with temperature setpoint threshold logic. Simulation data also show multi-sensor strategies in combination with comfort offsets increase the diversity and range of cost-comfort performance options beyond temperature

setpoint changes for temperature threshold logic in conventional thermostats. These additional options are well-suited for application to Demand Response load management.

The integration of wireless sensor network technology into a residential energy and power management control system required evaluation of wireless sensor network communication performance in residential environments and development of a suitable system architecture. A series of in-situ experiments testing communicate performance of 2.4 GHz wireless sensor network technology show packet loss occurs in short "bursty" events on a few links throughout a house. A multi-agent architecture was developed to integrate wireless sensor networks with multi-sensor residential HVAC control strategies.

This system was deployed two real-world environments to evaluate the performance of multi-sensor residential HVAC control strategies. The real-world data confirm the energy efficiency performance and Demand Response capability of multi-sensor HVAC control strategies using wireless sensor networks.

Professor Paul K. Wright, Chair Date

Exhibit 13

RUSS AUGUST & KABAT

800 Maine Ave SW
Suite 200
Washington
DC
20004

Tel 310.826.7474
www.raklaw.com

Matthew D. Aichele
maichele@raklaw.com

October 22, 2019

Via Hand Delivery

The Honorable Lisa R. Barton
U.S. International Trade Commission
500 E Street, S.W., Room 112-F
Washington, DC 20436

Re: *Certain Smart Thermostats, Smart HVAC Systems, and Components Thereof*; Inv. No. 337-TA-____

Dear Secretary Barton:

Enclosed for filing on behalf of Complainant EcoFactor, Inc. ("EcoFactor" or "Complainant") are the following documents in support of EcoFactor's request that the Commission commence an investigation pursuant to Section 337 of the Tariff Act of 1930, as amended:

1. One (1) original plus eight (8) paper copies of the verified Non-Confidential Complaint and the Public Interest Statement. (19 CFR §§ 210.8(a)(1)(i), 210.8(b));

2. One (1) original plus eight (8) copies of EcoFactors letter and certification requesting confidential treatment of the information contained in the Confidential Exhibit Nos. 12C, 49C, 50C and 59C. (19 CFR §§ 210.4(f)(7)(i), 210.5 (d), 201.6 (b));

3. One (1) copy, on DVD of the accompanying non-confidential exhibits. (19 CFR § 210.8(a)(l)(i));

4. One (1) copy, on DVD with the Confidential Exhibits Nos. 12C, 49C, 50C and 59C. (19 CFR §§ 201.6(c));

5. Eleven (11) additional copies of the verified Non-Confidential Complaint, Public Interest Statement, Request for Confidential Treatment and Certification and eleven (11) CD's of the Non-Confidential exhibits for each proposed Respondent. (19 CFR §§ 210.8(a)(l)(iii) and 210.1l(a)(l)(i));

6. Eleven (11) additional DVDs of the Confidential exhibits for each of the proposed Respondents. (19 CFR §§ 210.8(a)(l)(iii));

7. The original certified copies of the prosecution histories of the Asserted Patents and technical references included as Appendices A-D to the Complaint, and four (4)

electronic copies of each on DVDs. (19 CFR §§ 210.12(c)(l) and 19 C.F.R. §§ 210.12(c)(2));

8. Three (3) additional copies of the verified Non-Confidential Complaint and the Public Interest Statement for service upon the Embassy of of Canada to the U.S.A. and the Embassy of France to the U.S.A. (19 CFR §§ 210.8(a)(l)(iv) and 210.1 l(a)(l)(ii)).

Please contact me with any questions regarding this submission. Thank you for your attention to this matter.

Respectfully submitted,

Matthew D. Aichele
Russ, August & Kabat

RUSS AUGUST & KABAT LAWYERS

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maichele@raklaw.com

800 Maine Ave SW
Suite 200
Washington
DC
20004

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October 23, 2019

Via Hand Delivery

The Honorable Lisa R. Barton
U.S. International Trade Commission
500 E Street, S.W., Room 112-F
Washington, DC 20436

Re: *Certain Smart Thermostats, Smart HVAC Systems, and Components Thereof*; Inv. No. 337-TA-____

Dear Secretary Barton:

Pursuant to Commission Rule 201.6, Complainant EcoFactor, Inc. ("EcoFactor") respectfully request confidential treatment of certain confidential business information contained in Confidential Exhibits 12C, 49C, 50C and 59C to the Verified Complaint.

The information in the exhibits for which Complainants seek confidential treatment consists of a confidential list of licensees (Exhibit 12C), a confidential agreement entered into between Complainant and Trane (Exhibit 49C), a confidential agreement entered into between Complainant and Bidgely (Exhibit 50C), and a confidential description of the nature and significance of investments made by Complainant in the domestic industry (Exhibit 59C).

This information qualifies as confidential business information under Commission Rule 201.6 because substantially-identical information is not available to the public, because the disclosure of this information would cause substantial competitive harm to Complainant, and because the disclosure of this information would likely impede the Commission's efforts and ability to obtain similar information in the future.

Thank you for your attention. Please contact me with any questions regarding this request for confidential treatment.

Respectfully submitted,

Matthew D. Aichele
Russ, August & Kabat

THE UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In the Matter of **CERTAIN SMART THERMOSTATS, SMART HVAC SYSTEMS, AND COMPONENTS THEREOF**	**Investigation No. 337-TA-_____**

STATEMENT REGARDING THE PUBLIC INTEREST

Pursuant to Commission Rule 210.8(b), 19 C.F.R. § 210.8(b), Complainant EcoFactor, Inc. ("EcoFactor" or "Complainant") respectfully submits this Statement Regarding the Public Interest. EcoFactor seeks a limited exclusion order excluding from entry into the United States certain smart thermostats. smart HVAC systems, and components thereof that infringe certain claims of United States Patent Nos. 8,131,497 ("'497 patent"); 8,423,322 ("'322 patent"); 8,498,753 ("'753 patent"); and 10,018,371 ("'371 patent") (collectively, the "Asserted Patents"). EcoFactor also seeks permanent cease and desist orders prohibiting the Proposed Respondents, their subsidiaries, parents, related companies, and agents from engaging in the importation, sale for importation, marketing and/or advertising, distribution, offering for sale, sale, use after importation, sale after importation, or other transfer within the United States of certain smart thermostats and components thereof that infringe one or more claims of the Asserted Patents. Exclusion of such products from the United States will not have an adverse effect on the public health and welfare in the United States, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, or United States consumers.

Exclusion of the Proposed Respondents' infringing smart thermostats, smart HVAC systems, and components thereof would not "deprive the public of products necessary for some important health or welfare need." *Spansion, Inc. v. U.S. Int'l Trade Comm'n*, 629 F.3d 1331, 1360

(Fed. Cir. 2010). Further, because EcoFactor's licensees and other companies supply the market for smart thermostats, consumers would not face any shortage of like or competitive products in the United States. As described in the Complaint, EcoFactor's licensees, as well as third parties, supply smart thermostats to the U.S. market. Thus, this Investigation does not present an instance where a compelling public interest would supersede entry of the requested remedial orders.

I. Explanation of How the Articles Potentially Subject to the Remedial Orders Are Used in The United States

The products at issue in this investigation include smart thermostats, smart HVAC systems, and components thereof that are commonly used by consumers in residential and commercial applications. These smart thermostats often allow a consumer or a utility to control a building's heating, ventilation, and air conditioning ("HVAC") systems remotely, and further comprise the ability to operate more efficiently than traditional thermostats.

II. Identification of Any Public Health, Safety, or Welfare Concerns Relating to the Requested Remedial Orders

Issuance of the requested remedial orders would have no adverse effect on the public health, safety, or welfare in the United States. In general, concerns about a negative impact on public health, safety, or welfare have arisen in cases involving pharmaceuticals, essential equipment for medical treatment or implicated key national interests. *See Spansion*, 629 F.3d at 1360. For example, the Commission has previously concluded that access to essential medical equipment used to treat burn victims is a significant public interest consideration because the equipment "provide[s] benefits unavailable from any other device or method of treatment." *Certain Fluidized Supporting Apparatus & Components Thereof*, Inv. No. 337-TA-182/ 188, USITC Pub. 1667, Comm'n Op. at 23-25 (Oct. 1984). None of these concerns are present here. And as discussed further below, the requested remedial orders will not significantly impact the overall market for smart thermostats in the United States.

Accordingly, access to the accused products does not implicate any meaningful public health, safety, or welfare concern. Indeed, the requested relief serves the public interest because, as previously recognized by the Commission, there is a strong public interest in protecting intellectual property rights. *See, e.g.*, *Certain Baseband Processor Chips and Chipsets, Transmitter and Receiver (Radio) Chips, Power Control Chips, and Products Containing Same, Including Cellular Telephone Handsets*, Inv. No. 337-TA-543, Comm'n Op. at 136–37 (June 19, 2007). This strong interest in protecting EcoFactor's intellectual property rights and the domestic industry set forth in the Complaint far outweighs any hypothetical adverse effect on the public.

III. Identification of Like or Directly Competitive Articles That Complainant, Its Licensees, or Third Parties Make Which Could Replace the Subject Article If They Were to Be Excluded

Smart thermostats are already available from multiple sources with which Proposed Respondents compete. EcoFactor's licensees and others adequately supply the market and will continue to do so irrespective of whether the requested remedial orders are issued. Proposed Respondents are a subset of the many suppliers of smart thermostats in the United States market, and Proposed Respondents' products do not contain any unique health or safety-related features. No public interest concerns exist where the market contains an adequate supply of competitive or substitute products for those subject to a remedial order. *See, e.g.*, *Certain Lens Fitted Film Packages*, Inv. No. 337-TA-406, Comm'n Op. at 18 (June 28, 1999). The smart thermostat market is highly competitive, and numerous companies, including EcoFactor's licensees, have the capacity to replace Proposed Respondents' infringing products for the United States market without delay.

IV. Indication of Whether Complainant, Complainant's Licensees, and/or Third Party Suppliers Have the Capacity to Replace the Volume of Articles Subject to the Requested Remedial Orders in a Commercially Reasonable Time

Smart thermostats and components thereof are currently available in the United States including products from EcoFactor's licensees and non-Respondent third parties. EcoFactor's licensees and the non-Respondent third parties have the capacity to increase domestic production of smart thermostats should demand require. In addition, non-infringing smart thermostats will also continue to be available from third-party suppliers. Consequently, consumers would have access to competitive non-infringing products from EcoFactor's licensees and third parties in amounts sufficient to meet the demand should the accused products be excluded from the United States.

V. Statement of How the Requested Remedial Order Would Impact Consumers

Consumers will have available to them in the United States marketplace a wide variety of smart thermostats, including those supplied by EcoFactor's licensees, as well as other competitive non-infringing smart thermostats, if the accused products are excluded from the United States. In view of the availability of commercial alternatives to the accused products, the exclusion of the infringing smart thermostats and components thereof will not negatively impact consumers in the United States. Rather, the requested relief will serve the public interest by enforcing United States intellectual-property rights. Precluding the Proposed Respondents from importing and selling their infringing smart thermostats and components thereof will benefit the public interest by protecting innovators, such as EcoFactor and its licensees, who invest domestically to research and develop new energy-efficient technology. Permitting unlicensed entities like the Proposed Respondents to import and sell infringing smart thermostats, smart HVAC systems and components thereof would not only devalue the licenses EcoFactor granted to other companies but would also undermine

future investment in similar technology. *See Certain Display Controllers and Products Containing Same*, Inv. No. 337-TA-491/481, Comm'n Op. at 66 (Feb. 2005).

Dated: October 22, 2019

Respectfully submitted,

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THE UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In the Matter of	
CERTAIN SMART THERMOSTATS, SMART HVAC SYSTEMS, AND COMPONENTS THEREOF	**Investigation No. 337-TA-_____**

COMPLAINT UNDER SECTION 337 OF THE TARIFF ACT OF 1930, AS AMENDED

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Provo, Utah 84604
Phone: (844) 236-4291

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3	Certified Copy of U.S. Patent No. 8,498,753
4	Certified Copy of U.S. Patent No. 10,018,371
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33	INTENTIONALLY LEFT BLANK
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37	Receipt from Amazon.com showing purchase of *ecobee4 Smart Thermostat with Built-In Alexa, Room Sensor Included* ("ecobee4 Smart Thermostat")
38	Photograph(s) of product and/or packaging of the ecobee4 Smart Thermostat
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D1	Certified copy of the prosecution history of U.S. Patent No. 10,018,371
D2	References cited in the prosecution history of U.S. Patent No. 10,018,371

I. INTRODUCTION

1. This Complaint is filed by Complainant EcoFactor, Inc. ("EcoFactor" or "Complainant") pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("Section 337"), based on the unlawful and unauthorized importation into the United States, the sale for importation into the United States, and/or the sale within the United States after importation, of certain smart thermostats, smart HVAC systems, and components thereof (the "Accused Products") that infringe one or more claims of United States Patent Nos. 8,131,497 ("'497 patent"); 8,423,322 ("'322 patent"); 8,498,753 ("'753 patent"); and 10,018,371 ("'371 patent") (collectively, the "Asserted Patents"). Certified copies of the Asserted Patents are attached as Exhibit Nos. 1-4.

2. Complainant EcoFactor owns all right, title, and interest in each of the Asserted Patents. Certified copies of the recorded assignments of the Asserted Patents are attached as Exhibit Nos. 5-8. Certified copies of the prosecution history for each of the Asserted Patents are attached as App. No. A-D.

3. The proposed Respondents are Ecobee Ltd. and Ecobee, Inc. (collectively, "Ecobee"); Google LLC ("Nest"); Alarm.com Incorporated and Alarm.com Holdings, Inc. (collectively, "Alarm.com"); Daikin Industries, Ltd., Daikin America, Inc., and Daikin North America LLC (collectively, "Daikin"); Schneider Electric USA, Inc. and Schneider Electric SE (collectively, "Schneider"); and Vivint, Inc. ("Vivint") (collectively, the "Proposed Respondents").

4. The Proposed Respondents' Accused Products infringe at least the following claims of one or more Asserted Patents in violation of Section 337(a)(1)(B)(i) and 35 U.S.C. §§ 271(a), (b), and/or (c), either literally or under the doctrine of equivalents:

Table 1		
Asserted Patent	**Asserted Claims**	**Respondents**
U.S. Patent No. 8,131,497	1–12	Ecobee, Nest, Alarm.com, Daikin, Schneider, Vivint
U.S. Patent No. 8,423,322	1–7	Ecobee, Nest, Alarm.com, Daikin, Schneider, Vivint
U.S. Patent No. 8,498,753	1-20	Ecobee, Nest, Alarm.com, Daikin, Schneider, Vivint
U.S. Patent No. 10,018,371	1–24	Ecobee, Nest

5. On information and belief, and as set forth in this Complaint, each of the Proposed Respondents imports into the United States, sells for importation into the United States, and/or sells in the United States after importation Accused Products that directly and/or indirectly infringe the Asserted Patents.

6. As required by 19 U.S.C. §§ 1337(a)(2) and (3), an industry in the United States relating to the articles protected by the Asserted Patents exists. A domestic industry exists as the result of activities and investments in the United States related to products that are protected by the Asserted Patents. These activities include the past, current and ongoing significant and substantial domestic investments in plant and equipment, labor and capital, and research and development of EcoFactor and its licensees.

7. Complainant EcoFactor seeks a permanent limited exclusion order ("LEO") under Section 337(d)(1) that bars from entry into the United States products that infringe any asserted claim of the Asserted Patents that are manufactured, imported, sold for importation into the United States, or sold within the United States after importation by or on behalf of the Proposed Respondents, their subsidiaries, related companies, and agents in violation of Section 337.

8. Complainant EcoFactor also seeks permanent cease-and-desist orders ("CDO") under Section 337(f) against the Proposed Respondents, their affiliates, subsidiaries, successors, or assigns that prohibit the sale, offer for sale, advertising, marketing, packaging, distribution,

maintenance of inventory, or solicitation of any sale of imported Accused Products that infringe the Asserted Patents.

9. Complainant EcoFactor further seeks the imposition of a bond under Section 337(j) that covers the importation, sale, or other transfer of the Accused Products that infringe one or more claims of the Asserted Patents during the 60-day Presidential review period to prevent further injury to EcoFactor's domestic industry resulting from the Proposed Respondents' infringement.

II. THE PARTIES

A. Complainant

10. EcoFactor is a privately held company, having its principal place of business at 441 California Avenue, Number 2, Palo Alto, CA 94301.[1] EcoFactor was founded in 2006 and is headquartered in Palo Alto, California. EcoFactor is a leader in smart home energy management services. EcoFactor delivers smart home energy management services that improve energy efficiency, reduce energy bills and vastly increase demand response efficacy – all while maintaining consumer comfort. EcoFactor's patented big-data analytics and machine learning algorithms collect and process massive amounts of residential data – including home thermodynamics, family comfort preferences and schedules, plus external data such as weather – to continually monitor, adapt and learn for optimum energy savings. The company provides homeowners significant cost savings and energy usage benefits. EcoFactor's award-winning service has been offered through channel partners such as utilities, energy retailers, broadband service providers and HVAC companies.

11. EcoFactor has transformed how homes use energy by applying advanced analytics to connected devices in the home. EcoFactor's platform actively manages thermostats on

[1] Prior to October 2019, EcoFactor's principal place of business was at 1450 Veterans Blvd., Suite 100, Redwood City, CA 94063.

occupants' behalf in intelligent ways that improve comfort while helping them save time, energy and money. Utilities, home service providers and homeowners rely on EcoFactor for demand response, energy efficiency, and HVAC performance monitoring services.

12. The HVAC industry and researchers in the field recognize the technological and commercial impact of EcoFactor's patented technologies and innovations. For example, EcoFactor's demand response solution has been recognized multiple times from the Association of Energy Services Professionals (AESP) for outstanding achievement in pricing and demand response. Ex. 9. EcoFactor was also named "Innovator of the Year" by San Mateo County Economic Development Association for EcoFactor's automated approach to energy efficiency and demand response services, and has also been named Owler HOT in Redwood City, CA. Exs. 10, 60. Moreover, EcoFactor received Powergrid International's Demand Response/Energy Efficiency Project of the Year award, Ex. 11, and was assessed as one of the top innovators with some of the most commercially important smart home patents.

13. The patented innovations at issue in this action were invented by EcoFactor engineers and researchers. EcoFactor has played a significant role in the development and advancement of such improvements to energy management technology—and the domestic market for them. EcoFactor has expended tens of millions of dollars of research and development and technical services and support in the United States. In recent years, an explosion of imported products, which infringe EcoFactor's innovative Asserted Patents has significantly eroded EcoFactor's market standing for the domestic industry products, and that of its licensees, that practice the Asserted Patents. EcoFactor, by this Complaint, seeks to prohibit and remedy these unfair and unlawful acts.

B. Proposed Respondents

1. Ecobee

14. Ecobee Ltd. is a Nevada limited company with its principal place of business at 334 Adelaide St. W, Toronto, ON M5V 0M1, Canada. Ecobee, Inc. is a Canadian corporation with its principal place of business at 207 Queens Quay West, Suite 600, Toronto, ON M5J 1A7, Canada.

15. Ecobee, Ltd. designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.[2]

16. Ecobee, Inc. designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

2. Nest

17. Google LLC is a wholly-owned subsidiary of Alphabet, Inc, and a Delaware limited liability company with a principal place of business at 1600 Amphitheatre Parkway, Mountain View, California 94043. Google LLC operates a division named Google Nest ("Nest") which, on information and belief, is the relevant division with respect to the Accused Products

18. Nest designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

[2] All factual assertions throughout this Complaint, if not accompanied by a citation to an exhibit, are on information and belief.

3. Alarm.com

19. Alarm.com Incorporated and Alarm.com Holdings, Inc. are both Delaware corporations with their principal place of business at 8281 Greensboro Drive, Suite 100, Tysons, VA 22102.

20. Alarm.com Incorporated designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are then sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

21. Alarm.com Holdings, Inc. designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are then sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

4. Daikin

22. Daikin Industries, Ltd. is a Japanese company with its principal place of business at Umeda Center Bldg., 2-4-12, Nakazaki-Nishi, Kita-ku, Osaka 530-8323, Japan.

23. Daikin America, Inc., a wholly owned subsidiary of Daikin Industries, Ltd., is a Delaware corporation with its principal place of business at 20 Olympic Drive, Orangeburg, New York 10962.

24. Daikin North America LLC, a wholly owned subsidiary of Daikin Industries, Ltd., is a Delaware limited liability company with its principal place of business at 5151 San Felipe, Suite 500, Houston, TX 77056.

25. Daikin Industries, Ltd. designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are then sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

26. Daikin America, Inc., imports into the United States and/or sells within the United States after importation the Accused Products.

27. Daikin North America LLC imports into the United States and/or sells within the United States after importation the Accused Products.

5. Schneider

28. Schneider Electric USA, Inc. is a Delaware corporation with its principal place of business at 800 Federal Street, Andover, MA, USA 01810. Schneider Electric SE is a French company with its principal place of business at 35 Rue Joseph Monier - CS 30323, F-92506 Rueil-Malmaison Cedex (France).

29. Schneider Electric SE designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

30. Schneider Electric USA, Inc. imports into the United States and/or sells within the United States after importation the Accused Products.

6. Vivint

31. Vivint, Inc. ("Vivint") is a Utah corporation with its principal place of business at 4931 North 300 West, Provo, Utah 84604.

32. Vivint designs and manufactures and/or has manufactured on its behalf abroad the Accused Products that are sold for importation into the United States, imported into the United States, and/or sold within the United States after importation.

III. THE TECHNOLOGY AND PRODUCTS AT ISSUE

33. Pursuant to 19 C.F.R. §§ 210.10(b)(1) and 210.12(a)(12), the categories of products accused of infringing one or more of the Asserted Patents are smart thermostats, smart HVAC (Heating, Ventilation, and Air Conditioning) systems, and components thereof. Proposed Respondents infringe the Asserted Patents through the sale for importation into the United States, importation into the United States, and/or sale within the United States after importation of such

Accused Products. Section IV identifies the Asserted Patents in detail, along with a further description of the technology covered by each. Exemplary identifications of such infringing products are provided in Section V.

IV. THE ASSERTED PATENTS[3]

34. The Asserted Patents relate to heating, ventilation and cooling ("HVAC") systems and smart thermostats that intelligently control HVAC systems in buildings and homes. All four Asserted Patents have John Douglas Steinberg and Scott Douglas Hublou as co-inventors, and two of the four Asserted Patents additionally have Leo Cheung as additional co-inventor. Two of the four Asserted Patents (the '497 patent and the '322 patent) claims priority to the same provisional patent application and share substantially similar specifications.

35. The identification, ownership, non-technical description, foreign counterparts, and licensees for each Asserted Patent are identified below.

A. U.S. Patent No. 8,131,497

1. Identification of the Patent and Ownership

36. The '497 patent, titled "system and method for calculating the thermal mass of a building," issued on March 6, 2012. Ex. 1 (the "'497 patent"). Inventors of the '497 patent are John Douglas Steinberg and Scott Douglas Hublou. The '497 patent is based on U.S. Pat. App. No. 12/959,225 filed on December 2, 2010, which is a continuation of App. No. 12/211,733 filed on Sept. 16, 2008. The '497 patent also claims priority to Provisional App. No. 60/994,011, filed on Sept. 17, 2007. The '322 patent and the '497 patent claims priority to the same Provisional Application, and the '322 patent and the '497 patent have substantially similar specifications.

[3] The descriptions and any other non-technical descriptions of the Asserted Patents within this Complaint are for illustrative purposes only. Nothing in this Complaint is intended to express, either implicitly or explicitly, any position regarding the proper construction or scope of any claim of any of the Asserted Patents

37. A certified copy of the '497 patent is attached as Exhibit 1. Pursuant to Commission Rule 210.12(c)(1), this Complaint is filed with four certified copies of the prosecution history of the '497 patent as Appendix A1. Pursuant to Commission Rule 210.12(c)(2), this Complaint is also filed with four copies of each technical reference identified in the prosecution history of the '497 patent as Appendix A2.

38. The expiration date of the '497 patent is Sept. 16, 2028.

39. EcoFactor owns by assignment all rights, title, and interest in the '497 patent. Exs. 5-7.

2. Nontechnical Description of the Patent

40. The '497 patent relates to a smart HVAC control system that is configured to calculate rates of change in temperature in one location (e.g., a house) during which HVAC system is "on" and also during which the HVAC system is "off." The system is further configured to relate the calculated rates of change to outside temperature measurements. The patented invention comprises innovative improvements to existing automated smart thermostats and solved technological problems in existing smart thermostats and computer networks/systems pertaining to HVAC systems. The claimed combinations (including, e.g., at least the system configured to calculate rates of change in temperature in one location (e.g., a house) during which HVAC system is "on" and also during which the HVAC system is "off," and to relate the calculated rates of change to outside temperature measurements) comprise innovative technological solutions. Indeed, the '497 patent overcame numerous references, including at least 90 references cited during prosecution of the '497 patent. Moreover, approximately 74 later patents and patent applications cite to the '497 patent, including patents and patent applications of a number of companies that develop smart thermostats (including, e.g., Nest) who tried to solve similar

technological problems but only recognized those technological problems and technological solutions after EcoFactor.

3. Foreign Counterparts of the Patent

41. Pursuant to Commission Rule 210.12(a)(9)(v), there are no other foreign patents issued or foreign patent applications pending, filed, abandoned, withdrawn, or rejected corresponding to the '497 patent.

4. Licensees

42. Pursuant to Commission Rule 210.12(a)(9)(iii), all licensees to the '497 patent are identified in Confidential Exhibit 12C. There are no other known licenses relating to the '497 patent.

B. U.S. Patent No. 8,423,322

1. Identification of the Patent and Ownership

43. The '322 patent, titled "system and method for evaluating changes in the efficiency of an HVAC system," issued on April 16, 2013. Ex. 2 ('322 patent). Inventors of the '322 patent are John Douglas Steinberg and Scott Douglas Hublou. The '322 patent is based on U.S. Pat. App. No. 13/230,610 filed on Sept. 12, 2011, which is a continuation of App. No. 12/211,690 filed on Sept. 16, 2008. The '322 patent also claims priority to Provisional App. No. 60/994,011, filed on Sept. 17, 2007. The '322 patent and the '497 patent claims priority to the same Provisional Application, and the '322 patent and the '497 patent have substantially similar specifications.

44. A certified copy of the '322 patent is attached as Exhibit 2. Pursuant to Commission Rule 210.12(c)(1), this Complaint is filed with four certified copies of the prosecution history of the '322 patent as Appendix B. Pursuant to Commission Rule 210.12(c)(2), this Complaint is also filed with four copies of each technical reference identified in the prosecution history of the '322 patent as Appendix F.

45. The expiration date of the '322 patent is Sept. 16, 2028.

46. EcoFactor owns by assignment all rights, title, and interest in the '322 patent. Ex. 2, Appx B1.

2. Nontechnical Description of the Patent

47. The '322 patent relates to a smart HVAC control system that is configured to compare the inside temperature of a structure and the outside temperature over time, and to compare the inside temperatures recorded at multiple different times to determine whether operational efficiency of the HVAC system has decreased over time. The patented invention comprises innovative improvements to existing automated smart thermostats and solved technological problems in existing smart thermostats and computer networks/systems pertaining to HVAC systems. The claimed combinations (including, e.g., at least the system configured to compare the inside temperature of a structure and the outside temperature over time, and to compare the inside temperatures recorded at multiple different times to determine whether operational efficiency of the HVAC system has decreased over time) comprise innovative technological solutions. Indeed, the '322 patent overcame numerous references, including at least 131 references cited during prosecution of the '322 patent. Moreover, approximately 16 later patents and patent applications cite to the '322 patent, including patents and patent applications of a number of companies that develop smart thermostats (including, e.g., Nest) who tried to solve similar technological problems but only recognized those technological problems and technological solutions after EcoFactor.

3. Foreign Counterparts of the Patent

48. Pursuant to Commission Rule 210.12(a)(9)(v), there are no other foreign patents issued or foreign patent applications pending, filed, abandoned, withdrawn, or rejected corresponding to the '322 patent.

4. Licensees

49. Pursuant to Commission Rule 210.12(a)(9)(iii), all licensees to the '322 patent are identified in Confidential Exhibit 12C. There are no other known licenses relating to the '322 patent.

C. U.S. Patent No. 8,498,753

1. Identification of the Patent and Ownership

50. The '753 patent, titled "system, method and apparatus for just-in-time conditioning using a thermostat," issued on July 30, 2013. Ex. 3 ('753 patent). Inventors of the '753 patent are John Douglas Steinberg, Scott Douglas Hublou, and Leo Cheung. The '753 patent is based on U.S. Pat. App. No. 12/773,690 filed on May 4, 2010. The '753 patent claims priority to Provisional App. No. 60/215,657, filed on May 8, 2009.

51. A certified copy of the '753 patent is attached as Exhibit 3. Pursuant to Commission Rule 210.12(c)(1), this Complaint is filed with four certified copies of the prosecution history of the '753 patent as Appendix C. Pursuant to Commission Rule 210.12(c)(2), this Complaint is also filed with four copies of each technical reference identified in the prosecution history of the '753 patent as Appendix G.

52. The expiration date of the '753 patent is August 5, 2030.

53. EcoFactor owns by assignment all rights, title, and interest in the '753 patent. Exs. 6-8.

2. Nontechnical Description of the Patent

54. The '753 patent relates to a smart climate control system that is configured to determine thermal performance values of a structure by correlating historic internal and external temperatures occurring at multiple different times, and to determine time at which the climate control system should turn on, as well as to calculate a plurality of intermediate setpoints and

setpoint target times, based at least in part on the thermal performance values of the structure, performance characteristics of the climate control system, the internal temperature, the external temperature, and a forecasted temperature. The patented invention comprise innovative improvements to existing automated smart thermostats, and solved technological problems in existing smart thermostats and computer networks / systems pertaining to HVAC systems. The claimed combinations (including, e.g., at least the system configured to determine thermal performance values of a structure by correlating historic internal and external temperatures occurring at multiple different times, and to determine time at which the climate control system should turn on, as well as to calculate a plurality of intermediate setpoints and setpoint target times, based at least in part on the thermal performance values of the structure, performance characteristics of the climate control system, the internal temperature, the external temperature, and a forecasted temperature) comprise innovative technological solutions. Indeed, the '753 patent overcame numerous references, including at least 133 references cited during prosecution of the '753 patent. Moreover, approximately 22 later patents and patent applications cite to the '753 patent, including patents and patent applications of a number of companies that develop smart thermostats (including, e.g., Nest) who tried to solve similar technological problems but only recognized those technological problems and technological solutions after EcoFactor.

3. Foreign Counterparts of the Patent

55. Pursuant to Commission Rule 210.12(a)(9)(v), there are no other foreign patents issued or foreign patent applications pending, filed, abandoned, withdrawn, or rejected corresponding to the '753 patent.

4. Licensees

56. Pursuant to Commission Rule 210.12(a)(9)(iii), all licensees to the '753 patent are identified in Confidential Exhibit 12C. There are no other known licenses relating to the '753 patent.

D. U.S. Patent No. 10,018,371

1. Identification of the Patent and Ownership

57. The '371 patent, titled "system, method and apparatus for identifying manual inputs to and adaptive programming of a thermostat," issued on July 10, 2018. Ex. 4 ('371 patent). Inventors of the '371 patent are John Douglas Steinberg, Scott Douglas Hublou, and Leo Cheung. The '371 patent is based on U.S. Pat. App. No. 14/878,872 filed on Oct. 8, 2015, which is a continuation of Pat. No. 9,194,597, which is a continuation of Pat. No. 8,596,550. The '371 patent also claims priority to Provisional App. No. 61/215,999, filed on May 12, 2009.

58. A certified copy of the '371 patent is attached as Exhibit 4. Pursuant to Commission Rule 210.12(c)(1), this Complaint is filed with four certified copies of the prosecution history of the '371 patent as Appendix D. Pursuant to Commission Rule 210.12(c)(2), this Complaint is also filed with four copies of each technical reference identified in the prosecution history of the '371 patent as Appendix H.

59. The expiration date of the '371 patent is May 11, 2030.

60. EcoFactor owns by assignment all rights, title, and interest in the '371 patent. Ex. 4, Appx D1.

2. Nontechnical Description of the Patent

61. The '371 patent relates to a smart thermostatic control system that is configured to calculate an automated setpoint at a particular time, to generate a difference value based on comparing the actual setpoint to the automated setpoint, and to detect and log a manual change to

the automated setpoint. The patented invention comprise innovative improvements to existing automated smart thermostats, and solved technological problems in existing smart thermostats and computer networks / systems pertaining to HVAC systems. The claimed combinations (including, e.g., at least the system configured to calculate an automated setpoint at a particular time, to generate a difference value based on comparing the actual setpoint to the automated setpoint, and to detect and log a manual change to the automated setpoint) comprise innovative technological solutions. Indeed, the '371 patent overcame numerous references, including at least 241 references cited during prosecution of the '371 patent.

3. Foreign Counterparts of the Patent

62. Pursuant to Commission Rule 210.12(a)(9)(v), there are no other foreign patents issued or foreign patent applications pending, filed, abandoned, withdrawn, or rejected corresponding to the '371 patent.

4. Licensees

63. Pursuant to Commission Rule 210.12(a)(9)(iii), all licensees to the '371 patent are identified in Confidential Exhibit 12C. There are no other known licenses relating to the '371 patent.

V. UNLAWFUL AND UNFAIR ACTS OF THE PROPOSED RESPONDENTS

64. The Proposed Respondents have engaged in unfair trade practices, including the sale for importation, importation, and/or sale after importation of certain smart thermostats, smart HVAC systems, and components thereof, that infringe the asserted claims of the Asserted Patents. These activities by the Proposed Respondents constitute a violation of Section 337.

65. EcoFactor asserts that Proposed Respondents directly infringe, literally or under the doctrine of equivalents, actively induce the infringement of, and/or contributorily infringe one or

more asserted claims of the Asserted Patents. Table 1 above identifies the claims asserted against each Proposed Respondent.

66. The infringement allegations contained in this Complaint include the Proposed Respondents' (i) direct infringement of the asserted claims (literally and/or under the doctrine of equivalents); (ii) contributory infringement by knowingly selling products or components thereof without substantial noninfringing uses that are the same or especially made or especially adapted for use in an infringement of the asserted claims; and/or (iii) infringement by inducement by exhibiting an affirmative intent to cause direct infringement of the asserted claims.

67. The Proposed Respondents have been given notice of their infringement by, among other things, the filing and service of this Complaint.

68. The Proposed Respondents have induced, and continue to induce, others to infringe the asserted claims. The Proposed Respondents have taken active steps to encourage and facilitate direct infringement by others, such as sellers, distributors, and users of the Accused Products, with knowledge that infringement, such as by contracting for the distribution of the Accused Products, by marketing the Accused Products, and by creating and/or distributing user manuals, white papers, datasheets, marketing materials, and/or similar materials with instructions on using the Accused Products. The use of the Accused Products in their ordinary and customary fashion results in infringement of the asserted claims. *See* Exhibits 13-32.

69. The Proposed Respondents have contributorily infringed, and continue to contributorily infringe, the asserted claims. The Proposed Respondents have sold for importation into the United States, offered for sale within the United States, and/or imported into the United States Accused Products that embody a material part of the claimed inventions, that are known by Proposed Respondents to be specially made or specially adapted for use in an infringing manner

and that are not staple articles or commodities suitable for substantial noninfringing use. *See* Exhibits 13-36.

70. In lieu of providing physical samples of the numerous, generally available, and prevalent devices, Complainants provide charts comparing claims of the Asserted Patents to exemplary products and photographs of the exemplary infringing devices and services. Complainants assert that the Accused Products infringe the claims set forth in Table 1. Discovery may reveal that the Accused Products infringe additional claims of the Asserted Patents.

A. Ecobee

71. The Ecobee Accused Products include Ecobee's smart thermostats (e.g., ecobee3, ecobee3 lite, ecobee4, Ecobee SmartThermostat).

1. Infringement of the '322 Patent

72. Exhibit 13 includes a chart comparing independent claim 1 of the '322 patent to the Ecobee Accused Products. Exhibit 13 shows that the Ecobee Accused Products practices at least these claims.

2. Infringement of the '497 Patent

73. Exhibit 14 includes a chart comparing independent claims 1 and 7 of the '497 patent to the Ecobee Accused Products. Exhibit 14 shows that the Ecobee Accused Products practices at least these claims.

3. Infringement of the '753 Patent

74. Exhibit 15 includes a chart comparing independent claims 1, 9, and 15 of the '753 patent to the Ecobee Accused Products. Exhibit 15 shows that the Ecobee Accused Products practices at least these claims.

4. Infringement of the '371 Patent

75. Exhibit 16 includes a chart comparing independent claims 1, 9, and 17 of the '371 patent to the Ecobee Accused Products. Exhibit 16 shows that the Ecobee Accused Products practices at least these claims.

B. Nest

76. The Nest Accused Products include Nest's smart thermostats (e.g., Nest Learning Thermostat).

1. Infringement of the '322 Patent

77. Exhibit 17 includes a chart comparing independent claim 1 of the '322 patent to the Nest Accused Products. Exhibit 17 shows that the Nest Accused Products practices at least these claims.

2. Infringement of the '497 Patent

78. Exhibit 18 includes a chart comparing independent claims 1 and 7 of the '497 patent to the Nest Accused Products. Exhibit 18 shows that the Nest Accused Products practices at least these claims.

3. Infringement of the '753 Patent

79. Exhibit 19 includes a chart comparing independent claims 1, 9, and 15 of the '753 patent to the Nest Accused Products. Exhibit 19 shows that the Nest Accused Products practices at least these claims.

4. Infringement of the '371 Patent

80. Exhibit 20 includes a chart comparing independent claims 1, 9, and 17 of the '371 patent to the Nest Accused Products. Exhibit 20 shows that the Nest Accused Products practices at least these claims.

C. Alarm.com

81. The Alarm.com Accused Products include Alarm.com's smart thermostats (e.g., ADC-T2000, T3000).

1. Infringement of the '322 Patent

82. Exhibit 21 includes a chart comparing independent claim 1 of the '322 patent to the Alarm.com Accused Products. Exhibit 21 shows that the Alarm.com Accused Products practices at least these claims.

2. Infringement of the '497 Patent

83. Exhibit 22 includes a chart comparing independent claims 1 and 7 of the '497 patent to the Alarm.com Accused Products. Exhibit 22 shows that the Alarm.com Accused Products practices at least these claims.

3. Infringement of the '753 Patent

84. Exhibit 23 includes a chart comparing independent claims 1, 9, and 15 of the '753 patent to the Alarm.com Accused Products. Exhibit 23 shows that the Alarm.com Accused Products practices at least these claims.

D. Daikin

85. The Daikin Accused Products include Daikin's smart thermostats (e.g., ComfortNet Thermostats, CTK04 Thermostat, Daikin One+, Daikin ENVi Thermostat, Daikin Comfort Control Application).

1. Infringement of the '322 Patent

86. Exhibit 24 includes a chart comparing independent claim 1 of the '322 patent to the Daikin Accused Products. Exhibit 24 shows that the Daikin Accused Products practices at least these claims.

2. Infringement of the '497 Patent

87. Exhibit 25 includes a chart comparing independent claims 1 and 7 of the '497 patent to the Daikin Accused Products. Exhibit 25 shows that the Daikin Accused Products practices at least these claims.

3. Infringement of the '753 Patent

88. Exhibit 26 includes a chart comparing independent claims 1, 9, and 15 of the '753 patent to the Daikin Accused Products. Exhibit 26 shows that the Daikin Accused Products practices at least these claims.

E. Schneider

89. The Schneider Accused Products include Schneider's smart thermostats (e.g., Wiser Air Smart Thermostat).

1. Infringement of the '322 Patent

90. Exhibit 27 includes a chart comparing independent claim 1 of the '322 patent to the Schneider Accused Products. Exhibit 27 shows that the Schneider Accused Products practices at least these claims.

2. Infringement of the '497 Patent

91. Exhibit 28 includes a chart comparing independent claims 1 and 7 of the '497 patent to the Schneider Accused Products. Exhibit 28 shows that the Schneider Accused Products practices at least these claims.

3. Infringement of the '753 Patent

92. Exhibit 29 includes a chart comparing independent claims 1, 9, and 15 of the '753 patent to the Schneider Accused Products. Exhibit 29 shows that the Schneider Accused Products practices at least these claims.

F. Vivint

93. The Vivint Accused Products include Vivint's smart thermostats (e.g., Vivint Element, CT200, CT100, SkyControl).

1. Infringement of the '322 Patent

94. Exhibit 30 includes a chart comparing independent claim 1 of the '322 patent to the Vivint Accused Products. Exhibit 30 shows that the Vivint Accused Products practices at least these claims.

2. Infringement of the '497 Patent

95. Exhibit 31 includes a chart comparing independent claims 1 and 7 of the '497 patent to the Vivint Accused Products. Exhibit 31 shows that the Vivint Accused Products practices at least these claims.

3. Infringement of the '753 Patent

96. Exhibit 32 includes a chart comparing independent claims 1, 9, and 15 of the '753 patent to the Vivint Accused Products. Exhibit 32 shows that the Vivint Accused Products practices at least these claims.

VI. SPECIFIC INSTANCES OF IMPORTATION

97. The unfair acts of the Proposed Respondents involve the design, manufacture, importation into the United States, sale for importation into the United States, and/or sale within the United States after importation, of certain smart thermostats, smart HVAC systems, and components thereof, including, without limitation, the Accused Products.

A. Ecobee

98. The Ecobee Accused Products are manufactured outside of the United States and sold for importation into the United States, imported into the United States, and/or sold within the United States after importation. For example, Exhibit 37 is a receipt from Amazon.com showing

the purchase of an ecobee4 Smart Thermostat for delivery to an address in the United States. Exhibit 38 contains photograph(s) of the product and/or product packaging, delivered to an address in the United States, indicating that China is the country of origin and that the product was imported into the United States.

B. Nest

99. The Nest Accused Products are manufactured outside of the United States and sold for importation into the United States, imported into the United States, and/or sold within the United States after importation. For example, Exhibit 39 is a receipt from Amazon.com showing the purchase of a Nest Learning Thermostat for delivery to an address in the United States. Exhibit 40 contains photograph(s) of the product and/or product packaging, delivered to an address in the United States, indicating that China is the country of origin and that the product was imported into the United States.

C. Schneider

100. The Schneider Accused Products are manufactured outside of the United States and sold for importation into the United States, imported into the United States, and/or sold within the United States after importation. For example, Exhibit 41 is a receipt from Amazon.com showing the purchase of a Schneider Wiser Air Smart Thermostat for delivery to an address in the United States. Exhibit 42 contains photograph(s) of the product and/or product packaging, delivered to an address in the United States, indicating that Mexico is the country of origin and that the product was imported into the United States.

D. Vivint

101. The Vivint Accused Products are manufactured outside of the United States and sold for importation into the United States, imported into the United States, and/or sold within the United States after importation. For example, Exhibit 43 is a receipt from Amazon.com showing

the purchase of a Vivint Element for delivery to an address in the United States. Exhibit 44 contains photograph(s) of the product and/or product packaging, delivered to an address in the United States, indicating that China is the country of origin and that the product was imported into the United States.

E. Alarm.com

102. The Alarm.com Accused Products are manufactured outside of the United States and sold for importation into the United States, imported into the United States, and/or sold within the United States after importation. For example, Exhibit 45 is a receipt from Amazon.com showing the purchase of an Alarm Smart Thermostat for delivery to an address in the United States. Exhibit 46 contains photograph(s) of the product and/or product packaging, delivered to an address in the United States, indicating that China is the country of origin and that the product was imported into the United States.

F. Daikin

103. The Daikin Accused Products are manufactured outside of the United States and sold for importation into the United States, imported into the United States, and/or sold within the United States after importation. For example, Exhibit 47 is a receipt from Bonanaza.com showing the purchase of a Daikin DACA-TS1-1 ENVi Intelligent Thermostat for delivery to an address in the United States. Exhibit 48 contains photograph(s) of the product and/or product packaging, delivered to an address in the United States, indicating that China is the country of origin and that the product was imported into the United States.

VII. CLASSIFICATION OF THE ACCUSED PRODUCTS UNDER THE HARMONIZED TARIFF SCHEDULE

104. The Accused Products are classified under at least the following subheadings of the Harmonized Tariff Schedule of the United States: 9032.10.00, 9032.20.00, and 9032.89.60

(thermostats). These classifications are exemplary in nature and not intended to restrict the scope of any exclusion order or other remedy ordered by the Commission.

VIII. RELATED LITIGATION

105. The unfair methods of competition and unfair acts contained in this Complaint, and the subject matter thereof, are not and have not been the subject of any current or prior court or agency litigation.

IX. DOMESTIC INDUSTRY

106. A domestic industry exists under Section 337(a)(2) and 337(a)(3). In particular, a domestic industry exists as a result of EcoFactor's significant investment in plant and equipment significant employment of labor and capital and substantial investment in engineering and research and development with respect to EcoFactor's energy platform ("EcoFactor Platform") that practices and is protected by the Asserted Patents. 19 U.S.C. § 1337(a)(3)(A)-(C).

107. A domestic industry as defined by Section 337(a) further exists in the United States as a result of the significant and substantial domestic investments in plant and equipment, labor and capital and engineering, research and development of EcoFactor's licensees Trane Inc. ("Trane") and Bidgely, Inc. ("Bidgely") both of whose products also practice at least one claim of each of the Asserted Patents.

108. Pursuant to Commission Rule 210.12(a)(9)(iv), Complainant has attached as Confidential Exhibit 49 a copy of the Trane Agreement. The Trane Agreement did not involve the purchase or sale of EcoFactor's patents. *See* Ex. 49 at § 2.2. Pursuant to Commission Rule 210.12(a)(9)(iv), Complainant has also attached as Confidential Exhibit 50 a copy of the Bidgely Collaboration Agreement.

A. EcoFactor and Bidgely

1. Technical Prong

109. EcoFactor makes significant and substantial investments in plant and equipment, labor and capital, and engineering and research and development with respect to products that practice one or more claims of each of the Asserted Patents (the "EcoFactor Products"), including the EcoFactor Platform. EcoFactor has entered into a partnership and licensing agreement with Bidgely to continue servicing and supporting the EcoFactor Products and the EcoFactor Platform.

110. Exhibits 51-54 are claim charts demonstrating that the EcoFactor Products practice at least one claim of the '497 patent, one claim of the '322 patent, one claim of the '753 patent, and one claim of the '371 patent.

2. Economic Prong

111. EcoFactor has in the United States, with respect to the EcoFactor Products, millions of dollars in investments in plant and equipment, significant employment of labor and capital, and substantial investments in exploitation of the Asserted Patents, including in research and development. These investments and employment are all with respect to protected products and the Asserted Patents. Confidential Exhibit 59 is a declaration from EcoFactor's Chief Executive Officer, Shayan Habib, detailing EcoFactor's significant and substantial activities, investments, and employment with respect to the Asserted Patents.

112. EcoFactor is the assignee of the Asserted Patents. Exs. 1-8, Appxs. A1, B1, C1, and D1. EcoFactor designs, develops, manufactures, sells, and supports products, within the United States, that are protected by at least one claim of each of the Asserted Patents.

113. EcoFactor was founded in 2006 and is headquartered in Redwood City, California. EcoFactor is a leader in smart home energy management services. EcoFactor delivers smart home energy management services that improve energy efficiency, reduce energy bills and vastly

increase demand response efficacy – all while maintaining consumer comfort. EcoFactor's patented big-data analytics and machine learning algorithms collect and process massive amounts of residential data – including home thermodynamics, family comfort preferences and schedules, plus external data such as weather – to continually monitor, adapt and learn for optimum energy savings. The company provides homeowners significant cost savings automatically. EcoFactor's award-winning service has been offered through channel partners such as utilities, energy retailers, broadband service providers and HVAC companies.

114. EcoFactor has transformed how homes use energy by applying advanced analytics to connected devices in the home. EcoFactor's platform actively manages thermostats on occupants' behalf in intelligent ways that improve comfort while helping them save time, energy and money. Utilities, home service providers and homeowners rely on EcoFactor for demand response, energy efficiency, and HVAC performance monitoring services.

115. EcoFactor has invested and continues to make significant investments in domestic labor and capital relating to the EcoFactor Product, including through its strategic partnership with Bidgely. Details relating to EcoFactor's domestic expenditures on labor and capital are set forth in Confidential Exhibit 59.

116. EcoFactor has also invested and continues to make significant investments in domestic plant and equipment relating to the EcoFactor Product, including through its strategic partnership with Bidgely. Details relating to EcoFactor's domestic expenditures on plant and equipment are set forth in Confidential Exhibit 59.

117. EcoFactor has also invested and continues to make substantial investments in engineering and research and development relating to the EcoFactor Product and the Asserted Patents, including through its strategic partnership with Bidgely. Details relating to EcoFactor's

domestic expenditures on engineering and research and development are set forth in Confidential Exhibit 59.

118.

B. Trane

1. Technical Prong

119. On information and belief, Trane makes significant and substantial investments in plant and equipment, labor and capital, and engineering and research and development with respect to products that practice one or more claims of each of the Asserted Patents (the "Trane Products"), including the Trane XL824 Connected Control.

120. Exhibits 55-58 are claim charts demonstrating that the Trane Products practice at least one claim of the '497 patent, one claim of the '322 patent, one claim of the '753 patent, and one claim of the '371 patent.

2. Economic Prong

121. Complainant EcoFactor has licensed the Asserted Patents to Trane for use in the manufacture, research and development, and engineering of covered products.

122. Trane was founded in 1885 as a family plumbing business in La Crosse, Wisconsin. Joined by his son Reuben, a mechanical engineer, James Trane developed an innovative low-pressure steam heating system. By 1913, the family had incorporated as The Trane Company. Over the next hundred years, Trane established its position as a pioneer in climate control. In 1931, the company patented its first air conditioner. Seven years later, Trane launched Turbovac, a new type of water chiller that fundamentally altered the industry's approach to large-building air conditioning systems. These early innovations paved the way for Trane's industry-leading commercial air conditioner, CenTraVac— the highest efficiency, lowest emissions, most reliable chiller on the market. Throughout the second half of the Twentieth century, Trane

expanded its offerings to customers. With the acquisition of Sentinel Electronics in the late 1970s, and General Electric's Central Air Conditioning Division in 1982, Trane expanded both its residential and energy management offerings. In 1984, American Standard Companies, Inc., acquired the Trane Company, and four years later, launched the American Standard Heating & Air Conditioning Brand. In 2007, American Standard Companies divided, allowing Trane to renew its business focus and leadership in integrated HVAC services and solutions.

123. Furthering its transformation into a multi-brand commercial manufacturer that serves customers in diverse markets, Ingersoll Rand acquired Trane in June 2008. Trane is now a world leader in air conditioning systems, services and solutions, and it controls the comfort of the air for people in homes and many of the world's largest and most famous commercial, industrial and institutional buildings.

124. On information and belief, Trane engages in significant manufacturing, engineering, and research and development activities in the United States with respect to the Asserted Patents and products protected by the Asserted Patents. Moreover, Trane has made substantial investment in engineering and research and development with respect to exploiting the Asserted Patents considering the industry in general, Trane's relative size, and the relative importance of Trane's domestic operation.

125. On information and belief, a domestic industry as defined by 19 U.S.C. § l337(a)(3)(A) exists in the United States with respect to the articles protected by the Asserted Patents via Trane's significant investment in plant and equipment. On information and belief, Trane invests significant sums in domestic plant and equipment and labor and capital relating to the Trane Domestic Industry Products.

126. Specifically, Trane operates a number of manufacturing locations in the United States, including in Charlotte, North Carolina; Clarksville, Tennessee; Columbia, South Carolina;

Forsyth, Georgia; Fort Smith, Arkansas; La Crosse, Wisconsin; Lynn Haven, Florida; Macon, Georgia; Pueblo, Colorado; Rockingham, North Carolina; Rushville, Indiana; Springhill, Louisiana; St. Paul, Minnesota; Waco, Texas; Trenton, New Jersey; Tyler, Texas; and Vidalia, Georgia.

127. On information and belief, a domestic industry as defined by 19 U.S.C. § 1337(a)(3)(B) exists in the United States with respect to the articles protected by the Asserted Patents via Trane's significant employment of labor and/or capital. On information and belief, Trane invests significant sums in domestic labor and capital relating to the Trane Domestic Industry Products at its many domestic manufacturing facilities, set forth above.

128. On information and belief, a domestic industry as defined by 19 U.S.C. § 1337(a)(3)(C) exists in the United States with respect to the articles protected by the Asserted Patents via Trane's substantial investment in its engineering, research, and development directed to the Domestic Industry Products and services and the Asserted Patents for the reasons stated above.

X. RELIEF REQUESTED

129. The Proposed Respondents have infringed and will continue to infringe the Asserted Patents as specified in Sections V and VI above, unless the Commission prohibits the importation into and sale within the United States after importation of the Accused Products.

130. Accordingly, EcoFactor respectfully requests that the United States International Trade Commission:

a) institute an investigation pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337, into Proposed Respondents' violations of Section 337 arising from the sale for importation into the United States, importation, and/or sale within the United States

after importation of certain smart thermostats, smart HVAC systems, and components thereof that infringe the Asserted Patents;

b) schedule and conduct a hearing, pursuant to Section 337(c), for purposes of receiving evidence and hearing argument concerning whether Proposed Respondents have violated Section 337 and, following the hearing, determine that Proposed Respondents have violated Section 337;

c) issue a permanent limited exclusion order, pursuant to Section 337(d) and (f)(1), specifically directed to each named Respondent and each of their respective subsidiaries and affiliates, excluding from entry into the United States all Accused Products that infringe one or more claims of the Asserted Patents;

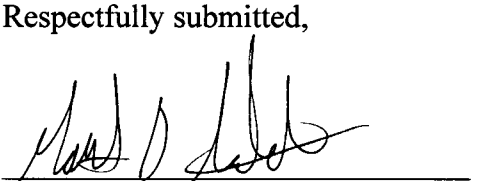
d) issue permanent cease and desist orders, pursuant to Section 337(f), directing Proposed Respondents to cease and desist from importing, selling, selling for importation, offering for sale, using, demonstrating, promoting, marketing, and/or advertising in the United States Proposed Respondents' smart thermostats, smart HVAC systems, and components thereof that infringe one or more claims of the Asserted Patents,;

e) impose a bond on importation and sales of infringing products during the 60-day Presidential review period pursuant to 19 U.S.C. § 1337(j); and

f) grant all such other and further relief as it deems appropriate under the law, based upon the facts complained of herein and as determined by the investigation.

Dated: October 22, 2019

Respectfully submitted,



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Attorneys for Complainant EcoFactor, Inc.

THE UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

In the Matter of	§	
	§	
CERTAIN SMART THERMOSTATS, SMART HVAC SYSTEMS, AND COMPONENTS THEREOF	§	Investigation No. 337-TA-_____
	§	
	§	
	§	

I, Shayan Habib, declare, in accordance with 19 C.F.R. § 210.12(a)(1), as follows:

1. I am the Chief Executive Officer of EcoFactor, Inc. and I am duly authorized to sign this Complaint;

2. I have read the Complaint and am aware of its contents;

3. The Complaint is not being presented for any improper purpose, such as to harass or to cause unnecessary delay or needless increase in the cost of the investigation or related proceeding;

4. To the best of my knowledge, information and belief founded upon reasonable inquiry, claims, defenses, and other legal contentions therein are warranted by existing law or by a non-frivolous argument for the extension, modification, or reversal of existing law or the establishment of new law;

5. The allegations and other factual contentions have evidentiary support or are likely to have evidentiary support after a reasonable opportunity for further investigation or discovery.

I declare under the penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on October 21, 2019

Shayan Habib
Chief Executive Officer
EcoFactor, Inc.

Exhibit 14

Patent Litigation Experience

Rank by Number of Patent Cases

Alan D. Albright	NDCA
#7	#5

Rank by Number of Patent Accusations

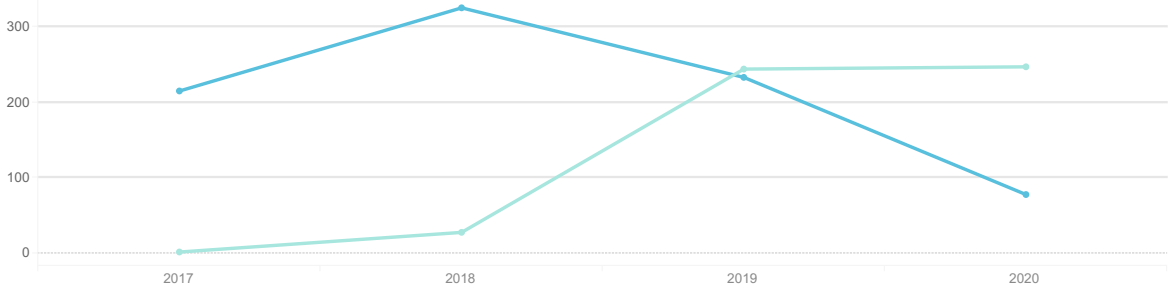
Alan D. Albright	NDCA
#10	#7

Type of Measure
- (•) Patent Cases
- ( ) Patent Accusations
- ( ) Claim Constructions

Filing Date
2017 to 2020

Patent Cases by Year

Show YTD

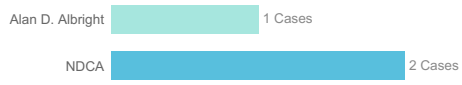


ANDA Cases
- [x] ANDA Cases
- [x] Non-ANDA Cases

Patent Technology Center
All

Alan D. Albright
NDCA

Trials



Mature Cases

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC., Plaintiff, v. GOOGLE LLC, Defendant.	**Case No. 6:20-cv-00075-ADA**
ECOFACTOR, INC., Plaintiff, v. ECOBEE INC., Defendant.	**Case No. 6:20-cv-00078-ADA**

DECLARATION OF SHAYAN HABIB IN SUPPORT OF ECOFACTOR'S OPPOSITION TO MOTIONS TO TRANSFER VENUE TO THE NORTHERN DISTRICT OF CALIFORNIA

I, Shayan Habib, declare and state as follows:

1. I have personal knowledge of the facts set forth herein, and if called upon to testify, could and would testify competently thereto.

2. I am the Chief Executive Officer of EcoFactor, Inc. ("EcoFactor"), and I am knowledgeable about the ownership, licensing, and commercialization of the patents-in-suit, and EcoFactor's organizational and financial information.

3. I currently live in Palo Alto, California. However, I frequently travel as part of my job, and traveling to the Western District of Texas for this case would not be inconvenient for me. If asked to testify in Waco, Texas, or elsewhere in the Western District of Texas, I would be willing to do so.

4. EcoFactor has conducted and conducts business in Texas, including with Trane U.S. Inc., which is based in Texas.

5. EcoFactor has had, until recently, employees based in Texas. For example, Mr. Aftab Zia was a System Architect at EcoFactor until 2019, and Mr. Zia resided in or near Austin, Texas. To my knowledge, Mr. Zia still resides in or near Austin, Texas.

6. It would not be inconvenient for EcoFactor to produce documents in the Western District of Texas. All of EcoFactor's documents are available electronically and are as easily accessible in the Western District of Texas as they are in the Northern District of California. I am not aware of any relevant non-electronic documents or other evidence in EcoFactor's possession that is stored in the Northern District of California.

I declare under penalty of perjury that the foregoing is true and correct.

Executed June 3, 2020, at Palo Alto, California.

By: Shayan Habib
Shayan Habib

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC., Plaintiff, v. GOOGLE LLC, Defendant.	**Case No. 6:20-cv-00075-ADA**

DECLARATION OF C. JAY CHUNG IN SUPPORT OF ECOFACTOR'S OPPOSITION TO GOOGLE'S MOTION TO TRANSFER VENUE TO THE NORTHERN DISTRICT OF CALIFORNIA

I, C. Jay Chung, declare and state as follows:

1. I am a member of the State Bar of California and a partner at the firm of Russ August & Kabat, counsel of record for Plaintiff EcoFactor, Inc. in the above-captioned action. I have personal knowledge of the facts set forth herein, and if called upon to testify, could and would testify competently thereto.

2. Attached as Exhibit 1 is a true and correct copy of the April 20, 2020 Standing Order Regarding Pretrial Procedures in Civil Cases Assigned to Chief Judge Rodney Gilstrap During the Present COVID-19 Pandemic for the Eastern District of Texas, available at http://www.txed.uscourts.gov/sites/default/files/judgeFiles/COVID19%20Standing%20Order.pdf

3. Attached as Exhibit 2 is a true and correct copy of Aaron Berndt's LinkedIn page.

4. Attached as Exhibit 3 is a true and correct copy of Zach Floca's LinkedIn page.

5. Attached as Exhibit 4 is a true and correct copy of Justin Walker's LinkedIn page.

6. Attached as Exhibit 5 is a true and correct copy of Peter Grabowski's LinkedIn page.

7. Attached as Exhibit 6 is a true and correct copy of Michael Ladner's LinkedIn page.

8. Attached as Exhibit 7 is a true and correct copy of a June 14, 2019 article entitled "Google confirms Austin expansion, will begin moving in next year" from Austin Business Journal, available at https://www.bizjournals.com/austin/news/2019/06/14/google-confirms-austin-expansion-will-begin-moving.html.

9. Attached as Exhibit 8 is a true and correct copy of a July 20, 2019 article entitled "New Google building will be a rare starchitect-designed tower" from Curbed Austin Newsletter, available at https://austin.curbed.com/2019/4/2/18291500/google-building-austin-new-design-pelli.

10. Attached as Exhibit 9 is a true and correct copy of a June 17, 2019 article entitled "Google is opening new offices in Austin and a data center in Midlothian" from Built in Austin, available at https://www.builtinaustin.com/2019/06/17/google-new-offices-austin-data-center-midlothian.

11. Attached as Exhibit 10 is a true and correct copy of a screenshot from Google's website https://careers.google.com/locations/austin/ showing available job listings in Austin as of June 2, 2020.

I declare under penalty of perjury pursuant to the laws of the United States that the foregoing is true and correct.

Executed on June 3, 2020 at Los Angeles, California.

/s/ C. Jay Chung

Exhibit 2
FILED UNDER SEAL

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC., Plaintiff, v. GOOGLE LLC, Defendant	Case No. 6:20-cv-00075-ADA **JURY TRIAL DEMANDED** **FILED UNDER SEAL**

SUPPLEMENTAL DECLARATION OF SHANNON SHAPER IN SUPPORT OF GOOGLE LLC'S MOTION TO TRANSFER

I, Shannon Shaper, declare as follows:

1. I am the Global Head of Reporting and Insights, People Operations at Defendant Google LLC ("Google"). I have been a Google employee since 2007. I work in Mountain View, California. I have access to and am familiar with relevant information about Google's operations, staff, and physical presences, including activities relating to the Google Nest Learning Thermostat. If called as a witness, I could and would testify competently to the facts stated herein.

2. I provide this supplemental declaration in support of Google's motion to transfer venue to the Northern District of California. I previously submitted a declaration in support of this same motion. This supplemental declaration is based upon my knowledge of Google's corporate structure, including Nest's operations, and Google's investigation of the location of witnesses and evidence relevant to Plaintiff EcoFactor, Inc.'s complaint in this action, which focuses on the Google Nest Learning Thermostat.

3. I understand that Plaintiff claims to have identified "five additional Google

CONFIDENTIAL MATERIAL OMITTED

employees in Austin who work or have worked directly with the accused Nest products." ECF No. 23 at 6. Plaintiff identifies those employees as Aaron Berndt, Zach Floca, Justin Walker, Peter Grabowski, and Michael Ladner. ECF No. 23-2 at 2.

[redacted]

9. As stated in my first declaration, no other Google employees involved in the sales and distribution of Nest Learning Thermostat are located in Texas. The engineers and managers from Google Nest who work on the Nest Learning Thermostat functionality at issue are located in the Mountain View area.

10. In my first declaration, I stated: "The relevant Google documents about the Nest Learning Thermostat are created and maintained by these employees in Mountain View" (¶ 17). I understand that Plaintiff has contended that "maintained" is not the same as "stored." For clarification, "maintained" means that the categories of documents identified in my first declaration are stored and located in Mountain View.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 10th day in June, 2020, in Menlo Park, California.

Shannon Shaper

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ECOFACTOR, INC, Plaintiff, v. GOOGLE LLC, Defendant.	Case No. 6:20-cv-00075 **JURY TRIAL DEMANDED**

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 *et seq.*, in which Plaintiff EcoFactor, Inc. ("Plaintiff" or "EcoFactor") makes the following allegations against Defendant Google LLC. ("Defendant"):

INTRODUCTION

1. This complaint arises from Defendant's unlawful infringement of the following United States patents owned by EcoFactor: U.S. Patent No. 8,180,492 ("'492 Patent"); U.S. Patent No. 8,412,488 ("'488 Patent"); U.S. Patent No. 8,738,327 ("'327 Patent"); and U.S. Patent No. 10,534,382 ("'382 Patent") (collectively the "Asserted Patents").

PARTIES

2. EcoFactor is a privately held company, having its principal place of business at 441 California Avenue, Number 2, Palo Alto, CA 94301.[1] EcoFactor was founded in 2006 and is headquartered in Palo Alto, California. EcoFactor is a leader in smart home energy

[1] Prior to October 2019, EcoFactor's principal place of business was at 1450 Veterans Blvd., Suite 100, Redwood City, CA 94063.

management services. EcoFactor delivers smart home energy management services that improve energy efficiency, reduce energy bills and vastly increase demand response efficacy – all while maintaining consumer comfort. EcoFactor's patented big-data analytics and machine learning algorithms collect and process massive amounts of residential data – including home thermodynamics, family comfort preferences and schedules, plus external data such as weather – to continually monitor, adapt and learn for optimum energy savings. The company provides homeowners significant cost savings and energy usage benefits. EcoFactor's award-winning service has been offered through channel partners such as utilities, energy retailers, broadband service providers and HVAC companies.

3. EcoFactor has transformed how homes use energy by applying advanced analytics to connected devices in the home. EcoFactor's platform actively manages thermostats on occupants' behalf in intelligent ways that improve comfort while helping them save time, energy and money. Utilities, home service providers and homeowners rely on EcoFactor for demand response, energy efficiency, and HVAC performance monitoring services.

4. The HVAC industry and researchers in the field recognize the technological and commercial impact of EcoFactor's patented technologies and innovations. For example, EcoFactor's demand response solution has been recognized multiple times from the Association of Energy Services Professionals (AESP) for outstanding achievement in pricing and demand response. EcoFactor was also named "Innovator of the Year" by San Mateo County Economic Development Association for EcoFactor's automated approach to energy efficiency and demand response services, and has also been named Owler HOT in Redwood City, CA. Moreover, EcoFactor received Powergrid International's Demand Response/Energy Efficiency Project of the Year award, and was assessed as one of the top innovators with some of the most

commercially important smart home patents.

5. Google LLC is a wholly-owned subsidiary of Alphabet, Inc, and a Delaware limited liability company with a principal place of business at 1600 Amphitheatre Parkway, Mountain View, California 94043. Google LLC operates a division named Google Nest ("Nest") which, on information and belief, designs and manufactures, among other things, smart Thermostats. Google LLC may be served with process through its registered agent, the Corporation Service Company, at 211 East. 7th Street, Suite 620, Austin, Texas 78701. Google LLC is registered to do business in the State of Texas and has been since at least November 17, 2006.

JURISDICTION AND VENUE

6. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has original subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

7. This Court has personal jurisdiction over Defendant in this action because Defendant has committed acts within this District giving rise to this action, and has established minimum contacts with this forum such that the exercise of jurisdiction over Defendant would not offend traditional notions of fair play and substantial justice. Defendant, directly and through subsidiaries or intermediaries, has committed and continue to commit acts of infringement in this District by, among other things, importing, offering to sell, and selling products that infringe the asserted patents.

8. Venue is proper in this District under 28 U.S.C. § 1400(b). Upon information and belief, Defendant has transacted business in this District and has committed acts of direct and indirect infringement in this District by, among other things, making, using, offering to sell,

selling, and importing products that infringe the asserted patents. Defendant has at least one regular and established place of business in the District. For example, Google invested $20 million to build a corporate office at 500 West 2nd Street, Austin, Texas 78701.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 8,180,492

9. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

10. Plaintiff is the owner and assignee of United States Patent No. 8,180,492 titled "System and method for using a networked electronic device as an occupancy sensor for an energy management system." The '492 Patent was duly and legally issued by the United States Patent and Trademark Office on May 15, 2012. Plaintiff is the owner and assignee, possessing all substantial rights, to the '492 Patent. A true and correct copy of the '492 Patent is attached as Exhibit 1.

11. Defendant makes, uses, offers for sale, sells, and/or imports into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '492 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, all generations of the Google Nest Learning Thermostat and all versions and variations thereof since the issuance of the '492 Patent ("Accused Instrumentalities").

12. Defendant has had knowledge of the '492 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and has known, or has been willfully blind to the fact, that making, using, offering to sell, and selling the

accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

13. Defendant has induced, and continues to induce, infringement of the ’492 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information, education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

14. Defendant has also infringed, and continue to infringe, claims of the ‘492 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the ’492 patent, in violation of 35 U.S.C. § 271(c).

15. The Accused Products satisfy all claim limitations of one or more claims of the ’492 Patent. For example the Accused Instrumentalities infringe claim 10 of the ’492 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below.

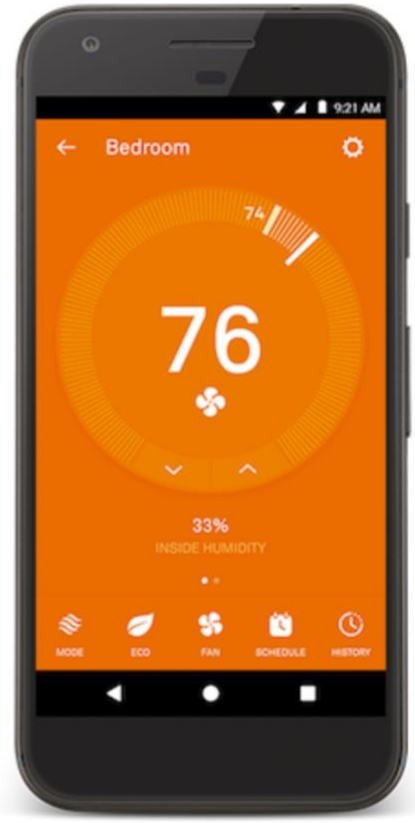
16. The Accused Instrumentalities include: “A system for altering the setpoint on a thermostat for space conditioning of a structure comprising: at least one thermostat having at least a first temperature setpoint associated with a non-occupied structure, and at least a second temperature setpoint associated with the existence of occupants in said structure.” For example,

the Accused Instrumentalities allow users to adjust set points that vary based on whether a structure is occupied.

How to change the target temperature

1. Drag your finger along the ring to change the target temperature.
2. To fine tune the temperature, tap the up or down arrow at the bottom of the ring.

Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

17. The Accused Instrumentalities include "one or more electronic devices having at least a graphic user interface comprising a display wherein said electronic devices receive input

from one or more users and wherein use of said electronic devices comprises at least one of cursor movement, keystrokes or other user interface actions intended to alter a state of one or more of said electronic devices by one or more users wherein activity of one or more networked electronic devices indicates whether said thermostat should be changed from said first temperature setpoint to said second temperature setpoint." For example, the Accused Instrumentalities are designed to work the Google Nets mobile application, that includes a graphic user interface that allows to alter the set points and to move the house between Heat, Cool, Heat/Cool, and Eco modes as well as to set up Home/Away assist and Early-On.

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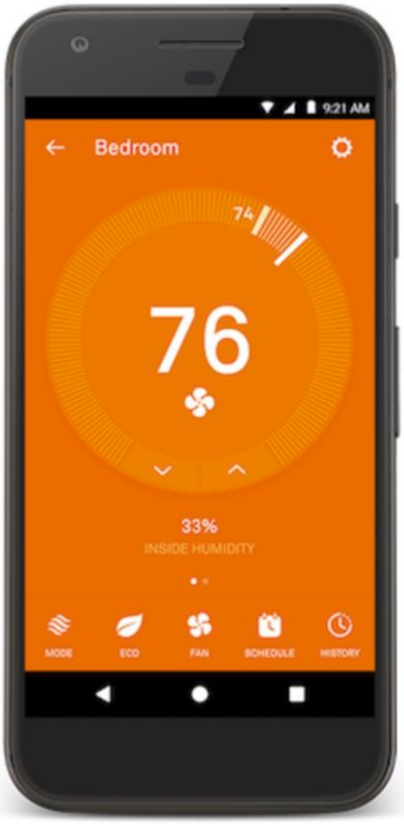
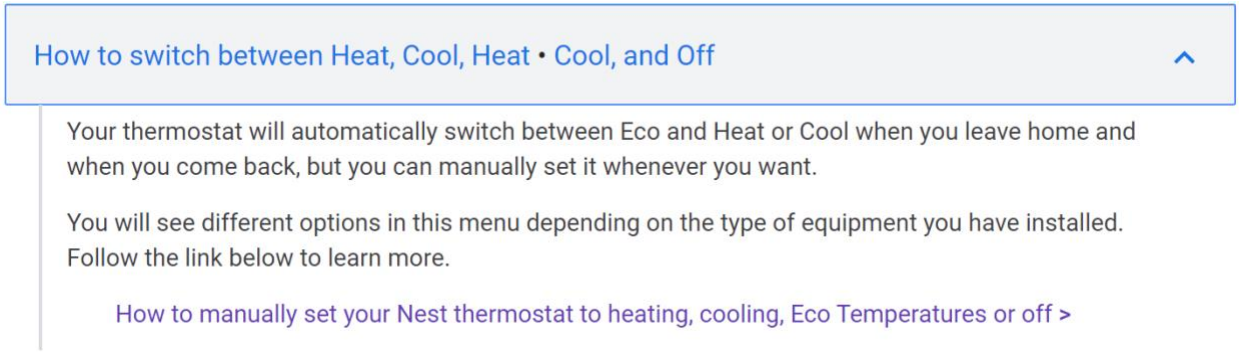
Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.





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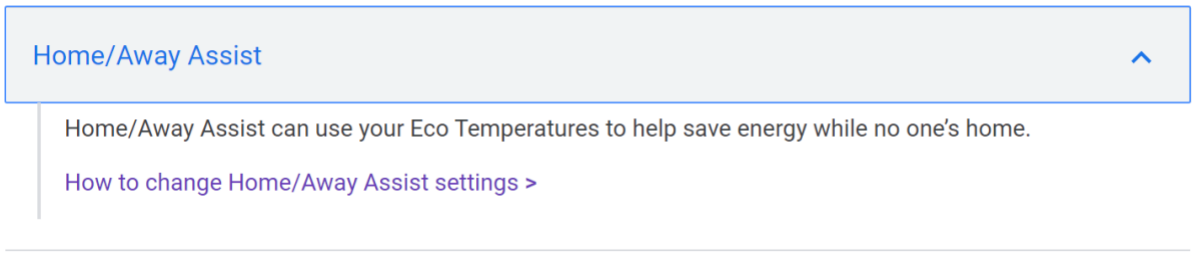
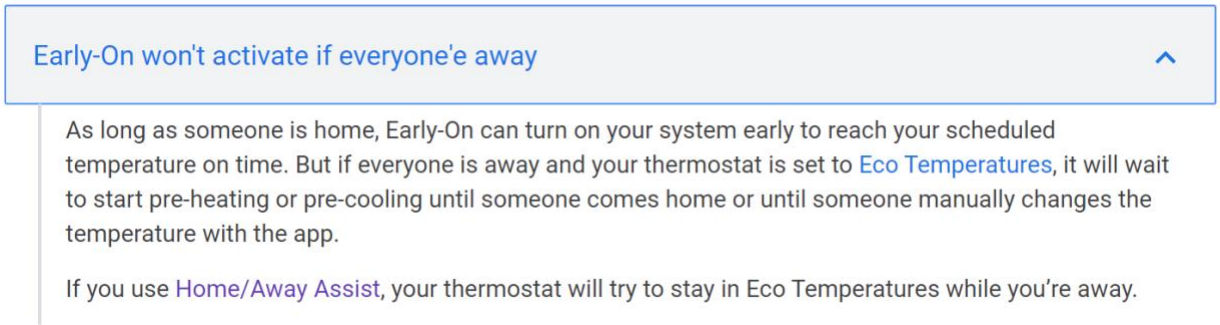


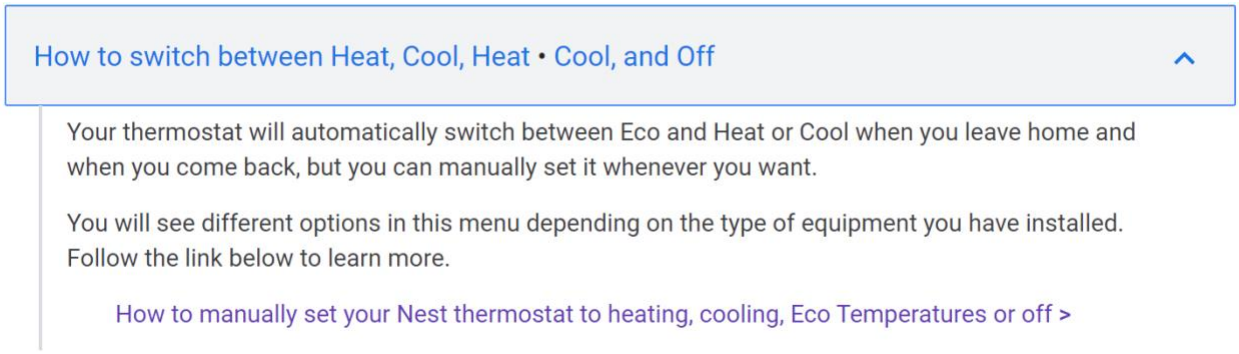
https://support.google.com/googlenest/answer/9244728



https://support.google.com/googlenest/answer/9246532

18. The Accused Instrumentalities include "wherein said electronic devices and said thermostat are connected to a network; an application comprising one or more computer processors in communication with said network, wherein said application determines whether said one or more electronic devices are in use and in response, whether said thermostat is set to said first temperature setpoint that indicates said structure is not occupied." For example, a smartphone using the Google Nest application can be designated to provide location information

that is used to determine whether the user is home and thus whether the thermostat should be set to an unoccupied temperature setpoint.



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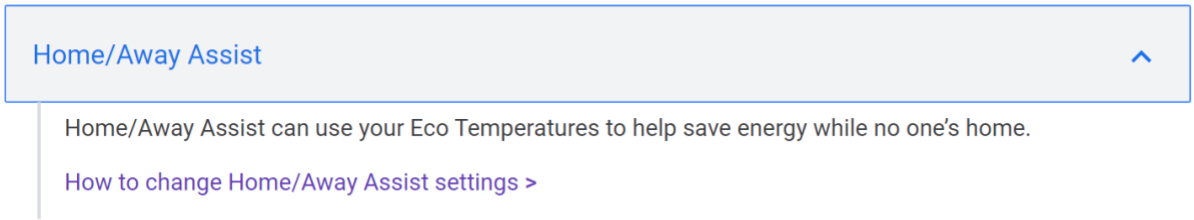
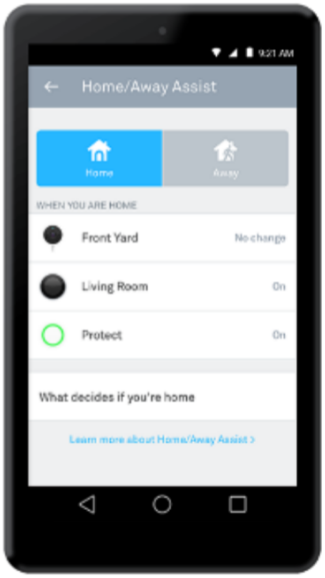


https://support.google.com/googlenest/answer/9244728

How to change what Nest products do when you're home or away

To change how Home/Away Assist controls your Nest products, follow these steps.

1. Open the Nest app on your phone or tablet. If you're on a computer, go to home.nest.com.
2. Tap **Settings** in the top right corner of the app home screen.
3. Select **Home/Away Assist**.
4. Tap either the **Home** or **Away** icon at the top of the screen. You'll see a summary of what each of your Nest products will do when your home is in that mode.
5. If you want to make any changes, tap on the Nest product you'd like to control.



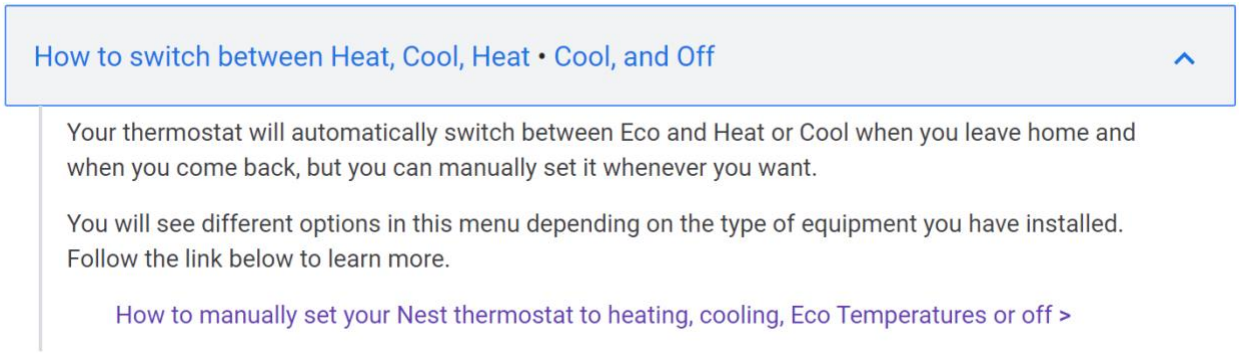
In general, if you have multiple Nest products in your home, you have different settings for each one. The one exception is Nest Protect: all the Protects in your home share the same Home/Away Assist settings, so you'll only see one Protect in this list.

Settings for each product's Home/Away Assist options are listed below.

https://support.google.com/googlenest/answer/9261489

19. The Accused Instrumentalities include "said application determining that said one or more users has previously indicated a preference that said user's input be obtained before automatically changing said first HVAC temperature setpoint to said second HVAC temperature setpoint indicating that said structure is deemed to be occupied; said application prompting said one or more users based on said determining that said one or more of said user's input should be obtained, wherein said application provides electronic notice to one or more of said users of said electronic devices that said thermostat is set for a non-occupied structure and whether to keep said first temperature setpoint or change to said second temperature setpoint; and wherein said application in response to said prompting, receives input from said one or more users to keep said first HVAC temperature setpoint; and wherein said thermostat is kept at said first

temperature setpoint based upon said input from said one or more users." For example, the Accused Instrumentalities will store schedules set by a user that determine whether and when to switch to an active Heating/Cooling from an away Eco state. The user can access these settings and modify the settings by use of the mobile application. The user can also disable auto-scheduling so that user input is required to switch between modes. Further, the user can set and enable or disable Home/Away assist and Early-On modes.



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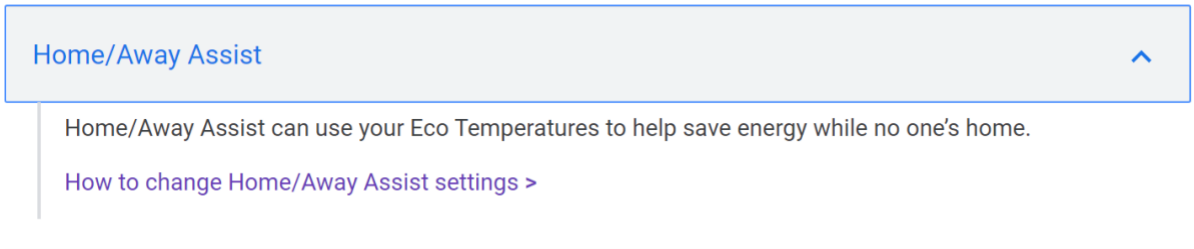

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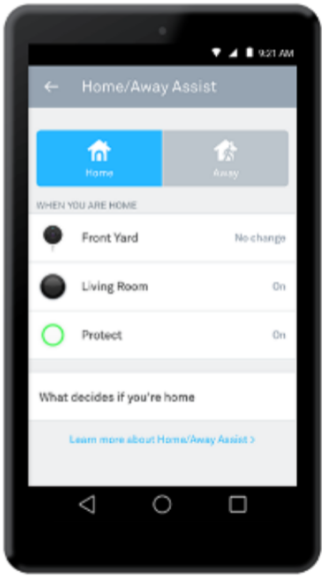
4. Tap either the **Home** or **Away** icon at the top of the screen. You'll see a summary of what each of your Nest products will do when your home is in that mode.
5. If you want to make any changes, tap on the Nest product you'd like to control.



In general, if you have multiple Nest products in your home, you have different settings for each one. The one exception is Nest Protect: all the Protects in your home share the same Home/Away Assist settings, so you'll only see one Protect in this list.

Settings for each product's Home/Away Assist options are listed below.

https://support.google.com/googlenest/answer/9261489

Schedule (Nest Thermostat E)

Note: If you have a Nest Learning Thermostat, you'll find the **thermostat schedule** in the Quick View menu instead.

Depending on the type of system you have, you can set up to 3 different schedules for Heat, Cool, and Heat•Cool. If you have a fan installed, you can also set a separate fan schedule.

Before you adjust your schedule, make sure you've selected the correct **mode**: Heat, Cool, or Heat•Cool.

Select **Schedule** to see the temperature schedule for the mode that your thermostat is currently set to. You can set a new schedule or edit your current one.

You can also view and set your thermostat's schedule in the Nest app.

Learn about Nest thermostat temperature schedules and how to change them

How Nest thermostats are different from programmable thermostats

Programmable thermostats will simply continue cycling through their schedule even if nobody's home. Nest thermostats can prevent this waste by automatically detecting when everyone's gone, using Home/Away Assist. When no one's home, your Nest thermostat will set itself to your Eco Temperatures to help save energy.

Nest thermostats use their unique Nest Sense and Auto-Schedule features to create a dynamic, comfortable schedule that's personalized for you and your home.

Learn about Auto-Schedule

All Nest thermostats have Auto-Schedule, and it's turned on by default when you install your thermostat to help keep you comfortable and help save energy.

With Auto-Schedule, you don't have to manually program your thermostat to save energy. Simply change the temperature to get comfortable whenever you like with the Nest app or on the thermostat itself, and it will learn from your preferences. After a few days, it will program a schedule for you, based on what temperatures you prefer and when you want them.

For more details, see the following article:

Learn about Auto-Schedule

How to turn off Auto-Schedule

In the first few days after you install it, your Nest thermostat will learn what temperatures you like and when you want them. It will automatically create a temperature schedule for you. If you don't want to use this feature and program your own schedule, you can turn off Auto-Schedule on the thermostat. See the following article for full instructions:

How to use your Nest thermostat as a traditional programmable thermostat

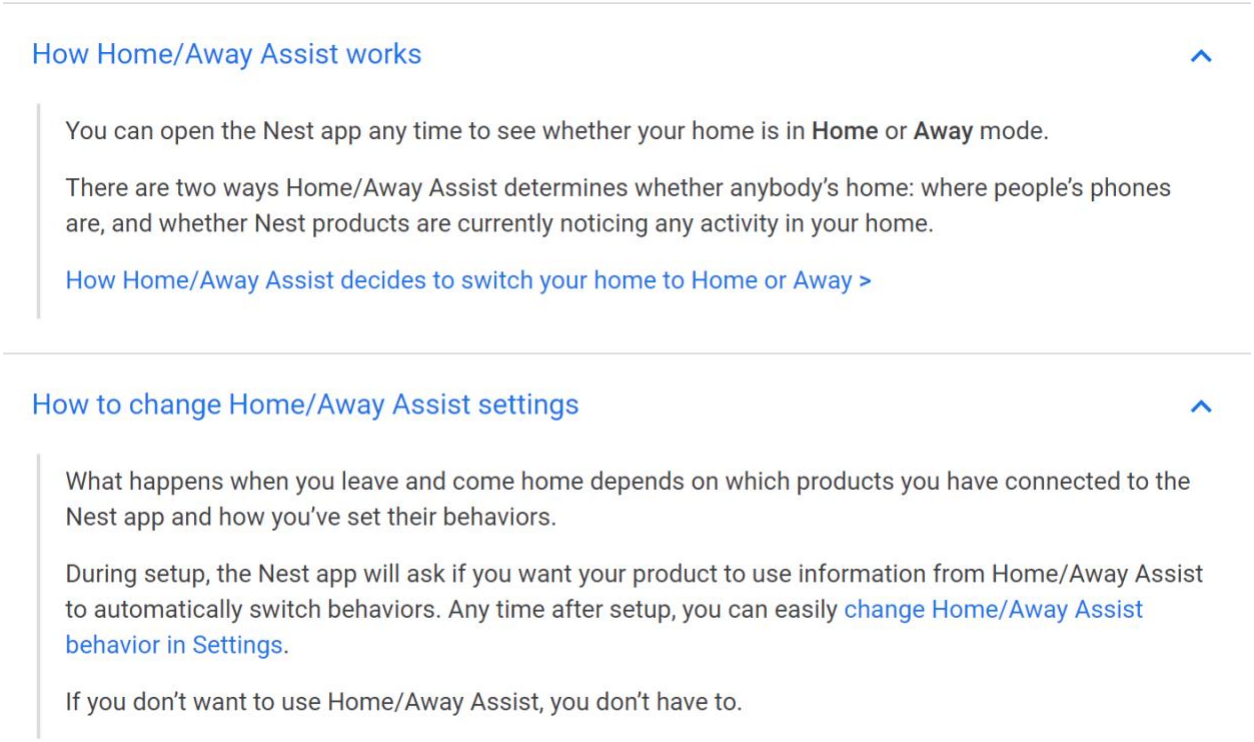
https://support.google.com/googlenest/answer/9243487

Early-On won't activate if everyone'e away

As long as someone is home, Early-On can turn on your system early to reach your scheduled temperature on time. But if everyone is away and your thermostat is set to Eco Temperatures, it will wait to start pre-heating or pre-cooling until someone comes home or until someone manually changes the temperature with the app.

If you use Home/Away Assist, your thermostat will try to stay in Eco Temperatures while you're away.

https://support.google.com/googlenest/answer/9246532



https://support.google.com/googlenest/answer/9257400

20. Defendant's infringement has been and is willful. Defendant knew of the '492 patent long before this suit was filed. For example, Defendant submitted the '492 patent as relevant prior art in prosecuting its own patent applications numerous times. Indeed, the following 43 patents by Defendant are non-exhaustive examples of Defendant's patents and patent applications that cite to the '492 patent: US8510255B2, US8511577B2, US8532827B2, US8620841B1, US8622314B2, US8727611B2, US8754775B2, US8924027B2, US8950686B2, US8963727B2, US8965587B2, US8994540B2, US9026232B2, US9081405B2, US9091453B2, US9182140B2, US9189751B2, US9256230B2, US9268344B2, US9298197B2, US9298196B2, US9342082B2, US9360229B2, US9417637B2, US9429962B2, US9453655B2, US9459018B2, US9595070B2, US9696735B2, US9714772B2, US9732979B2, US9810442B2, US9857238B2, US9890970B2, US9910449B2, US9952573B2, US9998475B2, US10101050B2, US10107513B2, US10145577B2, US10346275B2, US10452083B2, US10663443B2. On

information and belief, Defendant studied EcoFactor's patent portfolio, including the asserted patents. Moreover, EcoFactor communicated with Defendant in the 2015 and 2018 time frame, including regarding EcoFactor's patent portfolio, including the asserted patents. In these discussions, EcoFactor notified Defendant of the asserted patents, including the '492 patent. Despite Defendant's knowledge of the '492 patent, Defendant continued to infringe. In doing so, Defendant knew, or should have known, that its conduct amounted to infringement of the '492 patent. Indeed, Defendant knew that the asserted patents are directed to its Nest line of products, and knew, or should have known, that the asserted patents cover its Nest line of products. Accordingly, Defendant is liable for willful infringement.

21. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and is liable for infringement of the '492 Patent pursuant to 35 U.S.C. § 271.

22. As a result of Defendant's infringement of the '492 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

23. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '492 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 8,412,488

24. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if

fully set forth herein.

25. Plaintiff is the owner and assignee of United States Patent No. 8,412,488 titled "System and method for using a network of thermostats as tool to verify peak demand reduction." The '488 patent was duly and legally issued by the United States Patent and Trademark Office on April 2, 2013. Plaintiff is the owner and assignee, possessing all substantial rights, to the '488 Patent. A true and correct copy of the '488 Patent is attached as Exhibit 2.

26. Defendants make, use, offer for sale, sell, and/or import into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '488 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, such all generations of the Google Nest Learning Thermostat and all versions and variations thereof since the issuance of the '488 Patent ("Accused Instrumentalities").

27. Defendant has had knowledge of the '488 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and has known, or has been willfully blind to the fact, that making, using, offering to sell, and selling the accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

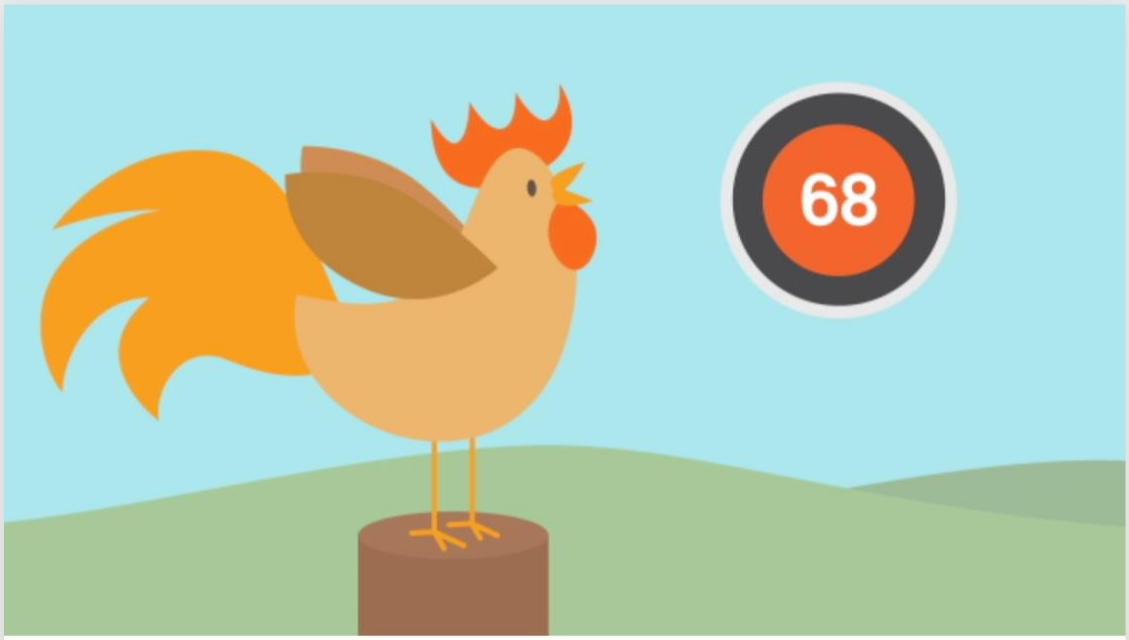
28. Defendant has induced, and continues to induce, infringement of the '488 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information,

education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

29. Defendant has also infringed, and continue to infringe, claims of the ‘488 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the ’488 patent, in violation of 35 U.S.C. § 271(c).

30. The Accused Products satisfy all claim limitations of one or more claims of the ’488 Patent. For example the Accused Instrumentalities infringe claim 1 of the ’488 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below.

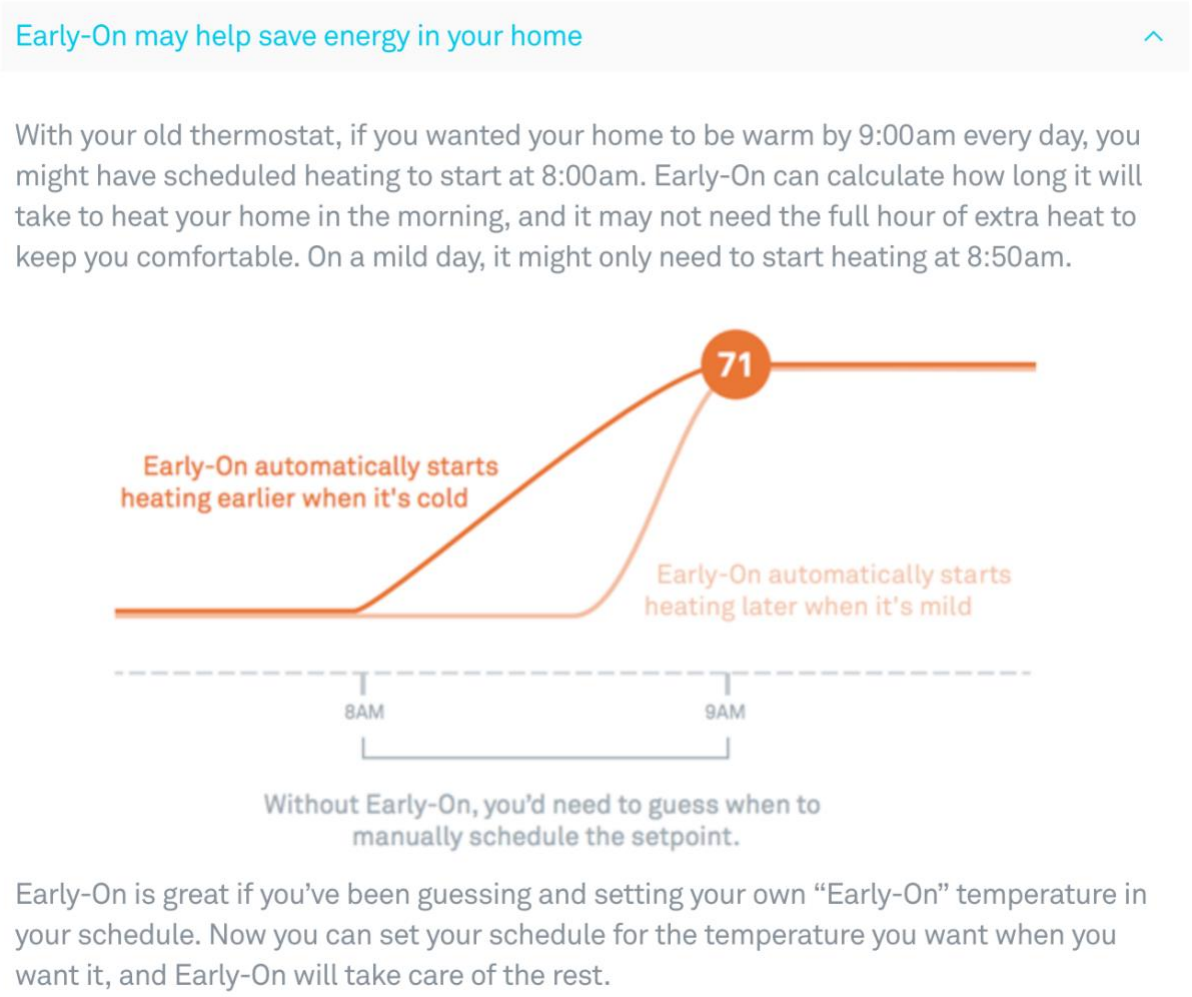
31. The Accused Instrumentalities include “[a] system for monitoring the operational status of an HVAC system comprising: at least one HVAC control system associated with a first structure that receives temperature measurements from at least a first structure conditioned by at least one HVAC system.” For example, Accused Instrumentalities receive temperature measurements from inside the building that it is servicing.



Early On

Want it to be 68° at 7am? Early-On will figure out when to turn up the heat so you'll wake up to a perfectly warm house.

Learn more about Early-On >



https://support.google.com/googlenest/answer/9246532?hl=en

32. The Accused Instrumentalities include "one or more processors that receive measurements of outside temperatures from at least one source other than said HVAC system." For example, the Accused Instrumentalities receive measurements of outside temperature and sunset and sunrise information from the internet.

Learn about Early-On and how to change settings

When Early-On is enabled, your Nest thermostat automatically calculates when to turn on heating or cooling so your home will reach a scheduled temperature on time. To do this, your thermostat takes into account the weather, what it has learned about how quickly your home warms and cools, and how efficient your system is.

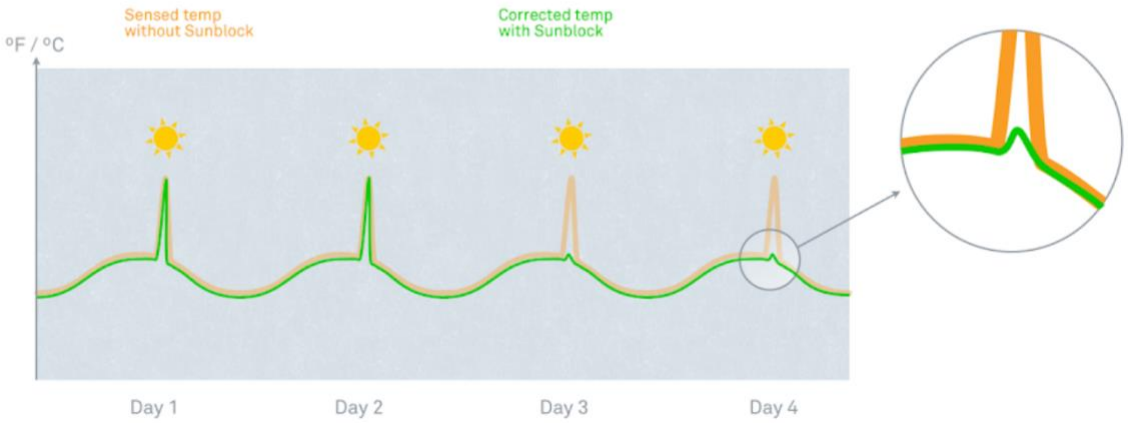
Early-On works a lot like pre-heating the oven when you're making cookies. You typically start heating your oven a few minutes ahead of time so that it's the right temperature when you're ready to put your batch of cookies in to bake. Now imagine that your oven knew you'd be done mixing the dough at 5pm and would automatically turn on early to be 350°F/175°C right at 5pm.

https://support.google.com/googlenest/answer/9246532

https://store.google.com/product/nest_learning_thermostat_3rd_gen

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



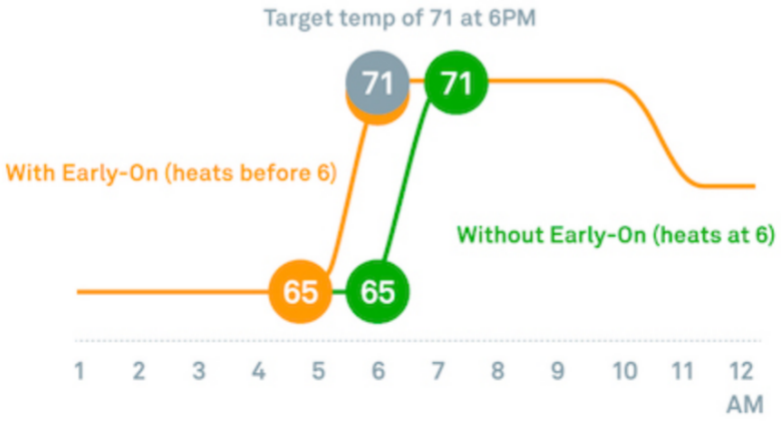
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

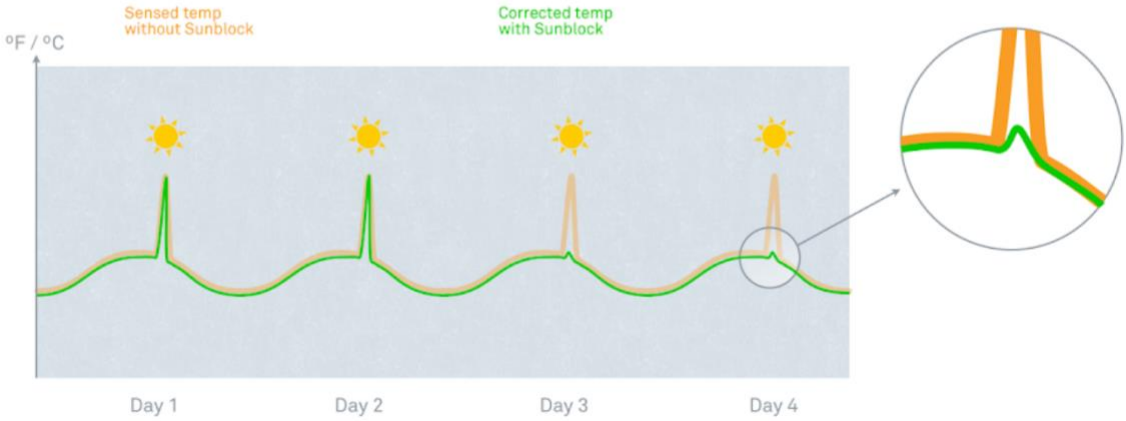
Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

33. The Accused Instrumentalities include "wherein said one or more processors compares the inside temperature of said first structure and the outside temperature over time to derive an estimation for the rate of change in inside temperature of said first structure in response to outside temperature, and wherein said one or more processors compare an inside temperature recorded inside the first structure with said estimation for the rate of change in inside temperature of said first structure to determine whether the first HVAC system is on or off." For example, the Accused Instrumentalities will compare internal temperature and external temperature and, other factors, to calculate the rate of change of inside temperature, and use this calculation to determine when to turn the HVAC system on or off.

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



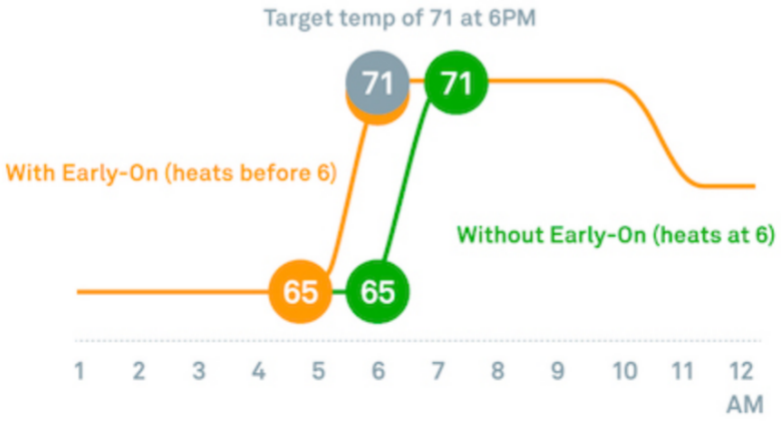
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



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Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

34. Defendant's infringement has been and is willful. Defendant knew of the '488 patent long before this suit was filed. For example, Defendant submitted the '488 patent as relevant prior art in prosecuting its own patent applications numerous times. Indeed, the following patents by Defendant are non-exhaustive examples of Defendant's patents and patent applications that cite to the '488 patent or related EcoFactor patent: US9453655B2, US10346275B2, US9075419B2, US9098279B2, US9046898B2, US9459018B2, US9256230B2, US8850348B2, US9104211B2, US8893032B2, US9595070B2, US9807099B2, US9810442B2, US9298197B2, US9910449B2, US10101050B2, US8727611B2, US8195313B1, US8622314B2, WO2013149210A1, WO2013059671A1. On information and belief, Defendant studied EcoFactor's patent portfolio, including the asserted patents. Moreover, EcoFactor communicated

with Defendant in the 2015 and 2018 time frame, including regarding EcoFactor's patent portfolio, including the asserted patents. In these discussions, EcoFactor notified Defendant of the asserted patents, including the '488 patent. Despite Defendant's knowledge of the '488 patent, Defendant continued to infringe. In doing so, Defendant knew, or should have known, that its conduct amounted to infringement of the '488 patent. Indeed, Defendant knew that the asserted patents are directed to its Nest line of products, and knew, or should have known, that the asserted patents cover its Nest line of products. Accordingly, Defendant is liable for willful infringement.

35. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and is liable for infringement of the '488 Patent pursuant to 35 U.S.C. § 271.

36. As a result of Defendant's infringement of the '488 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

37. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '488 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

COUNT III

INFRINGEMENT OF U.S. PATENT NO. 8,738,327

38. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

39. Plaintiff is the owner and assignee of United States Patent No. 8,738,327 titled "System and method for using a network of thermostats as tool to verify peak demand reduction." The '327 patent was duly and legally issued by the United States Patent and Trademark Office on May 27, 2014. Plaintiff is the owner and assignee, possessing all substantial rights, to the '327 Patent. A true and correct copy of the '327 Patent is attached as Exhibit 3.

40. Defendants make, use, offer for sale, sell, and/or import into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '327 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, such as all generations of the Google Nest Learning Thermostat and and all versions and variations thereof since the issuance of the '327 Patent ("Accused Instrumentalities").

41. Defendant has had knowledge of the '327 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and have known, or have been willfully blind to the fact, that making, using, offering to sell, and selling the accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

42. Defendant has induced, and continue to induce, infringement of the '327 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information,

education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

43. Defendant has also infringed, and continue to infringe, claims of the '327 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the '327 patent, in violation of 35 U.S.C. § 271(c).

44. The Accused Products satisfy all claim limitations of one or more claims of the '327 Patent. One, non-limiting, example of the Accused Instrumentalities' infringement is presented below. For example, the Accused Instrumentalities include "[a] system for controlling the operational status of an HVAC system comprising: at least one thermostat associated with a structure that receives temperature measurements from inside the structure, the structure conditioned by at least one HVAC system, the thermostat having at least a first setting stored therein." For example, the Accused Instrumentalities have a thermostat that receives temperature settings from inside the structure which can store settings, including a schedule for heating and cooling, set points, whether the device is in Heat/Cool, Heat, Cool, or Eco modes, whether to enable Home/Away assist, whether to enable automatic scheduling, and whether to enable Early-On.


nest
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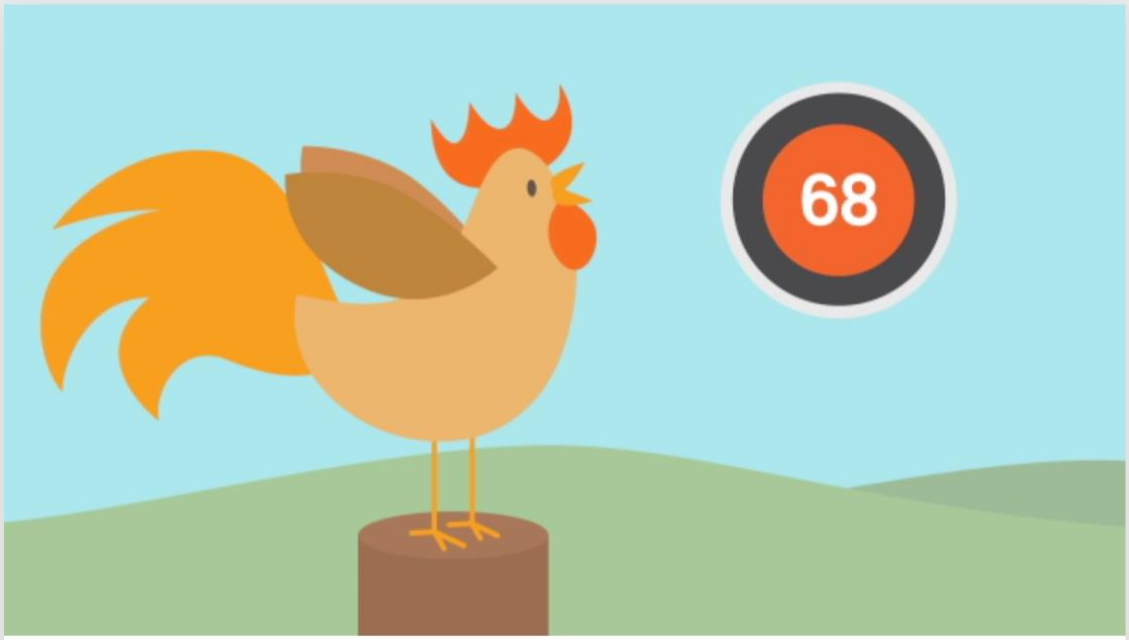
68
Early On
Want it to be 68° at 7am? Early-On will figure out when to turn up the heat so you'll wake up to a perfectly warm house.
Learn more about Early-On >

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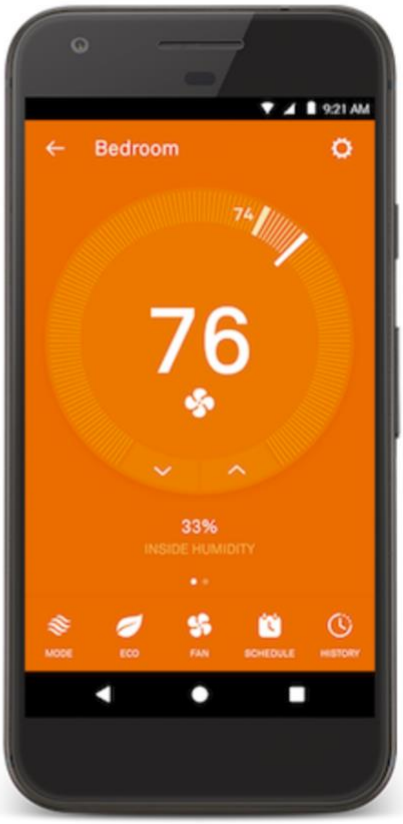
https://support.google.com/googlenest/answer/9246532?hl=en

How to change the target temperature

1. Drag your finger along the ring to change the target temperature.
2. To fine tune the temperature, tap the up or down arrow at the bottom of the ring.

Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

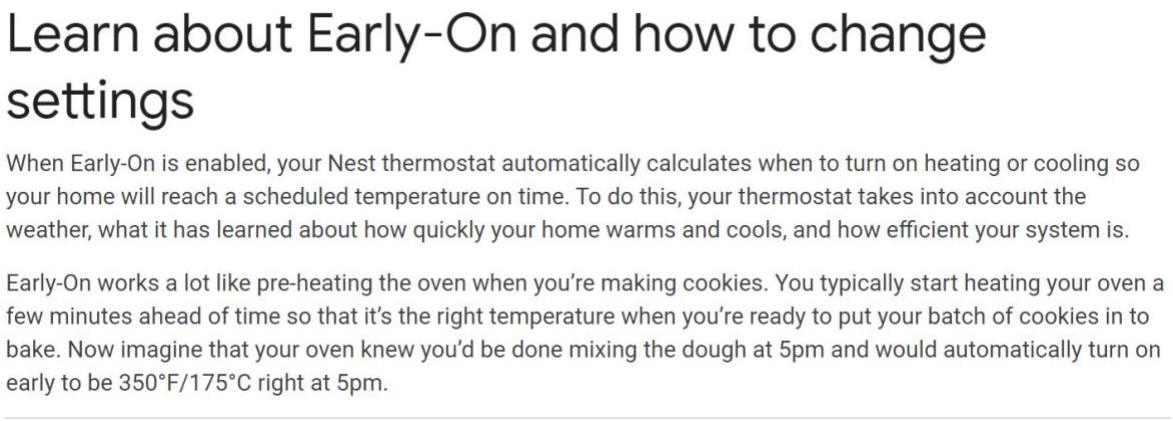
You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

45. For example, the Accused Instrumentalities include "one or more servers located remotely from the structure, the one or more servers configured to receive measurements of outside temperatures from at least one source other than the HVAC system." For example, the

Accused Instrumentalities receive measurements of outside temperature from the internet.



Learn about Early-On and how to change settings

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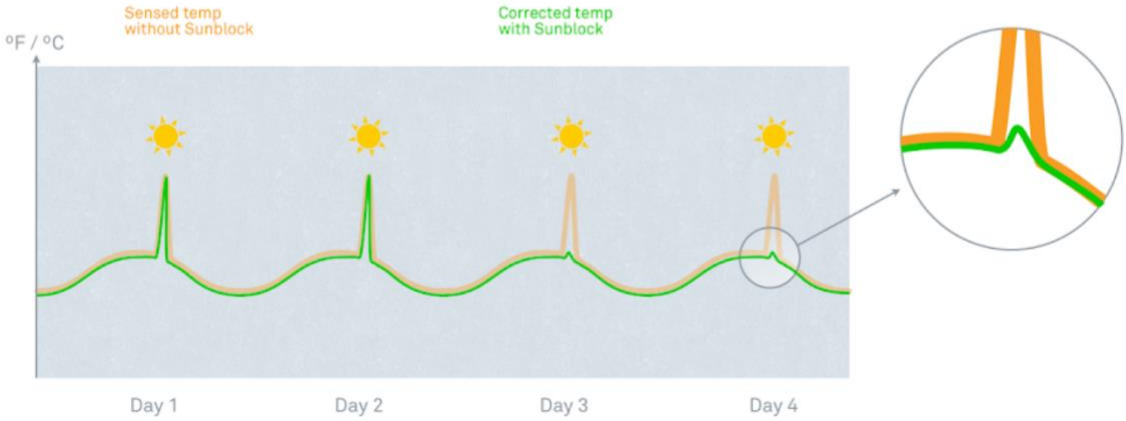
https://support.google.com/googlenest/answer/9246532

https://store.google.com/product/nest_learning_thermostat_3rd_gen

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



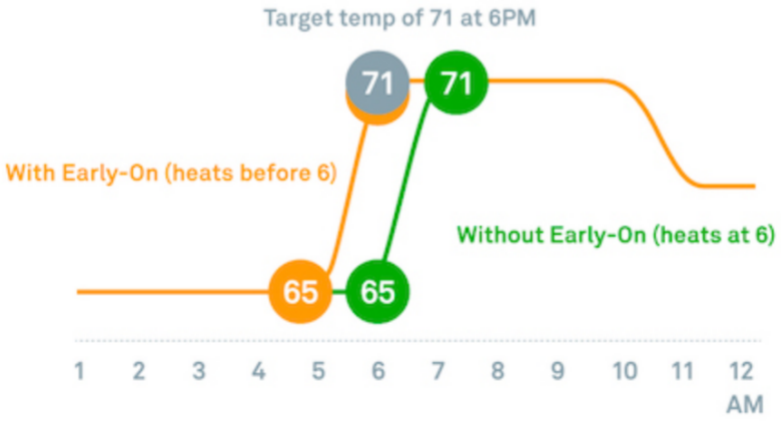
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

46. For example, Accused Instrumentalities include "the one or more servers are further configured to communicate with the thermostat via a network, wherein the one or more servers receive inside temperatures from the thermostat and compares the inside temperatures of the structure and the outside temperatures over time to derive an estimation for the rate of change in inside temperature of the structure in response to outside temperature." For example, the Accused Instrumentalities will compare internal temperature and external temperature and, other factors, to calculate the rate of change of inside temperature in order to allow Early-On, auto scheduling, and Home/Away Assist modes to operate.

Learn about Early-On and how to change settings

When Early-On is enabled, your Nest thermostat automatically calculates when to turn on heating or cooling so your home will reach a scheduled temperature on time. To do this, your thermostat takes into account the weather, what it has learned about how quickly your home warms and cools, and how efficient your system is.

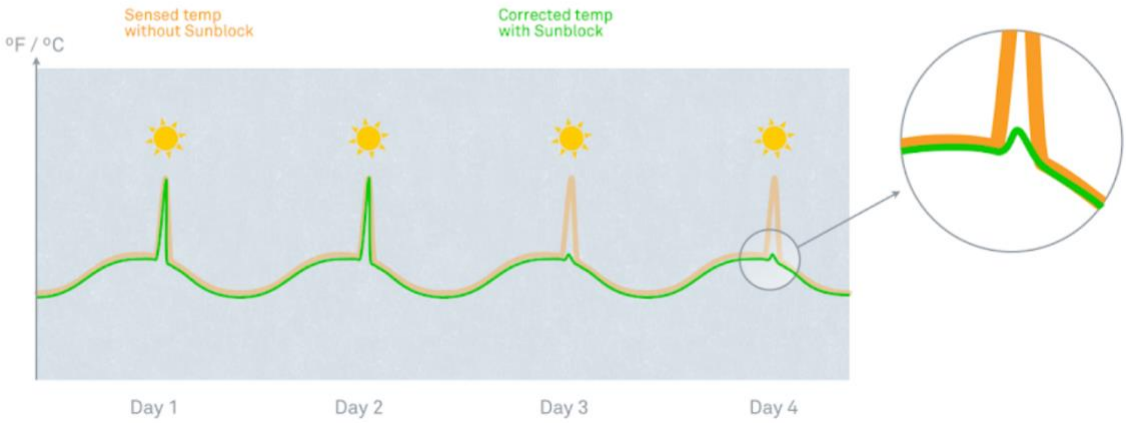
Early-On works a lot like pre-heating the oven when you're making cookies. You typically start heating your oven a few minutes ahead of time so that it's the right temperature when you're ready to put your batch of cookies in to bake. Now imagine that your oven knew you'd be done mixing the dough at 5pm and would automatically turn on early to be 350°F/175°C right at 5pm.

https://support.google.com/googlenest/answer/9246532

https://store.google.com/product/nest_learning_thermostat_3rd_gen

How sunblock works

Sunblock uses the Nest thermostat's built-in light sensor to track the sun's patterns and its temperature sensors to detect the heat spikes that occur in direct sunlight. If your thermostat is connected to Wi-Fi, it'll also take into account sunrise and sunset time. Sunblock then uses all this information to set your Nest thermostat to the correct temperature whenever it's in direct sunlight.



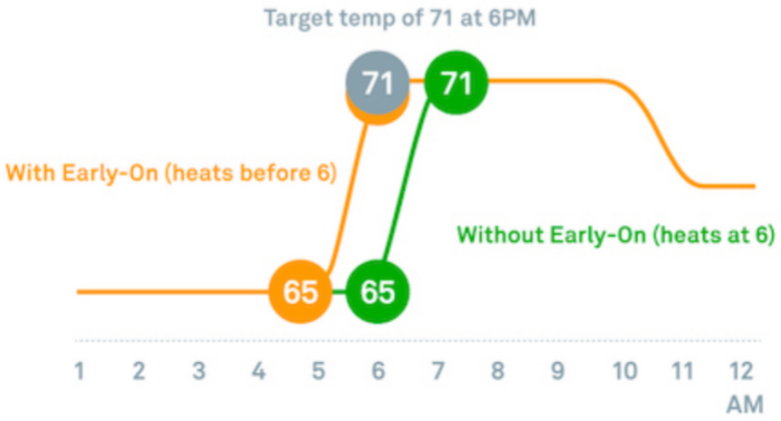
https://support.google.com/googlenest/answer/9249796

With Early-On

After your thermostat has learned about your home, here's what to expect when Early-On is enabled:

- Your thermostat will start heating or cooling your home **before the scheduled time**, using what it has learned about your home to predict how long it will take to reach the target temperature.
- For example, if your schedule has a target temperature of 72°F/22°C at 6:00pm, your thermostat might start heating or cooling at 5:30pm to get your home to 72°F/22°C at 6:00pm.

When Early-On starts your system varies based on factors like the weather and how long it's taken to heat or cool your home in the past. If you enable Early-On, your thermostat can begin heating up to 5 hours before a scheduled temperature.



How Early-On learns

Early-On will continually adapt to the weather forecast and how fast your home heats up or cools down so it can improve its Time-to-Temperature estimates and keep you comfortable while helping to saving energy.

For example, on a cold day the Nest thermostat might need to start heating at 5:00am to reach your target temperature by 7:00am. But on a mild day, the thermostat may only need to start heating at 6:50am.

Early-On may help save energy in your home

With your old thermostat, if you wanted your home to be warm by 9:00am every day, you might have scheduled heating to start at 8:00am. Early-On can calculate how long it will take to heat your home in the morning, and it may not need the full hour of extra heat to keep you comfortable. On a mild day, it might only need to start heating at 8:50am.

Early-On is great if you've been guessing and setting your own "Early-On" temperature in your schedule. Now you can set your schedule for the temperature you want when you want it, and Early-On will take care of the rest.

https://support.google.com/googlenest/answer/9246532

47. The Accused Instrumentalities further include "the one or more servers are further configured to receive a demand reduction request and determine whether the structure is associated with demand rejection request, and based on the determination that the structure is associated with the demand reduction request, the one or more servers are further configured to send a signal to the thermostat to change the setting to a second setting to reduce electricity demand by the HVAC system." For example, using the mobile application users of the Accused Instrumentalities can instruct the Accused Instrumentalities to reduce the amount of usage of the devices by placing the device into Eco mode, by enabling Early-On to reduce unnecessary HVAC use, by using Home/Away assist, by altering set point temperatures, or by using Sun

Block as described above.

48. Defendant's infringement has been and is willful. Defendant knew of the '327 patent long before this suit was filed. For example, Defendant submitted the '327 patent as relevant prior art in prosecuting its own patent applications numerous times. Indeed, the following patents by Defendant are non-exhaustive examples of Defendant's patents and patent applications that cite to the '327 patent or related EcoFactor patent: US9453655B2, US10346275B2, US9075419B2, US9098279B2, US9046898B2, US9459018B2, US9256230B2, US8850348B2, US9104211B2, US8893032B2, US9595070B2, US9807099B2, US9810442B2, US9298197B2, US9910449B2, US10101050B2, US8727611B2, US8195313B1, US8622314B2, WO2013149210A1, WO2013059671A1. On information and belief, Defendant studied EcoFactor's patent portfolio, including the asserted patents. Moreover, EcoFactor communicated with Defendant in the 2015 and 2018 time frame, including regarding EcoFactor's patent portfolio, including the asserted patents. In these discussions, EcoFactor notified Defendant of the asserted patents, including the '327 patent. Despite Defendant's knowledge of the '327 patent, Defendant continued to infringe. In doing so, Defendant knew, or should have known, that its conduct amounted to infringement of the '327 patent. Indeed, Defendant knew that the asserted patents are directed to its Nest line of products, and knew, or should have known, that the asserted patents cover its Nest line of products. Accordingly, Defendant is liable for willful infringement.

49. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and are liable for infringement of the '327 Patent pursuant to 35 U.S.C. § 271.

50. As a result of Defendant's infringement of the '327 Patent, Plaintiff is entitled to

monetary damages in an amount adequate to compensate for Defendant's infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

51. Defendant's infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the '327 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

COUNT IV

INFRINGEMENT OF U.S. PATENT NO. 10,534,382

52. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

53. Plaintiff is the owner and assignee of United States Patent No. 10,534,382 titled "System and method for using a wireless device as a sensor for an energy management system." The '382 patent was duly and legally issued by the United States Patent and Trademark Office on January 14, 2020. Plaintiff is the owner and assignee, possessing all substantial rights, to the '382 Patent. A true and correct copy of the '382 Patent is attached as Exhibit 4.

54. Defendants make, use, offer for sale, sell, and/or import into the United States certain products and services that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '382 Patent, and continue to do so. By way of illustrative example, these infringing products and services include, without limitation, Defendant's products and services, *e.g.*, all generations of the Google Nest Learning Thermostat and all versions and variations thereof since the issuance of the '382 Patent ("Accused Instrumentalities").

55. Defendant has had knowledge of the ’382 patent from a date no later than the date of filing of this complaint. Defendant has known how the Accused Products are made and have known, or have been willfully blind to the fact, that making, using, offering to sell, and selling the accused products within the United States, or importing the Accused Products into the United States, would constitute infringement.

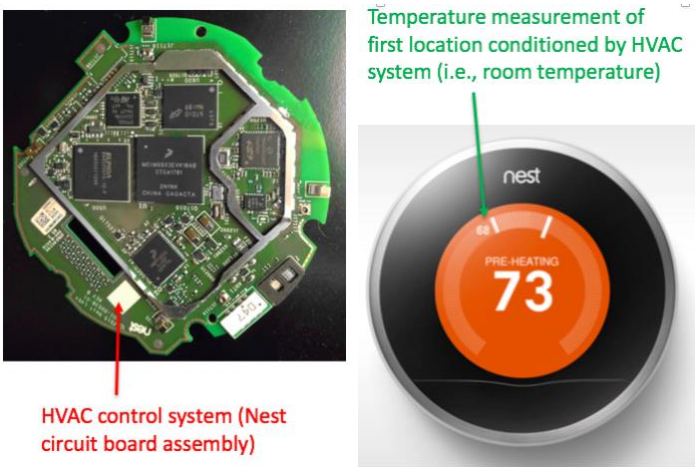
56. Defendant has induced, and continue to induce, infringement of the ’382 patent by actively encouraging others (including distributors and end customers) to use, offer to sell, sell, and import the Accused Products. On information and belief, these acts include providing information and instructions on the use of the Accused Products; providing information, education and instructions supporting sales by distributors; providing the Accused Products to distributors; and indemnifying patent infringement within the United States.

57. Defendant has also infringed, and continue to infringe, claims of the ‘382 patent by offering to commercially distribute, commercially distributing, making, and/or importing the Accused Products, which are used in practicing the process, or using the systems, of the patent, and constitute a material part of the invention. Defendant knows the components in the Accused Products to be especially made or especially adapted for use in infringement of the patent, not a staple article, and not a commodity of commerce suitable for substantial noninfringing use. Accordingly, Defendant has been, and currently are, contributorily infringing the ’382 patent, in violation of 35 U.S.C. § 271(c).

58. The Accused Products satisfy all claim limitations of one or more claims of the ’327 Patent. One, non-limiting, example of the Accused Instrumentalities’ infringement is presented below.

59. The Accused Instrumentalities include: “[a] system for controlling an HVAC

system at a user's building, the system comprising: a memory; and one or more processors with circuitry and code designed to execute instructions." For example, the Accused Instrumentalities includes memory, processors and circuity and code, to schedule heating and cooling, to set the device into Cool, Heat, Heat/Cool, or Eco modes, and to enable a variety of features including Home/Away Assist, Early-On, automatic scheduling, Sun Block, and others.



How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

Home/Away Assist

Home/Away Assist can use your Eco Temperatures to help save energy while no one's home.

How to change Home/Away Assist settings >

https://support.google.com/googlenest/answer/9244728

Early-On won't activate if everyone'e away

As long as someone is home, Early-On can turn on your system early to reach your scheduled temperature on time. But if everyone is away and your thermostat is set to Eco Temperatures, it will wait to start pre-heating or pre-cooling until someone comes home or until someone manually changes the temperature with the app.

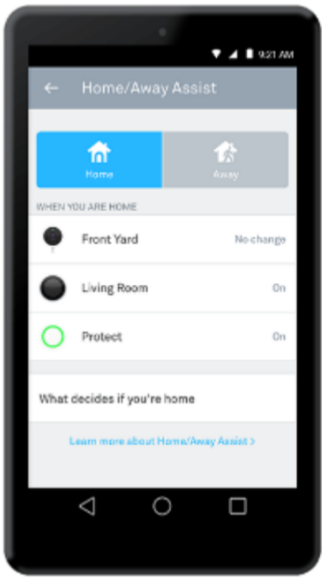
If you use Home/Away Assist, your thermostat will try to stay in Eco Temperatures while you're away.

https://support.google.com/googlenest/answer/9246532

How to change what Nest products do when you're home or away

To change how Home/Away Assist controls your Nest products, follow these steps.

1. Open the Nest app on your phone or tablet. If you're on a computer, go to home.nest.com.
2. Tap **Settings** in the top right corner of the app home screen.
3. Select **Home/Away Assist**.
4. Tap either the **Home** or **Away** icon at the top of the screen. You'll see a summary of what each of your Nest products will do when your home is in that mode.
5. If you want to make any changes, tap on the Nest product you'd like to control.



In general, if you have multiple Nest products in your home, you have different settings for each one. The one exception is Nest Protect: all the Protects in your home share the same Home/Away Assist settings, so you'll only see one Protect in this list.

Settings for each product's Home/Away Assist options are listed below.

https://support.google.com/googlenest/answer/9261489

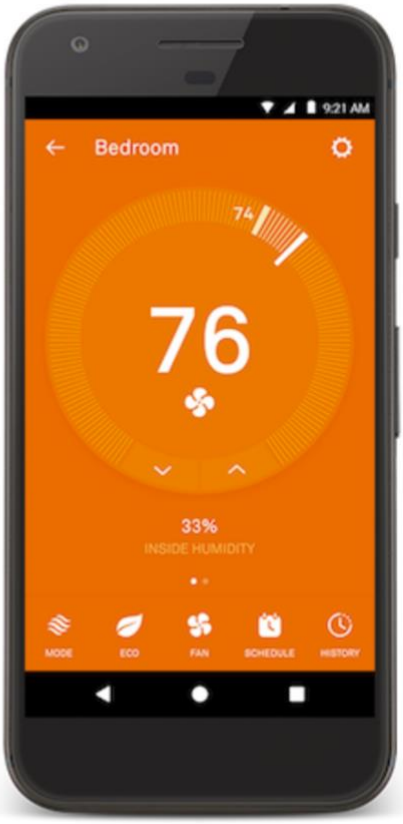
60. The Accused Instrumentalities include "the one or more processors with circuitry and code designed to execute instructions to receive a first data from at least one sensor, wherein

the first data from the at least one sensor includes a measurement of at least one characteristic of the building." For example, the Accused Instrumentalities can determine whether the building is occupied, the internal temperature of the building, and the status of the HVAC system.

How to change the target temperature

1. Drag your finger along the ring to change the target temperature.
2. To fine tune the temperature, tap the up or down arrow at the bottom of the ring.

Note: The screenshot shown here is for the Nest Learning Thermostat, but the controls for the Nest Thermostat E are the same.



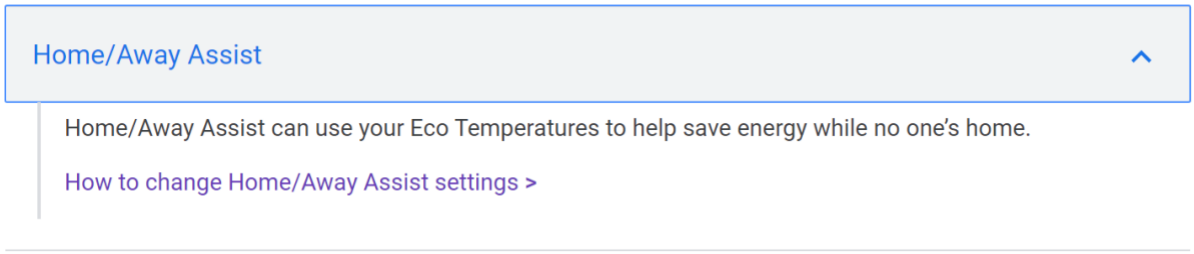
How to switch between Heat, Cool, Heat • Cool, and Off

Your thermostat will automatically switch between Eco and Heat or Cool when you leave home and when you come back, but you can manually set it whenever you want.

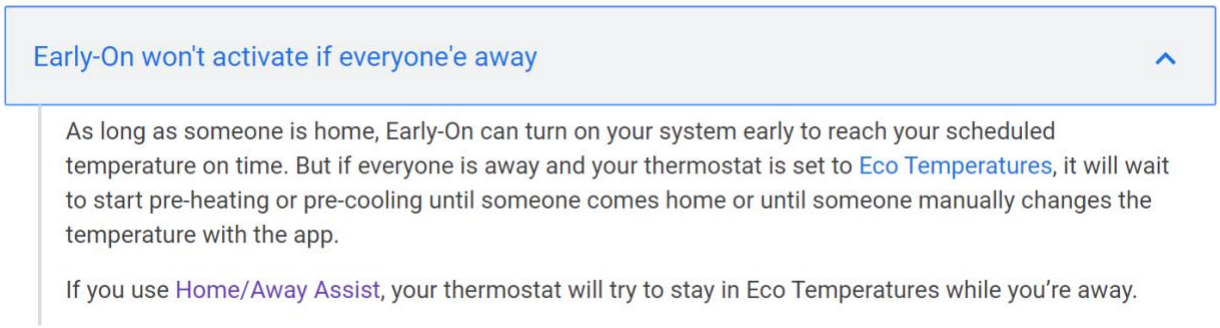
You will see different options in this menu depending on the type of equipment you have installed. Follow the link below to learn more.

How to manually set your Nest thermostat to heating, cooling, Eco Temperatures or off >

https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968



https://support.google.com/googlenest/answer/9244728



https://support.google.com/googlenest/answer/9246532

61. The Accused Instrumentalities include "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." For example, as explained above, the Accused Instrumentalities receive information concerning outdoor temperature, weather, sunrise and sunset times, anticipated rates of temperature change, and mobile device lations, which, on information and belief is received from the internet.

62. The Accused Instrumentalities include "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." For example, as explained above, the Accused Instrumentalities using,

e.g., Home Assist, Early-On, automatic scheduling, and user settings to identify a target temperature set point when the building is occupied (e.g., the temperature set by a user or automatic scheduling) and a temperature setpoint for when the building is unoccupied (e.g., an automatically scheduled away temperature, the Eco setting temperature, Home/Away Assist designated temperature set points, or a temperature that allows for Early-On adjustment when a user arrives home).

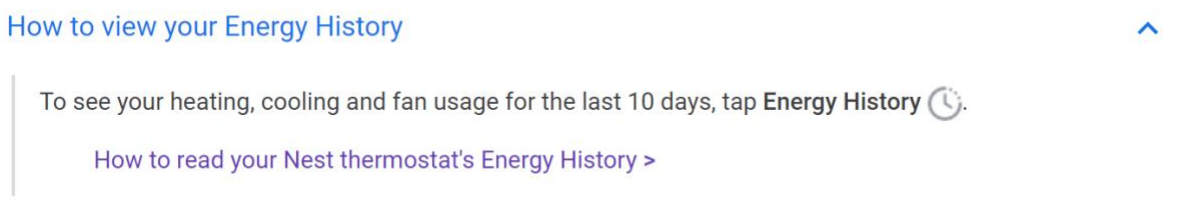
63. The Accused Instrumentalities include "the one or more processors with circuitry and code designed to execute instructions to receive commands through the Internet by way of a remote interface on a mobile, wireless device running software application code; wherein the interface is configured to allow the user to adjust temperature setpoints for the HVAC system; 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." For example, as explained above, using the Google Nest mobile application, a user can change temperature set points and enable or disable features that alter the set point through the user settings in combination with, on information and belief, cloud based features such as automatic scheduling, Home/Away Assist, and Early-On.

64. The Accused Instrumentalities include "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." For example, the Accused

Instrumentalities will provide heating or cooling based on whether a building is occupied or unoccupied through their Home/Away Assist features, automatic temperature scheduling, and Early-On features, among others.

65. The Accused Instrumentalities include "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; the first processor with circuitry and code designed to execute instructions to communicate with the memory." For example, using a mobile device with the Google Nest mobile application, which is not connected to the memory on the Accused Instrumentalities, a user can change the setpoints of the thermostat and enable or disable features capable of doing same. On information and belief, Google's cloud-based program may also communicate with the memory. In addition, the Accused Instrumentalities can communicate with remote sensors, which are configured to communicate with the memory of the Accused Instrumentalities.

66. The Accused Instrumentalities include "wherein the memory is configured to store historical values of the first data and second data." For example, on information and belief, the Accused Instrumentalities store historical information about internal temperature, temperature set points, occupation and activity, external temperature, external weather, mobile device location, etc. as part of the learning features of the device including learning for automatic scheduling, Home/Away Assist, and Early-On and in order to provide Energy History.



https://support.google.com/googlenest/answer/9249866?hl=en&ref_topic=9361968

Viewing Energy History on your thermostat

You can find your Energy History by selecting **Energy** in the Nest thermostat's Quick View menu.

If you're using a Nest Thermostat E, your **Energy** option will be in the **Settings** menu.

Your Energy History at a glance

When you first select **Energy**, you'll see a simple graphic that represents how long your system ran for the day. An orange bar represents heating, and a blue one represents cooling (if available). If your thermostat was in HEAT • COOL mode (if available), or you recently switched between modes, you'll see both orange and blue bars.

Turn the thermostat's ring to see the Energy History for other days. You can look as far back as 10 days ago. Since the Nest thermostat needs time to learn about how you use energy, it will usually take at least a day after installation for information to appear.

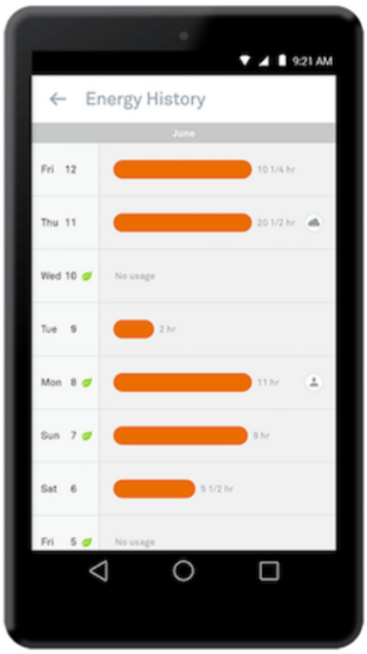
Daily Energy History details

Press the thermostat's ring to see more details about a particular day. Turn the ring to scroll down and to see more information, like if your energy use was significantly higher or lower than the average over the last week. If it was, the thermostat will also show you the main contributor: your adjustments, Home/Away Assist, or the weather.

Press the thermostat ring to go back to the main Energy History screen when you're done, or hold down the ring to exit and return to the thermostat temperature screen.

Viewing Energy History with the Nest app

1. Open the Nest app and tap your Nest thermostat on the home screen.
2. Tap the **History** icon.
3. Here, you'll see a 10 day summary. Tap on any day to see more details about your heating and cooling system's energy use.



https://support.google.com/googlenest/answer/9247300

How your Nest thermostat learns

Note: Nest thermostats learn a different schedule for each temperature mode. For instance, if you currently have your thermostat set to **Heat**, it will learn the temperatures you like for heating your home. If you have both heating and cooling, your thermostat will create separate schedules for **Heat**, one for **Cool**, and another for **Heat•Cool**.

Learning on day one

Your thermostat can start learning your temperature preferences from the day you start using it.

Simply turn the ring to select a new temperature whenever you like. Your thermostat will remember your choice and add it to the schedule that it's building for you.

While your thermostat is learning, the exact behavior you'll see depends on which model you have:

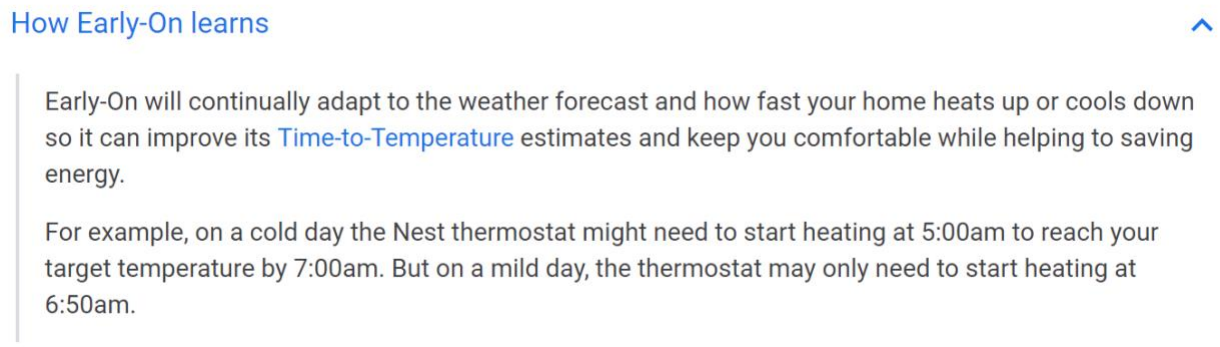
- **3rd, 2nd, or 1st gen Nest Learning Thermostat**: When you adjust the temperature on the first day, your Nest thermostat will hold that temperature until someone changes it. For instance, if you set your thermostat to 70°F (21°C), it will stay at that temperature until it's changed.
- **Nest Thermostat E**: During setup, you'll have the option to choose a pre-programmed schedule that balances energy savings and comfort.
  - If you chose the pre-programmed schedule and **also** have Auto-Schedule turned on, your thermostat will learn your preferences on top of the pre-programmed schedule. So your thermostat will hold its current temperature until someone changes it, or until the next scheduled temperature change, whichever comes first.
  - If you chose **not** to use the pre-programmed schedule, your thermostat will simply hold the temperature until someone changes it.
  - Learn about your options in our article about Nest thermostat schedules.

Learning after about a week and going forward

After about a week, your thermostat will have learned your temperature preferences and it will have settled on a schedule for you.

It will never stop learning, but now it will be less sensitive to each change you make. Going forward, your Nest thermostat will only learn from a **pattern of at least two similar changes**.

https://support.google.com/googlenest/answer/9247510



https://support.google.com/googlenest/answer/9246532

67. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Defendant has injured Plaintiff and are liable for infringement of the ’382 Patent pursuant to 35 U.S.C. § 271.

68. As a result of Defendant’s infringement of the ’382 Patent, Plaintiff is entitled to monetary damages in an amount adequate to compensate for Defendant’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Defendant, together with interest and costs as fixed by the Court.

69. Defendant’s infringing activities have injured and will continue to injure Plaintiff, unless and until this Court enters an injunction prohibiting further infringement of the ’382 Patent, and, specifically, enjoining further manufacture, use, sale, importation, and/or offers for sale that come within the scope of the patent claims.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that this Court enter:

a. A judgment in favor of Plaintiff that Defendant has infringed, either literally and/or under the doctrine of equivalents, the ’492 Patent, the ’488 Patent, the ’327 Patent, and the ’382 Patent;

b. A permanent injunction prohibiting Defendant from further acts of infringement of the ’492 Patent, the ’488 Patent, the ’327 Patent, and the ’382 Patent;

c. A judgment and order requiring Defendant to pay Plaintiff its damages, enhanced damages, costs, expenses, and pre-judgment and post-judgment interest for Defendant’s infringement of the ’492 Patent, the ’488 Patent, the ’327 Patent, and the ’382 Patent;

d. A judgment and order requiring Defendant to provide an accounting and to pay supplemental damages to Plaintiff, including without limitation, pre-judgment and post-judgment interest;

e. A judgment that Defendant’s infringements have been and are willful, and award Plaintiff enhanced damages pursuant to 35 U.S.C. § 284, up to and including trebling of damages;

f. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys’ fees against Defendant; and

g. Any and all other relief as the Court may deem appropriate and just under the circumstances.

DEMAND FOR JURY TRIAL

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: June 17, 2020

Respectfully submitted,

/s/ Reza Mirzaie
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Paul A. Kroeger

C. Jay Chung
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Attorneys for Plaintiff EcoFactor, Inc.

CERTIFICATE OF SERVICE

I hereby certify that the foregoing document was served on all counsel of record via electronic service on June 17, 2020.

/s/ Reza Mirzaie

CERTIFICATE OF SERVICE

I certify that on May 10, 2021, I served a copy of the foregoing document on the following counsel of record and district court judge by Federal Express and electronic mail at the following addresses:

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/s/ Neal Kumar Katyal