United States Court of Appeals for the Federal Circuit

OLLNOVA TECHNOLOGIES LTD.,
Plaintiff-Appellant

v.

ECOBEE TECHNOLOGIES ULC, DBA ECOBEE,
Defendant-Cross-Appellant

2025-1045, 2025-1046

Appeals from the United States District Court for the Eastern District of Texas in No. 2:22-cv-00072-JRG, Judge J. Rodney Gilstrap.

Decided: June 4, 2026

LUCAS M. WALKER, MoloLamken LLP, Washington, DC, argued for plaintiff-appellant. Also represented by ROBERT AUCHTER, Auchter PLLC, Washington, DC; BRETT E. COOPER, BC Law Group, PC, New York, NY.

MICHAEL P. SANDONATO, Venable LLP, Los Angeles, CA, argued for defendant-cross-appellant. Also represented by MANNY CAIXEIRO; JOSHUA DANIEL CALABRO, New York, NY; JASON M. DORSKY, MEGAN S. WOODWORTH, Washington, DC.

Before CHEN, CUNNINGHAM, and STARK, *Circuit Judges*.

CHEN, *Circuit Judge*.

Ollnova Technologies Ltd. (Ollnova) sued ecobee Technologies ULC d/b/a ecobee (ecobee) for patent infringement in the United States District Court for the Eastern District of Texas. Ollnova asserted U.S. Patent Nos. 7,860,495 ('495 patent), 8,264,371 ('371 patent), 7,746,887 ('887 patent), and 8,224,282 ('282 patent) (collectively, the Asserted Patents). The Asserted Patents are directed to improvements in wireless communications used in building automation systems. Ollnova contends that ecobee's smart thermostat products infringe the Asserted Patents.

The jury returned a verdict that (i) found ecobee infringed at least one of the Asserted Patents (but without identifying which patent or patents); (ii) found the '495 patent's asserted claims were not directed only to "well-understood, routine, and conventional" technology; (iii) found the '282 patent's asserted claims were invalid; and (iv) awarded Ollnova lump sum damages of $11.5 million covering the life of the patents.

ecobee appeals the district court's (1) denial of ecobee's motion for a new trial based on the allegedly flawed jury instruction and verdict form as to ecobee's challenge to the '495 patent's validity under 35 U.S.C. § 101; (2) denial of ecobee's motion for judgment as a matter of law that the '495 patent's asserted claims are invalid under 35 U.S.C. § 101; (3) denial of ecobee's motions to dismiss under 35 U.S.C. § 101 for the '887 and '371 patents; (4) denial of ecobee's motion for judgment as a matter of law concerning non-infringement of the '371 patent; (5) denial of ecobee's motion for a new trial due to the verdict form's inclusion of a single question covering infringement for all the Asserted Patents; and (6) denial of ecobee's *Daubert* motions to exclude expert testimony related to damages and its marking defense. Ollnova appeals the district court's order that

prejudgment interest is limited to the time period allowed under 35 U.S.C. § 286.

For the reasons below, we vacate the infringement and damages judgments and remand for proceedings consistent with this opinion, including a new trial on infringement and damages. We vacate and remand for further proceedings under *Alice* step two of the 35 U.S.C. § 101 analysis as to the '495 patent. We affirm the district court's determinations that the asserted claims of the '887 and '371 patents are not directed to an abstract idea under 35 U.S.C. § 101. We also affirm the district court's denial of ecobee's motion for judgment as a matter of law concerning non-infringement of the '371 patent. Because we vacate the damages judgment, we do not reach ecobee's remaining arguments regarding its *Daubert* motions on damages and marking or Ollnova's arguments regarding prejudgment interest.

BACKGROUND

I. Technological Background

This dispute relates to patents directed to improvements in a building automation system (BAS). According to the patent specifications, a BAS is an integrated system of components that automates a process control within a building or facility. *See, e.g.*, '887 patent, col. 1 ll. 6–19. The components include, for example, controllers, sensors, alarms, and air handling units configured to manage heating, ventilation, air conditioning (HVAC), air quality, and fire prevention throughout the individual floors of a building. *Id.* col. 1 ll. 11–17. The components may operate together to detect events, sense conditions, respond to detected events or changes in conditions, and/or control operation of connected devices. *Id.* col. 1 ll. 20–22.

For example, a temperature sensor can detect a temperature reading and communicate that data to a controller. *Id.* col. 1 ll. 20–32. The controller evaluates the

reading to determine whether a responsive control action is needed, such as by comparing the reported temperature to a predetermined limit (e.g., 75°F). *Id.* When the threshold is met, the controller broadcasts control signals to an actuator to adjust airflow in the room to lower the temperature. *Id.*

Traditionally, BAS components used wired communications, which created substantial installation costs and expensive maintenance. '495 patent, col. 1 ll. 38–52. To reduce these costs, the industry moved toward using wireless networks to connect BAS components. *Id.* col. 1 ll. 53–54.

Wireless networks, however, introduced their own technical challenges. Limited bandwidth can constrain the number of devices connected to the system and the amount of information communicated over the system. '887 patent, col. 1 ll. 34–46. Continuous monitoring and broadcasting by a building's sensors also consumes large amounts of power. *Id.* Moreover, wireless communication systems are susceptible to communication errors and data loss. *See* '371 patent, col. 8 ll. 10–25.

The Asserted Patents address these technical problems by taking various steps to reduce power usage and bandwidth use and also implement redundancy mechanisms to mitigate data loss in the event of communications failures.

The '495 patent, titled "Wireless Building Control Architecture," issued on December 28, 2010. It describes a BAS that utilizes two wireless networks having different associated protocols. *See* '495 patent, col. 4 l. 60 – col. 5 l. 30. The patent further describes that BAS systems may be implemented using multiple tiers or architectural levels. *Id.* col. 1 ll. 9–15. For example, a floor-level network may provide control for a particular floor of a building and may adjust heating or cooling to regulate temperature within rooms on that floor. *Id.* col. 1 ll. 14–23. A building-level network integrates multiple floor-levels to provide

coordinated control across zones within a building and may adjust centralized systems such as pumps or fans. *Id*. col. 1 ll. 24–28.

While prior-art systems may have used a single wireless network to connect the floor-level and building-level functions, the '495 patent describes using two wireless networks having different associated protocols (e.g., WiFi and Bluetooth). The patent further describes two modes of operation: (1) a first mode where a first wireless network controls building components "free of communications with the second wireless network" and in response to sensors on the first wireless network (e.g., floor-level control); and (2) a second mode where the first wireless network controls building components in response to data from the second wireless network (e.g., building-level coordination). *See id.* at claim 1; *id*. col. 2 ll. 18–36, 53–64.

This architecture provides redundancy by providing for two separate wireless networks using different protocols, ensuring that control of building components is maintained if one network fails. For example, in normal operation, a first network (e.g., floor level) may control building components using Bluetooth in coordination with input from a second network (e.g., building level) via WiFi. *Id*. col. 2 ll. 18–30. In the event of a WiFi outage, the first network may continue to operate using local control alone. *Id*. col. 10 ll. 36–39. In this manner, the first network benefits from coordination with information from the second network during normal operation, while remaining capable of continuing local operation when second network communications are unavailable. *See id.* col. 4 ll. 42–48.

Claim 1 is representative and reproduced below:

> 1. A control system for wireless building automation control, the control system comprising:

> a first wireless network in a building having first wireless communications protocol; and
>
> a second wireless network in the building having a second wireless communications protocol, the first wireless communications protocol different than the second wireless communications protocol;
>
> wherein the first wireless network is operable to control, free of communications with the second wireless network, building components in response to sensors operable within the first wireless network, and wherein the first wireless network is also operable to control the building components in response to data from the second wireless network.

Id. at claim 1.

The '887 patent, titled "Dynamic Value Reporting for Wireless Automated Systems," issued on June 29, 2010. It addresses problems of limited bandwidth, signal interference, and power usage through an improved wireless automation device that curtails sensor monitoring while also minimizing transmissions across the wireless network. '887 patent, col. 1 ll. 34–50.

According to the patent, unlike conventional systems that rely on *continuous* monitoring and transmission, the claimed invention operates according to defined polling and transmission intervals. *Id.* A controller polls a sensor only within a polling interval to obtain a reading of a sensed condition. *Id.* col. 1 ll. 63–66; *id.* col. 9 ll. 23–50. During that polling period, the controller determines if the sensed condition falls outside of a predetermined range. *Id.* col. 9 ll. 51–53; *id.* col. 10 ll. 12–30.

Based on that determination, the controller selectively controls a transceiver to transmit data during a period of a transmission interval, and when the sensed condition falls outside the predetermined range. *Id.* col. 10 l. 57 – col. 11 l. 3. If the condition remains within the range, the processor suspends transmission. *Id.* col. 14 l. 67 – col. 15 l. 4. Cutting back on a device's network traffic in this way enables more devices to operate on the same wireless network. *Id.* col. 1 ll. 56–62.

Claim 1 is representative and reproduced below:

1. A wireless automation device, comprising:

> a transceiver operable to wirelessly communicate packets of information over a wireless network;
>
> a sensor operable to generate a [*sic*] indicator for a sensed condition;
>
> a controller configured to poll the sensor at a polling interval to read the indicator during a current period of the polling interval and to selectively operate the transceiver to communicate information associated reading of the indicator; and
>
> a memory, the controller storing a reading of the indicator during the current period in the memory, where the memory stores at least one prior reading of the indicator, the prior reading of the indicator made during a prior period of the polling interval,
>
> wherein the transceiver is configured to transmit a most recent reading of the indicator stored in the memory during a period of a transmission interval in response to detecting a change in the sensed condition outside a predetermined range and wherein transmission of

> the most recent reading of the indicator stored in the memory during the period of the transmission interval is suspended in response to detecting a change in the sensed condition within the predetermined range.

Id. at claim 1.

The '371 patent, titled "Method and Device for Communicating Change-of-Value Information in a Building Automation System," issued on September 11, 2012. It describes techniques for wirelessly communicating "change-of-value" (COV) information within a BAS, where COV information indicates whether any monitored values have changed beyond a predetermined reporting limit (e.g., a temperature set point). *See* '371 patent, col. 2 ll. 18–25; *id*. col. 6 ll. 44–49. In such systems, communication of COV information between distributed automation components can be constrained by limited wireless bandwidth and may be vulnerable to data loss during communications failure. *See id.* col. 7 ll. 62–65; *id*. col. 8 ll. 10–25.

The '371 patent describes two communication approaches for transmitting COV information between peripheral and centralized automation components. *See id*. col. 6 l. 20 – col. 7 l. 65. In a polling-based approach, a centralized automation component transmits COV request messages to one or more peripheral components (e.g., a sensor). *Id*. col. 6 ll. 36–44. Each peripheral component then evaluates whether a change of value has occurred and responds to the centralized automation component with an acknowledgment indicating whether relevant changes are present. *Id*. col. 6 ll. 44–61.

In contrast, the patent also describes a push-based approach in which peripheral components monitor their own inputs and outputs to determine whether a value has changed beyond a predefined threshold. *Id*. col. 7 ll. 11–27. When such a change occurs, the peripheral device generates a "Push COV message" that may include other queued

COV values and transmits the message to the centralized automation component. *Id*. col. 7 ll. 27–30. The centralized automation component then processes the received COV values and may report those updated values to another device. *Id*. col. 7 ll. 39–42.

In this push configuration, COV messages are aggregated into a "COV update" at peripheral components and transmitted to a centralized component, which may further distribute the information within the system. *Id*. col. 7 ll. 58–65. The patent explains that this approach can reduce wireless bandwidth usage and end-to-end delays by avoiding repeated polling of peripheral devices that may not have updated values, and, instead, transmitting aggregated updates to a centralized component only when changes are detected. *Id*.

The '371 patent also describes techniques for mitigating communications failure. *Id*. col. 8 ll. 10–25. In particular, to ensure that a communication attempt is successful, a communication transmission may be repeated a predetermined number of times or until an acknowledgment message is returned. *Id*. col. 8 ll. 13–19; *id*. at claim 13. In addition, "the COV-related messages may still be aggregated and stored pending the reestablishment of communications." *Id*. col. 8 ll. 22–25.

Claim 13 is representative and reproduced below:[1]

> 13. An automation component configured for wireless communication within a building automation system, the automation component comprising:

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[1] Although claim 13 was withdrawn before trial, the district court used it as the representative claim in its Section 101 analysis, and neither party disputes that it is representative for purposes of evaluating patent eligibility for the asserted claims of the '371 patent. *See* J.A. 134–35.

> a wireless communications component;
>
> a processor in communication with the wireless communications component;
>
> a memory in communication with the processor, the memory configured to store computer readable instructions which are executable by the processor;
>
> wherein the computer readable instructions are programmed to:
>
> receive at least one change-of-value update via the wireless communications component, wherein the change-of-value update includes a plurality of change-of-value messages received from a plurality of devices;
>
> storing the at least one change-of-value update corresponding to at least one wireless device; and
>
> communicate the at least one change-of-value update in response to a polling request and repeat the at least one change-of-value update at regular intervals according to a schedule or until a change-of value acknowledgment is received.

Id. at claim 13.

By reciting the receipt of a "change-of-value update" that "includes a plurality of change-of-value messages received from a plurality of devices," claim 13 corresponds to the specification's description of aggregating COV messages from peripheral devices and then transmitting those aggregated messages to a centralized automation component. *See id*. at claim 13; *id*. col. 7 ll. 11–30. Consistent with that disclosure, the claimed "automation component" corresponds to a centralized component that receives aggregated COV information from multiple devices, as

described in the push-based approach of the specification. *Id.* col. 7. ll. 58–62.

The claim also describes the claimed "automation component" repeating its communication of the change-of-value update at regular intervals or until acknowledgment, which the specification explains is a technique that addresses "communications failure" that can occur in the wireless network of the BAS. *See id.* col. 8 ll. 10–25. Thus, claim 13 reflects a combination of the push-based aggregation of COV data and the repeated techniques disclosed in the specification.

II. Procedural Background

On March 8, 2022, Ollnova sued ecobee for infringement of the Asserted Patents[2] in the Eastern District of Texas. ecobee moved to dismiss on the ground that each Asserted Patent claims ineligible subject matter under Section 101. The district court denied ecobee's motion, holding (1) the '495 patent's claims were directed to the abstract idea of "controlling generic 'components' using information from two separate sources (i.e., information from two separate networks)," but "factual disputes" existed concerning *Alice* step two, J.A. 132–33; and (2) the remaining patents were eligible because they satisfied *Alice* step one.

The district court then held a jury trial on invalidity, infringement, and damages. Although the parties jointly proposed a verdict form requiring a separate response for each of the Asserted Patents as to infringement liability, J.A. 8079, the district court on its own included only a single infringement question covering all Asserted Patents:

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[2] The asserted claims at trial consisted of claims 1, 11, 12, and 20 of the '887 patent; claims 1 and 2 of the '495 patent; claims 1, 3, 6, and 21 of the '282 patent; and claims 1, 5, and 17 of the '371 patent (collectively, the Asserted Claims).

"Did Ollnova, the Plaintiff, prove by a preponderance of the evidence that ecobee, the Defendant, infringed **ANY** of the Asserted Claims of the Asserted Patents?" J.A. 8388. By contrast, the invalidity question on the verdict form was broken up on a patent-by-patent, claim-by-claim basis. J.A. 8390.

The district court also overruled ecobee's objection to the court's draft final jury instruction and verdict form on the '495 patent's eligibility. The instruction and form did not inform the jury that the claims were directed to an abstract idea nor instruct the jury that the abstract idea itself could not supply the inventive concept under *Alice* step two.

The district court thus instructed the jury:

> To succeed on its claims for patent ineligibility, ecobee must establish two things. The first is whether the claims are directed to an abstract idea. That issue is one for the Court to decide and not the jury. It is not something you will have to decide in this case.
>
> However, you, the jury, will decide the second question related to patent eligibility. Specifically, and in that regard, *ecobee must show that the claims involve nothing more than the performance of activities which a person of ordinary skill in the art would have considered well-understood, routine, and conventional at the time the patent application was filed.* You, the jury, will determine this issue.

J.A. 2139, [1240:4–15] (emphasis added).

Likewise, the question on the verdict form regarding subject matter eligibility of the '495 patent claims asked:

> Did ecobee prove by clear and convincing evidence that the limitations of the asserted claims of the '495 Patent, when taken individually or when

> taken as an ordered combination, involve only technology which a person of ordinary skill in the art would have considered to be well-understood, routine, and conventional as of April 9, 2004?

J.A. 8389.

The jury returned a verdict that: (i) ecobee infringed at least one of the Asserted Patents (without any opportunity to identify which patent(s) or which patent claim(s)); (ii) the '495 patent's asserted claims were not directed only to "well-understood, routine, and conventional" technology; (iii) the '282 patent's asserted claims were invalid; and (iv) Ollnova was entitled to lump sum damages of $11.5 million. J.A. 8385–93. The district court entered final judgment for Ollnova, J.A. 1–3, and denied ecobee's post-judgment motions. *See Ollnova Techs. Ltd. v. ecobee Techs. ULC*, No. 2:22-CV-00072-JRG, 2024 WL 4107484, at *1 (E.D. Tex. Sept. 6, 2024); *Ollnova Techs. Ltd. v. ecobee Techs. ULC*, No. 2:22-CV-00072-JRG, 2024 WL 4107482, at *1 (E.D. Tex. Sept. 6, 2024); J.A. 4–47.

Both sides timely appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(1).

DISCUSSION

On appeal, ecobee raises several issues: (1) whether the single question on the verdict form covering all the Asserted Patents was improper; (2) whether the jury instruction and verdict form on the '495 patent's ineligibility under § 101 erroneously failed to identify the abstract idea and instruct the jury that it could not rely on the abstract idea itself to find that the claims were not well-understood, routine, or conventional; (3) whether ecobee is entitled to judgment as a matter of law that the '495 patent's asserted claims are not patent eligible under § 101; (4) whether the asserted claims of the '371 and '887 patents are patent ineligible under § 101; (5) whether a jury could have found that ecobee's products infringe claims of the '371 patent;

and (6) whether the district court erred in admitting certain expert opinions regarding damages and marking. For its part, Ollnova raises the single issue of whether the district court properly limited the accrual of prejudgment interest for a lump sum reasonable royalty to the time period allowed under 35 U.S.C. § 286.

We address the issues relating to the verdict form, jury instructions, invalidity, and infringement in turn. Because we vacate the infringement verdict upon which the damages award is based, we also vacate the damages award and need not reach the issues raised by ecobee and Ollnova regarding damages, marking, or prejudgment interest.

I

We first address ecobee's challenges to the verdict form and jury instructions. On issues of patent law, we apply Federal Circuit law to review the legal sufficiency of jury instructions without deference to the district court. *Eko Brands, LLC v. Adrian Rivera Maynez Enters., Inc.*, 946 F.3d 1367, 1378 (Fed. Cir. 2020) (citation omitted). A party challenging jury instructions must generally "prove the jury instructions read in their entirety were incorrect or incomplete as given." *Id.* (citation omitted). To the extent jury instructions or the verdict form do not implicate an issue of patent law, they are reviewed for abuse of discretion under the law of the regional circuit (here, the Fifth Circuit). *Optis Cellular Tech., LLC v. Apple Inc.*, 139 F.4th 1363, 1373 (Fed. Cir. 2025) (citing *R.R. Dynamics, Inc. v. A. Stucki Co.*, 727 F.2d 1506, 1515 (Fed. Cir. 1984)).

A

ecobee argues that the verdict form improperly combined all Asserted Patents into a single infringement question and permitted the jury to find liability without unanimous agreement that ecobee infringed any particular claim of any patent. We agree.

This Court's decision in *Optis Cellular Technology, LLC v. Apple Inc.* held that a materially identical verdict form constituted an abuse of discretion. 139 F.4th at 1374–76. We vacated the infringement judgment, explaining that, where multiple patents are asserted as distinct causes of action, a single combined infringement question created an unacceptable risk of a non-unanimous general verdict. *Id.* The verdict form permitted a finding of infringement without requiring juror agreement as to which patent was infringed—so long as each juror believed that some claim of some patent was infringed, he or she could enter a finding of infringement, even if various jurors believed that different asserted patents were infringed. *Id.* That structure erroneously required a "Yes" answer to the question of whether defendant infringed "ANY" of the asserted claims even in a situation where all jurors did not agree that the same patent was being infringed. *Id.* Such a result violated the defendant's right to a unanimous verdict on each legal claim against it as it related to infringement. *Id.* at 1374. ("'Unanimity in jury verdicts is required where,' as here, the 'Seventh Amendment[] appl[ies].'" (quoting *Andres v. United States*, 333 U.S. 740, 748 (1948))). Accordingly, we held that to ensure a unanimous verdict, "the verdict form needed to have included, at the very least, separate infringement questions for each asserted patent." *Id.* at 1375.

Optis rejected the same arguments raised by Ollnova here. In *Optis*, as here, the patent owner argued that the unanimity issue was remedied by jury instructions requiring unanimity and assessing infringement on a claim-by-claim basis. *Id.* at 1375; *see* Appellant Resp. Br. 60. We disagreed, explaining that the jury could have followed those instructions yet understood that it only needed to be unanimous as to the question presented on the verdict form—whether defendant infringed "**ANY**" of the asserted claims—not whether defendant infringed the same patent. *Optis*, 139 F.4th at 1376. We further explained that

parsing the damages verdict in an effort to demonstrate unanimity does not establish that the jury actually agreed that the same patent was infringed. *Id.*; *see* Appellant Resp. Br. 60.

We also reject Ollnova's contention that ecobee forfeited its unanimity argument. *See* Appellant Resp. Br. 60. On this record, ecobee preserved the issue. ecobee objected that, as written, the verdict form was "incomplete in view of . . . evidence re[quiring] patent-by-patent analysis" and expressly requested that the infringement question "list each patent separately." J.A. 2111, [1212:11–23]. Although it did not explicitly use the term "unanimity," its timely-made objection specifically argued that the verdict form was incomplete and would confuse the jury by grouping all four Asserted Patents into a single question. *Id.* Moreover, the district court addressed the unanimity issue on the merits, which preserves the issue for appeal. *Ollnova Techs.,* 2024 WL 4107484, at *5; *see Optis*, 139 F.4th at 1374 n.5 (first citing *LaserDynamics, Inc. v. Quanta Comput., Inc.*, 694 F.3d 51, 70–71 (Fed. Cir. 2012); and then citing *Garriott v. NCsoft Corp.*, 661 F.3d 243, 249 (5th Cir. 2011)).

For the foregoing reasons, we see no basis to depart from *Optis*, and conclude that the district court here likewise abused its discretion by submitting a single infringement question to the jury covering all the Asserted Patents. The infringement judgment is therefore vacated.[3]

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[3] We need not reach the issue of whether the verdict form needed to be broken out on a claim-by-claim basis because ecobee argues only that the verdict form should have broken up the infringement question on a patent-by-patent basis as the parties jointly proposed to the district court. *See* Cross-Appellant Br. 65–69; *Optis*, 139 F.4th at 1375 n.6.

Because a new trial on infringement is required, we must also vacate the damages judgment awarding Ollnova $11.5 million. Absent a finding of infringement at a new trial, there is no basis for an award of damages.

B

Next, we address ecobee's argument that the jury instructions and verdict form on the '495 patent's eligibility were erroneous. We agree.

Section 101 defines patent-eligible subject matter as "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." 35 U.S.C. § 101. Laws of nature, natural phenomena, and abstract ideas, however, are not patentable. *Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc.*, 566 U.S. 66, 70 (2012). Such categories of subject matter are excluded from patent-eligibility because they represent "the basic tools of scientific and technological work." *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013) (internal quotations and citation omitted).

To determine whether an invention claims ineligible subject matter, we engage in a two-step process established by the Supreme Court in *Alice*. *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 217–18 (2014). At *Alice* step one, we "determine whether the claims at issue are directed to a patent-ineligible concept." *Id.* at 218. At *Alice* step two, we consider "the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application." *Id.* at 217 (cleaned up). Such additional elements, to "constitute an inventive concept," "must be more than well-understood, routine, conventional activity." *Sanderling Mgmt. Ltd. v. Snap Inc.*, 65 F.4th 698, 704 (Fed. Cir. 2023) (cleaned up) (citation omitted).

Here, the district court held at step one that the '495 patent's claims were directed to the abstract idea of

"controlling generic 'components' using information from two separate sources (i.e., information from two separate networks)."[4] J.A. 129–134. The district court further concluded that "factual disputes" concerning *Alice* step two precluded summary judgment. J.A. 82; 133–34.

However, neither the district court's *Alice* step two verdict form nor the related jury instructions informed the jury that the '495 patent's claims were directed to an abstract idea, much less specified what that abstract idea was. Nor did they instruct the jury that the abstract idea itself could not supply the inventive concept under *Alice* step two.

The verdict form asked only whether "ecobee prove[d] by clear and convincing evidence that the limitations of the asserted claims of the '495 Patent, when taken individually or when taken as an ordered combination, involve only technology which a person of ordinary skill in the art would have considered to be well-understood, routine, and conventional as of April 9, 2004[.]" J.A. 8389. Similarly, the district court's instructions did not include any identification of or reference to the abstract idea, instead noting only that step one "is one for the Court to decide and not the jury." J.A. 2139, [1240:4–15] (final); J.A. 8099–101 (draft).

ecobee objected to the district court's verdict form and jury instructions and tendered alternative instructions that identified the abstract idea. J.A. 2103–06, [1204:13–1207:5]. The district court overruled ecobee's objections and denied ecobee's post-judgment motion on the '495

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[4] On appeal, neither party challenges the district court's conclusion that the asserted claims of the '495 patent are directed to an abstract idea. We thus assume without deciding that the claims are directed to an abstract idea.

patent ineligibility jury instruction issue. *Ollnova Techs.*, 2024 WL 4107482, at *7–9.

Although *Alice* step two "involves a question of law," *AI Visualize, Inc. v. Nuance Commc'ns, Inc.*, 97 F.4th 1371, 1379 (Fed. Cir. 2024), it may also involve underlying factual determinations regarding whether claim limitations were well-understood, routine, and conventional, *BSG Tech LLC v. Buyseasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018). In this case, the jury was asked to resolve those factual questions as to the '495 patent's claim limitations. *See* J.A. 8119. The parties and the district court further treated the jury's finding as essentially resolving *Alice* step two—that is, if the jury identified any aspect of the claim that was not well-understood, routine, and conventional, that sufficed to establish an inventive concept. *See* J.A. 2139, [1240:4–15]; J.A. 59.[5] In other words, the jury was effectively asked to determine whether the claim contained an inventive concept without being instructed on the underlying abstract concept required to frame that analysis under *Alice*.

Under that framework, the district court's instruction was inconsistent with this Court's precedent. This Court has explained that "[a]fter identifying an ineligible concept at step one, we ask at step two '[w]hat else is there in the claims before us?'" *BSG Tech*, 899 F.3d at 1290 (quoting *Mayo*, 566 U.S. at 78). Moreover, "a claimed invention's use of the ineligible concept to which it is directed cannot supply the inventive concept that renders the invention 'significantly more' than that ineligible concept." *Id.*; *see also Trading Techs. Int'l, Inc. v. IBG LLC*, 921 F.3d 1378, 1385 (Fed. Cir. 2019) ("The abstract idea itself cannot

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[5] To be clear, the issue on appeal is narrow and concerns the district court's failure to instruct the jury on the abstract idea.

supply the inventive concept, 'no matter how groundbreaking the advance.'" (citation omitted)).

Consistent with that principle, this Court's precedent evaluates the alleged inventive concept at step two in light of the abstract idea identified at step one.[6] *See Trading Techs.*, 921 F.3d at 1384–85 (determining that the purported inventive concept merely implemented the abstract idea of "providing a trader with additional financial information to facilitate market trades"); *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 774 (Fed. Cir. 2019) (holding that the claimed "network-controlled" charging stations "merely mirror[ed] the abstract idea itself" and therefore could not supply an inventive concept); *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1348 (Fed. Cir. 2016) (holding that inventive concept was a specific implementation of a filtering system, although filtering itself was an abstract idea). Here, the district court's instruction failed to identify the abstract idea, effectively permitting the jury to treat the abstract idea itself as supplying the inventive concept, contrary to this Court's precedent. "[T]he relevant inquiry" is "whether the claim limitations other than the invention's use of the ineligible concept to which it was directed were well-understood, routine and conventional." *BSG Tech*, 899 F.3d at 1290.

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[6] Ollnova's reliance on the non-precedential opinion *Infernal Technology, LLC v. Sony Interactive Entertainment LLC*, No. 2022-1647, 2024 WL 390881, at *9 (Fed. Cir. Feb. 2, 2024), in which the jury instructions were not challenged, is unpersuasive. *See* Appellant Resp. Br. 39–40. Also, while the district court submitted the *Alice* step two question to the jury, it ultimately concluded post-trial that the claims were not directed to an abstract idea at step one, compelling denial of the Section 101 challenge in any event.

None of the cases cited by Ollnova permit consideration of step two without first identifying[7] an abstract idea at step one. *See* Appellant Resp. Br. 40. In *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1303 (Fed. Cir. 2016), and *CosmoKey Solutions GmbH & Co. KG v. Duo Security LLC*, 15 F.4th 1091, 1097 (Fed. Cir. 2021), we first recognized the district court's identification of an abstract idea at step one before evaluating at step two whether the claims contained an inventive concept beyond that abstract idea. Likewise, in *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014), after identifying various characterizations of the abstract idea in the claims, we proceed to step two and concluded that, "under any of these characterizations of the abstract idea, the . . . claims satisfy *Mayo/Alice* step two."

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[7] An abstract idea may be identified, for example, not just by a ruling but instead by stipulation, assumption, or otherwise. Thus, nothing in this opinion should be taken to cast doubt on district courts' practice of denying motions—to dismiss, for summary judgment, or for judgment as a matter of law—based on the existence of fact disputes at step two, without definitively ruling as to step one. *See, e.g.*, *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1126–28 (Fed. Cir. 2018) (reviewing motion to dismiss and only considering *Alice* step two); *Coop. Ent., Inc. v. Kollective Tech., Inc.*, 50 F.4th 127, 131 (Fed. Cir. 2022) ("We need not address the parties' dispute regarding the application of *Alice* step one because, as explained below, the claims contain alleged inventive concepts not limited to the abstract idea, which defeat Kollective's Rule 12 motion."). Nevertheless, district judges always retain discretion to determine the abstract idea before proceeding to step 2, and doing so sometime before trial can avoid the possibility that an after-trial resolution of step 1 would identify a different abstract idea than reflected in the jury charge, requiring a new trial.

Ollnova contends that ecobee improperly sought to require the district court to separate out the abstract elements of the claim from the non-abstract elements. *See* Appellant Resp. Br. 41. That mischaracterizes ecobee's position. ecobee's proposed instruction tracked the district court's own articulation of the abstract idea ("I found that the asserted claims are directed to the abstract idea of 'controlling generic components using information from two separate sources'") and cautioned the jury not to rely on that abstract idea in step two ("when considering whether the '495 patent discloses an inventive concept, you must consider what, if anything, is in the claim beyond the abstract idea itself"). J.A. 2104–06, [1205:6–1207:3]. ecobee's proposed instruction was consistent with this Court's step-two framework, and the district court abused its discretion in rejecting it.

Nor was the district court's failure to instruct the jury on the abstract idea harmless error. Because the jury was not informed of the abstract idea, it could not evaluate whether the asserted claims were well-understood, routine, and conventional in light of the abstract idea identified at step one, and we cannot determine whether the jury relied on that abstract idea to supply the inventive concept in reaching its verdict. Ollnova argues that any error is harmless because the experts purportedly focused their trial testimony regarding step two on limitations beyond the abstract idea. *See* Appellant Resp. Br. 43–44. But Ollnova's expert's description of the allegedly inventive concept closely tracks the abstract idea itself. The district court identified the abstract idea as "*controlling* generic 'components' using information from *two separate sources*" while Ollnova's expert characterized the inventive concept as a system with "'*two modes*' of *control*,"—including "one where both networks work together to *control* and one where the first wireless network is operable to *control* free of communications [with the second network]." J.A. 63–64 (emphases added) (alteration in original). Because the jury

was not instructed as to what the abstract idea was, the jury was permitted to rely on the abstract idea itself as supplying the inventive concept in the step two analysis. The error was therefore not harmless.

For the foregoing reasons, we vacate and remand to the district court for further proceedings on *Alice* step two of the Section 101 analysis as to the '495 patent. If, on remand, the district court chooses to have the jury decide whether what is alleged to be the inventive concept is well-understood, routine, and conventional, then the jury should be instructed as to the abstract idea and informed that the abstract idea cannot supply the inventive concept. *See Optis*, 139 F.4th at 1380 n.11.

II

We next address ecobee's Section 101 validity challenges. First, ecobee challenges the district court's denial of ecobee's motion for judgment as a matter of law that the '495 patent's asserted claims are invalid under 35 U.S.C. § 101. Second, ecobee challenges the district court's denial of ecobee's motions to dismiss under 35 U.S.C. § 101 for the '887 and '371 patents. As explained below, we reject each of these arguments.

A

ecobee argues that it is entitled to judgment as a matter of law that the '495 patent's asserted claims are not patent eligible. Cross-Appellant Br. 31–38. Under the governing standard, ecobee's argument fails.[8]

A district court's decision on a motion for a judgment as a matter of law is reviewed under the law of the

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[8] Because Ollnova does not argue that the '495 patent's asserted claims are eligible as a matter of law, we decide only whether the jury had a legally sufficient basis for finding the claims eligible.

"applicable regional circuit," here, the Fifth Circuit. *Lighting Ballast Control, LLC v. Philips Elecs. N. Am. Corp.*, 790 F.3d 1329, 1342 (Fed. Cir. 2015) (citation omitted). In the Fifth Circuit, "[a] challenge to a JMOL ruling on an issue preserved in district court is reviewed *de novo*, applying the same standard applied by the district court." *Montano v. Orange Cnty.*, 842 F.3d 865, 873 (5th Cir. 2016) (citation omitted). Judgment as a matter of law is appropriate only when "a party has been fully heard on an issue and there is no legally sufficient evidentiary basis for a reasonable jury to find for that party on that issue." *Id.* (internal quotations and citations omitted).

The district court held claim 1 of the '495 patent to be "directed to the abstract idea of controlling generic components using information from two separate sources (i.e., information from two separate networks)." J.A. 132 (internal quotations omitted). But, in denying ecobee's motion for summary judgment, the court explained that ecobee's expert's opinions that the combination of the elements was not well-understood, routine, and conventional "is part of why there remain material fact questions that should go to the jury on this issue." J.A. 2284 [69:5–13]. Those same factual disputes foreclose judgment as a matter of law.

This Court has recognized that "an architecture providing a technological solution to a technological problem" can "provide[] the requisite 'something more' than the performance of 'well-understood, routine, [and] conventional activities previously known to the industry." *Amdocs*, 841 F.3d at 1301 (citation omitted, first alteration added). Here, the key dispute between the parties was whether the '495 patent's claimed dual-network architecture—particularly the requirement that one network can operate "free of communications" from the other—was conventional at the time of the invention or otherwise provide an inventive concept to survive *Alice* step two. '495 patent at claim 1.

The '495 patent describes an architecture in which a floor-level (first) wireless network can continue to control building components independently of a higher-level (second) network, enabling continued operation during interrupted communications with the higher-level network. *See* '495 patent, Abstract; *id*. col. 2 ll. 14–36; *id*. col. 10 ll. 36–41. The claimed architecture allows coordinated operation when both networks are available, while preserving local control when the higher-level network is unavailable.

At trial, Ollnova's expert, Dr. Madisetti, identified the inventive concept through such "two modes" of control: "one where both networks work together to control" building components and "one where the first wireless network is operable to control free of communications" with the second network. J.A. 1691–92, [1073:23–1074:15]. He explained that prior art systems relying on a single wireless network could "lose control of [their] functionality" in the event of a "communication failure," such that a user "could have wrong measurements and that will result in different improper settings of your HVAC equipment that could result in overheating or overcooling . . . ." J.A. 467, [268:18–24]; J.A. 468, [269:2–5]. In the '495 patent's system, in contrast, he explained that the claimed architecture ensured that if there was "communication failure" with one network, the invention ensured that "you don't lose control over your HVAC . . . and your equipment." J.A. 468, [269:20–25]; *see also* J.A. 688, [280:2–19] (testifying that "even if you lose WiFi connectivity, the [Bluetooth] network is sufficient to allow the system to . . . control your HVAC and other systems").

ecobee contends that this concept is indistinguishable from the abstract idea of "controlling generic 'components' using information from two separate [networks]." Cross-Appellant Br. 33 (alteration in original). But this argument ignores the essence of Dr. Madisetti's testimony, which was that the patent's inventive concept was "the application of multiple wireless networks that were *free of*

communication from each other" "for more reliant control of a building's automation systems." *Ollnova Techs.*, 2024 WL 4107482, at *6 (emphases added). Notably, ecobee's expert, Dr. Martens, did not meaningfully address the claim requirement that the first network operates "free of communications" from the second network in his ineligibility analysis. *See generally* J.A. 1578–84, [918:11–924:6].

ecobee further contends that the claims cannot supply an inventive concept because they do not expressly recite the benefit of maintaining control during system failure. Cross-Appellant Br. 36. But "[c]laims need not articulate the advantages of the claimed combinations to be eligible." *Uniloc USA, Inc. v. LG Elecs. USA, Inc.*, 957 F.3d 1303, 1309 (Fed. Cir. 2020). In any event, claim 1 expressly requires that the "first wireless network is operable to control, free of communications with the second wireless network," which embodies that functionality. '495 patent at claim 1.

In sum, the record contains sufficient evidence from which a reasonable jury could have found that the claimed dual-network architecture of the '495 patent was not well-understood, routine, or conventional. Hence, judgment as a matter of law is unwarranted.

B

ecobee next contends that the district court erroneously concluded that the asserted claims of the '887 patent are not directed to an abstract idea. We disagree.

Patent eligibility under 35 U.S.C. § 101 is a question of law that may involve underlying questions of fact. *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1342 (Fed. Cir. 2018) (citation omitted). "We review the district court's ultimate conclusion on patent eligibility de novo." *Id.* (citation omitted).

"In our eligibility analysis, we consider the claim as a whole, and read it in light of the specification." *Packet*

Intel. LLC v. NetScout Sys., Inc., 965 F.3d 1299, 1309 (Fed. Cir. 2020) (citations omitted). But, "while the specification may help illuminate the true focus of a claim, when analyzing patent eligibility, reliance on the specification must always yield to the claim language in identifying that focus." *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 766 (Fed. Cir. 2019); *see also Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1149 (Fed. Cir. 2016) ("The § 101 inquiry must focus on the language of the Asserted Claims themselves.").

We have held inventions to be patent-eligible where they recite "a technological solution to a technological problem." *See Packet Intel.*, 965 F.3d at 1309. For example, in *Packet Intelligence*, we held that the claims directed to classifying computer network traffic were patent eligible at step one because they addressed a challenge unique to computer networks—identifying disjointed connection flows—and recited a specific technique for meeting that challenge. *Id.* Although the claims recited general steps for data classification, the specification provided important context in explaining how those claimed steps purported to address problems in the prior art by providing a more granular, nuanced, and useful classification of network traffic to better match disjointed data connection flows. *Id.*

Like the claims in *Packet Intelligence*, the claims here are directed to a specific technology-based improvement in the operation of a network, here using a "wireless automation device." '887 patent at claim 1. Representative claim 1 recites a controller that (1) monitors a parameter from a sensor, but only during a polling interval and (2) transmits that parameter, but only during a transmission interval and only when that parameter is outside a predetermined range. *Id.*

Read as a whole, those limitations do not merely describe collecting and communicating data in the abstract. Instead, they recite a particular technique governing *when*

and *how* information is transmitted within a network using a wireless automation device. The claim imposes timing constraints (polling and transmission intervals) and a conditional transmission trigger (outside a predetermined range) that together contribute to reducing the controller's communications within the network.

The specification confirms that the claimed limitations address concrete technical problems in BAS networks. The specification explains that BAS networks, like other wireless networks, can be noisy, have limited available bandwidth, and consume large amounts of power from continuous monitoring and broadcasting of information. *Id.* col. 1 ll. 34–46. The claimed invention's recited techniques, as highlighted by the specification, reduce unnecessary communications and conserve power by preventing routine or redundant transmissions when monitored values remain within a predetermined range. *Id.* col. 1 ll. 56–62; *id.* col. 10 ll. 41–44. In this way, the claimed invention recites a technological solution to a technological problem.

ecobee argues that the claims are directed to "the abstract steps required to collect, analyze, and selectively communicate data." Cross-Appellant Br. 40. We disagree. That characterization oversimplifies the claims by ignoring their specific operational limitations, including timing constraints and conditional transmission. We have cautioned against "oversimplifying the claims by looking at them generally and failing to account for the specific requirements of the claims." *CardioNet, LLC v. InfoBionic, Inc.*, 955 F.3d 1358, 1371 (Fed. Cir. 2020) (citations omitted) (internal quotations omitted).

Moreover, the cases ecobee relies on do not involve comparable improvements in the operation of an existing technological system. In *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1354–55 (Fed. Cir. 2016), the claimed invention merely collected data from sensors located across an electric grid, analyzed it, and displayed the results

without changing how existing sensors worked, how information was analyzed or transmitted, or how it was displayed. *Id.* Likewise, in *Chamberlain Group, Inc. v. Techtronic Industries Co.*, 935 F.3d 1341, 1346–47 (Fed. Cir. 2019) and *Affinity Labs of Texas, LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1258 (Fed. Cir. 2016), the claimed inventions were directed to nothing more than wirelessly communicating information without altering when or how the information was transmitted.

Here, in contrast, the claims recite a particularized set of constraints that alters when and how data is collected and transmitted. The claims are not merely directed to a result, such as "filtering data" or "transmitting relevant information," but to a defined technique for achieving such results. The combination of periodic polling, transmission intervals, and selective transmission upon a threshold being met reflects a particular means for communications within BAS networks rather than a generalized data-handling concept.

ecobee cites *Trinity Info Media, LLC v. Covalent, Inc.*, 72 F.4th 1355, 1365 (Fed. Cir. 2023), to argue that the use of a "predetermined threshold" "merely reflects the kind of data analysis that the abstract idea of matching necessarily includes." Cross-Appellant Br. 40. In that case, the claimed invention was a system that matched users by comparing each user's answers to a poll. *Trinity*, 72 F.4th at 1359, 1364–65. Claiming a predetermined threshold was not sufficient in *Trinity* to save a claim from being directed to the abstract idea of "matching based on questioning." *Id.* at 1365. In *Trinity,* we determined that the claims were directed to a process that (1) was capable of being performed by a human mind, and (2) "merely [sought] to use computers as a tool," *id.* at 1363, before analyzing whether the invocation of a "predetermined threshold" limitation changed the focus of the claimed invention, *id.* at 1365. Conversely here, the transmission of data based on the claimed "predetermined range" changes *how* the system

communicates information and is thus part of the technological improvement recited by the claims.

ecobee's human-driven analogy is unpersuasive. Cross-Appellant Br. 41.[9] It fails to account for the wireless network communications challenges addressed by the inventors and the claimed improvements to device operation. *See Data Engine Techs. LLC v. Google LLC*, 906 F.3d 999, 1011 (Fed. Cir. 2018) ("It is not enough, however, to merely trace the invention to some real-world analogy.").

Accordingly, we conclude that the asserted claims of the '887 patent are not directed to an abstract idea under *Alice* step one. We do not reach *Alice* step two.

C

ecobee also contends that the district court erroneously concluded that the asserted claims of the '371 patent are not directed to an abstract idea. We disagree.

Similarly to the '887 patent, the claims of the '371 patent are directed to a specific improvement in the operation of automation components within a wireless communication system. *See* '371 patent at claim 13. The claimed invention provides a specific manner in which data is transmitted within a BAS system. First, the claimed "automation component" receives aggregated COV "messages" as a single "update" transmission (the "COV update") from "a plurality of devices." *Id.* Second, the claimed

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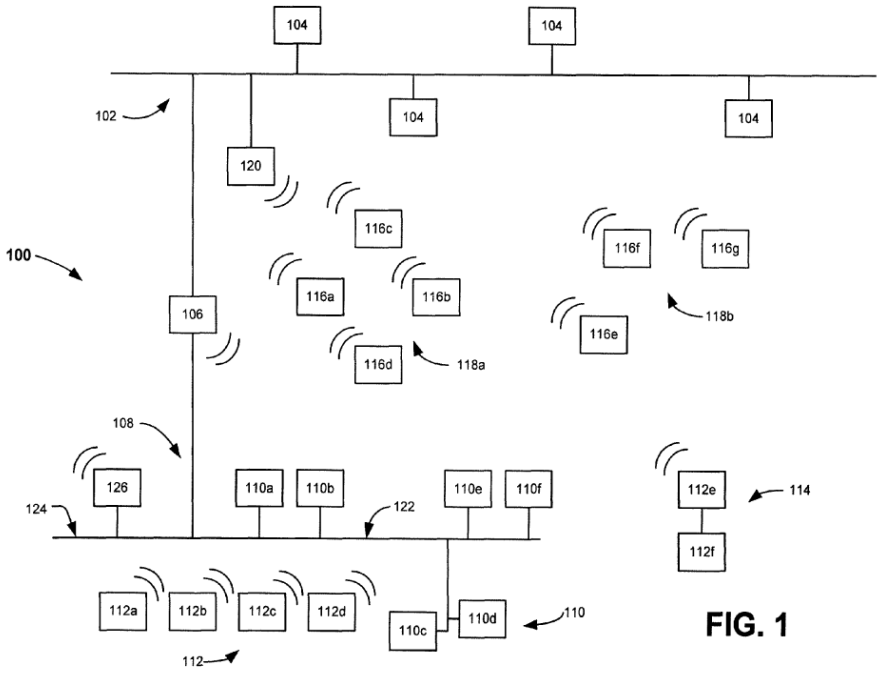
[9] ecobee argues that a person may ask their friend to call them if the temperature outside drops below 70°. Cross-Appellant Br. 41. If the friend sees that the temperature dropped below 70°, the friend will call the person and let them know. *Id.* If the friend starts to call but then sees that the temperature is above 70°, the friend can hang up the phone without providing any update. *Id.*

"automation component" "repeats" communication of the COV update until "acknowledgement" in a BAS. *Id.*

The specification confirms that the claimed communication means addresses technical challenges arising in BAS networks. A BAS may consist of multiple wireless networks, such as a building-level network (102), and a floor-level network (108). *See id.* col. 1 ll. 1–49; *id.* col. 4 ll. 22–32.



Id., FIG. 1.

As depicted in FIG. 1, each network may include various peripheral automation components (i.e., sensors, controllers, actuators used to control HVAC, security systems, and fire systems) (110a–f, 112a–f). *See id.* col. 1 ll. 13–20; *id.* col. 4 ll. 32–42. Centralized automation components may also exist in clusters independent of a floor network (116a–g). *Id.* col. 4 ll. 55–64; *id.* col. 5 ll. 4–10.

Due to this complexity of many different components interacting with each other, BAS wireless networks are susceptible to limited bandwidth and communication failures, and the claimed invention provides technological solutions to both of these technological problems. *See id.* col. 7 ll. 62–65; *id.* col. 8 ll. 10–13.

First, the COV messages are aggregated into a "COV update," which claim 13 describes as "includ[ing] a plurality of change of value messages received from a plurality of devices" and then transmitted to the claimed "automation component." *Id.* col. 7 ll. 39–42, 58–62; *id.* at claim 13. The patent specification describes an embodiment that avoids having the centralized component consume bandwidth through sending repeated polling messages to peripheral components for any COV information. Instead of polling each peripheral component, the specification describes a push-based approach in which peripheral sensors transmit updates (i.e., COV messages) only as they occur. *See id.* col. 7 ll. 11–30. Moreover, as the specification explains, "[b]y pushing COV's up to [centralized] automation component [] as opposed to polling each [peripheral] automation component [], less wireless bandwidth is used and system end to end delays shortened." *Id.* col. 7 ll. 62–65; *see* Oral Arg. at 45:13 – 47:9 (available at https://www.cafc.uscourts.gov/oral-arguments/25-1045_04082026.mp3).

Second, when communicating the COV updates to other parts of the BAS, the claimed automation component repeatedly transmits the aggregated COV information "at regular intervals according to a schedule or until a change-of-value acknowledgment is received." *See* '371 patent at claim 13. In this manner, the system is "configured to address and handle communications difficulties" within the network. *Id.* col. 8 ll. 10–13. "For example, if COV polling requests cannot be communicated or are not acknowledged by the intended receiving component, then the algorithm [] may be configured to recover from the communications

failure" by "repeating communication attempts a predetermined number of times." *Id*. col. 8 ll. 13–19.

Indeed, claim 13 is similar to those held eligible in *Uniloc*. *See* 957 F.3d at 1308. In *Uniloc*, the claimed invention improved conventional communication systems by including a data field for polling as part of an inquiry message, thus allowing primary stations to send inquiry messages and conduct polling simultaneously. *Id*. at 1305, 1307–08. That is, a specific operational change resulted in a functional improvement. Likewise here, claim 13 improves communication within a BAS network by modifying how COV messages are handled—aggregating and pushing COV messages to a centralized automation component and then repeatedly communicating that aggregate message—thereby reducing wireless bandwidth usage and also overcoming communication failures. '371 patent at claim 13; *id*. col. 7 ll. 58–65.

ecobee's arguments to the contrary are unpersuasive. ecobee fails to meaningfully engage with the claims' specific technical limitations, instead electing to characterize the claims at a high level of abstraction. That approach is "untethered from the language of the claims" and the specification. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016). For the reasons explained above, the claims are not merely directed to abstract data collection and communication, Cross-Appellant Br. 40, and ecobee's failure to address the specific technical features identified by Ollnova[10] leave us with no persuasive reason to overturn the district court's ruling.

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[10] For instance, at oral argument, ecobee's counsel offered no response to Ollnova's counsel's explanation regarding the specific technical solution of aggregating and pushing COV information from peripheral devices. *See generally* Oral Arg. at 45:13 – 47:9, 1:04:16 – 1:17:45.

ecobee's reliance on the same cases involving generalized data analysis and transmission claims it cited against the '887 patent is misplaced. *See* Cross-Appellant Br. 40. Unlike the automation component for a wireless communication system claimed here, those cases did not involve a comparably specific asserted improvement in the operation of an existing technological system. *See, e.g.*, *Elec. Power Grp.*, 830 F.3d at 1354–55; *Chamberlain Grp.*, 935 F.3d at 1346–48; *Affinity Labs*, 838 F.3d at 1258–62.

ecobee also asserts, without support, that the claimed aggregation of COV information and repeated communications constitute routine and conventional steps. Cross-Appellant Br. 43; Cross-Appellant Reply Br. 16. That assertion is not convincing.

Nor does that assertion undercut Ollnova's point that these claimed features provide a particular technical manner of handling communications between components in a BAS. Nor does ecobee offer any substantive argument or evidence that, in the context of a BAS network as described in the specification, such repeated communications until acknowledgement is received should be discounted.

ecobee's human-driven analogy likewise fails for the same reasons as stated for the '887 patent. Cross-Appellant Br. 40–41.[11] It fails to account for the wireless network communications challenges addressed by the

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[11] ecobee contends that, within an apartment, different people may notice temperature changes in their bedrooms and request someone to notify the landlord. Cross-Appellant Br. 40–41. That landlord may write down the temperature change information, and when building management later requests a building status update, the landlord may send the temperature change information to building management multiple times to ensure they are aware of the issue. *Id.*

inventors and the claimed improvements to device operation. *See Data Engine Techs.*, 906 F.3d at 1011.

Accordingly, we conclude that the asserted claims of the '371 patent are not directed to an abstract idea under *Alice* step one and do not reach *Alice* step two.

III

Next, ecobee argues that it is entitled to judgment as a matter of law that the '371 patent's asserted claims are not infringed because the accused products do not communicate the *same* COV update repeatedly. Cross-Appellant Br. 50–52. We disagree.

The asserted claims of the '371 patent require generating a COV update and communicating that update "at regular intervals" according to a schedule or "until a change-of-value acknowledgement is received." *See* '371 patent at claims 1, 17. ecobee argues that the claims require that the exact same message is repeated and that its thermostats therefore do not infringe because they do not repeat the same updates.

Substantial evidence supports the jury's finding of infringement even under ecobee's interpretation of the claims. Ollnova's expert disagreed with ecobee's argument that ecobee's smart thermostats do not send out the same message repeatedly. *See* J.A. 2018–19, [1122:9–1123:9]; *see also* J.A. 1277–78, [621:25–622:12]; J.A. 1283, [627:3–9]. Ollnova's expert explained when ecobee's thermostats send information to a server, the server will reply with a message. J.A. 2018–19, [1122:9–1123:9]. If the server does not reply, then ecobee's thermostat will send the same information again, at a minimum. *Id.* The jury was entitled to credit that testimony and find that the same message was repeated, as required by the claims, even if the thermostat's second message includes additional information.

Because there is a sufficient evidentiary basis for the jury's verdict, we must affirm the district court's denial of ecobee's motion for judgment as a matter of law.

IV

Because we vacate both the infringement and damages judgments, we do not reach the parties' remaining challenges to the district court's evidentiary rulings or its limitation of prejudgment interest on the lump sum reasonable royalty award to the statutory damages period under 35 U.S.C. § 286. *See* Appellant Opening Br. 10–22; Cross-Appellant Br. 52–64. Those issues may be addressed by the district court on remand if necessary.

CONCLUSION

For the foregoing reasons, we vacate both the infringement and damages judgments and remand for proceedings consistent with this opinion, including a new trial on infringement and damages. We vacate and remand for further proceedings under *Alice* step two of the 35 U.S.C. § 101 analysis as to the '495 patent. We affirm the district court's determination that the asserted claims of the '887 and '371 patents are not directed to an abstract idea under 35 U.S.C. § 101. We also affirm the district court's denial of ecobee's motion for judgment as a matter of law concerning non-infringement of the '371 patent. And, we dismiss Ollnova's appeal regarding prejudgment interest and ecobee's remaining appeal regarding its *Daubert* motions.

AFFIRMED-IN-PART, DISMISSED-IN-PART, AND VACATED AND REMANDED

COSTS

No costs.