2018-1364

IN THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

SIPCO, LLC,

Appellant,

v.

EMERSON ELECTRIC CO.,

Appellee.

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2016-00984

BRIEF OF APPELLANT SIPCO, LLC

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April 13, 2020

CERTIFICATE OF INTEREST

Counsel for Appellant SIPCO, LLC certifies the following:

1. Full name of the party represented by me:

SIPCO, LLC

2. Name of the real party in interest (please only include any real party in interest NOT identified in Question 3) represented by me is:

None.

3. Parent corporations and publicly held companies that own 10% or more of the stock in the party:

Glocom, Inc.

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

James E. Schutz, Troutman Sanders LLP

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. *See* Fed. Cir. R. 47.4(a)(5), 47.5(b).

SIPCO, LLC, et al. v. Emerson Electric Co., et al., Civil Action No. 6:15-cv-00907-JRG-KNM (E.D. Tex.)

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Parties

Appellant, Patent Owner, SIPCO	SIPCO, LLC
Appellee, Petitioner, or Emerson	Emerson Electric Co.

Citations

Appx____	Joint Appendix at page(s) _____

Terms

’780 patent	United States Patent No. 8,754,780
’732 patent	U.S. Patent No. 8,013,732
AIA	America Invents Act
APJ	Administrative Patent Judge
APA	Administrative Procedure Act
AAPA	Applicant Admitted Prior Art
Kahn	Robert E. Kahn et al., *Advances in Packet Radio Network Protocols*, Proceedings of the IEEE, Vol. 66, No. 11, Nov. 1978.
Burchfiel	J. Burchfiel et al., *Functions and Structure of a Packet Radio Station*, National Computer Conference presented paper, 1975.
Greeves	B. Greeves, *SCADA Uses Radio to Bridge the Gap*, Sensor Review, Vol. 14, No. 2, pp. 31-34, 1994.
Board, PTAB	Patent Trial and Appeal Board

PTO, Patent Office	United States Patent and Trademark Office
IPR	*Inter Partes* Review
FWD	Final Written Decision

STATEMENT OF RELATED CASES

Under Fed. Cir. R. 47.5(a), counsel for Appellant Sipco, LLC ("SIPCO"), certifies that no other appeal from the same proceeding in the United States Patent and Trademark Office ("PTO" or "Patent Office"), Patent Trial and Appeal Board ("PTAB" or "the Board") is or was previously before this Court or any other appellate court, whether under the same or a similar title.

Under Fed. Cir. R. 47.5(b), counsel for SIPCO states that the Court's decision in this appeal may affect the following judicial and administrative matters:

United States District Court actions involving the patent at issue

1. *SIPCO, LLC, et al. v. Emerson Electric Co., et al.*, Civil Action No. 6:15-cv-00907-JRG-KNM (E.D. Tex.).

STATEMENT OF JURISDICTION

This is an appeal under 35 U.S.C. § 141(c) from the Board's Final Written Decision entered on October 25, 2017, and from the Board's Decision On Remand entered on January 24, 2020, in *Inter Partes* Review No. IPR2016-00984. *See* Appx1-90.

SIPCO timely filed a Notice of Appeal on December 21, 2017. Appx772-777. This Court therefore has jurisdiction over this appeal under 35 U.S.C. §§ 141 and 319 and 28 U.S.C. § 1295(a)(4)(A).

I. STATEMENT OF THE ISSUES

A. Whether the Board acted contrary to law or arbitrarily and capriciously in denying SIPCO's motion seeking leave to request a certificate of correction from the Director of the Patent Office, where the Board had no ultimate authority in deciding whether to grant the correction request.

B. Whether the Certificate of Correction that issued after the Board's decision moots its finding that claims 1-15 of the '780 patent are rendered obvious by its grandparent—the '732 patent—where the Board expressly stated that it would "defer" to the Petitions Branch's decision on the Certificate of Correction.

C. Whether the Board erred in basing its obviousness decision on allegedly uncontested issues that, in fact, were vigorously disputed.

D. Whether the Board erred in holding certain claims of the '780 patent unpatentable based on new evidence not presented until the Petitioner's Reply and using the *inventor's* recognition of problems in the art as evidence of a motivation to combine.

II. STATEMENT OF THE CASE AND FACTS

A. The '780 Patent Claims a Novel Type of Distributed System for Remote Monitoring and Control

The '780 patent claims priority to a patent application first filed in mid-1998. Appx91; Appx110 (1:32-35). At that time, "control systems utilize[d] computers to process system inputs, model system responses, and control actuators to implement

process corrections within the system." Appx110 (1:65-67). Typically, control and monitoring systems were implemented in remote, distributed environments by installing "a local network of hard-wired sensors and actuators along with a local controller." Appx110 (2:44-47).

The inventor of the '780 patent recognized several problems with this approach, including "the costs associated with the sensor-actuator infrastructure required to monitor and control functions within such systems," "the added expense of connecting functional sensors and controllers with the local controller," "the installation and operational expense associated with the local controller," and that "appropriately wiring an existing industrial plant can be a dangerous and expensive proposition." Appx110 (2:41-44, 2:47-50, 2:50-53); Appx112 (6:1-3).

To solve these problems, the inventor of the '780 patent developed a new "monitoring/control system" including sensors/actuators integrated with transceivers that form part of a wireless mesh network:

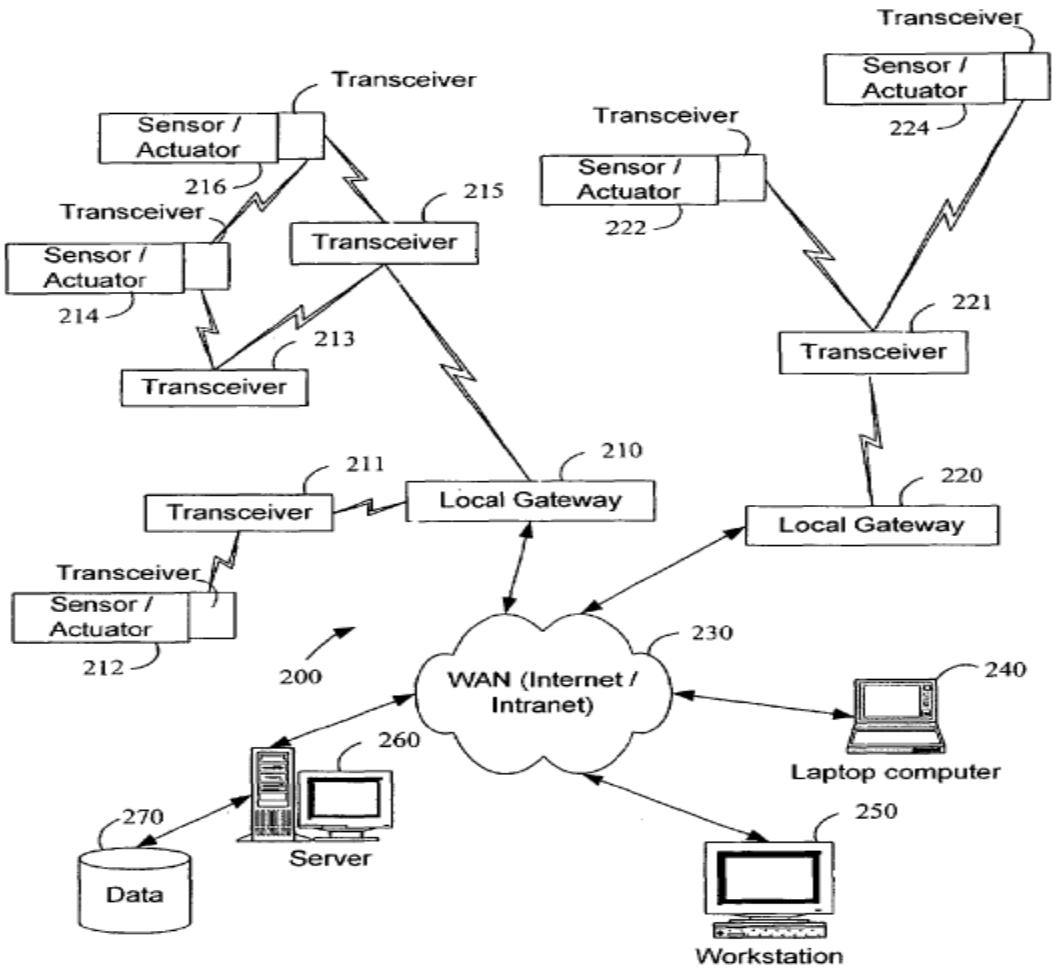

FIG. 2

Appx93 (Fig. 2); Appx111 (4:50-51). Representative claim 1 of the '780 patent recites:

> 1. In a system comprising a plurality of wireless devices, a device comprising:
>
> a transceiver having a unique identification code and being electrically interfaced with a sensor, the transceiver being configured to receive select information and identification information transmitted from a second wireless transceiver in a predetermined signal type;
>
> the transceiver being further configured to wirelessly retransmit in the predetermined signal type the

> select information, the identification information associated with the second wireless transceiver, and transceiver identification information associated with the transceiver making retransmission; and
>
> a controller operatively coupled to the transceiver and the sensor, the controller configured to control the transceiver and receive data from the sensor, the controller configured to format a data packet for transmission via the transceiver, the data packet comprising data representative of data sensed with the sensor.

Appx118-119 (18:53-19:4).

The system in the '780 patent includes "sensor/actuators 212, 214, 216, 222, and 224 each integrated with a transceiver." Appx112 (6:7-9). The system further includes "a plurality of stand-alone transceivers 211, 213, 215, and 221." Appx112 (6:24-25). Each of the transceivers, regardless of type, "may be configured to receive an incoming [radio frequency] RF transmission (transmitted by a remote transceiver) and to transmit an outgoing signal." Appx112 (6:24-29). "Local gateways 210 and 220 are configured and disposed to receive remote data transmissions" from the transceivers having "an RF signal output level sufficient to adequately transmit a formatted data signal to the gateways." Appx112 (6:41-46). The "local gateways 210 and 220 may communicate information, service requests, control signals, etc. to remote sensor/actuator transceiver combinations 212, 214, 216, 222, and 224 from server 260, laptop computer 240, and workstation 250 across WAN 230." Appx112 (6:49-54).

The integrated transceivers "have a unique identification code (e.g., transmitter identification number) 326, that uniquely identifies the transmitter to the functional blocks of control system 200 (see FIG. 2)." Appx113 (8:53-56). The integrated transceivers transmit a data packet 330, including "a function code, as well as, a transmitter identification number" to the stand-alone transceivers. Appx114 (9:5-7). A stand-alone transceiver receiving a data packet 330 from an integrated transceiver forms its own data packet "by concatenating received data packet 330 with its own transceiver identification code 326." Appx115 (11:16-19).

B. The PTAB Proceeding

1. Emerson's Petition and the Board's Institution Decision

Appellee Emerson Electric Co. ("Emerson" or "Petitioner") initiated an IPR challenging claims 1-15 of the '780 patent. Appx123; Appx131. On November 2, 2016, the Board instituted review of claims 1-15 on the three grounds Emerson proposed:

- Ground 1: Claims 1-15 as allegedly unpatentable under 35 U.S.C. § 103(a) over the '732 patent;
- Ground 2: Claims 1, 2, and 7 as allegedly unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the AAPA; and
- Ground 3: Claims 4-6 and 8 as allegedly unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the AAPA and Burchfiel.

Appx353; Appx378. Each of Grounds 2 and 3 relies on what Emerson characterized as Applicant Admitted Prior Art ("AAPA"). Appx143-145. The Board recognized that "one alternative motivation to combine proffered by Petitioner" was based on "the '780 patent's disclosure regarding solving the problem of 'costs associated with the sensor-actuator infrastructure.'" Appx372 (quoting Appx144). Indeed, Emerson relied heavily on "the problems that the applicants of the '780 patent expressly set out to solve" in establishing a motivation to combine Kahn and the AAPA. Appx144. The only reference other than the AAPA that Emerson alleged provided a motivation to combine was Kahn. Appx145. Accordingly, Emerson's theory of unpatentability of claim 1—adopted by the Board in the Institution Decision—relied on combining elements of Kahn with elements in the AAPA, with an alleged motivation arising from Kahn or the AAPA. No additional references were cited in support of this combination or as evidence of the knowledge one of ordinary skill in the art would bring to making the alleged combination. For instance, there was no mention of Greeves for any purpose. Appx144-145.

2. The Board Prevented SIPCO from Correcting the Now-Corrected Priority Claim of the '780 Patent During the IPR Proceeding

With respect to Ground 1, Emerson alleged that the priority claim of the '780 patent to the '732 patent was defective because "[t]here was no period of co-pendency between the '780 Patent filed on April 2, 2013 and any of its parent

applications." Appx133. The face of the '780 patent attempts to claim priority to the '732 patent via a parent application that is a continuation of the '732 patent.[1] Appx91; *see also* Appx48. During prosecution, however, the parent application was identified by the wrong number, thereby rendering the priority claim defective. Appx91; *see also* Appx48; Appx3612-3613 (Certificate of Correction). Because the grandparent '732 patent issued more than a year before the '780 patent was filed, the '732 patent would qualify as prior art to the '780 patent under 35 U.S.C. § 102 without the benefit of its priority claim. *See* 35 U.S.C. § 102; Appx941.

SIPCO attempted three times to correct the misidentification of the parent application during the IPR proceeding before the Board. Appx47-48. SIPCO's first two attempts failed to satisfy the Petitions Branch's procedural requirements for amending a priority claim. Appx3779-3781. When SIPCO filed a third request for leave to amend the priority claim, the Board denied the request and issued a stay prohibiting any further attempt to make this correction. *See* Appx47-48.

Specifically, SIPCO asked the Board for permission to file a third request to correct the priority claim on January 30, 2017. Appx3400. In response, the Board issued an Order to "Patent Owner to show good cause why its request should be granted, including why it would be in the interests of justice to grant its request."

[1] As the Board agreed, "the '780 patent and '732 patent share nearly the same specification." Appx52.

Appx482. SIPCO responded by filing a brief with a declaration from the prosecuting attorney attesting to why the errors in the priority claim, and the delay in making the claim, were unintentional and likely due to a publication error on the part of the Patent Office that appeared on the face of one of the patents to which the '780 patent claims priority. Appx518-524; Appx3390-3399.

The Board, however, denied SIPCO's third request because it believed that, in its previous unsuccessful petitions, SIPCO exhibited a "deliberate indifference toward making errors." Appx527. SIPCO filed a request for reconsideration of the denial, which was also denied. Appx529-545; Appx553-556.

In its Final Written Decision (FWD) on October 25, 2017, the Board "lift[ed] the stay prohibiting Patent Owner from filing Patent Owner's Third Request [to amend the priority claim]." Appx49. It also agreed to "*defer* to the determination of the Petitions Branch regarding Patent Owner's claim of priority." Appx49 (emphasis added). Thus, the priority claim, as now properly corrected by the Petitions Branch upon SIPCO's successful request, *see* Appx3612-3613, is binding on the Board.

Although SIPCO ultimately succeeded in correcting the priority claim, the Certificate of Correction (COC) did not issue until March 27, 2018—after the Board had issued its FWD and after this appeal had already been docketed. Appx3612-3613; Appx28. The COC replaces the incorrect parent application number on the

face of the '780 patent. Appx3612. With this correction, the '780 patent now properly claims priority to its grandparent—the '732 patent—thus eliminating the '732 patent as prior art.

The Board, however, declined to consider the impact of the familial relationship between the '780 patent and the '732 patent in its decision. Appx146-49. Specifically, the Board explained that, "at this stage of the proceeding the priority date of the '780 patent has not been corrected, and we, therefore consider [the '732 patent] as prior art" to the '780 patent. Appx58.

With respect to Ground 1, the Board concluded that all the claims of the '780 patent are unpatentable over the grandparent '732 patent on the premise of the uncorrected priority claim. Appx58. As noted below, the Board also found claims 1, 2, 4, and 6-8 unpatentable based on other grounds that are unaffected by the COC. Appx88. However, nine of the fifteen claims at issue in this appeal (i.e., 60% of the claims) were held unpatentable *only* because of the absence of a COC fixing the '780 patent's priority claim to the '732 patent. The Patent Office has now issued the required COC to fix this typographical error, effectively eliminating this ground of unpatentability. Appx3612-3613. And the Board has already agreed to "defer to the determination of the Petitions Branch regarding Patent Owner's claim of priority." Appx49.

3. SIPCO's Patent Owner Responses

SIPCO filed a Preliminary Response, Appx262-325, with a supporting expert declaration from Dr. Almeroth, Appx2173-2238, and a Patent Owner Response, Appx394-477, with a second expert declaration from Dr. Almeroth, Appx3307-3379. In both responses and declarations, SIPCO and its expert explained that claims 1, 2, and 7 of the '780 patent would not have been obvious over Kahn in view of the AAPA because the references do not teach "a controller operatively coupled to the transceiver and the sensor, the controller configured to … receive data from the sensor," as recited in claim 1. Appx313-317; Appx467-471; Appx2234-2237; Appx3275-3278. For example, SIPCO argued that

> the mere disclosure of these measurement facilities [alleged by Petitioner to be the claimed sensor operatively connected to a controller] in Kahn does not indicate that a sensor as construed above (*i.e.*, a device) is interfaced with a transceiver. Rather, the measurements disclosed in Kahn are merely network statistics that are produced by software tools counting received packets and registering their time of arrival. For example, Kahn explicitly states that "[n]o additional hardware is needed to make measurements on throughput, delay and several other parameters."

Appx314 (alteration in original) (quoting Appx1037). SIPCO further argued that the disclosure of a sensor in the AAPA did not compensate for Kahn's deficiencies:

> Figures 13 and 14 of Kahn show that the [packet radio] PR processor (referred to as controller by Petitioner) has only one external interface and that interface can only be used to communicate with a user terminal, host computer, or Station. As explained by Dr. Almeroth, "Kahn teaches

> that the PR radio unit (including the transceiver and the controller) can only be interfaced with a device that has communication capability such as a terminal, host computer, or Station." Indeed, Kahn states that communication through this interface uses ***packets***: "The interface between the user equipment and the [experimental packet radio] EPR digital unit is the portal through which packets enter and leave the network[.]" In other words, a device that can be interfaced with Kahn's PR controller must have packet communication capability and is more than a mere sensor or actuator."

Appx469-470 (citations omitted).

Thus, SIPCO vigorously argued that the combination of Kahn and the AAPA would not have taught or suggested "a controller operatively coupled to the transceiver and the sensor, the controller configured to … receive data from the sensor," as recited by claim 1. Appx467-471. This is because Kahn discloses a controller with a single type of interface—a packet communication portal—while the AAPA discloses a hard-wired sensor with a different type of interface—an electrical conductor. Appx1032; Appx112 (5:57-61). Emerson's proposed combination thus requires modification of the sensor in the AAPA before the Kahn controller could "receive data" from it, as required by claim 1. SIPCO argued to the Board that the combination of Kahn and the AAPA does not disclose or suggest this modification, nor would a person of ordinary skill in the art be motivated to make it. Appx470-471.

Further, with respect to dependent claims 4-6 and 8, SIPCO argued that "Petitioner's alleged motivation for combining Burchfiel's teachings to Kahn is inconsistent with its alleged motivation for combining the [A]APA with Kahn." Appx467. Specifically, Petitioner's proposed combination relied on Burchfiel for its teaching regarding "how a packet radio can be augmented to support the additional functions of a station (which performs centralized routing) and a *terminal* (which can act as a source or destination of user traffic.)." Appx466-467 (emphasis added) (quoting Appx1079-1080 (¶ 43)). But the proposed combination of Kahn and the AAPA would not include a terminal but rather a *sensor* (which the AAPA does not disclose as being a source or destination of user traffic). Thus, SIPCO disputed Petitioner's reliance on Burchfiel to fill the gaps remaining in claims 4-6 and 8:

> As explained by Dr. Almeroth, however, "the components of the network architecture are exactly the ones he [Dr. Heppe] expects to replace in the combination with the systems described in the [A]APA. In Burchfiel, user terminals are connected to the terminal. In the systems described in the [A]APA, there are no users, no user traffic.

Appx467 (first alteration in original) (quoting Appx2224 (¶ 119)).

At no time during the IPR proceedings did SIPCO concede that the combination of Kahn and the AAPA "teaches all of the limitations recited in claims 1, 2, and 7 of the '780 patent," as the Board erroneously stated in its FWD. Appx63.

To the contrary, SIPCO vigorously and repeatedly disputed this point, as explained above. *See* Appx313-317; Appx467-471; Appx2234-2237; Appx3375-3378.

SIPCO also argued that Emerson could not prevail on Grounds 2 and 3 using the AAPA because the obviousness analysis of Emerson's expert, Dr. Heppe, was based on an erroneous understanding of what constitutes admitted prior art. Appx454-458; Appx2216 (¶¶ 100-101). For example, SIPCO's expert explained that Emerson's expert incorrectly identified several portions of the '780 patent as prior art that, instead, are the *inventor's* recognition of problems in the art or descriptions of his solutions. *See* Appx2216 (¶¶ 100-101) (disputing that the following portions of the '780 patent constitute admitted prior art: Appx110 (2:41-44), Appx112 (5:57-6:3), Appx115-116 (12:62-13:15), Appx116 (13:20-26), Appx116 (13:59-64)). Thus, SIPCO consistently argued that Emerson's obviousness arguments were based on hindsight because the inventor's own recognition of problems in the art were misinterpreted as being admitted prior art. *Id.*

SIPCO's expert further explained that "numerous challenges with building multi-layer wireless mesh networks" introduce secondary considerations of nonobviousness that negate Petitioner's alleged motivation to combine. Appx2219 (¶ 109). Dr. Almeroth (SIPCO's expert) introduced Greeves for the purpose of demonstrating that "particular challenges and significant delays associated with

using radio technology" cut against the obviousness analysis set forth by Emerson. Appx2221 (¶ 113).

4. Emerson's Reply

In its Reply, Emerson introduced a new theory of unpatentability based on "Greeves for what it teaches about the knowledge of those of skill in the art and how that knowledge would have motivated an artisan to modify or combine the references relied upon in the petition." Appx504. Greeves was not included or cited in Emerson's Petition or in the Board's Institution Decision. Instead, Greeves was introduced for the first time by SIPCO in its Patent Owner Response via the declaration of its expert, Dr. Almeroth. Appx462-463; Appx2221 (¶ 113).

In its Reply, Emerson did not respond to Dr. Almeroth's arguments about secondary considerations of nonobviousness, but instead used Greeves (for the first time) to show "that it was within the knowledge of those in the art at the time of the invention to use a wireless infrastructure instead of a wired infrastructure in monitoring and control systems for cost savings." Appx502.

5. The Board's Final Written Decision

On October 25, 2017, the Board found claims 1-15 of the '780 patent unpatentable on three grounds:

- Claims 1-15 were found unpatentable under 35 U.S.C. § 103(a) over the '732 patent;

- Claims 1, 2, and 7 were found unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the AAPA; and

- Claims 4, 6, and 8 were found unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the AAPA and Burchfiel.

Appx88.

The Board based its decision on the incorrect premise that "Patent Owner does not dispute the combination of Kahn and the portions of the '780 specification Petitioner relies on as admitted prior art teaches all of the limitations recited in claims 1, 2, and 7 of the '780 patent." Appx63. The Board did not address Patent Owner's repeated argument that Kahn and the AAPA do not teach "a controller operatively coupled to the transceiver and the sensor, the controller configured to … receive data from the sensor," as recited by claim 1. Appx313-317; Appx467-471; Appx2234-2237; Appx3375-3378. Instead, the Board assumed—erroneously—that it was undisputed that all limitations of claim 1 would be satisfied by the combination of Kahn and the AAPA, and that the only dispute was whether "it would have been obvious to combine Kahn with the [A]APA to arrive at the claimed invention …." Appx63.

With respect to dependent claims 4, 6, and 8, the Board was "persuaded that a person of ordinary skill in the art would have looked to Burchfiel for further description of the functions described in Kahn," and the Board incorrectly stated that "Patent Owner does not argue otherwise." Appx83. In fact, Patent Owner *did* argue

otherwise. But the Board did not address Patent Owner's argument that "Petitioner's alleged motivation for combining Burchfiel's teachings to Kahn is inconsistent with its alleged motivation for combining the [A]APA with Kahn." Appx467; *see also* Appx2224.

For a motivation to combine Kahn and the AAPA, the Board relied in part on the "clear teaching in the '780 patent that installing hard-wired connections was expensive" and reasoned that this "express disclosure" by the inventor "indicates that it was well known that wiring could be costly, and that this was a known problem in the art, rather than a problem recognized only by the inventor of the '780 patent." Appx71-72. The Board did not, however, cite any timely introduced evidence to support the assertion that those of skill in the art at the time of the invention (other than the inventor) recognized this problem.

The Board's unpatentability determination of claims 1, 2, 4, and 6-8 rests on its conclusion that "we may properly consider Greeves for the limited purpose of determining the background level [of] knowledge of a person of ordinary skill in the art at the time of [the] alleged invention." Appx75. The Board reached this conclusion based on dicta from two decisions of this Court addressing the notice requirements of the APA. Appx72-75. Again, Greeves was never cited or discussed in Emerson's Petition or in the Board's Institution Decision.

6. The Board's Decision On Remand

This Court remanded this IPR "for the Board to issue an order addressing what, if any, impact the certificate of correction has on its final written decision." Order on Mot. For Remand, *SIPCO, LLC v. Emerson Elec. Co.*, No. 2018-1364, slip op. at 4 (Fed. Cir. June 27, 2018). On January 24, 2020, more than a year and a half after this Court's remand, the Board issued an order "that the certificate of correction (Ex. 2038) has no impact on the Final Written Decision." Appx26.

III. SUMMARY OF THE ARGUMENT

The Board erred in ruling claims 1-15 obvious over the '732 patent. Nine of the fifteen claims at issue in this appeal (*i.e.*, 60% of the claims) were held unpatentable *only* because (i) the Board prevented Patent Owner SIPCO from obtaining a Certificate of Correction to fix the '780 patent's priority claim to the '732 patent during the *inter partes* review and (ii) declined to recognize the Certificate, Appx3612-3613, that was issued by the Director of the PTO after the Final Written Decision.

The Patent Act, 35 U.S.C. § 255 allows patent owners to correct mistakes that "occurred in good faith" by requesting a certificate of correction from the Director. But the Board denied SIPCO's request for the certificate after determining that SIPCO's mistakes were "deliberate." Appx527. Here, as in *Honeywell Int'l v. Arkema, Inc.*, 939 F.3d. 1345 (Fed. Cir. 2019), the Board's denial violated the

Administrative Procedure Act because the Director—not the Board—should determine whether the mistakes occurred in "good faith" (not deliberate). Moreover, the Board was simply wrong. Declarations from SIPCO's patent prosecution attorney made under penalty of perjury provide detailed explanations of the reasons for the errors, showing that they were not deliberate. Appx3390-3399. The Board, however, did not address the attorney's detailed explanations, let alone show how the errors could possibly be determined to be "deliberate" considering the detailed explanations to the contrary. *See* Appx527. Here, as in *Honeywell*, the Board ran afoul of the APA's fundamental requirement that the agency "examine the relevant data and articulate … a 'rational connection between the facts found and the choice made.'" *Motor Vehicle Mfrs. Ass'n of U.S. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). Indeed, the Director demonstrated that the Board erred by concluding that SIPCO's errors were, in fact, made in good faith (not deliberate) and issuing the Certificate of Correction. Appx3615.

To make matters worse still, the Board declined to recognize the Director's Certificate of Correction, even though the Board had agreed to "defer to the determination of the Petitions Branch regarding Patent Owner's claim of priority." Appx22. By invalidating every claim of the '780 patent based on SIPCO's own '732 patent, which is not prior art under the corrected priority claim, the Board effectively ruled that the Director's Certificate of Correction will ***never*** be effective.

There is no statutory or case law support for the Board's radical position. Neither 35 U.S.C § 255 nor any other statute indicates that a Certificate of Correction should not be given effect in an IPR or thereafter. Rather, the proper interpretation of 35 USC § 355—when read in the context of the America Invents Act 35 USC § 316(d), which permits claim amendments during an IPR—indicates that priority claim errors can be corrected in an IPR. Indeed, this Court has held that a patent owner is entitled to a validity determination on the corrected version of a patent claim. *H-W Technology, L.C. v. Overstock.com, Inc.,* 758 F.3d 1329, 1335 (Fed. Cir. 2014). (striking a portion of a district court's ruling that held invalid a patent claim that had been corrected by the Director). Accordingly, the Board's finding that claims 1-15 are obvious over the grandparent '732 patent should be reversed.

The Board also erred in finding claims 1, 2, and 7 of the '780 patent obvious over Kahn in view of the AAPA; and claims 4, 6, and 8 obvious over Kahn, the AAPA, and Burchfiel for two independent reasons.

First, the Board erred by basing its obviousness determination on the false premise that certain points were undisputed by SIPCO when, in fact, they were vigorously disputed. Specifically, the Board premised its obviousness analysis of claim 1 on the incorrect assumption that "Patent Owner does not dispute the combination of Kahn and the portions of the '780 specification Petitioner relies on as admitted prior art teaches all of the limitations recited in claims 1, 2, and 7 of the

'780 patent." Appx63. This is demonstrably false. SIPCO consistently and repeatedly argued that the combination of Kahn and the AAPA does not teach "a controller operatively coupled to the transceiver and the sensor, the controller configured to … receive data from the sensor," as recited in independent claim 1. *See* Appx313-317; Appx467-471; Appx2234-2237; Appx3375-3378. Similarly, the Board incorrectly assumed it was undisputed that a person skilled in the art "would have looked to Burchfiel for further description of the functions described in Kahn," erroneously stating that "Patent Owner does not argue otherwise." Appx83. In fact, SIPCO disputed this point, arguing that "Petitioner's alleged motivation for combining Burchfiel's teachings to Kahn is inconsistent with its alleged motivation for combining the [A]APA with Kahn." Appx467.

Second, the Board improperly relied on a belated theory of unpatentability unveiled for the first time in Emerson's Reply, and the Board compounded this error by using the *inventor's* recognition of problems in the art as evidence of a motivation to combine—a clear use of hindsight. Specifically, the Board's unpatentability determination of claims 1, 2, 4, and 6-8 rests on its flawed conclusion that consideration of "Greeves for the limited purpose of determining the background level [of] knowledge of a person of ordinary skill in the art at the time of [the] alleged invention" was proper. Appx75. The factual assertions and articulated reasons for unpatentability based on Greeves were essential to establishing Emerson's alleged

prima facie case of obviousness, yet they were presented for the first time in its Reply. The Board's improper reliance on the belated use of Greeves to plug holes in the petition's deficient obviousness case deprived SIPCO of its procedural protections guaranteed by the Administrative Procedures Act. Moreover, the Board erred by relying on the inventor's recognition in the detailed description of the '780 patent of shortcomings in the prior art to supply a motivation to combine Kahn and the AAPA. Appx70-71.

IV. STANDARD OF REVIEW

This Court reviews decisions by the Board according to the standards of review set forth in the Administrative Procedure Act ("APA"). *In re Chapman*, 595 F.3d 1330, 1336-37 (Fed. Cir. 2010). Accordingly, this Court reviews the Board's legal conclusions de novo, and its factual findings for substantial evidence. *Id.*; *see* 5 U.S.C. § 706(2); *see also Rambus Inc. v. Rea*, 731 F.3d 1248, 1251 (Fed. Cir. 2013); *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1364 (Fed. Cir. 2015). This Court reviews the Board's procedures for compliance with the APA de novo and must "hold unlawful and set aside agency action ... not in accordance with [the] law [or] ... without observance of procedure required by law." 5 U.S.C. § 706(2)(A), (D); *Dell Inc. v. Acceleron, LLC*, 818 F.3d 1293, 1298 (Fed. Cir. 2016); *In re NuVasive, Inc.*, 841 F.3d 966, 970 (Fed. Cir. 2016).

Under the APA, an agency must provide "a satisfactory explanation for its action including a 'rational connection between the facts found and the choice made,'" *State Farm Mut.*, 463 U.S. at 43 (citation omitted). The Board must address the "important aspect[s] of the problem" presented to it and may not offer "an explanation for its decision that runs counter to the evidence before the agency." *Id.* This requirement exists to facilitate judicial review and ensure that agency decisions are not arbitrary and capricious. *SEC v. Chenery Corp.*, 318 U.S. 80, 94 (1943).

To avoid the improper use of hindsight, an obviousness "analysis should be made explicit," and obviousness rulings "cannot be sustained by mere conclusory statements," as opposed to "articulated reasoning with some rational underpinning." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citation omitted); *Rovalma, S.A. v. Bohler-Edelstahl GmbH*, 856 F.3d 1019, 1025 (Fed. Cir. 2017) ("The Supreme Court has recognized the importance of clarity with respect to obviousness determinations.").

V. ARGUMENT

A. The Board's Unpatentability Decision Based on the '732 Patent Should Be Reversed Because That Patent Is Not Prior Art With The Corrected Priority Claim.

The face of the '780 patent attempts to claim priority to the '732 patent via a parent application that is a continuation of the '732 patent. Appx91; *see also* Appx47. During prosecution, however, the parent application was identified by the wrong number, thereby rendering the priority claim defective. Appx7; *see also* Appx47.

The Board's ruling denying SIPCO sufficient opportunity during the IPR to correct the priority claim errors is procedurally and substantively erroneous. Procedurally, the Board committed similar errors here that it did in *Honeywell* in refusing to allow patent owner to correct the errors with the Director of the PTO. Substantively, the reasons the board gave for refusing authorization ("deliberate indifference") are not sufficiently explained by the Board, and unsupported by the record. Appx527.

Although the Board eventually permitted SIPCO to correct the priority claim and promised to "defer to the determination of the Petitions Branch regarding Patent Owner's claim of priority," Appx49, it reneged on its promise by not recognizing the Certificate of Correction issued by the Director. That too was wrong. Section 355 indicates—when read in the context of AIA 35 USC § 316(d), which permits

claim amendments during an IPR—that priority claim errors can be corrected in an IPR. Indeed, this Court has held that a patent owner is entitled to a validity determination on the corrected version of a patent claim. *H-W Technology*, 758 F.3d at 1335. (striking a portion of a district court's ruling that held invalid a patent claim that had been corrected by the Director).

Under the correct priority claim set forth in the Director's Certificate of Correction, the '732 patent is not prior art and therefore, cannot invalidate any claim of the '780 patent.

1. The Board Violated The Administrative Procedure Act By Not Giving SIPCO Sufficient Opportunity To Correct The Priority Claim Errors.

This Court has recently addressed the Board's practice of permitting Patent Owners to petition the Director to correct errors in a patent during an IPR. *Honeywell*, 939 F.3d at 1350. There, a patent owner sought leave to petition the Director to correct a priority claim error. Without properly considering the patent owner's arguments, the Board concluded that the priority errors were not of the type that are permitted to be corrected by 35 U.S.C. § 255 and denied the patent owner's request. *Id*.

On appeal, this Court vacated and remanded. *Id.* at 1351. The Court concluded that "Section 255 does not grant the Board authority to determine whether a mistake in an issued patent is of 'minor character' or 'occurred in good

faith.'" *Id.* at 1349. That authority, as explained by this Court is instead "expressly granted to the Director." *Id.* This Court then held that "[t]he Board abused its discretion by assuming the authority that § 255 delegates to the Director and deciding the merits of Honeywell's petition for a Certificate of Correction." *Id.* at 1350. The Court also concluded that the Board had not considered "evidence of whether the mistake was inadvertent and made in good faith" and "failed to provide an explanation or a reasoned basis for its decision." *Id.*

Here, the Board made the same mistakes. It concluded that the priority errors were made with "deliberate indifference," not in good faith, Appx527, when that determination should have been made by the Director. The Board did not fully consider the explanations for the errors set forth by SIPCO's patent prosecution attorney in a declaration signed under penalty of perjury. Appx3390-3399. The Board did not mention the explanation, let alone explain how the errors could possibly have been deliberate in light of it. Appx527.

a. The Board Must Act In Accordance With The Law.

Under the APA, an agency action, finding, or conclusion can be set aside where it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law" or is "unsupported by substantial evidence." 5 U.S.C. § 706(2)(A), (E). To determine whether the agency's action was arbitrary and capricious, an appellate court examines whether the agency came to a rational

conclusion and will set aside an agency action as arbitrary and capricious where (1) the agency "relied on factors which Congress has not intended it to consider," (2) the agency "failed to consider an important aspect of the problem," (3) the agency explained its decision in a way "that runs counter to the evidence," or (4) the action "is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." *Id.* (*quoting Miccosukee Tribe of Indians of Fla. v. United States*, 566 F.3d 1257, 1264 (11th Cir. 2009))

b. Both The Statute And The Patent Office Rules Governing Priority Claims Permit Unintentionally Delayed Claims.

The law permits a patent application to claim priority to an earlier-filed patent application "if it contains or is amended to contain a specific reference to the earlier filed application." 35 U.S.C 120 (pre-AIA). In addition, "[t]he Director may establish procedures, including the payment of a surcharge, to accept an ***unintentionally delayed*** submission of an amendment under this section." *Id.* (emphasis added). In accordance with the law, the Director did establish procedures permitting acceptance of a delayed priority claim provided that "the entire delay between the date the benefit claim was due under paragraph (d)(3) of this section and the date the benefit claim was filed was ***unintentional***." 37 C.F.R. § 1.78(e) (*emphasis added*). In addition, "[t]he Director may require additional information where there is a question whether the delay was unintentional." *Id.*

c. The Board's Ruling That SIPCO's Priority Claim Errors Were "Deliberate" Is Arbitrary and Capricious, And Inconsistent With The Record Evidence.

The Board initially permitted the Patent Owner to seek to correct a priority claim of the '780 patent at the Petitions Branch of the PTO. *Supra*, § II.B.2. The Petitions Branch, however, denied the Patent Owner's first two petitions to correct the priority claim because it discovered some additional problems in the priority claims of the patent applications in the chain of priority of the '732 patent. *Id.* After the Patent Owner filed a motion to seek the opportunity to return to the Petitions Branch to correct these additional problems, *id.*, the Board denied the Patent Owner's motion in an Order dated April 20, 2017. Appx527. The Board again denied Patent Owner's request in an Order on May 19, 2017 after the Patent Owner had filed a Request for Reconsideration on May 4, 2017. Appx555.

In both Orders, the Board clearly stated that it denied Patent Owner's request to correct the priority claim because it believed that the "Patent Owner's repeated mistakes indicate ***deliberate*** indifference toward avoiding errors." Appx527 (*emphasis added*); *see also* Appx555.

The Board's actions are arbitrary and capricious under the APA because the Board "failed to consider an important aspect of the problem." *Miccosukee Tribe of Indians of Fla.*, 566 F.3d at 1264. Mr. Dustin Weeks, Patent Owner's patent prosecution attorney and a member in good standing of the Georgia Bar and the

Patent Bar, declared that the entire delay between the issuance of the '780 patent and the date of the priority claim was unintentional and due to a clerical error. Appx3390-3399. In particular, Mr. Weeks explained that he mistakenly claimed priority to application no. 13/173,499 instead of application no. 13/222,216. Appx3391, ¶ 5.

Mr. Weeks also declared that the errors in the priority claims of the applications in the priority chain of the '780 patent were caused by the unintentional inclusion of the word 'which' in the priority description of these applications. Appx3392-3394, ¶¶ 10-12. Mr. Weeks also explained that these errors likely originated from a publication error that appeared on the face of U.S. Patent 6,437,692 ("'692 Patent"), related by priority to the '780 Patent that propagated into the priority claims of subsequent continuations of the'692 Patent. Appx3393-3394, ¶ 11.

Mr. Weeks explained that the Attorney Advisor in the Office of Petitions instructed him "that the sole reason for dismissing the First Request [to correct the priority error] was the failure to include the corrected application data sheet." Appx3392, ¶ 8. After he submitted the application data sheet, however, "the USPTO issued a decision again dismissing the Second Request [to correct the priority error] and identifying another error in the priority claim of the '780 patent—one not previously identified by any party or the Office of Petitions."

Appx3393, ¶ 10. Mr. Weeks explained that this newly-identified error "likely resulted" from the PTO's "publication error" when application no. 09/439,059 "issued as US Patent No. 6,437,692." *Id.*, ¶ 11. "This error in publication (i.e., the priority claim is correct in the specification but was printed incorrectly on the cover of the issued patent) also occurred in" two more patents in the family of the '780 Patent. *Id.* Finally, Mr. Weeks also declared that "[t]he entire delay in correcting these priority errors was unintentional." Appx3398-3399.

Yet the Board failed to mention any of this evidence, let alone explain how SIPCO's errors could possibly be considered as "deliberate" in view of it. *See* Appx527. By failing to consider these important issues and evidence, the Board failed to comply with the APA. Under the APA and longstanding precedent, an agency must provide "a satisfactory explanation for its action including a rational connection between the facts found and the choice made," *State Farm*, 463 U.S. at 43. The Board must address the "important aspect[s] of the problem" presented to it. *Id.* at 43. That requirement exists to facilitate judicial review and to ensure that agency decisions are not arbitrary and capricious. *SEC v. Chenery Corp.*, 318 U.S. 80, 94 (1943).

Clearly, the Board failed to comply with the APA by not addressing the explanation in Mr. Weeks' declaration. Its decision preventing SIPCO from petitioning the Director to correct the priority errors is arbitrary and capricious.

d. The Director—Not The Board—Should Have Decided Whether SIPCO's Errors Were Deliberate Or Unintentional and Made In Good Faith.

Section 255, the PTO's own regulations, and the PTAB's well-established practice make clear the limited role that the Board plays in assessing a party's request for a certificate of correction. By statute, the PTO "Director" has the authority to evaluate and decide, in the first instance, the ultimate merits of a requested certificate of correction. 35 U.S.C. § 255. The Director has not delegated that authority to the Board.

Rather, PTO regulations establish a process for requesting a certificate of correction from the Director. See, e.g., 37 C.F.R. § 1.323; MPEP §1485. And, when the patent is in proceedings before the Board, PTO regulations establish a further preliminary procedure for seeking the Board's leave to present a request for correction to the Director. MPEP §1485.

In other cases, the Board has appropriately recognized its limited role when the owner of a patent in post-grant review proceedings seeks leave to request a certificate of correction from the Director. *See, e.g., Plastic Dev. Grp., LLC v. Maxchief Inv. Ltd.*, IPR2017-00846, Paper 16 at 2 (P.T.A.B. Nov. 13, 2017)(Paper 16 at 2 ("The Board has not made a determination as to whether or not the mistake is in fact correctable. We leave the final determination on whether a Certificate of Correction should be issued with the Director in accordance with the authority

granted in 35 U.S.C. § 255."); *Aceto Agricultural Chem. Corp. v. Gowan Co.*, IPR2016-0076, Paper 12 at 2 (P.T.A.B. Jun. 13, 2016); *United Servs. Automobile Ass'n v. Asghari-Kamrani*, CBM2016-00063 [hereinafter "USAA"], 2016 WL 8944589, at *1, Paper 7 at 2 (P.T.A.B. July 27, 2016).

This case is indistinguishable. The Board's statement that SIPCO's "mistakes indicate deliberate indifference," Appx527, addressed a decision that was not the Board's to make. The Board's decision cannot be sustained on that basis.

2. The Board Should Have Given Effect To The Certificate of Correction That Was Ultimately Issued By The Director.

In its Final Written Decision (FWD), the Board not only "lift[ed] the stay prohibiting the Patent Owner from filing Patent Owner's Third Request [to amend the priority claim], it also agreed to "***defer*** to the determination of the Petitions Branch regarding Patent Owner's claim of priority." Appx49. The Petitions Branch issued the Certificate of Correction on March 27, 2018, after the Board had issued its FWD. Appx3612-3613. The Petitions Branch ruled that Patent Owner's priority claim errors were unintentional. Appx3614-3615. That is, the Petitions Branch, the group tasked to decide Petitions to correct priority claims, disagreed with the Board's ruling that Patent Owner's errors were "deliberate." The Board, therefore, had no legitimate basis on which to prevent Patent Owner from seeking a Certificate of Correction during the IPR before issuance of the FWD.

The Board later compounded its error by reneging on its promise to ***defer*** to the Petition Branch for Patent Owner's priority claim. Instead, the Board ruled that the Certificate of Correction issued by the Petitions Branch had no effect. Appx26. By cancelling every claim of the '780 patent based on SIPCO's own patent, which is not prior art under the corrected priority claim, the Board effectively ruled that the Director's Certificate of Correction will ***never*** be effective.

There is no statutory or case law support for the Board's radical position. Rather, this Court has held that a patent owner is entitled to a validity determination on a claim that has been corrected via a Certificate of Correction. *H-W Technology,* 758 F.3d at 1335.

a. There Is No Support For The Board's Ruling That The Director's Certificate Of Correction Should Never Be Given Effect.

The Board's case law citations do not support its ruling that the Director's Certificate of Correction is effectively meaningless and should never be given effect. Appx18-21, *citing Superior Fireplace Co. v. Majestic Prods. Co*., 270 F.3d 1358 (Fed. Cir. 2001); *Southwest Software, Inc. v. Harlequin Inc.*, 226 F.3d 1280 (Fed. Cir. 2000); *Roche Palo Alto LLC v. Ranbaxy Laboratories Ltd.*, 551 F. Supp. 2d 349 (D.N.J. 2008). All three cases address the issue of whether a Certificate of Correction issued by the Director will be effective in an earlier-filed district court case. None suggests in any way, shape, or form that a Certificate of Correction

should ***never*** be effective. *See Superior Fireplace*, 270 F.3d at 1370; *Southwest Software*, 226 F.3d at 1294; *Roche*, 551 F.Supp. 2d at 349. None settles the questions of what effect a Certificate of Correction has on an instituted IPR.

The Board stretches the limited holding in *Southwest Software* beyond its clear context—civil actions for patent infringement—to find application to IPRs. *See* Appx9-10. In *Southwest Software*, this Court stated: "[W]e hold that a certificate of correction that was issued under 35 U.S.C. § 254 to add certain material to the '257 patent is not effective for purposes of *this action* …." *Southwest Software,* 226 F.3d at 1283 (emphasis added). *Southwest Software* and its progeny all involve the applicability of a certificate of correction to a patent infringement action brought in a district court. *Id.* at 1282-83 (involving patent infringement action tried in U.S. district court); *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003) (same); *Superior Fireplace*, 270 F.3d at 1361 (same). The Board cites no court or agency decision extending *Southwest Software*'s holding to IPRs.

In addition, the Board's position finds no clear precedent in the patent statute or any court's jurisprudence. The statute governing certificates of correction mentions their effect only in "trial of actions for causes":

> Whenever a mistake of a clerical or typographical nature, or of minor character, which was not the fault of the Patent and Trademark Office, appears in a patent and a showing has been made that such mistake occurred in good faith, the Director may, upon payment of the required fee, issue a certificate of correction, if the correction does not

> involve such changes in the patent as would constitute new matter or would require re-examination. Such patent, together with the certificate, shall have the same effect and operation in law on the trial of actions for causes thereafter arising as if the same had been originally issued in such corrected form.

35 U.S.C. § 255.

This statute does not indicate that an IPR is a "trial of actions for causes." under § 255. Neither the statute defining an IPR, 35 U.S.C. § 311, nor any other part of Title 35 defines an IPR as a "trial of actions for causes." And the Board did not cite to any authority that squarely addresses this issue. *See* Appx6-13.

Moreover, the determination that a patent infringement suit is a "trial of actions for causes thereafter arising" under § 254 does not necessarily support the derivative conclusion that an administrative proceeding before the PTO also meets this definition under § 255, particularly because patent infringement is statutorily defined as a "civil action," whereas an IPR is not. *Compare* 35 U.S.C. § 281 ("civil action for infringement"), *with* 35 U.S.C. § 316 (referring to an inter partes review as a "proceeding").

The Board's position could have far reaching implications for other portions of the patent statute. For example, in Title 35, the identical phrase, "trial of actions for causes," occurs in § 254 regarding certificates of correction issued due to Patent Office mistakes, and in § 252 setting forth the effect of reissue. *See* 35 U.S.C. §§ 252, 254, 255. Moreover, in drafting Title 35, Congress expressly used different

language to distinguish a "*proceeding*" before the Patent Office from a "*trial of actions for causes.*" *Compare, e.g.*, 35 U.S.C. §§ 305-307, *with* 35 U.S.C. §§ 252, 254, 255; *see also* 35 U.S.C. § 315 (consistently using "actions" to refer to district court actions and "proceedings" to refer to administrative proceedings). The Board's statutory interpretation would arguably erase this distinction. *Wash. Mkt. Co. v. Hoffman*, 101 U.S. 112, 115-16 (1879) ("As early as in Bacon's Abridgment, sect. 2, it was said that 'a statute ought, upon the whole, to be so construed that, if it can be prevented, no clause, sentence, or word shall be superfluous, void, or insignificant.'").

There is no support for the Board's position that the Certificate of Correction should never be effective.

b. SIPCO Is Entitled To A Validity Determination On The Corrected Patent.

This Court has held that patent owners are entitled to an invalidity determination on a patent that has been corrected with a certificate of correction. *H-W Technology*, 758 F.3d at 1335. In *H-W Technology*, a patent owner requested and received a certificate of correction for a patent claim (claim 9) after the filing of a district court case. *Id.* at 1333. The district court then held that the corrected claim could not be asserted in the case and held claim 9 to be invalid. *Id.* at 1334. This Court struck "the portion of the judgment that holds claim 9 invalid." *Id.* at 1335.

Here, this Court should similarly vacate the Board's invalidity holding based on a reference that is not prior art under the corrected priority claim. SIPCO is entitled to a validity determination on the corrected '780 patent, just as the patent owner in *H-W Technology* was.

Section 255—when interpreted in the context of the America Invents Act (AIA)—indicates that the Director's Certificate of Correction, Appx3612-3613, should be given effect in an IPR. The AIA states that patents may be changed in an IPR. 35 U.S.C § 316(d) ("During an inter partes review instituted under this chapter, the patent owner may file 1 motion to amend the patent in 1 or more of the following ways: (A) Cancel any challenged patent claim. (B) For each challenged claim, propose a reasonable number of substitute claims."). Likewise, Section 255 should be interpreted to similarly permit other aspects of a patent (*e.g.*, priority claim) to be corrected in an IPR.

Moreover, this Court should take judicial notice of the now-issued Certificate of Correction. A fact can be judicially noticed if it is "not subject to reasonable dispute because it[]… can be accurately and readily determined from sources whose accuracy cannot be reasonably questioned." Fed. R. Evid. 201(b)(2). Public records are the types of facts that "may be judicially noticed." *Massachusetts v. Westcott*, 431 U.S. 322, 323 n.2 (1977). Patents and their file histories are public records that this Court has previously judicially noticed. *See* 37 C.F.R. § 1.11(a) ("The

specification, drawings, and all papers relating to the file of … a patent … are open to inspection by the public ….”); *Hoganas AB v. Dresser Indus., Inc.*, 9 F.3d 948, 954 n.27 (Fed. Cir. 1993) (taking judicial notice of a patent); *Standard Havens Prods., Inc. v. Gencor Indus., Inc.*, 897 F.2d 511, 514 n.3 (Fed. Cir. 1990) (taking judicial notice of an Office Action issued by the Patent Office).

The Certificate of Correction, once judicially noticed, moots the Board’s finding that claims 1-15 are unpatentable over the grandparent ’732 patent. Accordingly, SIPCO requests that this Court take judicial notice of the now-issued Certificate of Correction and reverse the Board’s unpatentability decision with respect to claims 1-15 based on the ’732 patent.

c. The Board’s Decision Contravenes Congressional Intent And Will Cause Confusion and Waste Resources.

Not only does the Board’s decision conflict with precedent from this Court, it would introduce problematic and illogical consequences Congress could not have intended. In this IPR, the Board “lift[ed] the stay prohibiting Patent Owner” from filing a petition to correct the priority claim errors and promised to “defer to the determination of the Petitions Branch regarding Patent Owner’s claim of priority.” Appx47. In reliance on the Board’s promise, SIPCO expended time, effort and money in legal and filing fees to prepare and file the Petition, exhibits, etc. The Petitions Branch then expended valuable resources to review the Petition and

exhibits, render a decision, and issue a certificate. Appx3612-3616. All of this will be wasted if this Court were to permit the Board to reneg on its promise. Congress could not have possibly intended this type of needless waste of resource.

The Board is statutorily mandated to "conduct inter partes reviews" (35 U.S.C. § 6(b)(4)) and "issue a final written decision with respect to the patentability of any patent claim challenged by the petitioner" during the proceeding. 35 U.S.C. § 318(a). Upon issuance of the final written decision, the "Director shall issue and publish a certificate" canceling, amending, and/or adding claims consistent with the final written decision. § 318(b). If certificates of correction were not given effect in IPR proceedings, the PTO would waste resources adjudicating issues and issuing certificates that are already superseded by another arm of the agency.

In such circumstances, it is illogical to suggest that the Board should proceed to adjudicate issues related to a patent that has since been revised by the Petitions Branch—another part of the same agency. This "illogical and unworkable result" is exactly the type of outcome the Federal Circuit warned against when interpreting similar statutory language in § 254. *See Southwest Software*, 226 F.3d at 1295 (citing *Timex V.I., Inc. v. United States*, 157 F.3d 879, 886 (Fed. Cir. 1998)).

B. The Board Erred by Basing Its Decision on Alleged Patent Owner Admissions that Were in Fact Disputed

1. The Board Clearly Erred by Ignoring SIPCO's Arguments that Certain Recitations of Claim 1 Are Not Taught by the

Combination of the AAPA and Kahn, Instead Mischaracterizing this Point as Undisputed

The Board based its obviousness decision on an erroneous premise, namely that "Patent Owner does not dispute the combination of Kahn and the portions of the '780 specification Petitioner relies on as admitted prior art teaches all of the limitations recited in claims 1, 2, and 7 of the '780 patent." Appx63. The Board was clearly mistaken because the Patent Owner Response, the Preliminary Response, and Dr. Almeroth's two supporting declarations included ample argument and supporting evidence that the combination of Kahn and the AAPA does *not* teach or suggest "a controller operatively coupled to the transceiver and the sensor, the controller configured to … receive data from the sensor," as recited in independent claim 1. Appx313-317; Appx467-471; Appx2234-2237; Appx3375-3378.

As an agency, the Patent Office is required to "include a statement of … findings and conclusions, and the reasons or basis therefor, on all the material issues of fact, law, or discretion presented on the record." 5 U.S.C. § 557(c)(3)(A). While the Board need not address every argument on the record, an agency errs if it "entirely fail[s] to consider an important aspect of the problem" or "offer[s] an explanation for its decision that runs counter to the evidence before the agency." *State Farm*, 463 U.S. at 43. Because of the deferential nature of judicial review of agency decisions, an agency must "develop an evidentiary basis for its findings." *In re Sang-Su Lee*, 277 F.3d 1338, 1344 (Fed. Cir. 2002); *see* 5 U.S.C. § 706.

Here, the question of whether Kahn and the AAPA disclose all the limitations of claim 1 is "an important aspect of the problem" of whether Petitioner established a prima facie case of obviousness sufficient to render claim 1 unpatentable. *See State Farm*, 463 U.S. at 43; 35 U.S.C. § 103. Thus, the Board was obligated to consider the record evidence supporting SIPCO's argument that the combination of Kahn and the AAPA fails to teach each element of claim 1. *See State Farm*, 463 U.S. at 43; 35 U.S.C. § 103.

In the Patent Owner Response and the Preliminary Response, as well as the two supporting expert declarations, SIPCO and its expert, Dr. Almeroth, demonstrated that claims 1, 2, and 7 of the '780 patent would not have been obvious over Kahn in view of the AAPA because this prior art combination fails to teach or suggest "a controller operatively coupled to the transceiver and the sensor, the controller configured to … receive data from the sensor," as recited in independent claim 1. Appx313-317; Appx467-471; Appx2234-2237; Appx3375-3378. Indeed, SIPCO devoted an entire section in each of the Preliminary Response and the Patent Owner Response to explain why the prior art does not teach this limitation. Appx313-317; Appx467-471. Dr. Almeroth likewise devoted an entire section in each of his two expert declarations to explain why the prior art does not teach this limitation. Appx2234-2237; Appx3375-3378.

Specifically, SIPCO explained that Kahn's measurement facilities (alleged by Emerson to be the claimed sensor operatively connected to a controller) would not have taught that a sensor is interfaced with a transceiver. Appx314. "Rather, the measurements disclosed in Kahn are merely network statistics that are produced by software tools counting received packets and registering their time of arrival." Appx314. Indeed, Kahn explicitly states that "[n]o additional hardware is needed to make measurements on throughput, delay and several other parameters." Appx1037.

SIPCO further explained that the disclosure of a sensor in the AAPA did not cure Kahn's deficiencies because, as explained by Dr. Almeroth, "Kahn teaches that the PR radio unit (including the transceiver and the controller) can only be interfaced with a device that has communication capability such as a terminal, host computer, or station." Appx3377 (¶ 165). Moreover, Kahn states that communication through this interface must use packets: "The interface between the user equipment and the EPR digital unit is the portal through which packets enter and leave the network." Appx1032. But, as SIPCO and its expert explained, the AAPA does not teach sensors that communicate via any type of wireless interface with a transceiver, let alone via packets. *See* Appx112 (5:57-61); Appx467-471; Appx3375-3378.

In other words, Kahn discloses a controller with a single type of interface—a packet communication portal—while the AAPA discloses a hard-wired sensor with

a different type of interface—an electrical conductor. Appx1032; Appx112 (5:57-61). Thus, Emerson's proposed combination requires modification of the sensor in the AAPA for the Kahn controller to "receive data" from it, yet Emerson provided no evidentiary support for this modification beyond a single conclusory statement by its expert. Appx1079 (¶ 42) ("Prior art sensors and actuators, intended for 'third-party' integration into control systems such as those disclosed in the [A]APA of the '780 patent, have well-defined behaviors and interface specifications to enable such integration with relative ease (i.e., without undue experimentation), and with predictable results.").

In view of the clear arguments made by SIPCO about this missing limitation, the Board's "explanation for its decision," which assumes there was no dispute over whether Kahn and the AAPA teach all the claim limitations, clearly "runs counter to the evidence before the agency." *State Farm*, 463 U.S. at 43. Accordingly, this case should be remanded to the Board to consider the record evidence that Kahn and the AAPA do not teach certain recitations of claim 1. *See In re Sang-Su Lee*, 277 F.3d at 1346 (remanding for further explanation where further evidence needed to be considered).

The facts here are similar to those in *Nike, Inc. v. Adidas AG*, 812 F.3d 1326 (Fed. Cir. 2016) (*rev'd on other grounds by Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1324 (Fed. Cir. 2017) (en banc)). In *Nike*, the Board found the challenged

claims obvious but ignored the patent owner's evidence of secondary considerations. *Id.* at 1339 ("Neither Adidas nor the PTO disputes that the Board's Final Written Decision lacks an acknowledgment of Nike's secondary considerations evidence."). This Court vacated the Board's obviousness determination because of its failure to acknowledge the patent owner's countervailing evidence. *Id.* While recognizing that the Board operates under "stringent time constraints," the Court in *Nike* nevertheless held that, under the circumstances, "the Board should have explicitly acknowledged and evaluated Nike's secondary considerations evidence." *Id.*

Here, as in *Nike*, the Board reached its obviousness determination while ignoring SIPCO's arguments and evidence showing that the combination of Kahn and the AAPA does not teach all the limitations of the challenged claims. Indeed, even worse than the situation in *Nike*, the Board *mischaracterized* SIPCO's argument, incorrectly stating that SIPCO did not dispute that all limitations were satisfied by the asserted combination when in fact SIPCO *did* dispute this point—vigorously and repeatedly. Appx63; Appx313-317; Appx467-471; Appx2234-2237; Appx3375-3378. This constitutes clear error that warrants vacatur of the obviousness holding. *Nike*, 812 F.3d at 1339; *see also PPC Broadband, Inc. v. Corning Optical Commc'ns RF, LLC*, 815 F.3d 734, 746-47 (Fed. Cir. 2016) (vacating the Board's obviousness holding because the Board ignored the patent owner's evidence of commercial success); *In re Mageli*, 470 F.2d 1380, 1383

(CCPA 1973) (in an obviousness analysis, "evidence bearing on the facts is never of 'no moment,' is always to be considered, and accorded whatever weight it may have." (citation omitted)).

Thus, this Court should vacate the Board's unpatentability finding with respect to claims 1, 2, and 7 based on the combination of Kahn and the AAPA and remand for the Board to consider SIPCO's argument that this limitation of claim 1 is not taught by Kahn and the AAPA.

2. The Board Clearly Erred by Ignoring Patent Owner's Argument that a Person of Ordinary Skill in the Art Would Not Have Looked to Burchfiel to Supplement the Teachings of the AAPA and Kahn, Instead Mischaracterizing this Point as Undisputed

Likewise, with respect to dependent claims 4-6, the Board explained that it was "persuaded that a person of ordinary skill in the art would have looked to Burchfiel for further description of the functions described in Kahn. Patent Owner does not argue otherwise." Appx83. But Patent Owner *did* argue otherwise in the Patent Owner Response and accompanying declaration. Appx466-467; Appx2224 (¶ 119). Specifically, Patent Owner argued that the "Petition did not establish that one of ordinary skill in the art would have been motivated to combine what it alleged to be the Admitted Prior Art ([A]APA) with both Kahn and Burchfiel to achieve the claimed invention with a reasonable expectation of success." Appx466. SIPCO argued that "Petitioner's alleged motivation for combining Burchfiel's teachings to

Kahn is inconsistent with its alleged motivation for combining the [A]APA with Kahn." Appx467.

This argument was further supported by Dr. Almeroth's declaration, which disputed the use of Burchfiel to supplement the functional teachings of Kahn:

> For the combination of Kahn, Burchfiel, and [the A]APA, Dr. Heppe's [sic] relies on Burchfiel providing an additional disclosure about details of the network architecture and its components: "Kahn expressly directs a reader to Burchfiel for additional information about the functions of a packet radio, and how a packet radio can be augmented to support the additional functions of a station (which performs centralized routing) and a terminal (which can act as a source or destination of user traffic.)" But the components of the network architecture are exactly the ones he expects to replace in the combination with the systems described in the [A]APA. In Burchfiel, user terminals are connected to the terminal. In the systems described in the [A]APA, there are no users, no user traffic. Adding Burchfiel to the combination contradicts the combination of Kahn and [the A]APA.

Appx2224 (¶ 119) (footnote omitted) (quoting Appx1079-1080 (¶ 43)).

Accordingly, the Board's "explanation for its decision" resting on an alleged lack of Patent Owner's argument against the combination of Kahn and the AAPA with Burchfiel clearly "runs counter to the evidence before the agency." *State Farm*, 463 U.S. at 43. Therefore, this Court should vacate the Board's unpatentability finding with respect to claims 4 and 6 based on the combination of Kahn, the AAPA, and Burchfiel and remand for the Board to consider SIPCO's argument that one of

ordinary skill in the art would not have looked to Burchfiel to cure the deficiencies of Kahn and the AAPA.

C. The Board's Obviousness Analysis Relies on Improper Evidentiary Sources and Hindsight

1. The Board Violated the APA by Relying on a New Theory of Unpatentability Raised for the First Time in Petitioner's Reply

As explained above, neither Emerson's Petition nor the Board's Institution Decision cited or relied on Greeves. After SIPCO introduced this reference in its Patent Owner Response, however, Emerson incorporated Greeves into its own arguments and created a new obviousness theory that uses Greeves to fill the holes in its Kahn/AAPA combination.

The Board's unpatentability determination of claims 1, 2, 4, and 6-8 rests on its flawed conclusion that "we may properly consider Greeves for the limited purpose of determining the background level [of] knowledge of a person of ordinary skill in the art at the time of [the] alleged invention." Appx75. Contrary to the Board's reasoning, the APA, the patent statute, this Court's jurisprudence, and the Patent Office guidelines—when taken as a whole—prohibit the Board from relying on factual assertions and articulated reasoning essential to establishing Petitioner's prima facie case of obviousness yet presented for the first time in its Reply. Here, the Board's reliance on the belated use of Greeves to plug holes in the Petition's

deficient obviousness case deprived SIPCO of its procedural protections guaranteed by the APA.

IPR proceedings are "formal administrative adjudications subject to the procedural requirements of the Administrative Procedure Act ('APA')." *SAS Inst., Inc. v. ComplementSoft, LLC.*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), *rev'd on other grounds sub nom. SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348 (2018). Accordingly, the Patent Office "must timely inform the patent owner of 'the matters of fact and law asserted,' give all interested parties the opportunity to submit and consider facts and arguments, and allow a party 'to submit rebuttal evidence ... as may be required for a full and true disclosure of the facts.'" *EmeraChem Holdings, LLC v. Volkswagen Grp. of Am., Inc.*, 859 F.3d 1341, 1348 (Fed. Cir. 2017) (quoting 5 U.S.C. §§ 554(b)-(c), 556(d)) (citing *Dell*, 818 F.3d at 1301). The patent statute mandates a particular sequence for the development of the record to provide the required notice: a petition identifying "with particularity … the grounds on which the challenge to each claim is based, and the [supporting] evidence," 35 U.S.C. § 312(a)(3); an institution decision "notify[ing] the petitioner and patent owner" of the basis for institution, 35 U.S.C. § 314(a), (c) ; a patent owner response identifying "factual evidence and expert opinions" in support of the response, 35 U.S.C. § 316(a)(8); and a final reply by the petitioner, 35 U.S.C. § 316(a)(13).

Because the patent owner's response follows the petition and institution decision, this Court has consistently inquired as to the adequacy of the notice by examining the particular theories in the petition and institution decision, while rejecting petitioners' attempts to "cure the petition's deficiencies in its subsequent briefing to the Board." *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017) (affirming the Board's decision not to consider reply arguments because petitioner "did not make out its obviousness case in its petition"); *EmeraChem*, 859 F.3d at 1350 (finding lack of notice because "neither the petition nor the Institution Decision put the patentee on notice" of the particular use of a prior art reference cited in the petition); *Ariosa*, 805 F.3d at 1365-67 (remanding to consider knowledge of a skilled artisan only because "Ariosa's Petitions and opening declarations invoked Exhibit 1010 in that way," and affirming "the Board's rejection of Ariosa's reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference"); *Genzyme Therapeutic Prods. Ltd. P'ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1367 (Fed. Cir. 2016) (agreeing that one "cannot plausibly argue that it lacked notice" of the use of references "that the petitioner had cited in its petitions" for the same purpose they were originally introduced).

Moreover, the Patent Office's regulations require the petition to identify how and on what basis the claims are unpatentable. 37 C.F.R. § 42.104(b)(4), (5). And its guidelines prohibit the introduction of new issues or evidence critical to meeting

the petitioner's burden of proof at the reply stage. *Office Patent Trial Practice Guide*, 77 Fed. Reg. 48,756, 48,767 (Aug. 12, 2012) ("Examples of indications that a new issue has been raised in a reply include new evidence necessary to make out a *prima facie* case for the patentability or unpatentability of … [a] claim.").

Here, both the Petition and the Institution Decision relied exclusively on the theory that the teachings in the AAPA and Kahn taught each element of claim 1 and supplied enough motivation to combine to establish a prima facie case of obviousness. Appx159-166; Appx370-375. Neither Emerson nor the Board gave SIPCO notice of a legal theory in which knowledge of one of ordinary skill in the art—based on Greeves or any other reference—filled in gaps between the AAPA and Kahn. Instead, it was only after SIPCO "pointed out the flaws" in the alleged combination that Emerson "effectively abandoned its petition in favor of a new argument," i.e., that knowledge of "one of ordinary skill in the art" could make up for the gaps in the combination of the AAPA and Kahn. *Wasica*, 853 F.3d at 1286; Appx502-504. This Court has rejected a petitioner's similar attempt to "cure the petition's deficiencies in its subsequent briefing" because this would deprive the patent owner of adequate notice:

> It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify with particularity the evidence that supports the grounds for the challenge to each claim.... Unlike district court litigation—where parties have greater freedom to revise and develop their arguments over time

> and in response to newly discovered material—the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute.

Wasica, 853 F.3d at 1286 (quoting *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016).

In *Illumina*, the appellant argued that "the Board *must* consider whether it is within the skill of the ordinary artisan" to modify the references to reach the claims. 821 F.3d at 1369 (citation omitted). But this Court affirmed the Board's decision not to consider that argument "because it was raised for the first time in IBS's [petitioner's] reply brief." *Id.* Likewise, in *Wasica*, this Court rejected the petitioner's attempts to provide "factual substantiation necessary for an obviousness evaluation" in its reply. 853 F.3d at 1286. Like the losing petitioner in *Illumina*, Emerson argued for the first time in its reply brief that "[t]he Board must consider Greeves for what it teaches about the knowledge of those of skill in the art and how that knowledge would have motivated an artisan to modify or combine the references relied upon in the petition." Appx504. Emerson engaged in precisely the same conduct rejected in *Illumina* and *Wasica*, namely attempting to inject a "new theory of invalidity" resting on knowledge of one skilled in the art via the reply to "cure the petition's deficiencies." *Illumina*, 821 F.3d at 1369; *Wasica*, 853 F.3d at 1286. The Board erred by accepting this belated argument when it was too late for SIPCO to

meaningfully respond to the post-petition reasoning and factual assertions based on Greeves.

At the hearing, APJ White struggled with the insufficiency of the arguments and evidence set forth in the petition in establishing prima facie obviousness:

> JUDGE WHITE: -- and I can understand that your point is that Greeves provides an additional teaching that one of ordinary skill in the art would have known the existence of this issue, this problem, but I think the thing that's troubling me is -- something that we've addressed in other contexts is that the *petition and your declaration focus not on what one of ordinary skill in the art would have known* but focus a lot on what was found in the disclosures of the specification.
>
> So, *are we bound by what it is that you've actually argued in your petition and what your declarant has actually spoken about*? And if we're not, why not?

Appx625 (emphases added). But for the Board's improper consideration of Emerson's late arguments concerning Greeves, claim 1 of the '780 patent would likely have been upheld as patentable. Thus, Emerson's belated arguments regarding what one of ordinary skill in the art would have known, as evidenced by Greeves, were essential to Emerson's ability to meet its burden in establishing a prima facie case of obviousness.

In reaching the incorrect conclusion that use of Greeves "for the limited purpose of determining the background level [of] knowledge" was permitted, the Board misread this Court's decisions in *Ariosa* and *Genzyme*—both of which

actually support *exclusion* of Greeves for any use beyond evaluation of secondary considerations of nonobviousness. Appx72-75. In *Ariosa*, this Court faulted the Board for failing to consider a brochure evidencing background knowledge where "Ariosa's Petitions and opening declarations invoked Exhibit 1010 in that way." *Ariosa*, 805 F.3d at 1367. In a subsequent decision, the Court reiterated the outcome-determinative facts in *Ariosa*, namely that "the references at issue were presented in the petition for IPR as well as the experts' opening declarations." *Qualtrics, LLC v. OpinionLab, Inc.*, 679 F. App'x 1016, 1020 (Fed. Cir. 2017) (unpublished). That is, both the timing of the introduction of the brochure—in the petition—and the purpose for which it was used in the petition—background knowledge—determined whether and for what purpose it could be used by the Board. *Ariosa*, F.3d at 1366-67.

Unlike the brochure in *Ariosa*, Greeves was first introduced in the declaration accompanying SIPCO's Patent Owner Response for the purpose of showing secondary considerations of nonobviousness. Appx3361-3362 (¶ 127). The Board incorrectly reasoned that Greeves can nevertheless be used "for the purposes of determining the knowledge of one of skill in the art" because "it was introduced in reply to an argument by Patent Owner in the Response." Appx73. But the key issue is whether SIPCO had "notice of … the matters of fact and law asserted" and an opportunity to respond. 5 U.S.C. § 554(b)-(c). Here, SIPCO was *not* on notice that Greeves would be used to fill the gaps in the combination of Kahn and the AAPA

until it was too late to reply. For example, even Petitioner's expert, Dr. Heppe, admitted that at the time of his deposition, he "did go through this article yesterday for the first time. So I have some familiarity with it; although, I can't say that I've, you know, spend [sic] a lot of time studying it." Appx3281-3282 (88:13-89:5). And the subsequent discussion of the article focused on only its teachings about secondary considerations of nonobviousness. Appx3282-3284 (89:6-91:17).

Thus, while Greeves can properly be considered for purposes of secondary considerations of nonobviousness, it cannot be considered for the purpose of showing background knowledge to fill gaps in Emerson's obviousness combination because this use of Greeves was first introduced in the Reply. Indeed, in *Ariosa*'s second challenge, this Court confirmed that there was "no error in the Board's rejection of Ariosa's reliance, in its Reply submissions, on previously unidentified portions of a prior-art reference," even though the prior art reference was introduced earlier in the proceeding to support a different theory. *Ariosa*, 805 F.3d at 1367.

The Board's reliance on *Genzyme* for its reasoning that the Board was not "changing theories" is likewise misplaced. Appx472-73. In *Genzyme*, the references at issue were ones "that the petitioner had cited in its petitions" for the original purpose of showing evidence of skill in the art. 825 F.3d at 1367. Thus, the documents in *Genzyme* were first introduced in the petition and consistently used for the same purpose. *Id.* Greeves, on the other hand, was first introduced in the

declaration accompanying SIPCO's Patent Owner Response for a first purpose—secondary considerations of nonobviousness—and then used by the Board for a second purpose—evidence of background knowledge—which was first introduced in Petitioner's Reply. Unlike the patent owner in *Genzyme*, SIPCO did not have an opportunity to address the particular assertions Emerson made concerning Greeves or their factual underpinnings because Emerson's obviousness case was an impermissible "moving target[]." *ComplementSoft*, 825 F.3d at 1351.

On these facts, the Board's unpatentability determination with respect to claims 1, 2, 4, and 6-8 should be reversed or, alternatively, remanded for the Board to consider whether the obviousness theories presented in the petition are sufficient to meet Petitioner's burden of proof.

2. The Board Improperly Relied on the Inventor's Recognition of Problems for a Motivation to Combine, Which Constitutes Impermissible Hindsight

The Board's obviousness conclusion is also improper because it "relies on Petitioner's argument that the [A]APA, rather than Kahn, provides cost savings as a benefit of wireless networks," Appx78, but this teaching in the '780 patent is not admitted prior art. It appears in the detailed description and is the *inventor's* recognition of a problem in the art that his invention overcomes:

> DETAILED DESCRIPTION OF PREFERRED & ALTERNATIVE EMBODIMENTS
> …

> Prior art control systems consistent with the design of FIG. 1 require the development and installation of an application-specific local system controller, as well as, the routing of electrical conductors to each sensor and actuator as the application requires. Such prior art control systems are typically augmented with a central controller 130 that may be networked to the local controller 110 via PSTN 120. As a result, prior art control systems often consist of a relatively heavy design and are subject to a single point of failure should local controller 110 go out of service. In addition, these systems require electrical coupling between the local controller and system sensors and actuators. As a result, *appropriately wiring an existing industrial plant can be a dangerous and expensive proposition*.

Appx112 (5:30-31, 5:57-6:3) (emphasis added).

It is a well-accepted principle that, "[w]hen prior art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination *other than the hindsight gleaned from the invention itself*." *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985) (emphasis added) (citation omitted). The motivation to combine "cannot come from the applicant's invention itself." *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992) (citations omitted).

Here, the Board relied on the "clear teaching in the '780 patent that installing hard-wired connections was expensive" and reasoned that this "express disclosure" by the inventor "indicates that it was well known that wiring could be costly, and that this was a known problem in the art, rather than a problem recognized only by

the inventor of the '780 patent." Appx71-72. But the Board failed to cite any credible evidence to substantiate its assertion that those of skill in the art at the time of the invention also recognized the problem the inventor identified in '780 patent. Instead, the Board erroneously concluded that "Dr. Almeroth [Patent Owner's expert] acknowledges that the expense of installing wiring … was a well-known problem in the art," Appx72 (citing Appx2217 (¶ 104)), citing to a portion of Dr. Almeroth's declaration that makes no such admission:

> As the '780 patent describes, the cost is in developing sensors, installing sensors, connecting sensors and controllers to the local controller, and installation and operation of the local controller. The cost of wiring is not emphasized and is insignificant in comparison to the other costs mentioned.

Appx2217 (¶ 104).

In this section, Dr. Almeroth was distinguishing between the costs of the sensor-actuator infrastructure—discussed in a different section of the '780 patent—and the costs of wiring discussed by Emerson's expert. Appx2217 (¶¶ 103-104) (citing Appx1079 (¶ 42); Appx110 (2:41-53)). He never admitted that the cost of wired systems was a well-known problem in the art. Moreover, SIPCO consistently argued throughout the proceeding, and clarified at the oral hearing, that this was not admitted to be a known problem in the art, but rather, was a problem recognized by the inventor. Appx674-676 (71:13-73:20); Appx454-458; Appx2216 (¶ 100); Appx1076-1077 (¶ 41 (citing Appx116 (13:20-26)). Accordingly, the Board

improperly used "that which the inventor taught against its teacher" when relying on the inventor's recognition of problems in the art as a motivation to combine Kahn and the AAPA. *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983). Therefore, the Board's unpatentability finding with respect to claims 1, 2, and 7 based on the combination of Kahn and the AAPA should be vacated and the case remanded for the Board to consider whether Kahn and the portions of the '780 patent that constitute the AAPA provide a motivation for the combination.

VI. CONCLUSION

For the foregoing reasons, the Court should reverse the Board's ruling that claims 1-15 are obvious over the grandparent '732 patent. And the Court should also reverse or, alternatively, vacate and remand the Board's findings that claims 1, 2, and 7 are obvious over Kahn in combination with the AAPA and that claims 4, 6 and 8 are obvious over Kahn in combination with the AAPA and Burchfiel.

Date: April 13, 2020

Respectfully submitted,

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ADDENDUM

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Paper No. 52
Entered: January 24, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMERSON ELECTRIC CO.,
Petitioner,

v.

SIPCO, LLC,
Patent Owner.

Case IPR2016-00984
Patent 8,754,780 B2

Before LYNNE E. PETTIGREW, STACEY G. WHITE, and CHRISTA P. ZADO, *Administrative Patent Judges*.

ZADO, *Administrative Patent Judge*.

DECISION ON REMAND
35 U.S.C. § 144 and 37 C.F.R. § 42.5(a)

I. BACKGROUND

A. Initial Proceedings Before the Board

Emerson Electric Co. ("Petitioner") filed a Petition for *inter partes* review of claims 1–15 ("challenged claims") of U.S. Patent No. 8,754,780 B2 (Ex. 1001, "the '780 patent") (Paper 1, "Pet."), and SIPCO, LLC ("Patent Owner") subsequently filed a Preliminary Response (Paper 12, "Prelim. Resp."). On November 2, 2016, we instituted an *inter partes* review to determine whether the challenged claims of the '780 patent are unpatentable under 35 U.S.C. § 103(a) on the following grounds: claims 1–15 as obvious over the '732 patent;[1] claims 1, 2, and 7 as obvious over Kahn[2] in view of admitted prior art (the "APA");[3] and claims 4–6 and 8 as obvious over Kahn in view of the APA and Burchfiel.[4] Paper 18, 26 ("Inst. Dec.").

After institution, Patent Owner filed a Response (Paper 22, "PO Resp." or "Response"), and Petitioner filed a Reply (Paper 25, "Reply"). An oral hearing was held on July 13, 2017. A transcript of the hearing is included in the record. Paper 40 ("Tr.").

On October 25, 2017, we entered a Final Written Decision (Paper 43, "Final Dec." or "Final Decision") determining that Petitioner had

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[1] U.S. Patent No. 8,013,732 B2 (Ex. 1012) ("the '732 patent").

[2] Robert E. Kahn et al., *Advances in Packet Radio Network Protocols*, Proceedings of the IEEE, Vol. 66, No. 11, Nov. 1978 (Ex. 1015) ("Kahn").

[3] Petitioner refers to portions of the '780 patent as Admitted Prior Art ("APA"). *See, e.g.*, Pet. 16–17; *see also* Ex. 1001.

[4] J. Burchfiel et al., *Functions and Structure of a Packet Radio Station*, National Computer Conference presented paper, 1975 (Ex. 1016) ("Burchfiel").

demonstrated, by a preponderance of the evidence, that claims 1–15 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over the '732 patent; claims 1, 2, and 7 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA; and, claims 4, 6, and 8 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA and Burchfiel. Final Dec. 61–62. We further determined that Petitioner had not shown that claim 5 of the '780 patent is unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA and Burchfiel. *Id.*

B. Proceedings Before the Federal Circuit

On December 21, 2017, Patent Owner filed a Notice of Appeal to the United States Court of Appeals for the Federal Circuit for review of the Final Decision. *See* Paper 44. The Federal Circuit docketed the appeal on January 2, 2018. *SIPCO, LLC v. Emerson Elec. Co.*, No. 2018-1364 (Fed. Cir.). On May 3, 2018, Patent Owner filed with the Federal Circuit a motion requesting that the Federal Circuit remand the case to the Board to consider the effect of a certificate of correction that issued for the '780 patent after our entry of the Final Decision. Mot. for Remand, *SIPCO, LLC v. Emerson Elec. Co.*, No. 2018-1364 (Fed. Cir. May 3, 2018). On June 27, 2018, the Federal Circuit granted Patent Owner's motion, ordering that

> (1) The motion is granted to the extent that the case is remanded for the Board to issue an order addressing what, if any, impact the certificate of correction has on its final written decision in this case. This court retains jurisdiction over the appeal.
>
> [(2)] Proceedings are stayed pending the Board's decision on this issue. Within seven days from the date of the Board's decision, the parties are directed to inform this court how they believe this appeal should proceed. Any

> appeal from the Board's decision on this issue will be consolidated with this appeal.

Order on Mot. for Remand, *SIPCO, LLC v. Emerson Elec. Co.*, No. 2018-1364, slip op. at 4 (Fed. Cir. June 27, 2018). This order by the Federal Circuit constitutes the mandate.

C. Proceedings on Remand

On August 30, 2018, a conference call was held with Petitioner, Patent Owner, and Judges Pettigrew, White, and Zado to discuss a procedure for this proceeding on remand. The parties agreed that each party would file on the same day an opening brief not to exceed ten (10) pages, and that each party thereafter would file on the same day a response not to exceed five (5) pages. Paper 46, 3. The parties agreed no other briefing is necessary and that no additional or supplemental discovery or briefing is required, and the parties confirmed they did not seek oral hearing in this remand proceeding. *Id.* We authorized each party to file an opening brief not to exceed ten (10) pages addressing what, if any, impact the certificate of correction has on the Final Decision and a response not to exceed five (5) pages responsive only to arguments made in the corresponding opening brief. *Id.* No other motions, briefing, or discovery was requested or authorized. *Id.*

Petitioner subsequently filed Petitioner's Opening Brief After Remand-in-Part (Paper 47, "Pet. Brief"), and Patent Owner filed Patent Owner's Brief Regarding the Effect of the Certificate of Correction on the Final Written Decision (Paper 48, "PO Brief"). In response, Petitioner filed Petitioner's Response to Patent Owner's Opening Brief After Remand-in-Part (Paper 50, "Pet. Reply"), and Patent Owner filed Patent Owner's Reply to Petitioner's Opening Brief After Remand-in-Part (Paper 49, "PO Reply").

D. The '780 Patent's Claim of Priority

For reasons discussed below, at the time the Petition was filed (and through the duration of the proceeding), the earliest priority date to which the challenged claims of the '780 patent were entitled was April 2, 2013. As a result, the '732 patent—which serves the basis for a ground of unpatentability affecting all challenged claims, claims 1–15—qualified as prior art against the challenged claims of the '780 patent. As discussed below, in an attempt to remove the '732 patent as prior art, Patent Owner sought to, and did, file multiple petitions requesting correction of the priority claim of the '780 patent to include other applications. A certificate of correction, however, did not issue until March 27, 2018, five months after entry of the Final Decision, and three months after Patent Owner filed a notice of appeal to the Federal Circuit.

The application for the '780 patent, U.S. Application No. 13/855,452 ("the '452 application"), was filed on April 2, 2013. Ex. 1001. On its face, the '780 patent asserts to be "a continuation of copending U.S. patent application Ser. No. 13/173,499, entitled, 'Automotive Diagnostic Data Monitoring Systems and Methods,' filed on Jun. 30, 2011." *Id.* at 1:8–11. U.S. Application No. 13/173,499 ("the '499 application"), however, issued as U.S. Patent No. 8,212,667 on July 3, 2012, several months prior to the filing of the application leading to the '780 patent. Ex. 1001; Ex. 1002. Accordingly, there was no co-pendency between the '780 patent and the '499 application. As a result, the earliest claim of priority to which the challenged claims of the '780 patent could be entitled was April 2, 2013, the filing date of the '452 application.

On May 26, 2016, nearly one month after the filing date accorded to the Petition, Patent Owner filed, with respect to the '780 patent, both a Request for a Certificate of Correction (Ex. 1023) and a Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration (Ex. 1022) (collectively, "First Request"). Patent Owner filed the First Request without Board authorization, namely, Patent Owner (1) did not seek leave from the Board to file a motion for authorization to file a certificate of correction, as required under 37 C.F.R. § 42.20(b), (2) did not file a motion with the Board seeking authorization to file a certificate of correction, as required under 37 C.F.R. § 1.323, and (3) did not have authorization from the Board to file for a certificate of correction. Patent Owner did not notify the Board or Petitioner after the filing. Petitioner asserts that it learned of the First Request as a result of a search of the Public Patent Application Information Retrieval ("PAIR") system. *See, e.g.*, Paper 10, 2. It is Petitioner who informed the Board of the First Request.

Patent Owner did not, at any time, request leave under 37 C.F.R. § 42.20(b) to file a motion for authorization to file a certificate of correction, or file a motion under 37 C.F.R. § 1.323. On July 2, 2016, exercising our authority under 37 C.F.R. § 42.3, we issued an order staying the First Request pending our decision on institution. Paper 10, 4. Our order also precluded Patent Owner, during the pendency of this proceeding, from filing additional papers to correct the claim of priority of the '780 patent without prior authorization from the Board. *Id.*

On November 2, 2016, we instituted *inter partes* review in this proceeding, and lifted the stay with respect to the First Request, noting that

we "defer to the determination of the Petitions Branch regarding Patent Owner's claim of priority." Inst. Dec. 11.

Patent Owner's First Request sought to amend the '780 patent's priority claim to an application that Patent Owner alleged shared co-pendency with the '452 application, U.S. Application 13/222,216 ("the '216 application"). Ex. 1022, 2; Ex. 1023, 2. On November 14, 2016, the Petitions Branch granted Patent Owner's request for expedited review of Patent Owner's petition, but otherwise dismissed the petition for failure to comply with 35 U.S.C. § 120 and 37 C.F.R. § 1.78(d)(2), which requires a reference be filed in an Application Data Sheet. Ex. 3001.

Pursuant to our July 27, 2016 Order (Paper 10), Patent Owner subsequently sought, and we granted, authorization to file a second Request for a Certificate of Correction and Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration (collectively, "Second Request"). Paper 20, 3. On January 20, 2017, the Petitions Branch granted Patent Owner's request for expedited review of Patent Owner's petition, but dismissed the request for correction of the '780 patent's priority claim for failure to "make a reference to the first (earliest) application and every intermediate application." Ex. 3002, 2 ("Second Dismissal"). Patent Owner sought to claim the benefit of a chain of applications by claiming priority to the '216 application, which claims priority to U.S. Application No. 12/477,329 ("the '329 application"). Ex. 2034, Ex. A, 2. The Second Dismissal explains that the chain set forth by Patent Owner in the Second Request did not match the chain in either the '329 application or the patent resulting from the '329 application. Ex. 3002, 2. The Second Dismissal states that before Patent Owner can claim priority as requested in the Second

Request, the claim of priority in the '329 application would need to be corrected through a separate request for correction. *Id.*

Patent Owner subsequently sought our authorization to file a third Request for a Certificate of Correction and Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration with the Petitions Branch (collectively, "Third Request"). We ordered Patent Owner to show cause why we should authorize it to file a Third Request. Paper 24. Patent Owner's response to our order to show cause alleged that the mistakes in the Second Request were due to an inadvertent omission, but Patent Owner did not explain any particular circumstances that would justify its mistakes. Paper 26, 4–5. We found that Patent Owner's demonstrated pattern of making mistakes indicated deliberate indifference toward avoiding errors. *See id.* Under the circumstances, we exercised our authority pursuant to 37 C.F.R. § 42.3, and denied Patent Owner's request to file a Third Request. *Id.* at 4. Patent Owner subsequently filed a request for rehearing (Paper 28), which we denied, noting:

> Patent Owner has made several errors and mistakes throughout Patent Owner's attempts to make a claim of priority with respect to U.S. Patent No. 8,754,780 B2 (the "'780 patent"), including during prosecution of the application leading to the '780 patent (*see, e.g.*, Paper 13, 1–5; Ex. 1022–1034; Paper 15; Ex. 2011–2021), during prosecution of the application to which Patent Owner seeks to claim priority (i.e., Application No. 12/477,329) (*see, e.g.*, Ex. 3002, 2), and in the First Request (*see, e.g.*, Ex. 3001) and Second Request (*see, e.g.*, Ex. 3002). In our Order [Paper 24], our finding regarding Patent Owner's "repeated mistakes" was in reference to Patent Owner's demonstrated pattern of making errors it should have recognized and could have avoided with the exercise of minimal diligence. Paper 27, 3. In the Response to our Order to Show Cause, Patent Owner

> did not provide sufficient justification for the failure to avoid making error after error.

Paper 31, 3.

Later, in conjunction with entering the Final Decision, we lifted the stay prohibiting Patent Owner from filing a request for a certificate of correction, and deferred to the determination of the Petitions Branch regarding Patent Owner's claim of priority. Final Dec. 22.

Subsequent to entry of the Final Decision on December 7, 2017, Patent Owner filed a third Request for a Certificate of Correction and Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration with the Petitions Branch (collectively, "Third Filed Request"). Ex. 3005; Ex. 3006. On January 16, 2018, the Petitions Branch granted Patent Owner's request for expedited review of Patent Owner's petition, but again dismissed Petitioner's request for correction of the '780 patent's priority claim for failure to "make a reference to the first (earliest) application and every intermediate application." Ex. 3007, 2.

On January 30, 2018, Patent Owner filed a Renewed Petition to Accept an Unintentionally Delayed Priority Claim ("Fourth Request"). Ex. 3008. On February 8, 2018, the Petitions Branch granted Patent Owner's Fourth Request. Ex. 3009.

On March 27, 2018 the certificate of correction issued. Ex. 2038 ("Certificate").

II. DISCUSSION

A. Legal Principles

The Director has the authority to issue a certificate of correction for certain mistakes in a patent made by patent applicant, pursuant to 35 U.S.C. § 255, which states:

> Whenever a mistake of a clerical or typographical nature, or of minor character, which was not the fault of the Patent and Trademark Office, appears in a patent and a showing has been made that such mistake occurred in good faith, the Director may, upon payment of the required fee, issue a certificate of correction, if the correction does not involve such changes in the patent as would constitute new matter or would require re-examination. Such patent, together with the certificate, shall have the same effect and operation in law on the trial of actions for causes thereafter arising as if the same had been originally issued in such corrected form.

Furthermore, a patent owner may petition the Director to issue a certificate of correction of applicant's mistake in accordance with 37 C.F.R. § 1.323. However, if the request for correction relates to a patent involved in a trial before the Patent Trial and Appeal Board, the request must be accompanied by a motion under 37 C.F.R. § 42.20:

> The Office may issue a certificate of correction under the conditions specified in 35 U.S.C. 255 at the request of the patentee or the patentee's assignee, upon payment of the fee set forth in § 1.20(a). If the request relates to a patent involved in an interference or trial before the Patent Trial and Appeal Board, the request must comply with the requirements of this section and be accompanied by a motion under § 41.121(a)(2), § 41.121(a)(3) or § 42.20 of this title.

37 C.F.R. § 1.323. Also, because we have exclusive jurisdiction over the challenged patent during an *inter partes* review proceeding, the Board may

determine the manner in which review of a request for a certificate of correction pursuant to § 255 and § 1.323 is to proceed. 35 U.S.C. § 315(d) (giving the Director authority to determine manner in which an *inter partes* review and any other proceeding or matter involving the patent may proceed); 37 C.F.R. § 42.3(a) (granting the Board "exclusive jurisdiction within the Office over every involved application and patent during the proceeding, as the Board may order"). Under 37 C.F.R. § 42.2, "*Proceeding* means a trial or preliminary proceeding" where a "*Preliminary Proceeding* begins with the filing of a petition for instituting a trial and ends with a written decision as to whether a trial will be instituted," and "[a] trial begins with a written decision notifying the petitioner and patent owner of the institution of the trial."

B. Effect of the Certificate

1. The Parties' Arguments

Petitioner submits that we should find, as a matter of law, that the Certificate that issued on March 27, 2018, has no impact on the Final Decision in this case. Pet. Brief 1. Petitioner argues this is so because under 35 U.S.C. § 255, which governs certificates of correction for patent applicant errors, a certificate applies only prospectively to a trial of actions, and an *inter partes* review proceeding qualifies as a trial of actions. *Id.* at 5–8.

To support the argument that a certificate applies only prospectively, Petitioner relies on the language in § 255 that a patent, together with the certificate, "shall have the same effect and operation in law on the trial of actions for causes thereafter arising as if the same had been originally issued in such corrected form." *See id.* at 5 (citing 35 U.S.C. § 255). Petitioner points out that the Federal Circuit, in addressing identical language in 35

U.S.C. § 254 (governing certificates of correction for Patent Office mistakes), recognized a "certificate of correction is only effective for causes of action arising after it was issued." *Id.* at 7 (quoting *Southwest Software, Inc. v. Harlequin Inc.*, 226 F.3d 1280, 1294 (Fed. Cir. 2000) ("*Southwest Software*")).

Petitioner asserts that an *inter partes* review is a trial of actions because it is a statutory cause of action properly assigned to a non-Article III tribunal. *Id.* at 6–7. Petitioner relies on *Granfinanciera, S.A. v. Nordberg*, 492 U.S. 33, 53–54 (1989), which Petitioner argues addresses whether a statutory cause of action can be assigned to a non-Article III Tribunal. *Id.* at 6. In *Granfinanciera*, the Supreme Court stated:

> For if a statutory cause of action, such as respondent's right to recover a fraudulent conveyance under 11 U.S.C. § 548(a)(2), is not a "public right" for Article III purposes, then Congress may not assign its adjudication to a specialized non-Article III court lacking "the essential attributes of the judicial power." And if the action must be tried under the auspices of an Article III court, then the Seventh Amendment affords the parties a right to a jury trial whenever the cause of action is legal in nature. Conversely, if Congress may assign the adjudication of a statutory cause of action to a non-Article III tribunal, then the Seventh Amendment poses no independent bar to the adjudication of that action by a nonjury factfinder.

Id. (quoting *Granfinanciera*, 492 U.S. at 53–54). Petitioner relies on *Granfinanciera* for the proposition that "Congress may devise novel *causes of action* involving public rights free from the strictures of the Seventh Amendment if it assigns their adjudication to tribunals without statutory authority to employ juries as factfinders." *Id.* (quoting *Granfinanciera*, 492 U.S. at 51). Petitioner argues this is precisely what Congress did for *inter partes* review—namely, Congress devised a cause of action involving public

rights. *Id.* at 7. To support the argument that an *inter partes* review involves a public right, Petitioner relies on *Oil States Energy Services, LLC v. Greene's Energy Group, LLC*, 138 S. Ct. 1365 (2018), asserting that the Supreme Court found "[w]hile 'inter partes review is not initiated by private parties in the way that a common-law cause of action is,' inter partes review is nonetheless a statutory cause of action properly assigned to a non-Article III tribunal because it involves public rights as the Court found in *Oil States*." Pet. Brief 6 (citing *Oil States*, 138 S. Ct. at 1378–79). Petitioner relies on the Court's statement that "'[i]nter partes review falls squarely within the public-rights doctrine,' which 'applies to matters "arising between the government and others, which from their nature do not require judicial determination and yet are susceptible of it."'" *Id.* (quoting *Oil States*, 138 S. Ct. at 1373 (quoting *Crowell v. Benson*, 285 U.S. 22, 50 (1932))).

In addition to its argument that, as a matter of law, the certificate has no impact on the *inter partes* review, Petitioner argues it would be prejudiced and Patent Owner would be rewarded unfairly if we were to give retroactive effect to the certificate. *Id.* at 9. Petitioner points out that Patent Owner filed two failed requests for correction with the Petitions Branch during this proceeding before we stayed any further filings requesting correction, and that for the two years between the patent's issuance and the filing of the Petition in this case, Patent Owner failed to seek correction of the error. *Id.* Petitioner also states that in another case the Board took note of how "[p]otential changes to the claims at this stage could lead to a moving target that is unfair to Petitioner." *Id.* at 10 (quoting *Kingston Tech. Co. v. CATR Co.*, Case IPR2015-00559, slip op. at 3 (Paper 44) (PTAB Nov. 6, 2015)). Petitioner argues that if we were to give effect to a certificate that

issued *after* the Final Decision, that target would not just move, it would alter the target entirely. *Id.*

Petitioner also argues that, by staying Patent Owner's request to file a Third Request, the Board "effectively determined that the request for a certificate should not have any impact on the IPR." *Id.* at 8.

Patent Owner does not dispute that under § 255, a certificate of correction applies only prospectively to a trial of actions for causes. *See* PO Brief 2–3. However, Patent Owner argues that an *inter partes* review is not a trial of actions for causes under the statute. *Id.* at 3–7.

Even though Patent Owner states that "it is not clear from the statutory text" of § 255 whether an *inter partes* review is a "trial of actions for causes," Patent Owner nonetheless asserts that this language should be interpreted such that it does not apply to an *inter partes* review. *Id.* at 4. To support this assertion, Patent Owner argues that "[n]either the statute defining IPR, 35 U.S.C. § 311, nor any other part of Title 35, defines an IPR as a 'trial of actions for causes.'" *Id.* Patent Owner also points out that *Southwest Software* involves a civil action for patent infringement, arguing that its holding should not be "stretched beyond its clear context" to include *inter partes* review proceedings. *Id.* Patent Owner also compares 35 U.S.C. § 281, which states "[a] patentee shall have a remedy by civil action for infringement of his patent," with 35 U.S.C. § 316, which provides that the file of any "proceeding" under "this chapter" be made available to the public. *Id.* at 5.

Patent Owner also argues that the holding in *Oil States* supports Patent Owner's interpretation of § 255 rather than Petitioner's. *Id.* at 5–6. Patent Owner asserts that in *Oil States* the "Supreme Court declined to find

that an IPR is a judicial proceeding merely because 'PTO regulations [] use terms typically associated with courts—calling the hearing a 'trial,'" and, moreover, argues that "'[a]lthough inter partes review includes some of the features of adversarial litigation, it does not make any binding determination regarding' the legal liabilities of one party to another, as in patent infringement trials." *Id.* at 5–6 (quoting *Oil States*, 138 S. Ct. at 1378).

Patent Owner also argues that it is unlikely that the drafters of § 255 envisioned that an administrative adjudication like an IPR proceeding would constitute a "trial of actions for causes" because *inter partes* review did not come into effect until 2012, decades after the drafting of § 255. PO Brief 6.

Patent Owner also argues that in drafting Title 35, Congress expressly used different language to distinguish a "proceeding" before the Patent Office from a "trial of actions for causes," comparing 35 U.S.C. §§ 305–307, with 35 U.S.C. §§ 252, 254, and 255. PO Brief 6. Patent Owner also directs us to 35 U.S.C. § 315, which Patent Owner asserts consistently uses "actions" to refer to district court actions and "proceedings" to refer to administrative proceedings. *Id.*

Patent Owner also asserts it would be contrary to current Board practice to interpret *inter partes* review proceedings as trials of actions for causes. *Id.* at 7. Patent Owner identifies, as current Board practice, the consideration of motions seeking authorization to file requests for certificate of correction of a patent during an *inter partes* review proceeding involving that patent. *Id.* at 7–8 (citing 35 U.S.C. § 315(d)); *see also* 37 C.F.R. § 1.323. Patent Owner argues that Petitioner's statutory construction of § 255 would unnecessarily disrupt the Board's practice of entertaining motions seeking authorization to file requests for correction during the

pendency of an *inter partes* review proceeding. PO Brief 7–8. According to Patent Owner

> The statutory grant of discretion to the Director in § 315(d) conflicts with Emerson's interpretation of § 255. Well-established principles of statutory construction indicate that when two statutes can be interpreted to give effect to both, the harmonizing interpretation prevails. *Morton v. Mancari*, 417 U.S. 535, 551 (1974). Further, even if the Board finds that §§ 255 and 315 are irreconcilable, the more specific statute—§ 315—prevails over the more general statute—§ 255—particularly since they are closely related provisions both granting the PTO authority to act. *See HCSC-Laundry v. United States*, 450 U.S. 1, 6 (1981) (finding that the relationship between the specific and general statutes impacts statutory interpretation of potentially conflicting statutes).

Id. at 8.

Finally, Patent Owner asserts that failing to give retroactive effect to certificates of correction would waste Patent Office resources. *Id.* at 9. Patent Owner submits that it would be illogical for the Director, upon issuance of a final written decision and expiration of appeals, to cancel claims of an uncorrected patent if the Petitions Branch of the Patent Office has issued a certificate correcting the patent. *Id.* Patent Owner argues that

> it is illogical to suggest that the PTAB should proceed to adjudicate issues related to a patent that has since been revised by the Petitions Branch—another part of the same agency. This "illogical and unworkable result" is exactly the type of outcome the Federal Circuit warned against when interpreting similar statutory language in § 254. *See* 226 F.3d 1280 at 1295 (citing *Timex V.I., Inc. v. United States*, 157 F.3d 879, 886 (Fed. Cir. 1998)).

Id.

2. Analysis

We begin our analysis with the language of 35 U.S.C. § 255. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018) ("[s]tart[ing] where the statute does"). "The first step 'is to determine whether the language at issue has a plain and unambiguous meaning with regard to the particular dispute in the case.'" *Barnhart v. Sigmon Coal Co.*, 534 U.S. 438, 450 (2002) (quoting *Robinson v. Shell Oil Co.*, 519 U.S. 337, 340 (1997)). In doing so, we "must read the words 'in their context and with a view to their place in the overall statutory scheme.'" *King v. Burwell*, 135 S. Ct. 2480, 2489 (2015) (quoting *FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 133 (2000)). This is because statutory "[a]mbiguity is a creature not of definitional possibilities but of statutory context." *Brown v. Gardner*, 513 U.S. 115, 118 (1994). In arriving at our construction, we consider not only the unambiguous language of § 255, but also the design of the statute as a whole with regard to certificates of correction. "To determine Congressional intent, we begin, of course, with the language of the statutes at issue. However, to fully understand the meaning of the statute, we look 'not only to the particular statutory language, but to the design of the statute as a whole and to its object and policy.'" *Associated Elec. Co-op., Inc. v. U.S.*, 226 F.3d 1322, 1326 (Fed. Cir. 2000) (quoting *Crandon v. U.S.*, 494 U.S. 152, 158 (1990)).

Section 255 contains only one sentence addressing retroactive versus prospective application of an issued certificate: "Such patent, together with the certificate, shall have the same effect and operation in law on the trial of actions for causes *thereafter arising* as if the same had been originally issued in such corrected form." 35 U.S.C. § 255 (emphasis added). Although the

parties' arguments focus on whether an *inter partes* review is a "trial of actions" under 35 U.S.C. § 255, we need not decide this issue in order to determine the impact, if any, of the Certificate on the Final Decision in this proceeding. Assuming, without deciding, that an *inter partes* review falls within the statute's "trial of actions" language, the statute makes a certificate of correction applicable only to actions arising *after* a certificate issues. As the above discussion of the procedural timeline here makes clear, the Certificate issued to Patent Owner well after the subject *inter partes* review commenced; Patent Owner did not even seek correction until after Petitioner had filed its Petition. Moreover, the correction did not occur until *after* the Final Decision issued. Thus, under the express language of the statute, the Certificate would not impact this trial.

Conversely, if we assume, without deciding, that an *inter partes* review is not a "trial of actions" under § 255, then the statute is silent about prospective or retroactive application. Patent Owner would apparently infer from this silence that a certificate has retroactive application for anything not qualifying as a "trial of actions." We reject that reading of the statute. The statute does not contain any affirmative language indicating any intention to retroactively apply a certificate of correction. Inferring retroactivity would be inconsistent with the plain language that Congress did include, which communicates that Congress contemplated only prospective application of a certificate of correction.

Giving a certificate of correction only prospective application is also consistent with the interpretation given to §§ 254 and 256, the sister provisions to § 255. *See Superior Fireplace Co. v. Majestic Prods. Co.*, 270 F.3d 1358, 1370 (Fed. Cir. 2001) (construing phrase "clerical or

typographical nature" in § 255 in context of related provisions §§ 251–256).

Section 255 authorizes the Director to issue a certificate correcting mistakes by *patent applicant*, and § 254 authorizes the Director to issue a certificate correcting mistakes by the *Patent Office* ("Office"). 35 U.S.C. §§ 254–255. Section 256 authorizes the Director to issue a certificate to correct named inventorship. *Id.* § 256.

Sections 254 and 255 provide the following language giving effect to a certificate, stating it "shall have the same effect and operation in law on the trial of actions for causes thereafter arising as if the same had been originally issued in such corrected form." *Id.* §§ 254–55. Therefore, these sections expressly give effect to a certificate on a trial of actions for causes arising after the certificate issues. These sections do not contain any language, or otherwise provide any indication, that certificates generally should be given retroactive effect. Instead, these provisions unambiguously provide the circumstance in which a certificate under these sections are to be given effect.

The Federal Circuit's analysis and holding in *Southwest Software* supports our conclusion. There, the Court rejected the retroactive application of a certificate of correction issued under § 254 based upon the same "thereafter arising" language found in § 255. While it did so in the context of a patent infringement litigation, the court's reasoning resonates here. Specifically, in reaching its conclusion, the Court rejected the argument that the language in § 254 providing that "such certificate [of correction] shall be considered part of the original patent" (this language is not in § 255) supported giving the correction retroactive effect. The Court explained that "[t]his language plays the role of establishing that, for *all*

circumstances in which the certificate of correction is effective—namely, at all times after its issue date—the certificate is considered part of the original patent." 226 F.3d at 1295 (emphasis added). This language from § 254 arguably provides a stronger basis for retroactivity of a certificate of correction (in § 254, for a mistake by the Office) than anything found in § 255, but the court rejected that reading. The two provision are otherwise, in relevant language, on all fours. Thus, the logical and natural reading of § 255 is that, like § 254, a certificate of correction for an applicant's mistake similarly does not receive retroactive application.

A comparison of § 255 with § 256 further indicates that § 255 does not have retroactive effect. Section 256 authorizes the Director to issue a certificate to correct named inventor errors, stating

> (a) CORRECTION.—
> Whenever through error a person is named in an issued patent as the inventor, or through error an inventor is not named in an issued patent, the Director may, on application of all the parties and assignees, with proof of the facts and such other requirements as may be imposed, issue a certificate correcting such error.
>
> (b) PATENT VALID IF ERROR CORRECTED.—
> The error of omitting inventors or naming persons who are not inventors *shall not invalidate the patent* in which such error occurred if it can be corrected as provided in this section. The court before which such matter is called in question may order correction of the patent on notice and hearing of all parties concerned and the Director shall issue a certificate accordingly

35 U.S.C. § 256(a)–(b) (emphasis added). Accordingly, by stating that a patent shall not be invalidated if inventorship is corrected, § 256 provides for retroactive effect of a certificate correcting named inventorship. By stating

that the error shall not invalidate the patent, certificates issued under this section have retroactive effect in general. This is in contrast with § 255, which does not include any similar provision.

Our interpretation of § 256 as having retroactive effect is consistent with the Federal Circuit's decision in *Vikase Corp. v. Am. Nat'l Can Co.*, 261 F.3d 1316, 1329 (Fed. Cir. 2001) (finding the district court correctly rejected the argument that a second family of patents were invalid for the period prior to correction of inventorship under § 256, stating that "§ 256 provides that an error of inventorship does not invalidate the patent if such error 'can be corrected as provided in this section.'").

In addition, our interpretation of § 256 is consistent with the district court's decision in *Roche Palo Alto LLC v. Ranbaxy Laboratories Ltd.*, 551 F. Supp. 2d 349, 349 (D.N.J. 2008) ("*Roche*"). In *Roche*, the parties contested whether a certificate correcting inventorship had issued pursuant to § 254 or § 256. *Id.* at 355. The significance of this distinction was that under § 254 the certificate would not have retroactive effect, whereas under § 256 it would apply retroactively. *Id.* at 355 (citing *Southwest Software*, 255 F.3d at 1297, 1299) (noting that the Federal Circuit has held that unlike § 256, certificates obtained under § 254 are prospective).

Our interpretation of § 255 is also consistent with 35 U.S.C. § 315(d) and with our Rules. During the pendency of an *inter partes* review, the Director has authority to determine the manner in which the *inter partes* review, and any other proceedings, including review of a request for certificate of correction, is to proceed. 35 U.S.C. § 315(d). This authority has been delegated to the Board. *See* 37 C.F.R. § 42.3 (stating that the Board may exercise exclusive jurisdiction within the Office over every

involved patent during the proceeding); *see id.* § 42.122 (stating that where another matter involving the patent is before the Office, "the Board may during the pendency of the *inter partes* review enter any appropriate order regarding the additional matter including providing for the stay, transfer, consolidation, or termination of any such matter"). The period of time during which the Board has jurisdiction begins when a petition for *inter partes* review is filed. *See id.* § 42.3 (providing for Board jurisdiction during the *proceeding*); *see id.* § 42.2 (defining *proceeding* as a "trial or preliminary proceeding," and *preliminary proceeding* as "begin[ning] with the filing of a petition for instituting a trial"). Moreover, if the request for the certificate of correction relates to a patent involved in a trial before the Board, it must be accompanied by a motion to the Board under 37 C.F.R. § 42.20. 37 C.F.R. § 1.323.

Therefore, once a petition for *inter partes* review of a patent has been filed, the Board may exercise jurisdiction over a request for a certificate of correction, and may stay the request. 35 U.S.C. § 315(d); 37 C.F.R. §§ 42.3, 42.122. Moreover, once trial has been instituted, Patent Owner must file a motion with its request, which the Board may deny. 37 C.F.R. § 1.323.

Therefore, it is within the Board's discretion to stay or prohibit filing of a certificate of correction, thereby avoiding potentially conflicting outcomes between proceedings before different authorities within the Office, such as a decision by the Certificates of Correction Branch on a request for a certificate of correction and a decision by the Board in an *inter partes* review. A stay or prohibition of filing a certificate of correction also prevents a moving target during an *inter partes* review for the parties and for the Board, which must issue a final determination within one year of

instituting trial. 35 U.S.C. § 316(a)(11). It would be inconsistent to grant the Director, under § 315(d), the discretion to stay or prohibit filing of a request for a certificate of correction during an *inter partes* review, yet mandate retroactive effect when a certificate issues *after* the Final Decision and after an appeal to the Federal Circuit has been filed.

These same equitable considerations support giving § 255 only prospective application. As the court explained in *Southwest Software* in declining to afford retroactive effect to a certificate of correction under § 254: "Moreoever, it does not seem to us to be asking too much to expect a patentee to check a patent when issued in order to determine whether it contains any errors that require the issuance of a certificate of correction." 226 F.3d at 1296. Those considerations have equal applicability to § 255—perhaps even greater import, when one considers that § 254 speaks to Office errors, while § 255 addresses errors by the patentee. A lack of diligence by the patentee in correcting patent errors has potentially negative consequences for the public, who may allocate its affairs based on the patent as issued, unaware of any such error. Permitting the patentee to alter the patent document with retroactive effect could have negative consequences for unsuspecting parties, while leaving the patentee no worse off. While Patent Owner suggests actual prejudice would exist here (*see, e.g.*, Reply at 4-5), that is not the correct inquiry. Statutory construction does not occur in a vacuum; provisions are read consistent with their language and place in the overall statutory scheme. Here, neither § 255 nor its place in the Patent Act requires or suggests that Congress intended for parties other than the patent owner to bear any consequences incident to the issuing of a certificate of correction pursuant to § 255, which would be the possible result if that

correction were to receive retroactive application.

We also disagree with Patent Owner's argument that failing to give certificates of correction retroactive effect in *inter partes* review proceedings would, as a matter of course, waste Office resources and result in an "illogical and unworkable result." PO Brief 9 (citing *Southwest Software*, 226 F.3d at 1295). Section 315(d) of Title 35, as well as 37 C.F.R. §§ 42.3 and 42.122, provide the Board with discretion to determine the manner in which various proceedings before the Office are to proceed, on a case by case basis, thereby vesting the Board with the authority to determine how best to manage Office resources. In addition, § 255 does not *require* the Director to issue a certificate of correction, but instead is permissive, stating "the Director *may*, upon payment of the required fee, issue a certificate of correction." 35 U.S.C. § 255 (emphasis added); *see also* 37 C.F.R. § 1.323 (providing that "[t]he Office *may* issue a certificate of correction under the conditions specified in 35 U.S.C. § 255" (emphasis added)). In view of the discretion accorded to the Director in determining the manner in which proceedings are to proceed and the permissive nature of issuing a certificate of correction, we disagree with Patent Owner that its interpretation of § 255, which is contrary to the language of the statute, is necessary in order to avoid an "illogical and unworkable result." PO Brief 9.

For the foregoing reasons, we reject Patent Owner's interpretation of § 255 as giving retroactive effect to certificates of correction. PO Brief 3–4.

Patent Owner asserts that because the Final Decision deferred determination of the certificate to the Petitions Branch, we agreed that we should vacate our unpatentability determination based on the '732 patent if a certificate were to issue later. PO Brief 1. Contrary to Patent Owner's

assertion, we did not agree that a decision by the Petitions Branch or Certificates of Correction Branch should impact the Final Decision. Even though the Board has jurisdiction over the manner in which a request for a certificate of correction is to proceed during an *inter partes* review—e.g., whether it is to be stayed or whether its filing is authorized—requests for certificates of correction are decided by the Certificates of Correction Branch. MPEP § 1002.02(l) (9th ed. Jan. 2018). Our deferral was an acknowledgment that upon lifting the stay a petition for a certificate of correction would be decided by another branch. However, for the reasons discussed above, a certificate of correction under § 255 does not have retroactive effect. The procedure employed here—deferring to Petitions on deciding the request to issue a certificate of correction but otherwise retaining the discretion and ability to determine what impact, if any, an issued certificate would have on this trial—is consistent with the procedure employed in other *inter partes* reviews. *See, e.g., SPTS Tech, Ltd. v. Plasma-Therm LLC*, IPR2018-00618, Paper 7 (PTAB May 1, 2018). It is consistent also with the Federal Circuit's determination in *Honeywell International Inc. v. Arkema Inc.*, 939 F.3d 1345, 1349 (Fed. Cir. 2019), that § 255 does not grant the Board authority to determine whether a certificate of correction should be issued.[5]

For the foregoing reasons, we determine that the Certificate, which issued after the Final Decision and after Patent Owner filed an appeal to the

[5] We note the issue in *Honeywell* of whether the Board abused its discretion in staying Patent Owner's request to file a certificate of correction is not before us. This issue is beyond the scope of the remand order in this case.

Federal Circuit, has no impact on the Final Decision in this case because it was not in effect during the proceeding.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the certificate of correction (Ex. 2038) has no impact on the Final Written Decision (Paper 43) in the proceeding; and

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

IPR2016-00984
Patent 8,754,780 B2

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMERSON ELECTRIC CO.,
Petitioner,

v.

SIPCO, LLC,
Patent Owner.

Case IPR2016-00984
Patent 8,754,780 B2

Before LYNNE E. PETTIGREW, STACEY G. WHITE, and CHRISTA P. ZADO, *Administrative Patent Judges*.

ZADO, *Administrative Patent Judge*.

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

I. INTRODUCTION

We have authority to hear this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision ("Decision") is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Emerson Electric Co. ("Petitioner")[1] has shown, by a preponderance of the evidence, that claims 1–15 of U.S. Patent No. 8,754,780 B2 (Ex. 1001, the "'780 patent") are unpatentable. *See* 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

A. Procedural History

Petitioner filed a Petition for *inter partes* review of claims 1–15 of the '780 patent (Paper 1, "Pet.") and SIPCO, LLC ("Patent Owner") subsequently filed a Preliminary Response (Paper 12, "Prelim. Resp."). On November 2, 2016, we instituted an *inter partes* review to determine whether claims 1–15 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over the '732 patent[2], whether claims 1, 2, and 7 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over Kahn[3] in view of admitted prior art (the "APA")[4], and whether claims 4–6 and 8 of the '780 patent are

[1] Petitioner identifies as real parties in interest, pursuant to 37 C.F.R. § 42.8, Emerson Electric Co., Emerson Process Management LLP, Fisher-Rosemount Systems, Inc., and Rosemount, Inc. Paper 17.

[2] U.S. Patent No. 8,013,732 B2 (Ex. 1012) ("the '732 patent").

[3] Robert E. Kahn et al., *Advances in Packet Radio Network Protocols*, Proceedings of the IEEE, Vol. 66, No. 11, Nov. 1978 (Ex. 1015) ("Kahn").

[4] Petitioner refers to portions of the '780 patent as Admitted Prior Art ("APA"). *See, e.g.*, Pet. 16–17; *see also* Ex. 1001.

unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA and Burchfiel.[5] Paper 18, 26 ("Inst. Dec.").

After institution, Patent Owner filed a Response (Paper 22, "PO Resp." or "Response"), and Petitioner filed a Reply (Paper 25, "Reply"). An oral hearing was held on July 13, 2017. A transcript of the hearing is included in the record. Paper 40 ("Tr.").

Also, Patent Owner filed Patent Owner SIPCO LLC's Observations on Cross-Examination of Dr. Heppe (Paper 33, "Obs."), and Petitioner filed a Response thereto (Paper 35, "Resp. to Obs.").

B. Related Proceedings

The parties indicate that Patent Owner has asserted the '780 patent against Petitioner in *SIPCO, LLC v. Emerson Electric Co.*, 6:15-cv-00907 (E.D. Tex.). Pet. 1; Paper 7, 1–2. Petitioner further indicates that Patent Owner has asserted a patent related to the '780 patent, U.S. Patent No. 7,103,511, against it in *Emerson Electric Co. v. SIPCO, LLC*, 1:15-cv-0319 (N.D. Ga.). Pet. 1.

Several *inter partes* review petitions have been filed with respect to patents related to the '780 patent. The parties inform us, for example, that Petitioner has filed petitions requesting *inter partes* review with respect to two related patents, U.S. Patent No. 8,013,732 (IPR2015-01973) and U.S. Patent No. 6,914,893 (IPR2015-01579). Pet. 2; Paper 7, 1–2. The parties failed to inform us of additional *inter partes* review petitions for patents related to the '780 patent (*see, e.g.*, IPR2017-00216 and IPR2017-00252)

[5] J. Burchfiel et al., *Functions and Structure of a Packet Radio Station*, National Computer Conference presented paper, 1975 (Ex. 1016) ("Burchfiel").

that were filed after June 8, 2016, the last date either party filed mandatory notices pursuant to 37 C.F.R. § 42.8(b)(2) regarding related matters.[6]

Also, Patent Owner filed several Requests for a Certificate of Correction and Petitions to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration with respect to the '780 patent (*see, e.g.*, Exs. 1022, 1023, 2034) and patents related to the '780 patent.

Petitioner also identifies a number of pending U.S. Patent Applications related to the '780 patent. Pet. 1–2.

C. The '780 Patent

The '780 patent, titled "Systems and Methods for Monitoring and Controlling Remote Devices," relates to "a system for monitoring a variety of environmental and/or other conditions within a defined remotely located region," wherein the system includes a plurality of wireless transmitters with integrated sensors adapted to monitor data input. Ex. 1001, Abstract.

[6] Parties have an on-going duty to file with the Board an identification of related matters within 21 days. 37 C.F.R. §§ 42.8(a)(3) and 42.8(b)(2). Neither party has explained why it failed to comply with its obligation to file in this proceeding updated notices identifying related matters. Indeed, both parties are aware of their on-going obligation under 37 C.F.R. § 42.8 to amend or supplement their mandatory notices, and filed updated mandatory notices with regard to counsel designation (Papers 36, 42) and real party in interest (Paper 17).

Figure 2 of the ’780 patent is reproduced below:

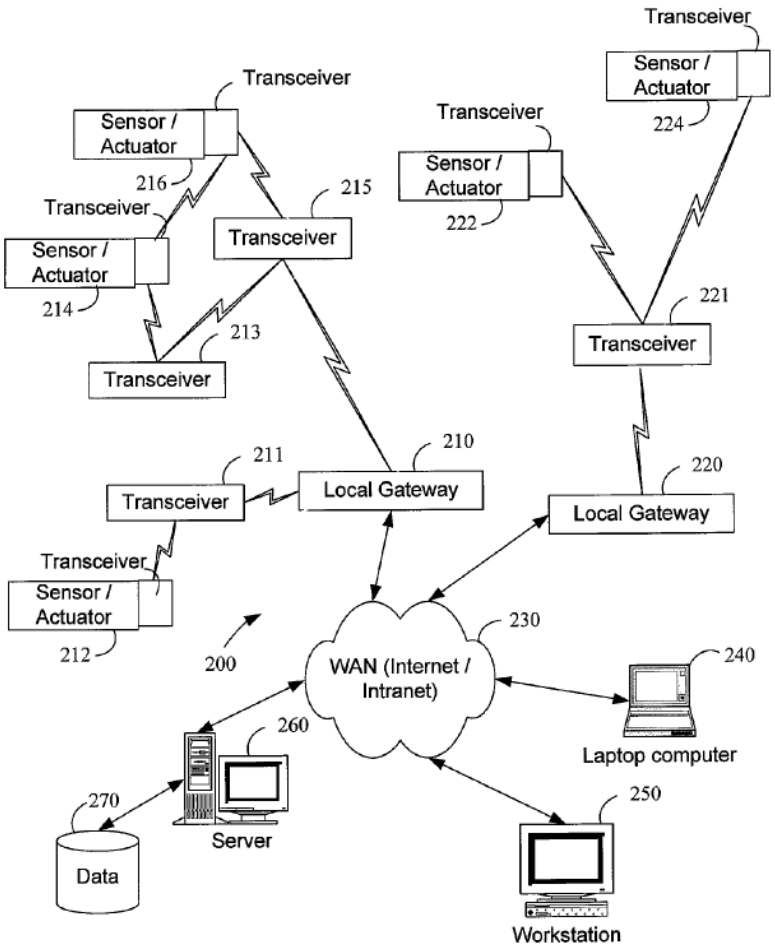

FIG. 2

Ex. 1001, Fig. 2. Figure 2 depicts a block diagram illustrating a monitoring/control system. *Id.* at 4:50–51. More specifically, Figure 2 depicts transceivers 212, 214, 216, 222, and 224 for transmitting data signals and receiving controls signals, wherein the transceivers have integrated sensors/actuators. *Id.* at 7:42–51. The ’780 patent specification discloses that radio frequency (RF) transmitter blocks 340 within the integrated transceivers each have “a unique identification code (e.g., transmitter identification number) 326, that uniquely identifies the transmitter to the

functional blocks of control system 200." *Id.* at 8:53–56; *see also id.* at 9:49–51 (explaining that many components of RF transmitter 340, depicted in Figure 3B, are similar to the corresponding components depicted in Figure 3A); *see also id.* at Figs. 3A and 3B. In one embodiment, RF transmitter block 320 is interfaced with sensor 310 via data interface 321, and accepts information from sensor 310 in digital electronic form. *Id.* at 8:66–67, Fig. 3A. The '780 patent specification further discloses data controller 324 that formats data packets 330 for RF transmission, wherein each data packet 330 includes RF transmitter 328's unique identification code (*see* Fig. 3B, "X-mitter I.D. 326") and a function code. *Id.* at 9:56–60. In one embodiment, the '780 patent describes lookup table 325 in which each unique function code corresponds to a button that is pressed on transmitter unit 320 that is worn by a person, and includes buttons the user may actuate by depressing the button. *Id.* at 8:26–31, Fig. 3A. The '780 patent specification further discloses that

> [f]unction codes, transmitter and or transceiver identification numbers, may all be stored with associated information within lookup tables 425. Thus, one look up table may be provided to associate transceiver identification numbers with a particular user. Another look up table may be used to associate function codes with the interpretation thereof. For example, a unique code may be associated by a look up table to identify functions such as test, temperature, smoke alarm active, security system breach, etc.

Id. at 11:51–60.

D. Challenged Claims

Of the challenged claims noted above, claims 1 and 9 are independent, and claims 2–8 and 10–15 depend therefrom.

Claim 1, reproduced below, is illustrative:

> 1. In a system comprising a plurality of wireless devices, a device comprising:
>
> a transceiver having a unique identification code and being electrically interfaced with a sensor, the transceiver being configured to receive select information and identification information transmitted from a second wireless transceiver in a predetermined signal type;
>
> the transceiver being further configured to wirelessly retransmit in the predetermined signal type the select information, the identification information associated with the second wireless transceiver, and transceiver identification information associated with the transceiver making retransmission; and
>
> a controller operatively coupled to the transceiver and the sensor, the controller configured to control the transceiver and receive data from the sensor, the controller configured to format a data packet for transmission via the transceiver, the data packet comprising data representative of data sensed with the sensor.

Ex. 1001, 18:53–19:4.

II. DISCUSSION

A. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art in the field of the '780 patent has:

> through formal education or extensive practical experience, the equivalent of a Bachelor's Degree in Electrical Engineering and 2–3 years of experience in designing and developing radio communications and/or computer networks systems or marketing such systems from a technical standpoint.

Pet. 10; *see also* Ex. 1018 ¶ 8 (opinion of Petitioner's expert, Dr. Heppe, regarding the level of ordinary skill in the art).

Patent Owner does not propose a relevant level of ordinary skill in the art in Patent Owner's response. Patent Owner's expert, Dr. Kevin

C. Almeroth, however, opines that a person of ordinary skill in the art with respect to the '780 patent:

> would have the equivalent of a four-year degree from an accredited institution (usually denoted as a B.S. degree) in computer science, computer engineering, or the equivalent and at least two years of experience with, or exposure to the design and development of wireless communication network systems, including familiarity with protocols used therein. Additional graduate education could substitute for professional experience, while significant experience in the field might substitute for formal education.

Ex. 2001 ¶ 75.

We do not discern any material differences between the two proffered levels of ordinary skill in the art that would affect our Decision. Neither expert disagrees with the other expert's opinion as to the level of ordinary skill in the art in the field of the '780 patent. Accordingly, for purposes of this Decision, we determine that a person of ordinary skill in the art with respect to the '780 patent would have had the equivalent of a four-year degree from an accredited institution (including a B.S. degree) in electrical engineering, computer science, computer engineering, or the equivalent, and would have had at least two years of experience designing and developing radio communications and/or computer network systems or wireless communication network systems.

B. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their "broadest reasonable construction in light of the specification of the patent" in which they appear. 37 C.F.R. § 42.100(b); *see also Cuozzo Speed Techs., LLC, v. Lee*, 136 S. Ct. 2131, 2141–46

(2016). The terms also generally are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner contends that with respect to its challenges based on the '732 patent, which shares a similar specification and claims with the '780 patent, no claim construction is necessary because the '732 disclosure is similar in scope to the claim terms of the '780 patent. Pet. 11. Patent Owner does not dispute this. Based on the current record, we are persuaded that the challenges based on the '732 patent do not raise any controversies that require claim interpretation. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that claim terms need only be interpreted to the extent necessary to resolve the controversy).

With respect to its challenges based on Kahn in view of the APA and Burchfiel, Petitioner does not propose any express claim constructions. Pet. 11–12. Petitioner, however, attempts to reserve its right to argue the same constructions for the terms "sensor," "actuator," and "function code," as it did in its Petition for IPR2015-01973, which challenged the patentability of claims of the '732 patent. *Id.* at 12. Patent Owner proposes constructions for the terms "sensor," "function," and "function code." Response 16–27. Below we discuss our interpretation of the terms "sensor," "function," and "function code."

For purposes of this Decision, we determine no other claim terms require express construction. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) ("[C]laim terms need only be construed 'to

the extent necessary to resolve the controversy.'") (quoting *Vivid Techs.*, 200 F.3d at 803).

1. "*sensor*"

The issue raised by the parties' proposed constructions is whether the term "sensor" should be construed to encompass a software program. Petitioner proposes that we interpret the term "sensor" to mean "an equipment, *program* or device that monitors or measures the state or status of a parameter or condition and provides information concerning the parameters or condition." Reply 1 (emphasis added). Patent Owner proposes that we interpret the term "sensor" to mean a "device that monitors or measures the state or status of a condition and provides information concerning the condition." PO Resp. 17 (emphasis omitted). Patent Owner does not dispute that a sensor measures a parameter, as well as a condition. *Id.* at 16–17. Indeed, the '780 patent specification indicates that the sensors of the invention monitor parameters. Ex. 1001, 10:1–7. Patent Owner argues only that the words "equipment" and "program" should be omitted from Petitioner's proposed construction. PO Resp. at 17. Petitioner concedes that the word "equipment" is not materially different from the word "device," and does not oppose omitting it from construction of the term "sensor." Response 2. Accordingly, the parties dispute only whether the word "program" should be omitted from our interpretation of the term "sensor." However, because Petitioner's contentions do not allege any software satisfies the claimed "sensor" limitation, we need not determine whether the term "sensor" should be construed to encompass software. *See Vivid Techs.*, 200 F.3d at 803.

2. *"function"*

Petitioner contends that the term "function" "should simply be accorded its ordinary and customary meaning." Reply 5–6.

Patent Owner proposes we construe the term "function" to mean "a relation from a domain to a codomain in which exactly one member of the codomain is assigned to each member of the domain." PO Resp. 17. In support of this construction, Patent Owner relies on definitions of "function" and "binary relation" in math text books. *Id.* at 17–19. According to Patent Owner's expert, Dr. Almeroth, undergraduate engineering and math students would have known of these definitions and agreed with them. Ex. 2026 ¶ 94. Patent Owner further argues that Petitioner's expert, Dr. Heppe, testified that he had no reason to disagree with the definitions set forth in the math textbooks. PO Resp. 19–21. Dr. Almeroth also opines that a person of ordinary skill in the art would have understood the term "function" in the programming context to refer to a particular type of subprogram that outputs a value for a given set of input values. Ex. 2026 ¶ 94.

The '780 patent does not expressly define the term "function." Accordingly, the term "function" is presumed to have its ordinary and customary meaning, as would have been understood by one of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech*, 504 F.3d at 1257. The '780 specification describes a system for monitoring, reporting, and controlling remote systems and for system information transfer, wherein the system includes sensors and actuators that are interfaced with wireless transceivers and controlled remotely. Ex. 1001, 3:1–19. The '780 patent specification describes buttons on a radio frequency ("RF") transmitter, (e.g., buttons labeled 1–4). Ex. 1001, 9:17–

35, Fig. 3D. When a user depresses a button, the feature or function associated with that button may be, for example, to indicate an emergency. *Id.* at 9:17–35. Figure 3D of the '780 specification depicts exemplary functions including "Temperature Set," "On/Off," "Actual Temperature," and "Air/Heat." Ex. 1001, Fig. 3D. The '780 specification, therefore, describes "functions" as being "features" of a transmitter. *See also id.* at 9:25–28 ("Furthermore, additional codes may be provided as necessary to accommodate additional functions or features of a given transmitter 320."). The '780 patent provides another example in which the term function is used to describe control tasks:

> Program code within the memory 424 may also be provided and configured for controlling the operation of a CPU to carry out the various ***functions*** that are orchestrated and/or controlled by local gateway 210. For example, memory 424 may include program code for controlling the operation of the CPU 422 to evaluate an incoming data packet to determine what action needs to be taken. In this regard, look up tables 425 may also be stored within memory 424 . . . [a] look up table may be used to associate function codes with the interpretation thereof. For example, a unique code may be associated by a look up table to identify ***functions*** such as test, temperature, smoke alarm active, security system breach, etc.

(Ex. 1001, 11:40–48, 56–60) (emphases added).

The '780 specification also describes functions as being tasks in the context of local controller 110 that "provides power, formats and applies data signals from each of the sensors to predetermined process control functions, and returns control signals as appropriate to the system actuators." *Id.* at 5:46–50.

The claim language uses the term function in a manner that is consistent with the understanding that a function is a task, or a feature or

capability. Claim 4 recites that the controller is configured to implement a function in response to receiving a data packet containing a function code (*id.* at 19:14–16), and claim 6 recites "function codes corresponding to a number of functions the controller can implement" (*id.* at 19:22–25).

We find that the positions of Patent Owner and its expert are not credible, and we determine that Patent Owner's proposed construction of "function" is too narrow in view of the '780 specification and claims. As Petitioner contends, the '780 patent is not concerned with mathematical functions. *See* Reply 3–4. The '780 specification and claims do not describe mathematical functions. *See id.* Dr. Almeroth's opinion that an undergraduate math or engineering student would have agreed with the mathematical definitions of "function" does not persuade us of a different result because an undergraduate engineering or math student is not a person of ordinary skill in the art *in the field of the '780 patent* under either expert's description of ordinary level of skill in the art, or under the ordinary level of skill in the art that we have adopted for purposes of this Decision. Moreover, Dr. Almeroth does not indicate whether the undergraduate math or engineering student would have understood that the mathematical definitions of the term "function" applied to the '780 patent, rather than simply whether the definitions were correct in the context of discrete mathematics. *See* Ex. 2026 ¶ 94.

Patent Owner's argument that "Dr. Heppe repeatedly testified under oath that he had no reason to disagree with the standard definition of the claim term 'function' as set forth in [the] text books [relied on by Patent Owner]" is disingenuous. PO Resp. 19. Dr. Heppe was never asked, during his deposition, whether the definitions related to the level of skill in the art

in the field of the '780 patent, or whether the definitions were relevant to how the term "function" is used in the context of the '780 patent. *See generally* Ex. 2025. For example, with respect to the definition of a "binary relation" on which Patent Owner relies in support of its proposed construction of "function," Dr. Heppe testified that "this is at least one definition of how a person of ordinary skill in the art would understand a binary relation alpha from a set A to a set B." *Id.* at 34:14–17. Dr. Heppe, however, continued to testify that "[y]ou haven't provided me any context as it relates to the knowledge of a person of ordinary skill or how you believe it may relate to this case." *Id.* at 34:20–35:1. Dr. Heppe opines in a supplemental declaration that Patent Owner's mathematical interpretation of the term "function" is overly narrow, and that in view of the '780 patent specification, its proper scope includes more generalized activities, tasks, and capabilities. Ex. 1041 ¶ 4. We find Dr. Heppe's opinion to be credible in view of the portions of the '780 specification we highlighted above that describe functions as features or tasks to be performed.

Also, we are not persuaded by Patent Owner's argument that its proposed construction of "function" is supported by the definition of "function" in the context of computer programming. *See* PO Resp. 22–25; Ex. 2026 ¶ 95. Patent Owner argues that its proposed construction is supported by a computer programming manual that describes a "function" as being "a specific type of subprogram that returns a particular output value (a member of the codomain) for a particular input (a member of the domain)." PO Resp. 22; Ex. 2026 ¶ 95. Patent Owner's argument is flawed for several reasons. First, Patent Owner does not cite to anything in the programming manual that indicates that the definition of a programming "function" is

limited to situations in which exactly one member of the codomain is assigned to each member of the domain, as stated in Patent Owner's proposed construction. *See* PO Resp. 22–23. The portion of the programming manual upon which Patent Owner relies provides only an example of one type of function, and even that description does not indicate that a function is limited in the manner argued by Patent Owner. Ex. 2024, 340–341. The manual states that when computing a single value requiring several statements, a FUNCTION subprogram would be used. *Id.* Second, the programming manual upon which Patent Owner relies refers to functions as subroutines used to perform mathematical operations. *See*, *e.g.*, *id.* at 341 ("If the mathematics you want to perform are not available as a library function, it is possible to design a 'home-made' function"). Neither the '780 specification nor the claims indicate that the term "function" as claimed is intended to refer only to programming subroutines that relate to mathematical operations. As we discussed above, the '780 specification refers to functions as being features such as "test," and "temperature," or as tasks, and the claim language uses the term function in a manner that is consistent with the understanding that a function is a task, or a feature or capability.

Accordingly, Patent Owner's proposed mathematical definition is too narrow, and is inconsistent with the '780 specification and claims.

For purposes of this Decision, we determine that the term "function" encompasses "features" or "parameters" of a system, and also encompasses "capabilities" and "tasks to be performed."

3. *"function code"*

Petitioner proposes we construe the term "function code" to mean "code corresponding to a function or condition." Reply 6. Patent Owner proposes we construe the term to mean "a symbol representing a function or the output of a function." PO Resp. 26.

The '780 patent does not expressly define the term "function code." Accordingly, the term "function code" is presumed to have its ordinary and customary meaning, as would have been understood by one of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech*, 504 F.3d at 1257.

Even though the '780 specification does not define the term "function code," it provides the following description of function codes:

> [A] function code is communicated from RF transmitter 320 to the nearby transceiver. FIG. 3A illustrates a lookup table 325 that may be provided in connection with data formatter 324. Lookup table 325 may be provided to assign a given and unique function code for each button pressed. For example, transmit button 327 may be assigned a first code to identify the party depressing the button. The emergency button 329 may be assigned a second code. Furthermore, additional codes may be provided as necessary to accommodate additional functions or features of a given transmitter 320. Thus, in operation, a user may depress the emergency button 329 . . . The data formatter 324 may then use the information pertaining to the emergency button 329 to access a look up table 325 to retrieve a code that is uniquely assigned to emergency button 329.

Ex. 1001, 9:17–32. Exemplary functions described in the '780 specification include "test, temperature, smoke alarm active, security system breach, etc." (*id.* at 11:59–60), "Temperature Set, On/Off, Actual Temperature, Air/Heat" (*id.* at Fig. 3D), and "the condition of parking spaces" (*id.* at 13:57–59). The

'780 specification further describes associating a unique code "by a look up table to identify functions such as test, temperature, smoke alarm active, security system breach, etc." *Id.* at 11:59–60. Lookup tables similarly are used to associate a transceiver identification number with a particular user. *Id.* at 11:54–55. Accordingly, the '780 specification describes function codes as data associated with a function or feature that allows for identification of the function or feature.

Patent Owner argues that its proposed construction is consistent with the definition of "code" in *Webster's New Collegiate Dictionary*: "a system of symbols (as letter, numbers, or words) used to represent assigned and often secret meanings." PO Resp. 26 (citing Ex. 2027, 214). However, Patent Owner's proposed definition is too narrow in view of the '780 specification and claims. Patent Owner has not directed us to any evidence in the '780 specification or claims that indicate the term "function code" is limited to "symbols representing a function or the output of a function." The description in the '780 specification does not limit the type of data a function code can be, but rather describes the function code in terms of being used in association with a look-up table to identify a corresponding function. Ex. 1001, 9:17–32. Similarly, the claims do not include language that limits "function code" to symbols representing a function or the output of a function. During reexamination (reexamination control no. 90/010,511) of U.S. Patent 6,891,838 (the "'838 patent")—a patent similar to the '780 patent, and which includes a Figure similar to Figure 3D of the '780 patent—Patent Owner argued to the Patent Office that the patentee clearly

defined, by implication, the term "function code" in the specification.[7] Ex. 1021, 53–54; Ex. 3003, 18.

Patent Owner specifically argued, with respect to the term "function code," that "[i]t is well known that a patentee is his own lexicographer, and that "[i]n the ['838 patent] the claim 1 term 'function code' is clearly defined (at least by implication) by the patentee in the specification." Ex. 1021, 371–372; Ex. 3003, 18. Patent Owner argued that "[a] function code, as defined by the ['838] Patent is a set of bits that may be stored in a look-up table and corresponds to one or more functions." Ex. 1021, 371; Ex. 3003, 19. In making this admission to the Patent Office, Patent Owner relied on disclosure in the '838 patent that is identical to the disclosure in the '780 patent: "Distinct control system signals may be mapped to function codes used by the present invention in order to provide customer access to control system data." Ex. 3003, 18–19; Ex. 1021, 372 (citing the '838 patent, 4:59–61); Ex. 1001, 4:29–32 (disclosure identical to that in the '838 patent). We find that this characterization by Patent Owner is consistent with the '780 specification, which describes data that is stored in a look up table that corresponds to a function. Ex. 1001, 11:54–60, Fig. 3D.

Accordingly, we determine that the term "function code" means "bits of data corresponding to a function."

[7] We note that in district court litigation, Patent Owner argued, with respect to '838 patent, that no construction of the term "function code" was necessary, and in the alternative, that the correct construction is "a code corresponding to one or more functions" (similar to Petitioner's proposed construction in this proceeding). Ex. 1021, 51, 56–57.

C. Principles of Law

To prevail in its challenges to the patentability of the claims, Petitioner must prove its proposition by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Also,

> Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007) (quoting 35 U.S.C. § 103).

D. The '780 Patent's Claim of Priority

The application for the '780 patent, U.S. Application No. 13/855,452 (the "'452 application"), was filed on April 2, 2013. Ex. 1001. The application to which the '780 patent claims priority, U.S. Application No. 13/173,499 (the "'499 application") issued as U.S. Patent No. 8,212,667 on July 3, 2012, several months prior to the filing of the application leading to the '780 patent. Exs. 1001, 1002. Accordingly, there is no co-pendency between the '780 patent and the '499 application. As a result, the earliest claim of priority to which the '780 patent is entitled is April 2, 2013, the filing date of the '452 application.[8]

[8] With respect to the unpatentability grounds involving Kahn, for purposes of assessing the level ordinary level of skill in the art, as well as obviousness, we apply Patent Owner's alleged priority date, October 5, 1999 (i.e., the date to which Patent Owner seeks to correct the priority claim of the '780 patent). PO Resp. 32. However, our determination is no different than if we had applied a date of April 2, 2013, based on the priority date of Kahn being November 1978 as discussed in detail *infra*.

On May 26, 2016, nearly one month after the filing date accorded to the petition in this proceeding, Patent Owner filed, with respect to the '780 patent, both a Request for a Certificate of Correction (Ex. 1023) and Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration (Ex. 1022) (collectively, "First Request."). Patent Owner filed the First Request without seeking prior authorization from the Board, and did not notify the Board or Petitioner after the filing. Petitioner asserts that it learned of the First Request as a result of a search of the Public Patent and Application Information Retrieval ("PAIR") system. *See*, *e.g.*, Paper 10, 2. It is Petitioner who informed the Board of the First Request.

On July 2, 2016, we issued an order staying the First Request pending our decision on institution. Paper 10, 4. Our order also precluded Patent Owner, during the pendency of this proceeding, from filing additional papers to correct the claim of priority of the '780 patent without prior authorization from the Board. *Id.*

On November 2, 2016 we instituted *inter partes* review in this proceeding, and lifted the stay with respect to the First Request, noting that we "defer to the determination of the Petitions Branch regarding Patent Owner's claim of priority." Paper 18, 11.

Patent Owner's First Request sought to amend the '780 priority claim to an application that Patent Owner alleges shares co-pendency with the '452 application, U.S. Application 13/222,216. Ex. 1022, 2; Ex. 1023, 2. On November 14, 2016, the Petitions Branch granted Patent Owner's request for expedited review of Patent Owner's petition, but otherwise dismissed the petition for failure to comply with 35 U.S.C. § 120 and 37 C.F.R.

§ 1.78(d)(2), which requires a reference be filed in an Application Data Sheet. Ex. 3001.

Pursuant to our July 27, 2016 Order (Paper 10), Patent Owner subsequently sought, and we granted, authorization to file a second Request for a Certificate of Correction and Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration (collectively, "Second Request"). Paper 20, 3. On January 20, 2017, the Petitions Branch granted Patent Owner's request for expedited review of Patent Owner's petition, but dismissed Petitioner's request for correction of the '780 patent's priority date for failure to "make a reference to the first (earliest) application and every intermediate application." Ex. 3002, 2. The chain of priority in Patent Owner's petition did not match the chain of priority in the reference to which Patent Owner sought to claim priority. *Id.*

Patent Owner subsequently sought our authorization to file a third Request for a Certificate of Correction and Petition to Accept an Unintentionally Delayed Priority Claim and for Expedited Consideration with the Petitions Branch (collectively, "Third Request"). We ordered Patent Owner to show cause why we should authorize it to file a Third Request. Paper 24. Patent Owner's response to our Order to Show Cause alleged that the mistakes in the Second Request were due to an inadvertent omission, but Patent Owner did not explain any particular circumstances that would justify its mistakes. Paper 26, 3. We found that Patent Owner's demonstrated pattern of making mistakes indicated deliberate indifference toward avoiding errors. *See id.* Under the circumstances, we exercised our authority pursuant to 37 C.F.R. § 42.3, and denied Patent Owner's request to file a Third Request. *Id.* at 4. Patent Owner subsequently filed a request for

rehearing (Paper 28), which we denied, noting:

> Patent Owner has made several errors and mistakes throughout Patent Owner's attempts to make a claim of priority with respect to U.S. Patent No. 8,754,780 B2 (the "'780 patent"), including during prosecution of the application leading to the '780 patent (*see, e.g.*, Paper 13, 1–5; Ex. 1022–1034; Paper 15; Ex. 2011–2021), during prosecution of the application to which Patent Owner seeks to claim priority (i.e., Application No. 12/477,329) (*see, e.g.*, Ex. 3002, 2), and in the First Request (*see, e.g.*, Ex. 3001) and Second Request (*see, e.g.*, Ex. 3002). In our Order [Paper 24], our finding regarding Patent Owner's "repeated mistakes" was in reference to Patent Owner's demonstrated pattern of making errors it should have recognized and could have avoided with the exercise of minimal diligence. Paper 27, 3. In the Response to our Order to Show Cause, Patent Owner did not provide sufficient justification for the failure to avoid making error after error.

Paper 31, 3.

In conjunction with entering this Decision, we hereby lift the stay prohibiting Patent Owner from filing Patent Owner's Third Request, and defer to the determination of the Petitions Branch regarding Patent Owner's claim of priority.

E. Patent Owner's Observations on Cross-Examination

Patent Owner filed Patent Owner SIPCO LLC's Observations on Cross-Examination of Dr. Heppe (Paper 33), related to the May 19, 2017 deposition testimony of Dr. Heppe (Ex. 2037). Petitioner filed Petitioner's Response to Observations. Paper 35. The Office Patent Trial Practice Guide states that observations should be in the following form:

> In exhibit __, on page __, lines __, the witness testified __. This testimony is relevant to the __ on page __ of __. The testimony is relevant because __.

Office Patent Trial Practice Guide, 48 Fed. Reg. 48756, 48768 (Aug. 14, 2012).

Petitioner responds that Patent Owner's observations should be expunged from the record or not considered because Patent Owner has failed to follow the form noted above, in particular the portion providing that "[t]his testimony is relevant to the __ on page __ of __. The testimony is relevant because __." Resp. to Obs., 1 n.1 (emphasis omitted). We disagree with Petitioner that Patent Owner failed to follow, in substance, the form set forth in the Office Patent Trial Practice Guide, at least with respect to observations 1, 4, 5, and 7. For example, Patent Owner observes that certain testimony directly contradicts Petitioner's position, at pages 3–5 of the Petitioner's Reply, that mathematics is separate and distinct from the field of the '780 patent. Obs., 4. In substance, this addresses "[t]his testimony is relevant to the __ on page __ of __." Patent Owner states the testimony "is relevant because" and provides reasoning, which follows the form "[t]he testimony is relevant because." *Id.* With respect to observations 2, 3, and 6, we agree with Petitioner that Patent Owner fails to provide citation regarding the relevancy of the testimony (i.e., "[t]his testimony is relevant to the __ on page __ of __."). However, even though observations 2, 3, and 6 do not comply with the form "[t]his testimony is relevant to the __ on page __ of __", the observations state the relevance in terms of whether Dr. Heppe is a person of ordinary skill in the art. *See generally* Obs.

Petitioner also provides substantive responses to Patent Owner's observations. Petitioner argues that Patent Owner's observations 1–3 and 5–7 are not relevant to any issue in this proceeding, and that Patent Owner mischaracterizes Dr. Heppe's testimony. *See generally* Resp. to Obs.

We determine that Patent Owner's observations are compliant with respect to observations 1, 4, 5, and 7, but are non-compliant with respect to observations 2, 3, and 6. However, noted above, observations 2, 3, and 6 state the relevance in terms of whether Dr. Heppe is a person of ordinary skill in the art. Under the present circumstances, we refrain from declining to consider Patent Owner's observations. We are mindful of Petitioner's responses that the observations are not relevant to this proceeding. We disagree because the observations are relevant to positions taken by the parties and to issues in this proceeding, and to Patent Owner's allegations regarding the level of skill of Dr. Heppe. Petitioner's responses bear on the credibility of Patent Owner's observations and the weight they should be accorded, but do not persuade us to decline consideration of Patent Owner's observations.

F. Asserted Obviousness of Claims 1–15 over the '732 Patent

Petitioner asserts that claims 1–15 of the '780 patent are unpatentable as obvious over the '732 patent. Pet. 20–32. Petitioner proffers a declaration and supplemental declaration of Dr. Heppe to support its contentions. Exs. 1018, 1041. Patent Owner disputes Petitioner's contentions, arguing that the '732 patent is not available as prior art. PO Resp. 32–34. We have reviewed the record, and we determine that Petitioner has shown by a preponderance of the evidence that claims 1–15 of the '780 patent are unpatentable as obvious over the '732 patent.

1. *Overview of the '732 Patent (Ex. 1012)*

The '732 patent issued from U.S. Application No. 12/477,329 (the "'329 application"), filed on June 23, 2009. Ex. 1012. As we discussed above, the '780 patent, as issued, claims to be a continuation of the '499

application. *Id.* In its attempt to correct its priority claim, Patent Owner seeks instead to claim priority to U.S. Application 13/222,216 (the "'216 application"), filed August 31, 2011, which issued as U.S. Patent No. 8,410,931 (the "'931 patent") on April 2, 2011. Exs. 1022, 1023. The '931 patent identifies itself as a continuation of the application leading to the '732 patent. Ex. 3004 at [63]. Accordingly, with respect to the '780 patent, Patent Owner seeks to claim priority, through a series of continuations, to the application leading to the '732 patent. Patent Owner, therefore, must take the position that the '780 patent claims do not contain any new matter not present in the '732 patent disclosure. *See* 35 U.S.C. § 132. Neither party disputes that the '780 and '732 specifications are identical, but for the "cross-reference to related applications & priority claims." *See*, e.g., Ex. 1013 (Petitioner-generated document comparing the '780 and '732 specifications).

2. *Analysis*

As we discussed above, the '780 patent and '732 patent share nearly the same specification. Ex. 1013; Ex. 1001; Ex. 1012. The '780 patent and '732 patent also share nearly identical claims. Ex. 1013; Ex. 1001; Ex. 1012. Petitioner alleges that claims 1–15 of the '780 patent are "completely encompassed by the nearly identical limitations in claims 13–25 of the '732 [p]atent," and cites to the declaration of Dr. Heppe for support. Pet. 20 (citing Ex. 1018 ¶¶ 18–32). Petitioner also provides a table in which claims 1–15 of the '780 patent are listed alongside corresponding claims of the '732 patent for a side-by-side comparison of claim language. Pet. 21–29.

Reproduced below is Petitioner's comparison of claim 1 of the '780 patent with claim 13 of the '732 patent, in which Petitioner highlights the

language that is identical between the claims, and the un-highlighted language indicates language that is different between the claims (*id.* at 21–22):

8,754,780 Claims	8,013,732 Claims (Prior Art)
1. In a system comprising a plurality of wireless devices, a device comprising:	13. In a system comprising a plurality of wireless devices configured for remote wireless communication and comprising a device for monitoring and controlling remote devices, the device comprising:
a transceiver having a unique identification code and being electrically interfaced with a sensor, the transceiver being configured to receive select information and identification information transmitted from a second wireless transceiver in a predetermined signal type;	a transceiver having a unique identification code and being electrically interfaced with a sensor, the transceiver being configured to receive select information and identification information transmitted from another wireless transceiver in a predetermined signal type;
the transceiver being further configured to wirelessly retransmit in the predetermined signal type the select	the transceiver being further configured to wirelessly retransmit in the predetermined signal type the select

8,754,780 Claims	8,013,732 Claims (Prior Art)
information, the identification information associated with the second wireless transceiver, and transceiver identification information associated with the transceiver making retransmission; and	information, the identification information associated with the nearby wireless transceiver, and transceiver identification information associated with the transceiver making retransmission; and
a controller operatively coupled to the transceiver and the sensor, the controller configured to control the transceiver and receive data from the sensor, the controller configured to format a data packet for transmission via the transceiver, the data packet comprising data representative of data sensed with the sensor.	a data controller operatively coupled to the transceiver and the sensor, the data controller configured to control the transceiver and receive data from the sensor, the data controller configured to format a data packet for transmission via the transceiver, the data packet comprising data representative of data sensed with the sensor.

Petitioner identifies the following differences between these claims. The preamble of claim 13 of the '732 patent is identical to the preamble of claim 1 of the '780 patent except that claim 13 further recites that the wireless devices are "configured for remote wireless communication" and that the claimed system comprises "a device for monitoring and controlling remote devices." Pet. 21. Also, claim 13 of the '732 patent recites "another wireless transceiver" and "the nearby transceiver," whereas claim 1 of the '780 patent recites "a second transceiver," and "the second wireless transceiver," respectively. *Id.* at 21–22. Furthermore, claim 13 of the '732 patent recites "a data controller," whereas claim 1 of the '780 patent recites

"a controller." *Id.* at 22. Petitioner argues that the differences between claim 1 of the '780 patent and claim 13 of the '732 patent are not substantive. Pet. 29–30. Similarly, as to claims 2–15 of the '780 patent, Petitioner identifies what it alleges to be non-substantive differences as compared with claims 13–25 of the '732 patent. *Id.* at 22–31.

Petitioner also argues that if claims 1–15 of the '780 patent are supported by the '780 specification, then the claims must be taught by the nearly identical '732 patent specification. *Id.* at 32.

We agree with Petitioner that any differences in claim language between the '780 claims and '732 corresponding claims are non-substantive, and that any differences are taught by the '732 patent specification and would have been obvious in view of the '732 patent specification and claims.

With regard to claim 1 of the '780 patent, the preamble of claim 13 clearly teaches what is recited in the preamble of claim 1 of the '780 patent because claim 13 of the '732 patent includes identical recitations, and its teaching is not negated by the additional recitations. The recitation in claim 1 of the '780 patent of a "*second* transceiver" is taught by "*another* transceiver" or "*nearby* transceiver," as recited in the '732 patent. Indeed, another transceiver or a nearby transceiver is a second transceiver because it is in addition to the first transceiver. Claim 1 of the '780 patent's recitation of "a controller" is taught by, or would have been obvious in view of, the '732 patent's recitation of "a data controller." The "controller" and "data controller" in both claims are operatively coupled to the claimed transceiver and sensor, and both are configured identically. Removal of the word "data"

from "data controller," therefore, does not render claim 1 of the '780 patent unobvious.

The recitations of claim 3 of the '780 patent are identical to the recitation of the corresponding '732 claim, claim 15. Pet. 23.

Regarding claims 2 and 4–6 of the '780 patent, which depend from claim 1, the only difference in claim language with the corresponding '732 claims, claims 14, 16, and 18, is the recitation of "controller," rather than "data controller." This difference is non-substantive for the reasons discussed above regarding claim 1 of the '780 patent. *Id.* at 22–24.

Claim 8 of the '780 patent recites "[t]he device of claim 1, wherein the second transceiver is nearby to the transceiver," but the corresponding '732 claim, claim 13, teaches a second nearby transceiver because it recites identification information of a transceiver that is "associated with the nearby wireless transceiver." *Id.* at 25.

Regarding claim 9 of the '780 patent, the corresponding claim of the '732 patent, claim 20, teaches all the recitations of the preamble of claim 9 of the '780 patent, but includes additional recitations, namely "remote devices for monitoring and controlling remote devices having wireless communication devices," and that the thermostat is "wireless enabled." *Id.* at 25–27. Claim 9 of the '780 patent also recites that the claimed transceiver is a "wireless transceiver," whereas claim 13 of the '732 patent recites "a transceiver," but claim 20 of the '732 patent teaches a wireless transceiver because the claim is directed to a wireless system, having wireless communication devices, and recites that the claimed "transceiver" is configured to receive information from "another wireless transceiver." *Id.* at 20. Use of the term "another" indicates the claimed "transceiver" also is

"wireless." Claim 9 of the '780 patent also recites a "second wireless transceiver" instead of "another wireless transceiver," as recited in claim 20 of the '732 patent, but for reasons discussed above, this difference does not negate obviousness because "another" transceiver is a "second" transceiver. *Id.* at 26.

With regard to claims 10–14 of the '780 patent, the corresponding claims of the '732 patent, claims 21–25, refer to a "wireless enabled thermostat device," whereas the '780 claims recite "thermostat device." *Id.* at 27–29. This difference is non-substantive. The preamble of claim 9, from which claims 10–14 depend, recites "a thermostat device comprising," rather than a "wireless enabled thermostat device comprising," as recited in the corresponding '732 claim, from which claims 21–25 of the '732 patent depend. However, the thermostat device recited in claim 9 of the '780 patent is wireless, because claim 9 recites that the thermostat device comprises a wireless transceiver. Accordingly, there is no substantive difference between the "thermostat device" comprising a wireless transceiver as claimed in the '780 patent and the "wireless thermostat enabled device" taught in the '732 patent.

With regard to claim 15 of the '780 patent, which recites that the second transceiver is "nearby," this is taught by claim 20 of the '732 patent which recites a transceiver "associated with the nearby wireless transceiver." *Id.* at 29.

Patent Owner does not dispute that claims 1–15 of the '780 patent are taught by claims 13–25 of the '732 patent and by the '732 specification. *See generally* PO Resp. Rather, Patent Owner argues that the '732 patent is not available as prior art to the '780 patent under a "correct" priority date for the

'780 patent. *Id.* at 32–34. As we discussed above, however, at this stage of the proceeding the priority date of the '780 patent has not been corrected, and we, therefore, consider it as prior art. Accordingly, we determine that the '732 patent teaches the recitations of claims 1–15 of the '780 patent.

Upon review of the record in this proceeding, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1–15 of the '780 patent are unpatentable under § 103 as obvious over the '732 patent.

G. Asserted Obviousness of Claims 1, 2, and 7 over Kahn in view of the APA

Petitioner contends that claims 1, 2, and 7 of the '780 patent are unpatentable as obvious over Kahn in view of the APA. Pet. 17–18, 32–41. Petitioner proffers a declaration and supplemental declaration of Dr. Heppe to support its contentions. Exs. 1018, 1041. Patent Owner disputes Petitioner's contentions, arguing that the claims would not have been obvious. PO Resp. 44–74. Patent Owner proffers two declarations of Dr. Almeroth to support its assertions. Exs. 2001, 2026. We have reviewed the record, and we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, and 7 of the '780 patent are unpatentable as obvious over Kahn in view of the APA.

1. *Overview of Kahn (Ex. 1015)*

Kahn is a journal article from Proceedings of the IEEE, and is dated November 1978. Ex. 1015, 1468. Petitioner asserts that Kahn qualifies as prior art under 35 U.S.C. §§ 102(a) and 102(b). Pet. 13. Patent Owner does not dispute Petitioner's assertion. For purposes of this decision, we are satisfied that Kahn qualifies as prior art under 35 U.S.C. §§ 102(a) and 102(b).

Kahn discusses "the basic concepts of packet radio." Ex. 1015, Abstract. In particular, Kahn describes PRNET, a multi-hop, multiple access packet radio network ("PR network"). *Id.* at 1469, col. 1. Kahn notes that the network "should be capable of internetting in such a way that a user providing a packet address in another net can expect his network to route the associated packet to a point of connection with the other net or to an intermediate (transit) net for forwarding." *Id.* at 1470, col. 1.

The packet radios in Kahn's network "contain[] the antenna, RF transmitter/receiver, and all signal processing and data detection logic." *Id.* at 1477, col. 2. In addition, each radio contains a microprocessor controller plus a semiconductor memory for packet buffering and software. *Id.* Each packet radio has an identifier known as its "selector" that is used in routing and control procedures. *Id.* at 1479, col. 1. These selectors may be "unique and preassigned." *Id.* at 1470 n.1.

Packets are transmitted to a destination using a store-and-forward method. *Id.* In this method, a user generated packet with associated addressing and control information in the packet's header is sent to the packet radio for processing. *Id.* The packet radio adds network routing and control information and transmits the packet to a nearby packet radio, called a repeater, which is identified within the packet. *Id.* at 1477, cols. 1, 2. The repeater processes the header to ascertain whether it should relay the packet, deliver it to an attached drive, or discard it. *Id.* at 1477, col. 2. The packet will be relayed repeater to repeater until it reaches the final repeater, which broadcasts it to the destination packet radio. *Id.*

An exemplary packet consists of a 48-bit preamble followed by a variable length header that is followed by the text and a checksum. *Id.* at

1478, col. 2. In routing the packet, a station can send the entire path directly to the sending or receiving packet radio and in this case, the transmitted packet "could then contain the entire set of selectors in its header." *Id.* at 1479, col. 2.

2. *Overview of the APA (Ex. 1001)*

Petitioner alleges that the '780 specification makes several admissions regarding the scope of the prior art. Pet. 16. Petitioner refers to such admissions as admitted prior art ("APA"). *Id.* Petitioner points out that the '780 specification provides that there were known "a variety of known 'systems for monitoring and controlling manufacturing processes, inventory systems, emergency control systems, and the like.'" *Id.*; *see also* Ex. 1001, 1:50–56. The '780 specification further discloses that "[m]ost automatic systems use remote sensors and controllers to monitor and automatically respond to system parameters to reach desired results." *Id.* at 1:62–65. Petitioner also refers to Figure 1 of the '780 patent, which is described as depicting a "prior art control system 100." *Id.* at 5:42–43; Fig. 1. Prior art control system 100 includes a plurality of sensor actuators 111–117 that are electrically coupled to local controller 110. *Id.* at 5:43–46; Fig. 1. The '780 specification further discloses that "local controller 110 provides power, formats and applies data signals from each of the sensors to predetermined process control functions, and returns control signals as appropriate to the system actuators," in "a manner well known in the art of control systems." *Id.* at 5:46–50.

The '780 specification also states that "[t]he typical approach to implementing control system technology is to install a local network of hard-wired sensors and actuators along with a local controller." *Id.* at 2:44–47.

The ’780 specification further states:

> Prior art control systems consistent with the design of FIG. 1 require the development and installation of an application-specific local system controller, as well as, the routing of electrical conductors to each sensor and actuator as the application requires . . . These systems require electrical coupling between the local controller and system sensors and actuators. As a result, appropriately wiring an existing industrial plant can be a dangerous and expensive proposition.

Ex. 1001, 5:57–6:3.

Figure 1 of the ’780 patent is reproduced below:

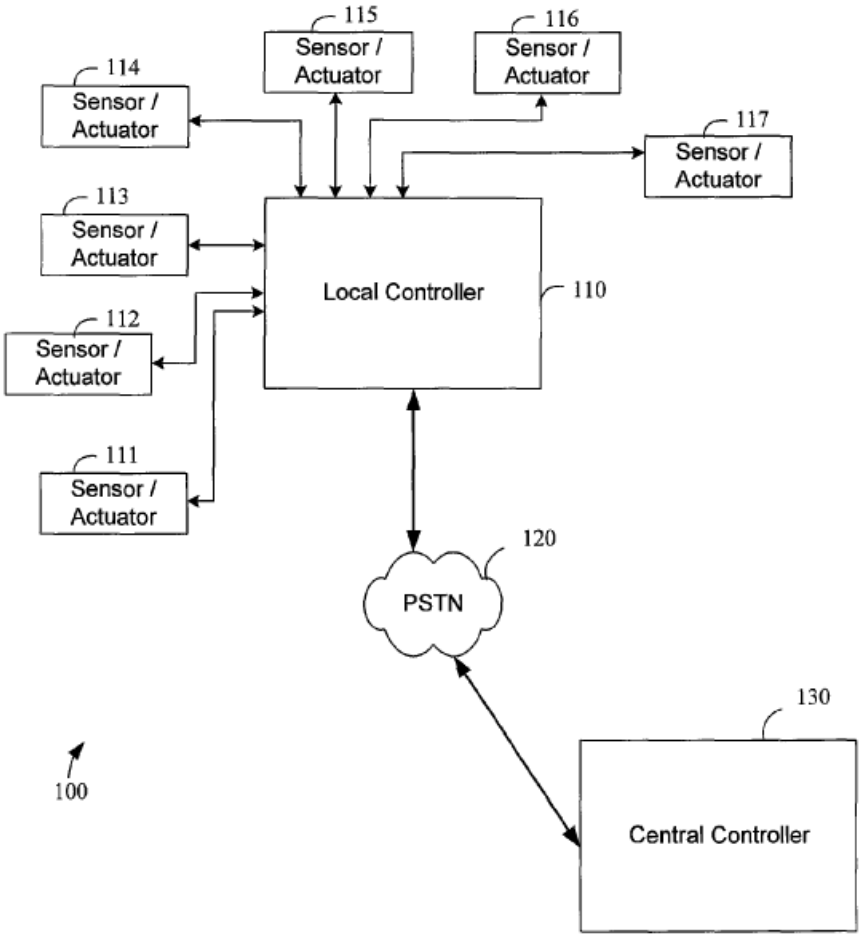

FIG. 1
(PRIOR ART)

Ex. 1001, FIG. 1. Figure 1 depicts Sensor/Actuators 111–117 connected using wires to Local Controller 110.

3. *Analysis*

Petitioner relies on Kahn as teaching the limitations of claims 1, 2, and 7 with the exception of the claimed “sensor” and “actuator.” *Id.* at 17–18, 32–41. Petitioner relies on the APA for teaching a “sensor” and

"actuator." *Id.* at 17–18, 34–35, 38–39. In an alternative analysis, Petitioner argues that Kahn teaches the claimed sensors. *Id.* at 35–36.

As we discussed above, Kahn describes a wireless PR network, PRNET, comprised of devices that communicate wirelessly using packet radios that have wireless transceivers. *See supra* Section II.G.1. Kahn does not expressly disclose sensors and actuators for monitoring systems in its PR network, but Kahn discloses that although the original impetus for wireless PR networks was based on tactical military requirements, "the basic concept is applicable to an extremely wide range of new and innovative computer communication applications never before possible in any practical way." Ex. 1015, 1469. Accordingly, Kahn teaches that an extremely wide range of computer communication applications could be implemented using a wireless PR network. For the specific claim requirements that the transceiver of the wireless radio interface with a sensor and provide a control signal to an actuator, and that a controller receive data sensed with the sensor, Petitioner relies on Patent Owner's admissions in the '780 patent that wired computer communication systems including sensors and actuators for monitoring were well known in the prior art. Pet. 17–18, 36, 39–41.

Patent Owner does not dispute the combination of Kahn and the portions of the '780 specification Petitioner relies on as admitted prior art teaches all of the limitations recited in claims 1, 2, and 7 of the '780 patent. Rather, Patent Owners argues that Petitioner has not demonstrated that it would have been obvious to combine Kahn with the APA to arrive at the claimed invention, and that Petitioner relies on portions of the '780 patent that are not prior art. PO Resp. 43–65. The issue before us, therefore, is whether it would have been obvious to implement a wireless PR network, as

taught in Kahn, to include sensors and actuators such as those in the prior art systems described in the '780 patent.

With respect to the preamble of claim 1, which recites "a system comprising a plurality of wireless devices," Petitioner relies on Kahn's teaching of a wireless PR network that comprises a plurality of packet radios. *Id.* at 32–33. We are persuaded by Petitioner's arguments and evidence that Kahn's wireless PR network, comprised of a plurality of packet radios that receive and transmit data wirelessly, discloses "a system comprising a plurality of wireless devices." Patent Owner does not dispute that Kahn teaches the preamble of claim 1.

With respect to "a transceiver," as recited in claim 1, Petitioner argues that each packet radio in Kahn includes an "RF transmitter/receiver." *Id.* at 34. Petitioner argues that each transceiver has a unique identification code, as recited in claim 1, because "[e]ach of Kahn's radios 'has an identifier'" called "its selector," wherein each selector is unique. *Id.* (citing Ex. 1015, 1479). We are persuaded by Petitioner's arguments and evidence that the "RF transmitter/receiver" disclosed in Kahn is a "transceiver," as recited in claim 1, and that the unique selector in Kahn is a "unique identification code," as recited in claim 1. Patent Owner does not dispute that Kahn teaches these limitations.

Claim 1 further recites that the transceiver is "electrically interfaced with a sensor." Petitioner argues that Kahn alone teaches this feature, and in the alternative, that the APA teaches this feature. Pet. 34–36.

We are not persuaded that Kahn alone teaches this feature. Petitioner argues that Kahn discloses a sensor in the form of a microphone. Pet. 35–36. In particular, Kahn discloses that PR networks provide high throughput,

low delay means to interconnect a community of (potentially) mobile computer users, wherein a number of operations may be interactive and involve input via remote user entry. Ex. 1015, 1469, col. 2. Kahn further explains that "[a]lthough the primary objective of the net is to provide service to computer communication traffic, other types of service, such as might be required for real-time speech, can be accommodated." *Id.* at 1469, col. 2 – 1470, col. 1. Petitioner gleans from this disclosure that Kahn discloses a microphone. Pet. 35 (citing Ex. 1018 ¶ 60). Even if services required for real-time speech would have necessitated a microphone to sense audible signals, Petitioner has not shown that the packet radio transceivers in Kahn would have been electrically interfaced with such a microphone, as required by claim 1. The Petition fails to provide any argument that the alleged microphone would have been electrically interfaced with a transceiver. Pet. 35–36. Petitioner's expert, Dr. Heppe, reaches the conclusion that a person of ordinary skill in the art would have understood the microphone to be associated with a computer terminal, wherein the terminal is interfaced with a packet radio. Ex. 1018 ¶ 60. Even if we accepted this to be true, Dr. Heppe's opinion shows only that the microphone would have been interfaced with a computer terminal, but not with a transceiver of the packet radio. Packet radios were distinct units from the computer terminal to which Dr. Heppe refers as being connected to a microphone. *See, e.g.*, Ex. 1015, Fig. 6. Accordingly, interfacing a microphone with a computer terminal would not have been the same thing as interfacing with the transceiver of the packet radio.

We are persuaded, however, by Petitioner's arguments relating to the APA's teaching of a sensor. Petitioner argues that the '780 patent admits

that prior art systems for monitoring and controlling used remote sensors and actuators to monitor and automatically respond to system parameters. Pet. 35 (citing Ex. 1001, 1:60–65; Ex. 1018 ¶ 61). We agree with Petitioner, and find the '780 patent admits that prior art control systems included sensors and actuators that were hard-wired to controllers. Specifically, the '780 specification describes what it admits are "[p]rior art control systems consistent with the design of FIG. 1," that include sensors and actuators 111–114 that are interfaced with local controller 110 via hard-wired connections. Ex. 1001, 5:41–46, 5:57–58, 5:66–6:3, Fig. 1. Furthermore, we agree with Petitioner that the '780 specification concedes that in admitted prior art systems a local controller would return control signals to system actuators, and that the actuators were configured to receive such commands and implement them, as required by claims 2 and 7. Pet. 40–42. The '780 specification describes, with reference to Figure 1 which "illustrat[es] certain fundamental components of a prior art control system 100," local controller 110 that returns control signals as appropriate to system actuators. Ex. 1001, 5:41–50.

Petitioner argues that a skilled artisan would have understood that Kahn's controller could be coupled to the sensors and actuators described in the APA in order to assemble data from the sensor into packets for transmission by Kahn's transceiver and to send control signals to associated actuators to carry out commands indicated by the control signal. Pet. 35 (citing Ex. 1018 ¶ 61); Pet. 40 (citing Ex. 1018 ¶¶ 72–76; Ex. 1015, 1494, col. 1). Petitioner's arguments are supported by the expert testimony of Dr. Heppe, who opines that a person of ordinary skill in the art could have achieved the combination of the APA's sensors with Kahn's PR network

without undue experimentation and with predictable results because "[p]rior art sensors and actuators, intended for 'third-party' integration into control systems such as those disclosed in the APA of the '780 patent, have well defined behaviors and interface specifications to enable such integration with relative ease (i.e., without undue experimentation), and with predictable results." Ex. 1018 ¶ 42. We find credible Dr. Heppe's testimony that prior art sensors and actuators would have had well-defined behaviors and interface specifications to enable their integration into control systems with relative ease. The '780 specification states that "[a]s is known, there are a variety of systems for monitoring and controlling," and describes sensors and actuators as being used in most automatic systems for monitoring and controlling. Ex. 1001, 1:60–67. This description indicates that sensors and actuators were commonly used in monitoring and controlling systems, which is consistent with Dr. Heppe's testimony that the sensors and actuators would have had well-defined behaviors and could have been integrated into control systems with relative ease.

Petitioner provides multiple reasons why a skilled artisan would have been motivated to combine the teachings of Kahn with the APA. Pet. 17–18; Reply 9–15. We find convincing Petitioner's argument that Kahn provides motivation to combine, namely Kahn's teachings that use of a PR network avoids a known problem in the art, the need to install physical wires and cables to connect network components. Pet. 17–18 (citing Ex. 1015, 1468, col. 1). In particular, Petitioner argues that "Kahn clearly posits that a wireless system is faster to deploy than a wired system." Reply 14 (citing Ex. 1015, 1469). We agree that Kahn discloses that packet radio networks "permit mobile [(e.g., wireless)] application over a wide geographic area"

and "[t]he use of broadcast radio technology for local distribution of information can also provide a degree of flexibility in rapid deployment and reconfiguration not currently possible with most fixed plant [(e.g., wired)] installations." Ex. 1015, 1469, col. 1. According to Petitioner, a skilled artisan, in view of Kahn, "would have recognized the advantage of using the communication infrastructure disclosed in Kahn to allow the sensors and actuators of the APA to be moved from location to location without having to reinstall physical cables and wires to connect the sensors and actuators." Pet. 18 (citing Ex. 1018 ¶ 42).

Petitioner argues that Greeves supports Petitioner's argument that a skilled artisan would have understood the benefits of wireless communication links over wired physical links, and that the benefits include ease of set-up (i.e., rapid deployment). Reply 15 (citing Ex. 2004, 32, right col.). Greeves is a journal article dated 1994, and is cited by Petitioner in the Reply as demonstrating the state of the art at the time of the alleged '780 invention. Reply 12–13. Greeves relates to communication networks that employ radio telemetry, which Greeves states is ideal for industries such as water-supply and treatment, where multi-locational sites require a sophisticated communications network. Ex. 2004, 31. Greeves describes radio telemetry as a "means of communication without the existence of a physical connection between the transmitter and the receiver," (Ex. 2004, 31), and states that radio's "benefits over physical links include . . . ease of set-up and operation and greater cost-effectiveness." (Ex. 2004, 32). Greeves, therefore, corroborates Petitioner's argument, and Dr. Heppe's opinion, that a skilled artisan at the time of alleged invention of the '780 patent would have understood that a benefit of wireless network links over

physical links was flexibility in rapid deployment and reconfiguration. In particular, Dr. Heppe opines that a skilled artisan would have been motivated to combine Kahn's PR network with the APA in order to enhance flexibility and ease of deployment. *Id.* (citing Ex. 1018 ¶ 61). Dr. Heppe points out that

> Kahn specifically notes the use of packet radio in the mobile environment (Kahn, 1468–1469), and the advantage of broadcast radio technology (such as the PRNET discussed in the article) in terms of network deployment flexibility and reconfiguration, as compared with most fixed plant installations.

Ex. 1018 ¶ 42 (citing Ex. 1015, 1469, col. 1). Dr. Heppe further opines

> Kahn describes various reasons to rely on a packet radio network ("motivation to combine") including support for mobile users and bursty traffic, and flexibility in rapid deployment and reconfiguration not currently possible with most fixed plant installations. Kahn, pp. 1468-69. "Although the original impetus for packet radio development was and still is largely based on tactical military computer communication requirements [10], the basic concept is applicable to an extremely wide range of new and innovative computer communication applications never before possible in any practical way." Id. "Deployment of the packet radio net should be rapid and convenient, requiring little more than mounting the equipment at the desired location." Id., p. 1470. So Kahn provides explicit motivations to combine. Furthermore, one of skill in the art would recognize that the flexibility and convenience in deployment and reconfiguration, explicitly discussed by Kahn, stems in large measure from the avoidance of the need for network wiring.

Ex. 1041 ¶ 21.

We agree with Dr. Heppe that Kahn provides a rationale to use wireless PR networks to connect network components because Kahn

discloses that PR networks permit mobile applications over a wide geographic area and can also provide flexibility in rapid deployment and reconfiguration not currently possible with most fixed plant [(e.g., wired)] installations for local distribution of information. Ex. 1015, 1469, col. 1. Dr. Heppe's opinion that a skilled artisan would have recognized that mobility and flexibility and rapid deployment described in Kahn stems from the avoidance of needing wiring is supported by Greeves. Ex. 2004, 32, col. 2. Accordingly, we find credible Petitioner's argument and Dr. Heppe's opinion that a skilled artisan would have recognized that an advantage of using *wireless* packet radio networks was to avoid the need for *wires*, and that the skilled artisan would have been motivated to use a wireless packet radio network in order to permit mobile applications and to enhance flexibility in rapid deployment and reconfiguration not currently possible with wired installations. Petitioner and Dr. Heppe, therefore, have provided "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418 (citation omitted).

Petitioner argues an alternative motivation to combine based on disclosure in the '780 specification. Pet. 17–18. Petitioner relies on the disclosure that one of the problems the '780 patent set out to address was the "costs associated with the sensor-actuator infrastructure required to monitor and control functions within such systems." *Id.* at 17 (quoting Ex. 1001, 2:41–44). Indeed, the '780 specification discloses that "[p]rior art control systems consistent with the design of FIG. 1 . . . require electrical coupling between the local controller and system sensors and actuators. As a result, appropriately *wiring an existing industrial plant can be* a dangerous and *expensive* proposition." Ex. 1001, 5:56–6:3 (emphases added). Accordingly,

the ’780 specification clearly discloses that installing hard-wiring, as opposed to using a wireless network, can be dangerous and costly. Petitioner argues that combining Kahn’s wireless PR network with the sensors and actuators in the monitoring and control systems of the APA would have allowed a skilled artisan to reduce the expense associated with needing wires and cables to install sensors and actuators in remote locations. Pet. 20.

Patent Owner responds that Petitioner uses impermissible hindsight to reconstruct the claimed invention and that Petitioner’s arguments are based on an incorrect understanding of what constitutes the prior art. PO Resp. 50–57. In particular, Patent Owner relies on its expert’s opinion that the portions of the ’780 specification relied on by Petitioner’s expert do not discuss admitted prior art. *Id.* (citing Ex. 2001 ¶ 100). In his declaration, Patent Owner’s expert, Dr. Almeroth alludes, in pertinent part, to column 5, line 57 through column 6, line 3. Ex. 2001 ¶ 100. Dr. Almeroth opines that the problem the ’780 patent set out to solve was not to reduce the cost of wiring, but rather was to reduce the costs of “developing sensors, installing sensors, connecting sensors and controllers to the local controller, and installation and operation of the local controller.” *Id.* ¶ 104. Patent Owner’s argument is a straw man. Even if the ’780 patent set out to address problems other than just the cost of installing wiring, as alleged by Dr. Almeroth, that would not negate the clear teaching in the ’780 patent that installing hard-wired connections was expensive. In particular, we find the discussion in the ’780 specification, including express disclosure that “appropriately wiring an existing industrial plant can be a dangerous and expensive proposition,” indicates that it was well known that wiring could be costly,

and that this was a known problem in the art, rather than a problem recognized only by the inventor of the '780 patent. *See* Ex. 1001, 5:57–6:3. The discussion is provided in the context of describing admitted "prior art" systems, and is offered in the context of what was known at the time.

We further note that Dr. Almeroth does not deny that it was well known at the time of the '780 patent invention that installing wiring to connect network components could be expensive. Rather, he opines that the cost of wiring is not emphasized in the '780 disclosure and would have been insignificant in comparison to other costs the '780 invention sought to address. Ex. 2001 ¶ 104. Accordingly, Dr. Almeroth acknowledges that the expense of installing wiring was not one of the problems the '780 patent sought to address, but rather was a well known problem in the art.

Greeves confirms that it was well known in the art that installing wiring to connect network components was expensive, and that such costs could be reduced by using wireless networks that did not require installing wiring. Reply 12–13. Greeves states that radio is "relatively cost-effective when compared with other physical links." *Id.* Greeves, therefore, corroborates Petitioner's argument, and Dr. Heppe's opinion, that a skilled artisan at the time of alleged invention of the '780 patent would have understood that using wireless network links was less costly than installing wires and cables in buildings for communications.

Patent Owner argued, at oral hearing, that we should not consider Greeves in determining the state of the art at the time of alleged invention because Greeves was not cited in the Petition. Tr. 73:21–74:8. We disagree with Patent Owner, and find that it is proper for us to consider Greeves in determining the state of the art. In *Ariosa Diagnostics v. Verinata Health,*

Inc., 805 F.3d 1359, 1365 (Fed. Cir. 2015), the Board declined to consider a brochure, even as evidence of the level of skill in the art, because it was not identified in the Petition as prior art defining a combination for obviousness. Our reviewing court held it was error to decline considering the brochure for purposes of determining the state of the art, noting that "[a]rt can legitimately serve to document the knowledge that skilled artisans would bring to bear in reading the prior art identified as producing obviousness," and that the brochure "had to be considered by the Board even though it was not one of the three pieces of prior art cited as the basis for obviousness." *Id.* (citation omitted). In *Ariosa*, the brochure at issue was produced with the Petition, and cited by the Petitioner's expert at the Petition stage as discussing the state of the art, whereas here, Greeves is introduced in the Reply. *Id.*; Reply 11–13. However, Petitioner's introduction of Greeves in the Reply is proper because it was introduced in reply to an argument by Patent Owner in the Response. *See* Reply 10–13. Accordingly, we may properly consider Greeves for the purposes of determining the knowledge of one of skill in the art in the relevant time frame.[9]

Moreover, Patent Owner has not been denied notice of the issues to be considered by the Board or an opportunity to address the facts and legal arguments upon which our final determination rests. *See Genzyme*

[9] In *Emerson Electric Co., v. SIPCO, LLC*, an *inter partes* review involving a patent related to the '780 patent and involving the same parties as this proceeding, we declined to consider Greeves because it was introduced by Petitioner for the first time at oral hearing, and was not raised in any briefing by the Petitioner. *Emerson Electric Co., v. SIPCO, LLC*, Case IPR2017-001973, slip. op. at 9 (PTAB Mar. 27, 2017) (Paper 25). The circumstances in this proceeding are distinguishable in that Greeves was properly raised in the Reply.

Therapeutic Prods Ltd. P'ship v. Biomarin Pharm. Inc., 825 F.3d 1360, 1365–69 (Fed. Cir. 2016). "The critical question for compliance with the APA [Administrative Procedure Act] and due process is whether [Patent Owner] received 'adequate notice of the issues that would be considered, and ultimately resolved.'" *Id.* at 1367 (citation omitted). As to that question, Patent Owner was not denied notice or a meaningful opportunity to be heard during the proceeding.

First, we are not changing theories or relying on a ground that is different from the one upon which *inter partes* review was instituted, namely obviousness over Kahn in view of the APA. We are not combining Greeves with Kahn and the APA, but rather are considering Greeves for the limited purpose of assessing the background knowledge of a person of ordinary skill in the art, and in particular, whether Greeves corroborates Petitioner's arguments made at the petition stage about the prior art. Pet. 17–18; Ex. 1018 ¶¶ 41–42.

Second, Patent Owner had the opportunity at the oral hearing to address Greeves. Indeed, the panel asked Patent Owner about Greeves during the hearing, including whether Greeves should be considered for the purpose of assessing the level of skill in the art. Tr. 69:5–74:8. In addition, if Patent Owner had wanted the Board to disregard Greeves for the purpose for which Petitioner relies on it, Patent Owner could have filed a motion to exclude its use for that purpose. *See* 37 C.F.R. § 42.64(c); *see also Genzyme*, 825 F.3d at 1368. Also, Patent Owner could have asked to file a surreply to address Greeves. *See Genzyme*, 825 F.3d at 1368. Patent Owner failed to take advantage of its procedural options to seek to exclude Greeves or to respond to Petitioner's arguments.

Our reviewing court noted, in *Genzyme*, that "[t]here is no requirement, either in the Board's regulations, in the APA, or as a matter of due process, for the institution decision to anticipate and set forth every legal or factual issue that might arise in the course of trial," and "[t]he purpose of the trial in an *inter partes* review proceeding is to give the parties an opportunity to build a record by introducing evidence—not simply to weigh evidence of which the Board is already aware." *Id.* at 1366–1367.

Accordingly, we may properly consider Greeves for the limited purpose of determining the background level knowledge of a person of ordinary skill in the art at the time of alleged invention.

Patent Owner proffers additional arguments in support of its contention that Petitioner has not established that a person of ordinary skill in the art would have been motivated to combine Kahn with the alleged APA to arrive at a transceiver that is "electrically interfaced with a sensor."

First, Patent Owner argues that Petitioner has not demonstrated that a skilled artisan would have achieved the claimed invention with a reasonable expectation of success. *Id.* Specifically, according to Patent Owner, Petitioner and its expert failed to consider numerous factors that would have dissuaded a skilled artisan from converting the network of sensors described in the APA into a wireless network. *Id.* These alleged factors include delay, interference, and security. *Id.* In support of its argument, Patent Owner relies on journal articles, namely Exhibits 2003, 2006, and 2008. *Id.* at 44–49. In particular, Patent Owner criticizes Petitioner's expert for not considering these journal articles in forming his opinion. *Id.* Patent Owner's argument is unpersuasive, because the journal articles are dated long after the alleged 1999 invention date, and have no bearing on sensors

and actuators and whether a skilled artisan would have known how to interface commonplace sensors and actuators with standard transceivers in Kahn's PR network at the time of invention. *See generally* Exs. 2003, 2006, 2008. The cited journal articles do not describe sensors or actuators (and how to interface them with wireless transceivers), but rather they relate to computer networks in general. *See generally* Exs. 2003, 2006, 2008. One article, dated 2014, relates to security and generally describes cyberwar, stating that cyberspace is a fifth domain of war, and discloses various definitions of "cyberwar" proffered by organizations such as NATO and the Geneva Center for the Democratic Control of Armed Forces. Ex. 2008, 14–21. The other two cited journal articles, dated 2006 and 2009, generally describe Wi-fi networks implementing IEEE 802.11 standards. *See generally* Exs. 2006, 2008. These articles relate to capacity problems in high data volume deployments. *Id.* We do not find credible Patent Owner's argument that, in light of these journal articles, a skilled artisan "would not have had a reasonable expectation of success of achieving the claimed invention without undue experimentation." PO Resp. 47. Therefore, the fact that Petitioner's expert did not consider these journal articles in forming his opinion does not persuade us of a different result. As we discussed above, we find credible Dr. Heppe's opinion that a skilled artisan would have known how to interface the prior art sensors with radio transceivers such as those described in Kahn without undue experimentation because the sensors described in the APA were commonplace parts intended for third parties to integrate into their systems, and therefore the sensors used interfaces having well-defined behavior described in specifications that would have been easy to integrate with radio transceivers. Ex. 1018 ¶ 42.

Patent Owner's evidence and arguments regarding the cited journal articles do not persuade us otherwise.

Patent Owner also argues that Petitioner's alleged motivation to combine is unsupported by the record of evidence (PO Resp. 58–60), and more specifically, that Petitioner's alleged motivation to combine based on the following factors is not supported by the record evidence: local distribution of information (PO Resp. 58–60); rapid deployment (PO Resp. 60–61); configurability and flexibility (PO Resp. 61–62); self-initializing and self-organizing (PO Resp. 62); and cost savings (PO Resp. 63–65).

With respect to Patent Owner's arguments relating to local distribution of information, Patent Owner acknowledges that both Kahn and the APA describe local distribution of information. PO Resp. 58–60. Patent Owner argues that this fact cuts against combining Kahn with the APA because a skilled artisan would have no motivation to alter a system to provide functionality it already possessed. *Id.* at 58. In other words, Patent Owner argues that because both systems provide for local distribution of information, there would be no reason to alter either system. This argument is not credible. Kahn teaches that, in implementations involving local distribution of information, using a wireless PR network can provide increased flexibility in rapid deployment and reconfiguration over using a wired network. Ex. 1015, 1469. Accordingly, Kahn teaches that it would have been advantageous to use a wireless network for locally distributed networks. The APA teaches a locally distributed network that is hard-wired, and that includes sensors and actuators. Ex. 1001, Fig. 1; 5:41–6:3. The modification of Kahn proposed by Petitioner involves adding sensors and

actuators to Kahn's PR network, which does not have sensors and actuators. The fact that both networks, the one described in Kahn and the one described in the APA, involve local distribution of information suggests an advantage to implementing a network of sensors and actuators wirelessly, namely to increase flexibility in rapid deployment and reconfiguration.

With respect to Patent Owner's arguments relating to rapid deployment, configurability, and flexibility, Patent Owner argues that "there is no evidence that these features would have been better achieved by the APA in a wireless network." PO Resp. 61–62. Patent Owner relies on its experts' testimony that wired networks have the same reachability and connectivity as wired networks. *Id.* (citing Ex. 2026 ¶ 112). We do not find this credible because Kahn discloses that PR networks permit mobile communications and flexibility in rapid deployment and reconfiguration over fixed installations. Ex. 1015, 1469, col. 1. We do not find it credible that wired networks, with fixed wires and cables to connect devices, had the same degree of flexibility in rapid deployment and reconfiguration as a wireless (mobile) network that is not limited to using already-installed, fixed wires and cables.

With respect to Patent Owner's argument that Kahn does not provide cost savings as a motivation to combine, this argument does not persuade us of a different result because our Decision relies on Petitioner's argument that the APA, rather than Kahn, provides costs savings as a benefit of wireless networks.

With respect to Patent Owner's arguments regarding self-initiating and self-organizing, these arguments do not persuade us of a different result

because our Decision does not depend on Petitioner's arguments in that regard.

As to claim 1's recitation that the transceiver be "configured to receive select information and identification information transmitted from a second wireless transceiver," Petitioner relies on Kahn's teaching of a second transceiver receiving payload data (i.e., text) and a unique identifier (i.e., selector), respectively, from a first transceiver. Pet. 36. We are persuaded by Petitioner's arguments and evidence that the payload data received by the transceiver in Kahn is "select information," as recited in claim 1, and that the selector received by Kahn's transceiver is "identification information," as recited in claim 1, because the selector identifies the second transceiver. Patent Owner does not dispute that Kahn teaches this limitation.

Petitioner argues that the information received by the second transceiver in Kahn is of a "predetermined signal type," as recited in claim 1, because it consists of a "48 bit preamble followed by a variable length header," "followed by the text and a 332 bit checksum." *Id.* (quoting Ex. 1015, 1478). We are persuaded by Petitioner's arguments and evidence that information received by the second transceiver in Kahn is of a "predetermined signal type," as recited in claim 1, because it is a signal that follows a pre-determined format. Patent Owner does not dispute that Kahn teaches this limitation.

With respect to claim 1's recitation of "the transceiver being further configured to wirelessly retransmit in the predetermined signal type the select information, the identification information associated with the second wireless transceiver, and transceiver identification information associated

with the transceiver making retransmission," Petitioner argues that Kahn teaches that during retransmission, Kahn's packet radio transceiver transmits its own selector along with the selector of the transceiver from which it originally received the transmission and text using a predetermined format. Pet. 37–38. We are persuaded by Petitioner's arguments and evidence that Kahn's retransmission by a transceiver, using a predetermined signal format, of its own selector and the selector from which it received the transmission, teaches this claim limitation. Patent Owner does not dispute that Kahn teaches this limitation.

With respect to claim 1's recitation of "a controller operatively coupled to the transceiver and the sensor, the controller configured to control the transceiver and receive data from the sensor, the controller configured to format a data packet for transmission via the transceiver, the data packet comprising data representative of data sensed with the sensor," Petitioner relies on Kahn's teaching of a microprocessor controller. *Id.* at 37. Petitioner argues that the controller in Kahn controls the transceiver because it selects the transmit frequency, data rate, power, and time of transmission for the transceiver. *Id.* Petitioner further argues that data from the APA sensors would have been received by Kahn's controller, and that Kahn's controller would have assembled the data into packets for transmission by the transceiver. *Id.*

Patent Owner does not dispute that Kahn teaches a controller operatively coupled to a transceiver, the controller configured to control the transceiver and receive data, the controller configured to format a data packet for transmission via the transceiver. Rather, Patent Owner argues that Petitioner has not demonstrated a motivation to modify Kahn in view of

the APA to include a sensor. PO Resp. 43–65. However, we discussed these arguments above. For reasons we discussed above, we are persuaded by Petitioner's arguments, and Patent Owner's arguments do not persuade us otherwise.

Dependent claims 2 and 7 further recite, in pertinent part, actuators for implementing commands. Petitioner cites to the actuator described in the APA as teaching this limitation. Pet. 40. Petitioner explains that the APA includes local controller 110 that "returns control signals . . . to the system actuators." *Id.* (citing Ex. 1001, 5:46–50). Petitioner argues that a person of ordinary skill in the art would have substituted Kahn's microprocessor controller for the APA's local controller 110, and coupled the controller to sensors and actuators as described in the APA. Pet. 40. Dr. Heppe opines that a person of ordinary skill in the art would have been motivated to combine the teachings of Kahn and the APA to achieve the claimed limitation for the same reasons discussed with respect to combining the APA's sensors with Kahn's PR network. Ex. 1018 ¶ 76; *see also id.* at ¶ 42 (discussing motivation to combine Kahn and the APA). Patent Owner does not introduce any arguments specific to claims 2 and 7, but rather provides general arguments regarding motivation to combine Kahn and the APA, which we discussed above. On this record, however, for reasons we discussed above with respect to the combination of the APA's sensors and actuators with Kahn's PR network, we are persuaded by Petitioner's arguments.

Upon review of the record in this proceeding, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, and 7 of the '780 patent are unpatentable under § 103 as obvious

over Kahn in view of the APA.

H. Asserted Obviousness of Claims 4–6 and 8 over Kahn in view of the APA and Burchfiel

Petitioner contends that claims 4–6 and 8 of the '780 patent are unpatentable as obvious over Kahn in view of the APA and Burchfiel. Pet. 41–44. Petitioner proffers a declaration and supplemental declaration of Dr. Heppe to support its contentions. Exs. 1018, 1041. Patent Owner disputes Petitioner's contentions, arguing that the claims would not have been obvious. PO Resp. 34–43. Patent Owner proffers two declarations of Dr. Almeroth to support its assertions. Exs. 2001, 2026. We have reviewed the record, and we determine that Petitioner has shown by a preponderance of the evidence that claims 4, 6, and 8 of the '780 patent are unpatentable as obvious over Kahn in view of the APA and Burchfiel. We determine that Petitioner has not made a sufficient showing with respect to claim 5.

1. *Overview of Burchfiel*

Burchfiel is an article published as part of the American Federation of Information Processing Societies National Computer Conference Proceedings, and is dated 1975. Ex. 1016. Petitioner asserts that Burchfiel qualifies as prior art under 35 U.S.C. §§ 102(a) and 102(b). Pet. 18. Patent Owner does not dispute Petitioner's assertion. For purposes of this decision, we are satisfied that Burchfiel qualifies as prior art under 35 U.S.C. §§ 102(a) and 102(b). Burchfiel is titled "Functions and structure of a packet radio station," shares a common author with Kahn, and like Kahn, describes PR networks. Burchfiel describes the same PR network described in Kahn, but provides additional details relating to various functions of a packet radio station. *See generally* Exs. 1016, 1015.

2. *Analysis*

Claims 4–6 further recite, in pertinent part, that the data packets comprise "a function code" and the claimed device implements the function code, or a memory to store one or more "function codes." Petitioner relies on Burchfiel's discussion of function fields to teach the claimed function codes. Pet. 41–44; Ex. 1018 ¶¶ 77–78. As we noted above, both Kahn and Burchfiel describe PR networks. *See generally* Exs. 1016, 1015. Kahn cites to Burchfiel in its description about functions of a station in PR networks. Ex. 1015, 1477. Burchfiel provides additional information about the functions of stations in PR networks. *See generally* Ex. 1016. Accordingly, we are persuaded that a person of ordinary skill in the art would have looked to Burchfiel for further description of the functions described in Kahn. Patent Owner does not argue otherwise.

a. Claims 4 and 6

Claim 4 recites the device of claim 1 "wherein the controller is configured to receive data packets comprising a function code, and in response to the function code, implement a function." Petitioner argues that Burchfiel teaches that the data controller in Kahn's packet radios receives packets that include a function code in a function field, and implements a process (control, debugging, or measurement) in response to the function code. Pet. 41–42. In particular, Burchfiel describes the radios as performing control functions such as "[e]stablishing control, debugging, and measur[ing] connections from the station to each repeater that it controls." Ex. 1016, 247. These functions are indicated by a "function field" located in a packet. *Id.* "The 'function field' provides an address: within a [packet radio], it selects the control process, the debugging process, or the

measurement process." *Id.*; *see id.* at Fig. 3 (depicting the protocol for a packet radio network including a "function" field in the protocol). We agree with Petitioner, and Patent Owner does not dispute, that Burchfiel discloses the PR network controller receiving data packets comprising a function field, and in response to the field, implementing a process. However, Patent Owner disputes that the function field disclosed in Burchfiel is a "function code" and that "implementing a process" in Burchfiel is the same as "implementing a function." PO Resp. 34–36.

Claim 6 recites the device of claim 1 "further comprising a memory to store one or more function codes corresponding to the device, the function codes corresponding to a number of functions the controller can implement." Petitioner relies on Kahn's disclosure that the digital section of Kahn's radio includes memory for buffering packets and storing software for use by Kahn's controller. Pet. 43–44 (citing Ex. 1015, 1477, col. 2). Petitioner argues that a person of ordinary skill in the art would have understood that the memory disclosed in Kahn also stored the function fields (described in Burchfiel) used by the controller in Kahn in order to generate packets for transmission. *Id.* at 44 (citing Ex. 1018 ¶¶ 82–84). Petitioner argues that the function field corresponds to a number of functions the controller can implement, namely the function field corresponds to a process (control, debugging, or measurement). *Id.* (citing Ex. 1016, 247, col. 1). We agree with Petitioner, and Patent Owner does not dispute, that the combination of Kahn and Burchfiel teaches a memory to store a function field corresponding to the packet radio, the function fields corresponding to a number of processes the controller can implement. However, Patent Owner disputes that the function field disclosed in Burchfiel is a "function code"

and that "implementing a process" in Burchfiel is the same as "implementing a function." PO Resp. 36–38. Patent Owner also contends that Petitioner and Dr. Heppe have failed to explain why a skilled artisan would have been motivated to store function *codes* in Kahn's radio or modify Kahn's radio to transmit function *codes*, but Patent Owner does not dispute Petitioner's contentions that the combination of Kahn and Burchfield teaches storing function *fields* and transmitting function *fields*. *Id.*

Accordingly, the issues before us are whether the "function field" disclosed in Burchfiel is a "function code" as recited in claims 4 and 6, and whether Burchfiel's disclosure of implementing a process is the same as "implement[ing] a function" as recited in claims 4 and 6.

With respect to the limitation "function code," because we have construed this term to mean "bits of data corresponding to a function," we are persuaded that the function field disclosed in Burchfiel is a function code because the address in the function field comprises bits of data, and it corresponds to a process (e.g., a function), namely a control process, debugging process, or measurement process, because when a packet radio unit ("PRU") receives the address in the function field, the PRU selects the process corresponding to the address. Reply 20; Ex. 1016, 247, col. 1. Patent Owner's arguments that Burchfiel does not disclose a function code are based on its construction of "function code" to mean "a symbol representing a function of the output of a function" and its construction of "function" to mean "a relation from a domain to a codomain in which exactly one member of the codomain is assigned to each member of the domain," both of which we have rejected. PO Resp. 34–36.

With respect to the limitation "implementing a function," because we have construed "function" to encompass "features" or "parameters" of a system, and "capabilities" and "tasks to be performed," we are persuaded the processes disclosed in Burchfiel are functions because the processes are tasks to be performed. Burchfiel describes "control functions performed" by a station that includes initialization of the packet radio network, which involves tasks or functions such as establishing control, debugging, and measurement connections from a station to various repeaters. Ex. 1016, 247. Patent Owner's arguments that Burchfiel does not disclose "implementing a function" are based on Patent Owner's construction of "function" to mean "a relation from a domain to a codomain in which exactly one member of the codomain is assigned to each member of the domain," which we have rejected. PO Resp. 36–38.

Accordingly, Petitioner has persuaded us that Kahn, in view of the APA and Burchfiel, renders obvious claims 4 and 6.

b. Claim 5

Claim 5 recites the device of claim 1 "wherein the controller is configured to format data packets for transmission via the transceiver, the data packets comprising a function code corresponding to sensed data and the unique identification code that identifies the transceiver." Petitioner relies on Kahn's disclosure that the controller is configured to format data packets for transmission via a transceiver. Pet. 42 (citing Ex. 1015, 1477, col. 2). Petitioner relies on Burchfiel and Kahn for teaching that the data packets include a function code corresponding to sensed data in the form of

keyboard strokes entered on a keyboard. *Id.*[10] However, the "sensed data" in claim 5 refers to data sensed in claim 1 by a sensor that is electrically interfaced with a transceiver. Petitioner has not demonstrated that the keyboard it alleges to be present would have been electrically interfaced with the transceiver of the packet radio, as required by claim 1, from which claim 5 depends. At best, Petitioner has shown that a keyboard would have been interfaced with a computer terminal that is, in turn, connected to a packet radio. Accordingly, Petitioner has not persuaded us that Kahn, in view of the APA and Burchfiel, teaches a "function code corresponding to sensed data," as recited in claim 5.

c. Claim 8

With respect to claim 8 of the '780 patent, which depends from claim 1 and further recites that "the second transceiver is nearby to the transceiver," Petitioner asserts Kahn teaches this recitation, and alternatively, so does Burchfiel. Pet. 44. Petitioner relies on Kahn's description of "nearby" radios, "closely spaced" radios, transceivers in "local distribution," radios close enough to have a "radio line-of-sight path," a radio reporting "neighbors," which it can "hear," and radios close enough to be in "line of sight propagation range." *Id.* (citing Exs. 1015, 1469, 1471, 1477, 1481). In the alternative, Petitioner relies on Burchfiel's description of "next transceivers" that are "within earshot" and discloses transceivers

[10] In the Petition, Petitioner does not identify a keyboard as satisfying the claimed sensor limitation in its discussion of claim 1, from which claim 5 depends. Pet. 34–36. Petitioner's expert, Dr. Heppe, discusses a keyboard in connection with the sensor limitation (Ex. 1018 ¶ 60), but the Petition limits its discussion with respect to claim 1 to a "microphone or similar transducer that senses acoustic signals" (Pet. 35–36).

speaking to "local" repeaters and to a "nearest" station. Pet. 44 (citing Ex. 1016, 247, 250). Patent Owner does not dispute that Kahn, or alternatively Burchfiel, teaches this limitation. We are persuaded for purposes of this decision that the recitation of claim 8 is taught by Kahn, or alternatively by Burchfiel.

Upon review of the record in this proceeding, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 4, 6, and 8 of the '780 patent are unpatentable under § 103 as obvious over Kahn in view of the APA and Burchfiel. However, Petitioner has not demonstrated by a preponderance of the evidence that claim 5 of the '780 patent is unpatentable under § 103 as obvious over Kahn in view of the APA and Burchfiel.

III. SUMMARY

For the foregoing reasons, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 1–15 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over the '732 patent, claims 1, 2, and 7 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA, and claims 4, 6, and 8 of the '780 patent are unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA and Burchfiel. We further determine that Petitioner has not shown that claim 5 of the '780 patent is unpatentable under 35 U.S.C. § 103(a) over Kahn in view of the APA and Burchfiel.

IV. ORDER

Accordingly, it is:

ORDERED that claims 1–15 of the '780 patent have been shown to be unpatentable;

FURTHER ORDERED that our previous Order "that Patent Owner shall not file any papers . . . with respect to [the '780 patent] without the Board's prior authorization, except for papers filed directly with the Board in [this proceeding] that do not otherwise require prior Board authorization" (Paper 10) is hereby lifted; and

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

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

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(54) **SYSTEMS AND METHODS FOR MONITORING AND CONTROLLING REMOTE DEVICES**

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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.

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(63) Continuation of application No. 13/173,499, filed on Jun. 30, 2011, now Pat. No. 8,212,667, which is a continuation of application No. 12/477,329, filed on Jun. 3, 2009, now Pat. No. 8,013,732, which is a continuation of application No. 12/337,739, filed on Dec. 18, 2008, now Pat. No. 7,978,059, which is a continuation of application No. 11/395,685, filed on Mar. 31, 2006, now Pat. No. 7,468,661, which is a continuation of application No. 10/139,492, filed on May 6, 2002, now Pat. No. 7,053,767, which is a continuation of application No. 09/439,059, filed on Nov. 12, 1999, now Pat. No. 6,437,692, which is a continuation-in-part of application No. 09/271,517, filed on Mar. 18, 1999, now abandoned, said application No. 09/439,059 is a continuation-in-part of application No. 09/102,178, filed on Jun. 22, 1998, now Pat. No. 6,430,268, which is a continuation-in-part of application No. 09/172,554, filed on Oct. 14, 1998, now Pat. No. 6,028,522, which is a continuation-in-part of application No. 09/412,895, filed on Oct. 5, 1999, now Pat. No. 6,218,953.

(60) Provisional application No. 60/146,817, filed on Aug. 2, 1999.

(51) **Int. Cl.**
G08B 21/00 (2006.01)

(52) **U.S. Cl.**
USPC **340/870.03**; 340/539.1; 340/540; 340/531;340/539.17;340/3.1;340/521;340/870.01; 340/870.07; 340/870.08; 340/870.16; 340/870.17; 700/108; 702/56

(58) **Field of Classification Search**
USPC ..... 340/870.03, 539.1, 540, 531, 539.17, 340/539.22, 3.1, 521, 870.01, 870.07, 340/870.08, 870.16, 870.17; 700/108; 702/56; 370/238, 375; 343/711, 700 R, 343/720; 375/211, 219, 220
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

8,013,732 B2 * 9/2011 Petite et al. 340/539.1

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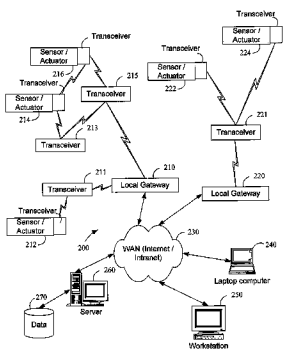
(74) *Attorney, Agent, or Firm* — Troutman Sanders LLP; James E. Schutz; Dustin B. Weeks

(57) **ABSTRACT**

Embodiments of the present invention are generally directed to a system for monitoring a variety of environmental and/or other conditions within a defined remotely located region. Such a system may be configured to monitor utility meters in a defined area. The system is implemented by using a plurality of wireless transmitters, wherein each wireless transmitter is integrated into a sensor adapted to monitor a particular data input. The system also includes a plurality of transceivers that are dispersed throughout the region at defined locations. The system uses a local gateway to translate and transfer information from the transmitters to a dedicated computer on a network. The dedicated computer, collects, compiles, and stores the data for retrieval upon client demand across the network. The computer further includes means for evaluating the received information and identifying an appropriate control signal, the system further including means for applying the control signal at a designated actuator. Other aspects, features, and embodiments are also claimed and described.

15 Claims, 18 Drawing Sheets



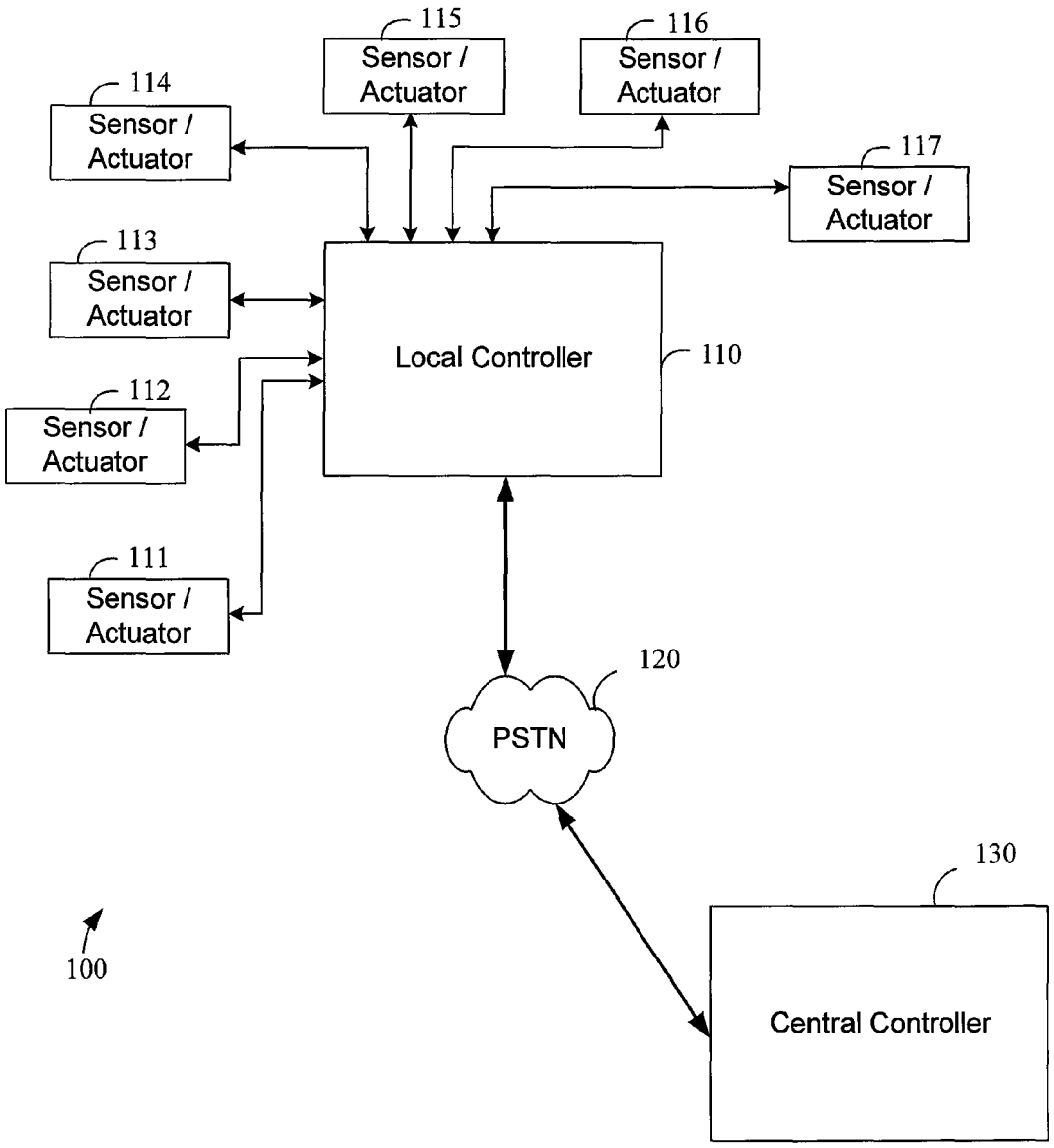


FIG. 1
(PRIOR ART)

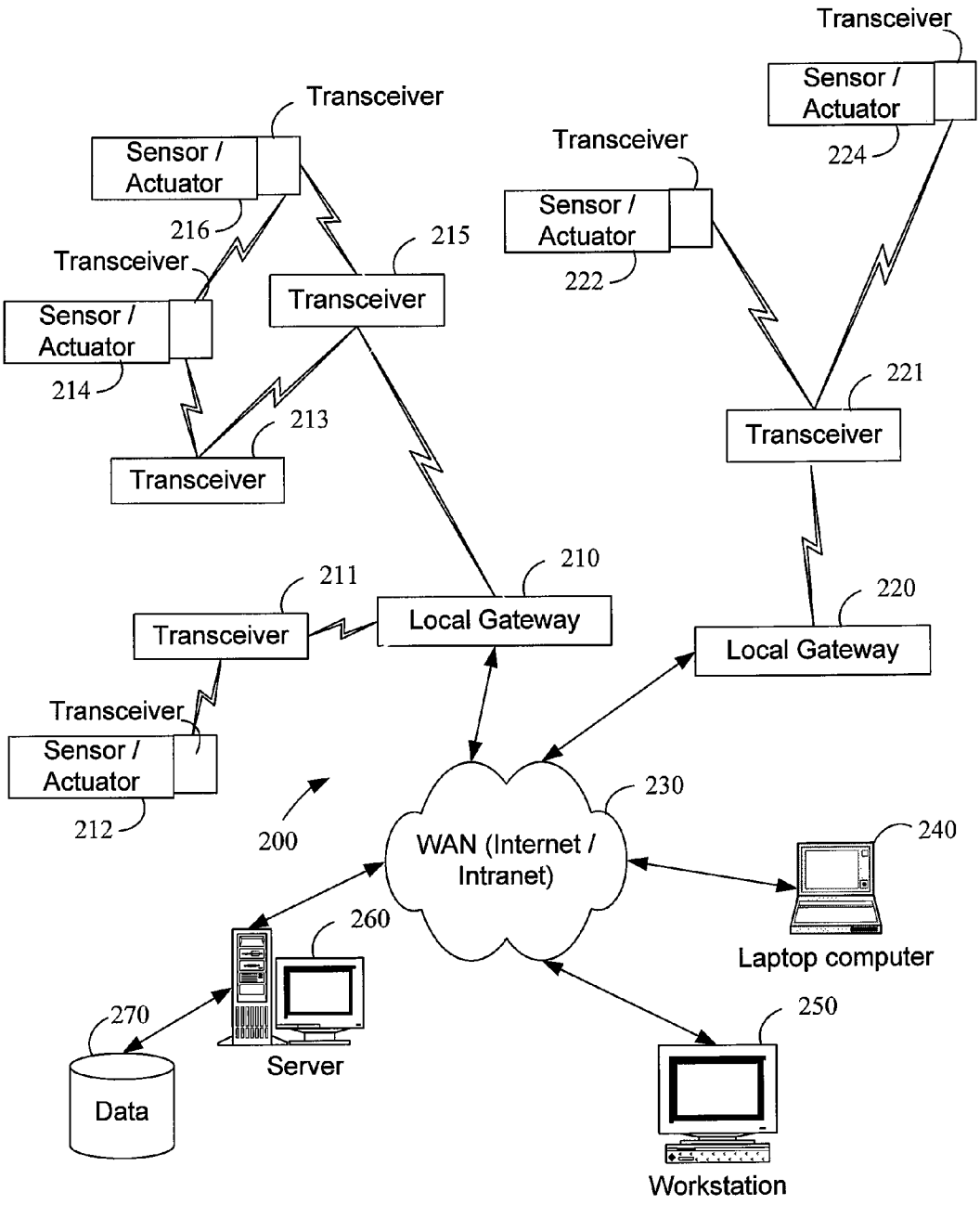

Transceiver
Sensor / Actuator
224
Transceiver
Sensor / Actuator
222
221
Transceiver
Transceiver
Sensor / Actuator
216
215
Transceiver
Sensor / Actuator
214
213
Transceiver
211
210
Transceiver
Local Gateway
220
Local Gateway
Transceiver
Sensor / Actuator
212
200
230
WAN (Internet / Intranet)
240
Laptop computer
260
270
Server
Data
250
Workstation

FIG. 2

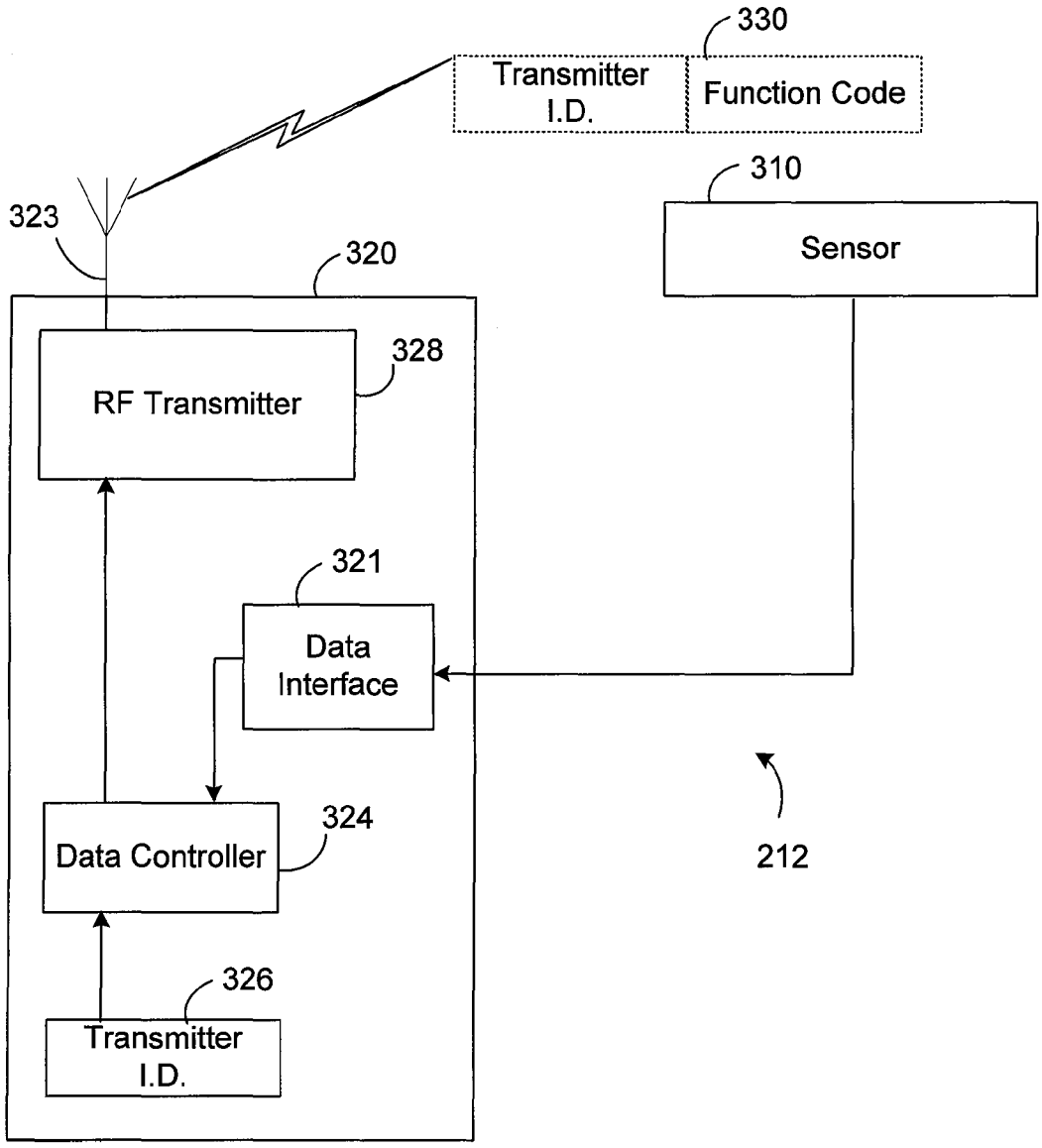

330
Transmitter I.D.
Function Code
310
Sensor
323
320
328
RF Transmitter
321
Data Interface
324
Data Controller
212
326
Transmitter I.D.

FIG. 3A

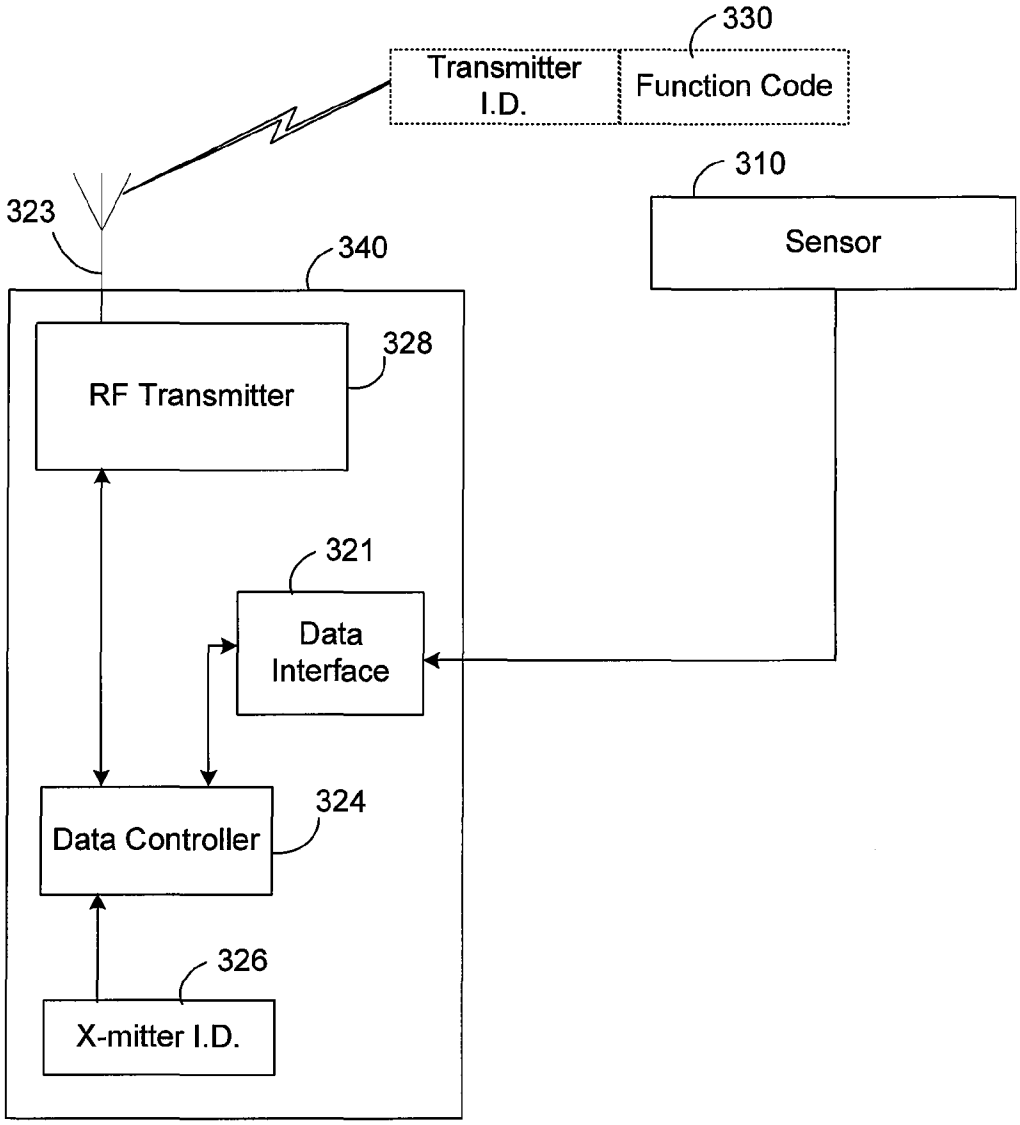

330
Transmitter I.D.
Function Code
310
Sensor
323
340
328
RF Transmitter
321
Data Interface
324
Data Controller
326
X-mitter I.D.

FIG. 3B

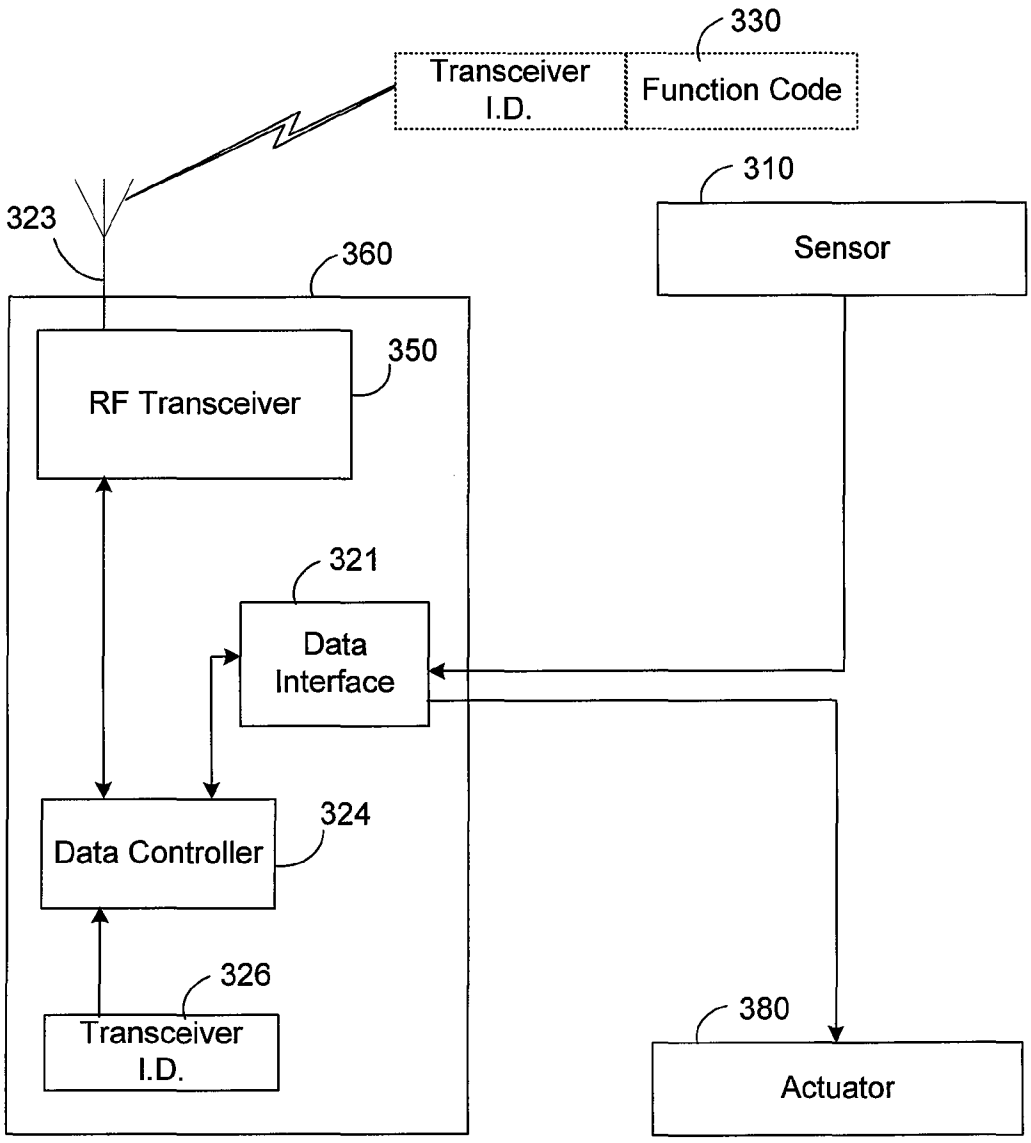

330
Transceiver I.D.
Function Code
310
Sensor
323
360
350
RF Transceiver
321
Data Interface
324
Data Controller
326
Transceiver I.D.
380
Actuator

FIG. 3C

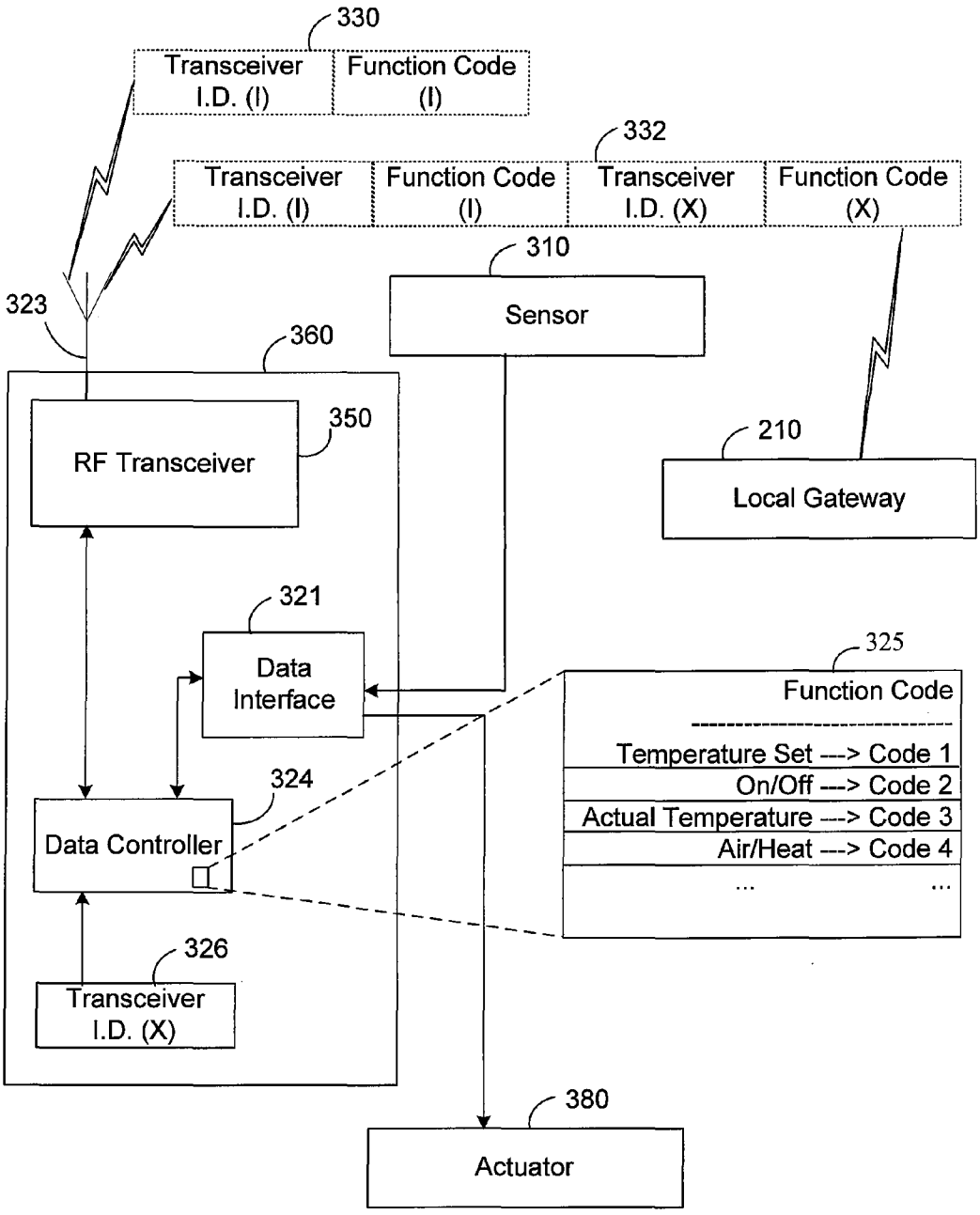

330
Transceiver I.D. (I)
Function Code (I)
332
Transceiver I.D. (I)
Function Code (I)
Transceiver I.D. (X)
Function Code (X)
310
Sensor
323
360
RF Transceiver
350
210
Local Gateway
321
Data Interface
325
Function Code
Temperature Set ---> Code 1
On/Off ---> Code 2
Actual Temperature ---> Code 3
Air/Heat ---> Code 4
...
324
Data Controller
326
Transceiver I.D. (X)
380
Actuator

FIG. 3D

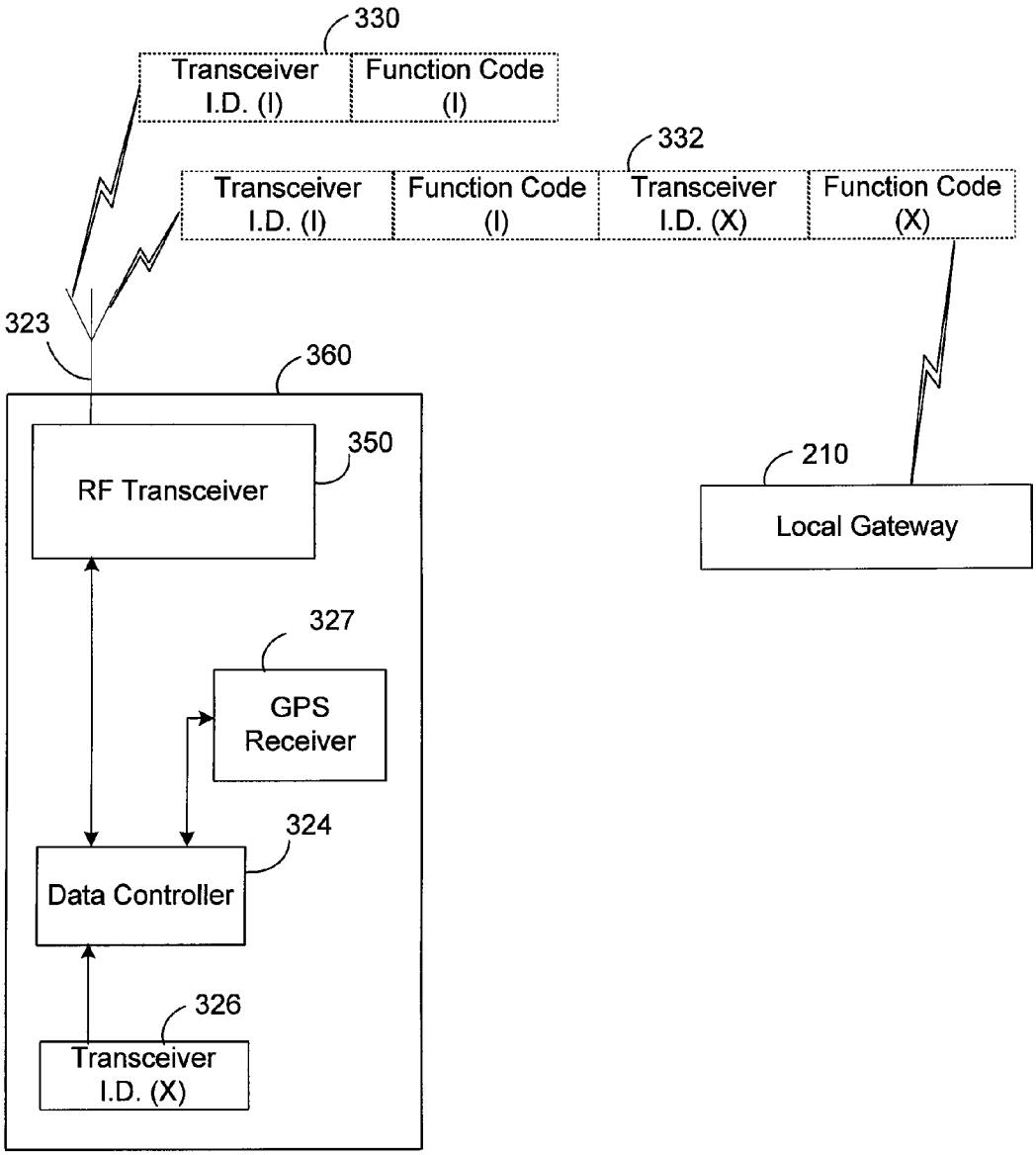

330
Transceiver I.D. (I)
Function Code (I)
332
Transceiver I.D. (I)
Function Code (I)
Transceiver I.D. (X)
Function Code (X)
323
360
RF Transceiver
350
210
Local Gateway
327
GPS Receiver
324
Data Controller
326
Transceiver I.D. (X)

FIG. 3E

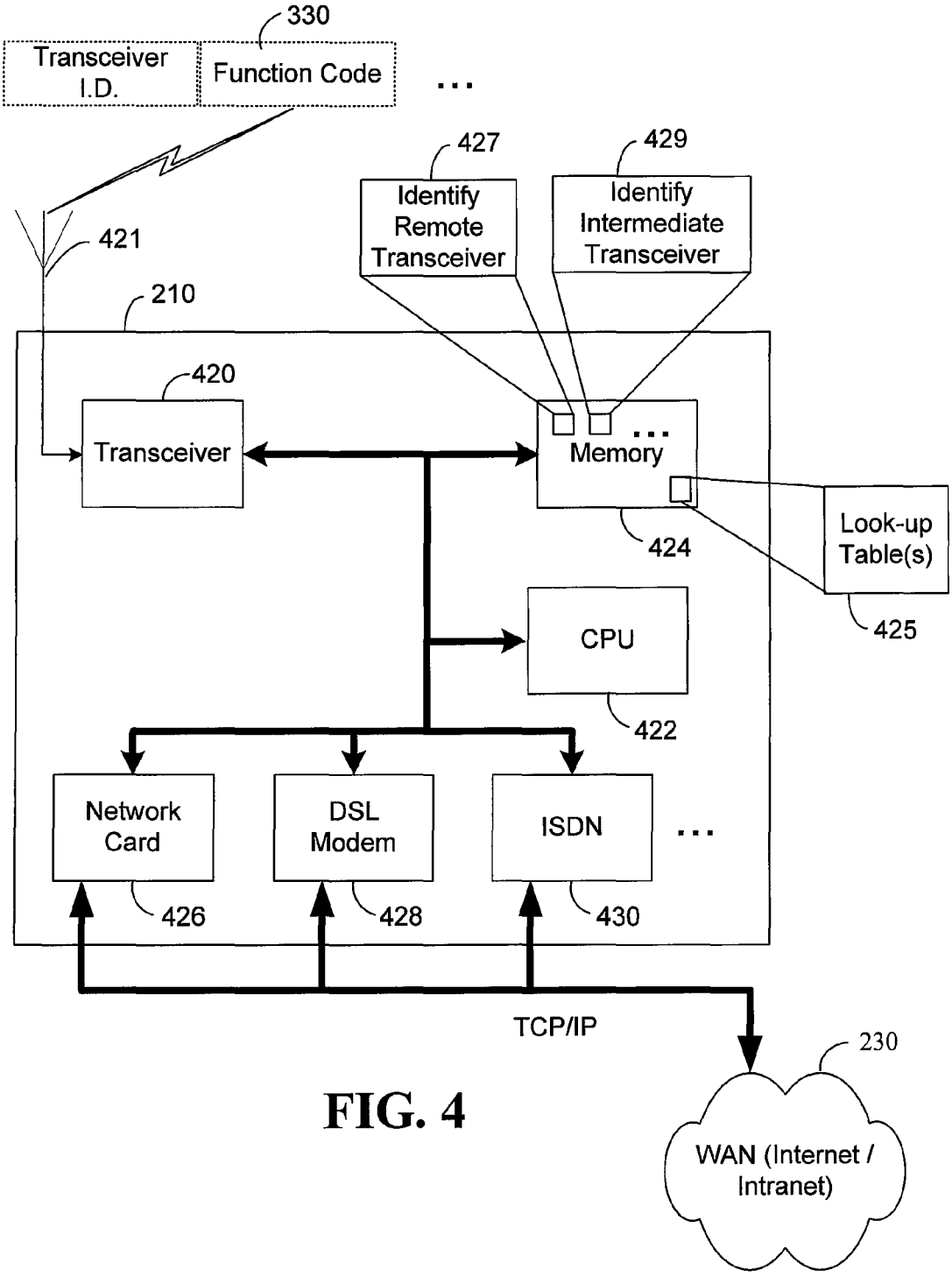

330
Transceiver I.D.
Function Code
...
427
Identify Remote Transceiver
429
Identify Intermediate Transceiver
421
210
420
Transceiver
Memory
...
Look-up Table(s)
424
425
CPU
422
Network Card
DSL Modem
ISDN
...
426
428
430
TCP/IP
230
WAN (Internet / Intranet)

FIG. 4

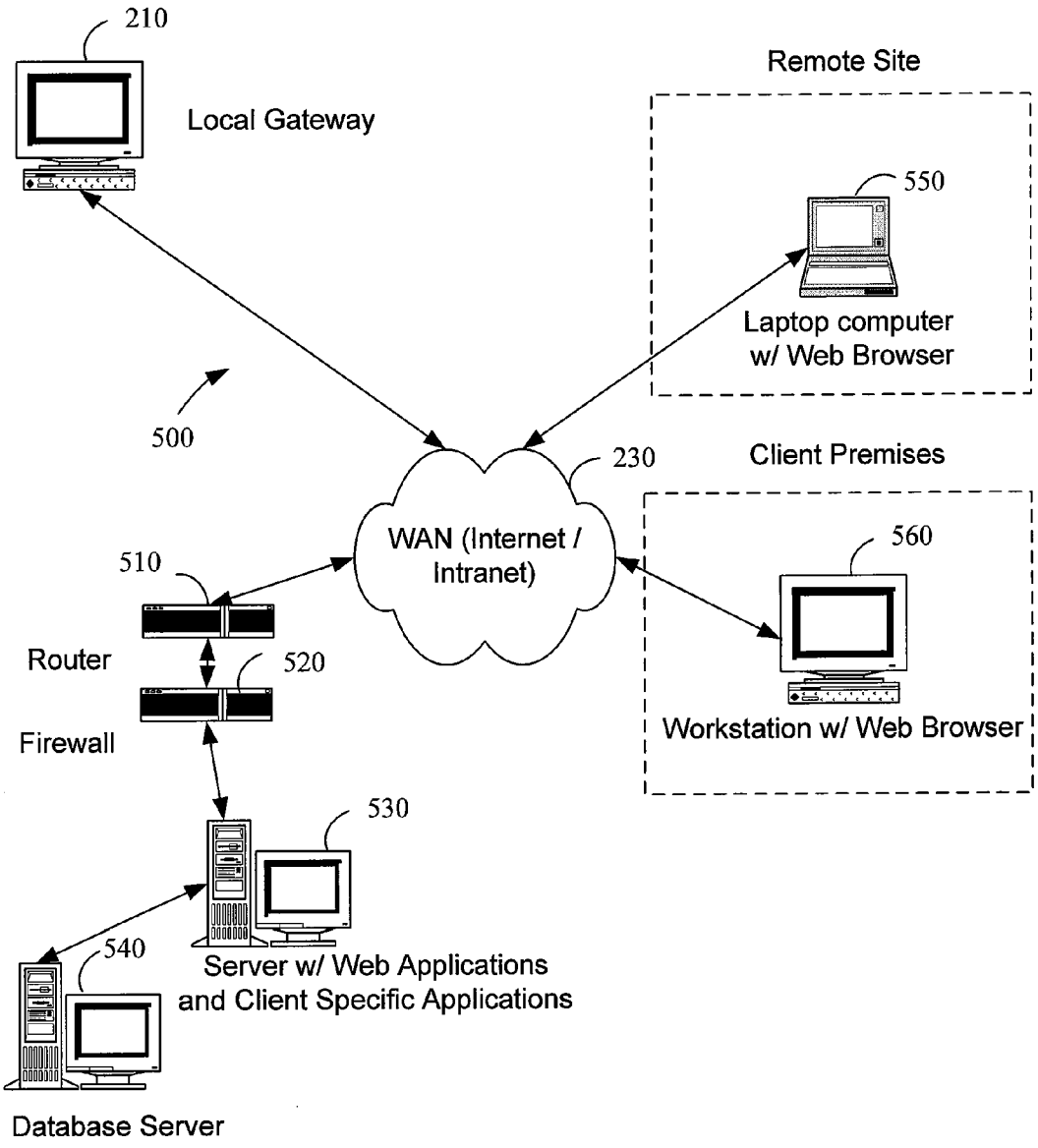

210
Local Gateway
Remote Site
550
Laptop computer
w/ Web Browser
500
230
Client Premises
WAN (Internet /
Intranet)
510
560
Router
520
Workstation w/ Web Browser
Firewall
530
540
Server w/ Web Applications
and Client Specific Applications
Database Server

FIG. 5

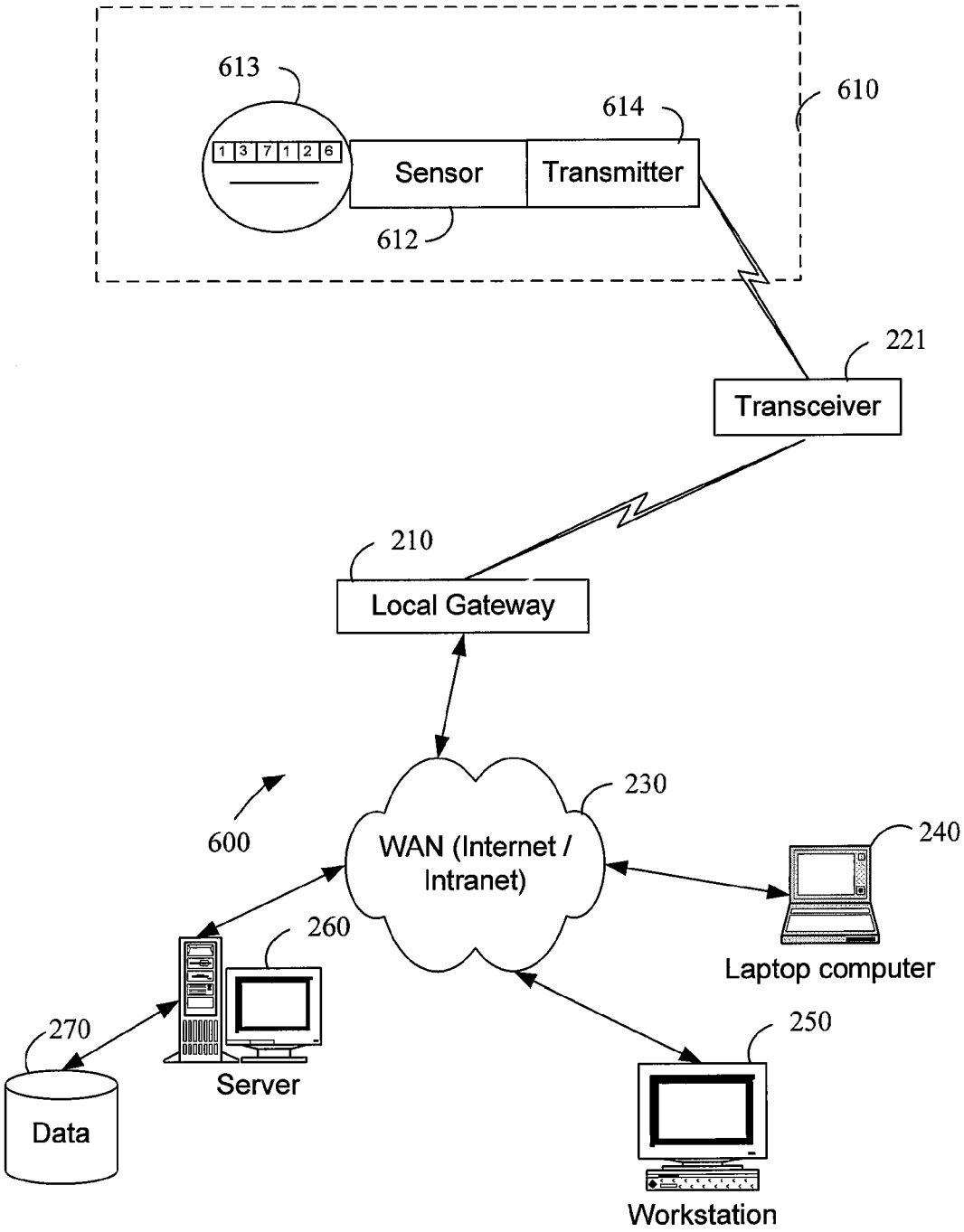

613
610
614
1 3 7 1 2 6
Sensor
Transmitter
612
221
Transceiver
210
Local Gateway
600
230
WAN (Internet / Intranet)
240
Laptop computer
260
270
Server
Data
250
Workstation

FIG. 6

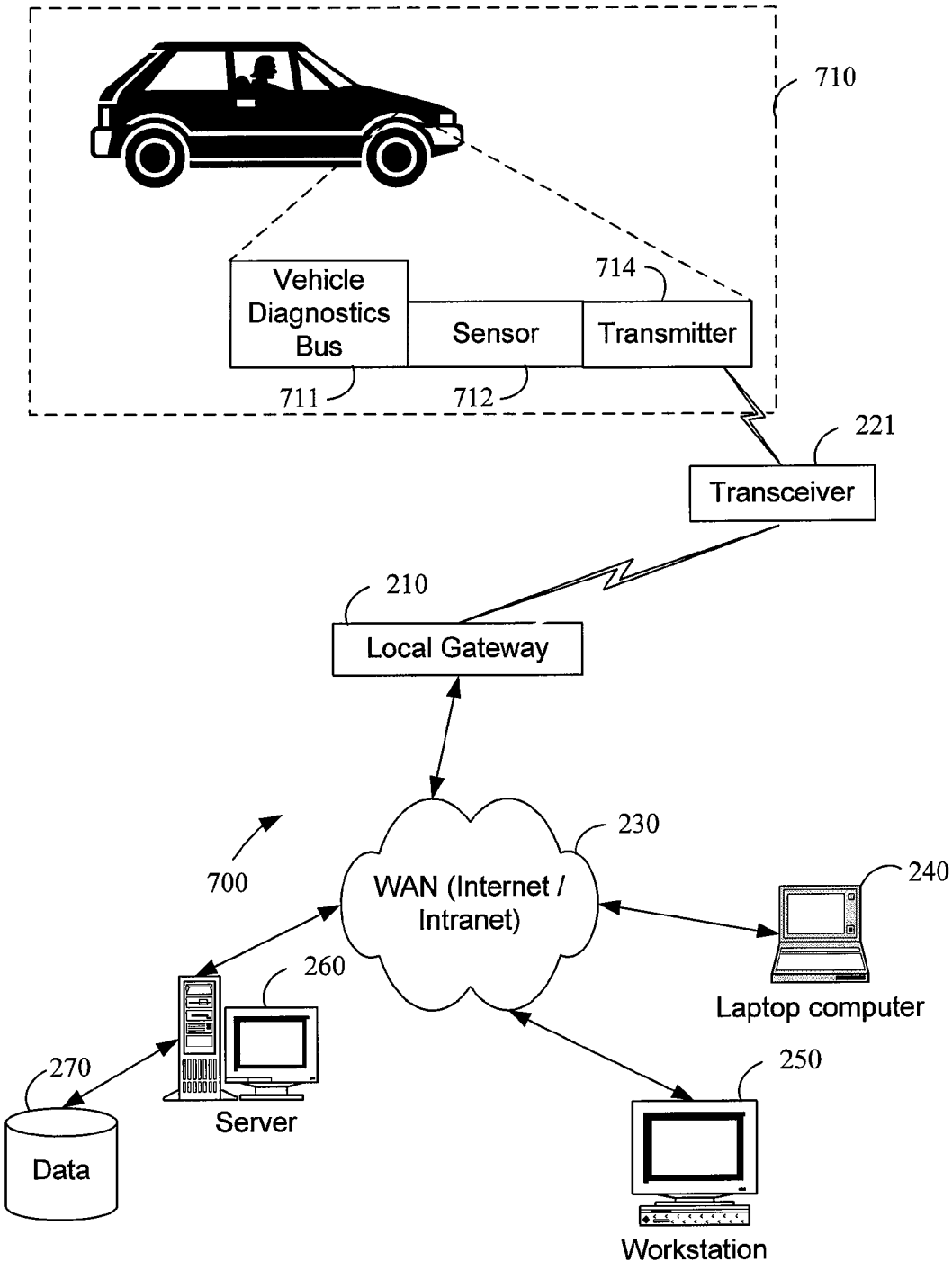

710
Vehicle Diagnostics Bus
Sensor
Transmitter
714
711
712
221
Transceiver
210
Local Gateway
700
WAN (Internet / Intranet)
230
240
Laptop computer
260
Server
270
Data
250
Workstation

FIG. 7

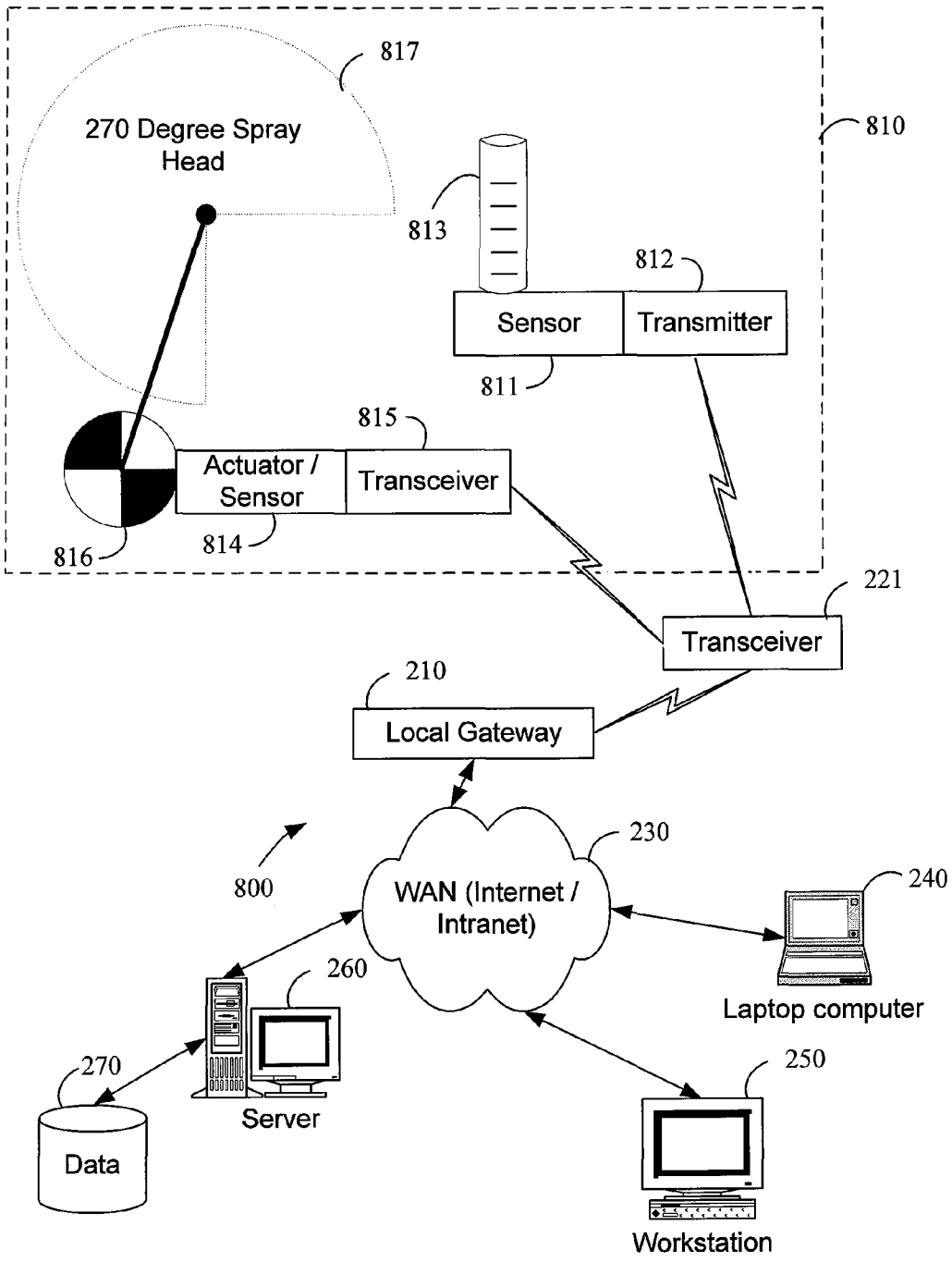

817
270 Degree Spray Head
810
813
812
Sensor
Transmitter
811
815
Actuator / Sensor
Transceiver
816
814
221
Transceiver
210
Local Gateway
800
230
WAN (Internet / Intranet)
240
Laptop computer
260
270
Server
Data
250
Workstation

FIG. 8

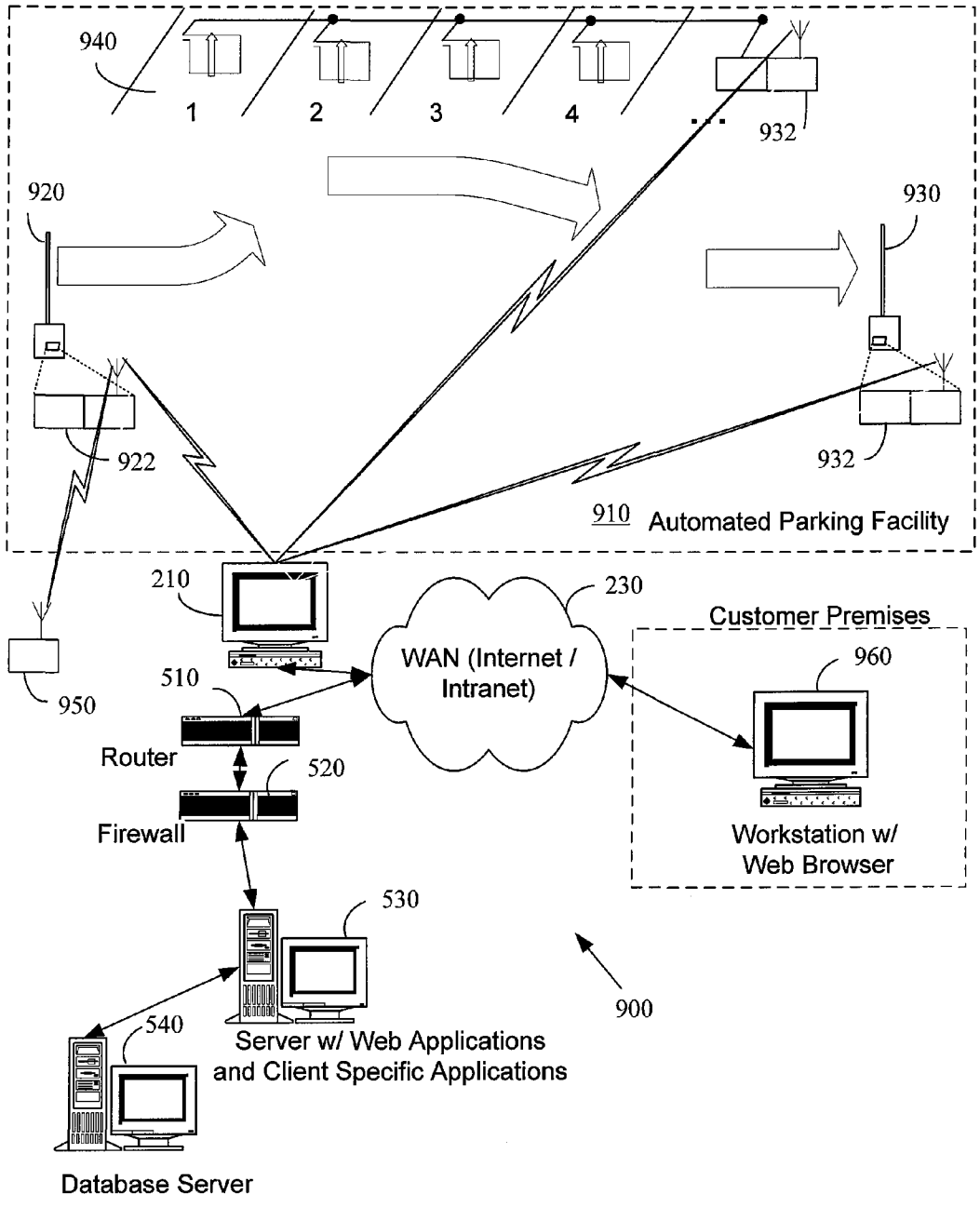

940
1
2
3
4
932
920
930
922
932
910 Automated Parking Facility
210
230
Customer Premises
WAN (Internet / Intranet)
960
510
950
Router
520
Firewall
Workstation w/ Web Browser
530
900
540
Server w/ Web Applications and Client Specific Applications
Database Server

FIG. 9

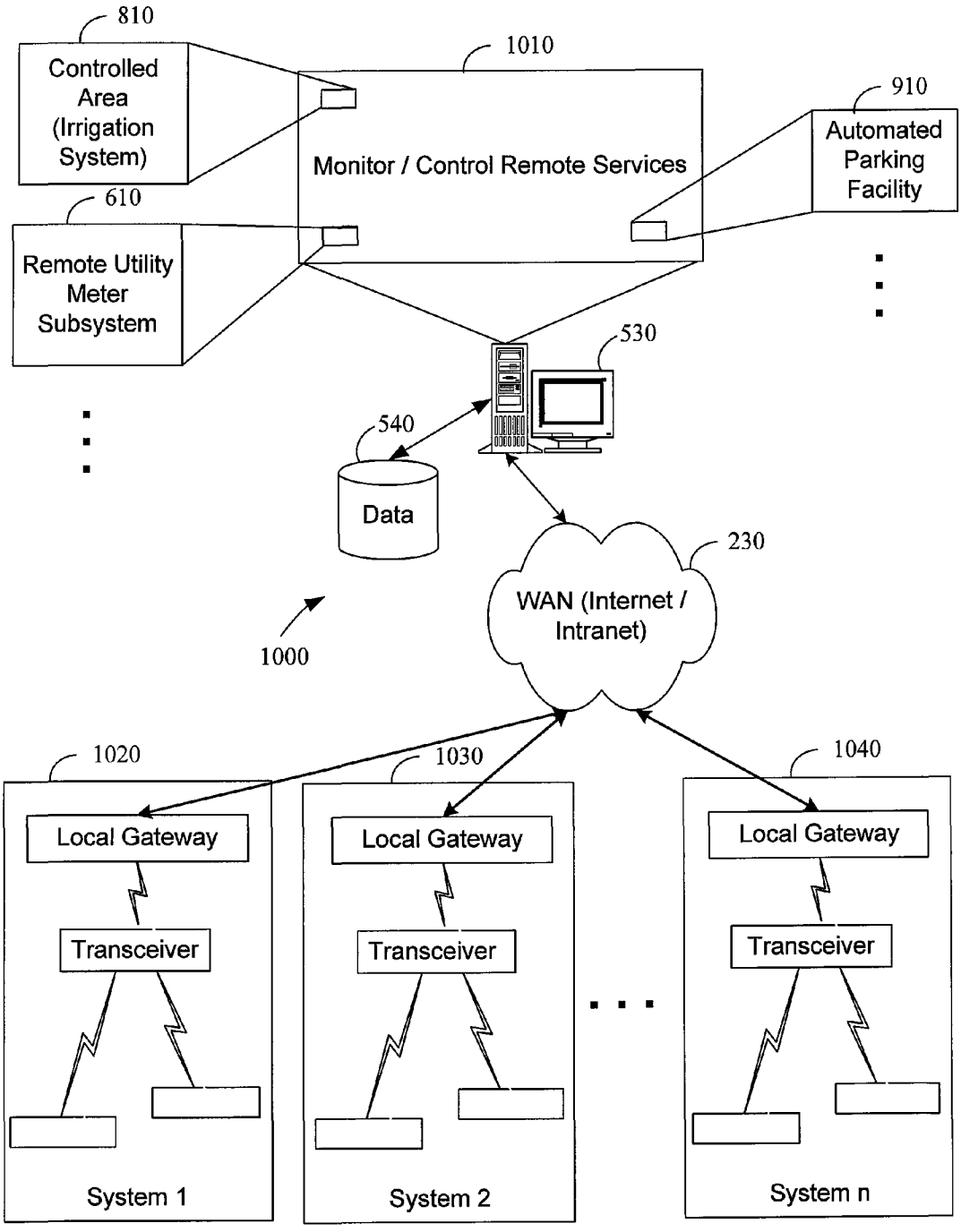

810
Controlled Area (Irrigation System)
1010
Monitor / Control Remote Services
910
Automated Parking Facility
610
Remote Utility Meter Subsystem
530
540
Data
230
WAN (Internet / Intranet)
1000
1020
1030
1040
Local Gateway
Transceiver
Local Gateway
Transceiver
Local Gateway
Transceiver
System 1
System 2
System n

FIG. 10

FIG. 11 Message Structure

To Addr. (1-6)	From Addr. (6)	Pkt. No. (1)	Pkt. Max. (1)	Pkt. Lngth. (1)	Cmd. (1)	Data (0-238)	CkH (1)	CkL (1)

The order of appearance remains fixed although byte position number in each packet may vary due to one or more of the following reasons:

1. Scalability of the "TO ADDRESS" (1 to 6 Bytes).
2. The CMD Byte.
3. Scalability of the Data portion of the message (0 to 238 Bytes).

"To Address" Byte Assignment:

MSB - Byte 1 Device Type	FF-F0 (16) - Broadcast All Devices (1 Byte Address) EF-1F (224) - Device Type Base (2 to 6 Byte Address) 0F-00 (16) - Personal Transceiver Identification (6 Byte Address)
Byte 2 Mfg./Owner ID	FF-F0 (16) - Broadcast all Devices (Byte 1 Type) (2 Byte Broadcast Address) EF-00 (240) - Mfg./Owner Code Identification Number
Byte 3 Mfg./Owner Extension ID	FF-F0 (16) - Broadcast all Devices (Byte 1 & Byte 2 Type) (3 Byte Broadcast Address) EF-00 (240) - Device Type/Mfg./Owner Code ID Number
Byte 4	FF-F0 (16) - Broadcast all Devices (Byte 1 & Byte 2 Type) (4 Byte Broadcast Address) EF-00 (240) - ID Number
Byte 5	(FF-00) 256 - Identification Number
Byte 6	(FF-00) 256 - Identification Number

"From Address" Byte Assignment:

From Address	(FF-00) Full "ID" of Originating Device (up to 6 Bytes)
Packet Number	(FF-00) Packet Number of Msg. longer than 256 Bytes
Packet Max.	(FF-00) Number of Packets in Message over 256 Bytes
Packet Length	(FF-00) Length (in Bytes) of Packet/Message Transmission*
Command	(FF-00) Command Byte
Data	(FF-00) Data as required by specific command
ChkH	(FF-00) Packet Checksum, High Byte
ChkL	(FF-00) Packet Checksum, Low Byte

* Packet Length - 13 Bytes (Min.) / 256 Bytes (Max.)

Sample Messages

Central Server to Personal Transceiver - Broadcast Message - FF (Emergency)

Byte Count = 12

To Addr. (FF)	From Addr. (12345678)	Pkt. No. (00)	Pkt. Max. (00)	Pkt. Lngth. (0C)	Cmd. (FF)	CkH (02)	CkL (9E)

First Transceiver to Repeater (Transceiver)
Broadcast Message - FF (Emergency)

Byte Count = 17

To Addr. (F0)	From Addr. (12345678)	Pkt. No. (00)	Pkt. Max. (00)	Pkt. Lngth. (11)	Cmd. (FF)		CkH (03)	CkL (A0)

Data (A000123456)

Note: Additional Transceiver Re-Broadcasts do not change the message.
The messages are simply received and re-broadcast.

Message to Device "A0" From Device "E1" Command - "08" (Respond to PING)
Response will reverse "To" and "From" Addresses

Byte Count = 17

To Addr. (A012345678)	From Addr. (E112345678)	P # (00)	P Max. (00)	P Lngth. (11)	Cmd. (08)	Data (A5)	CkH (04)	CkL (67)

FIG. 12

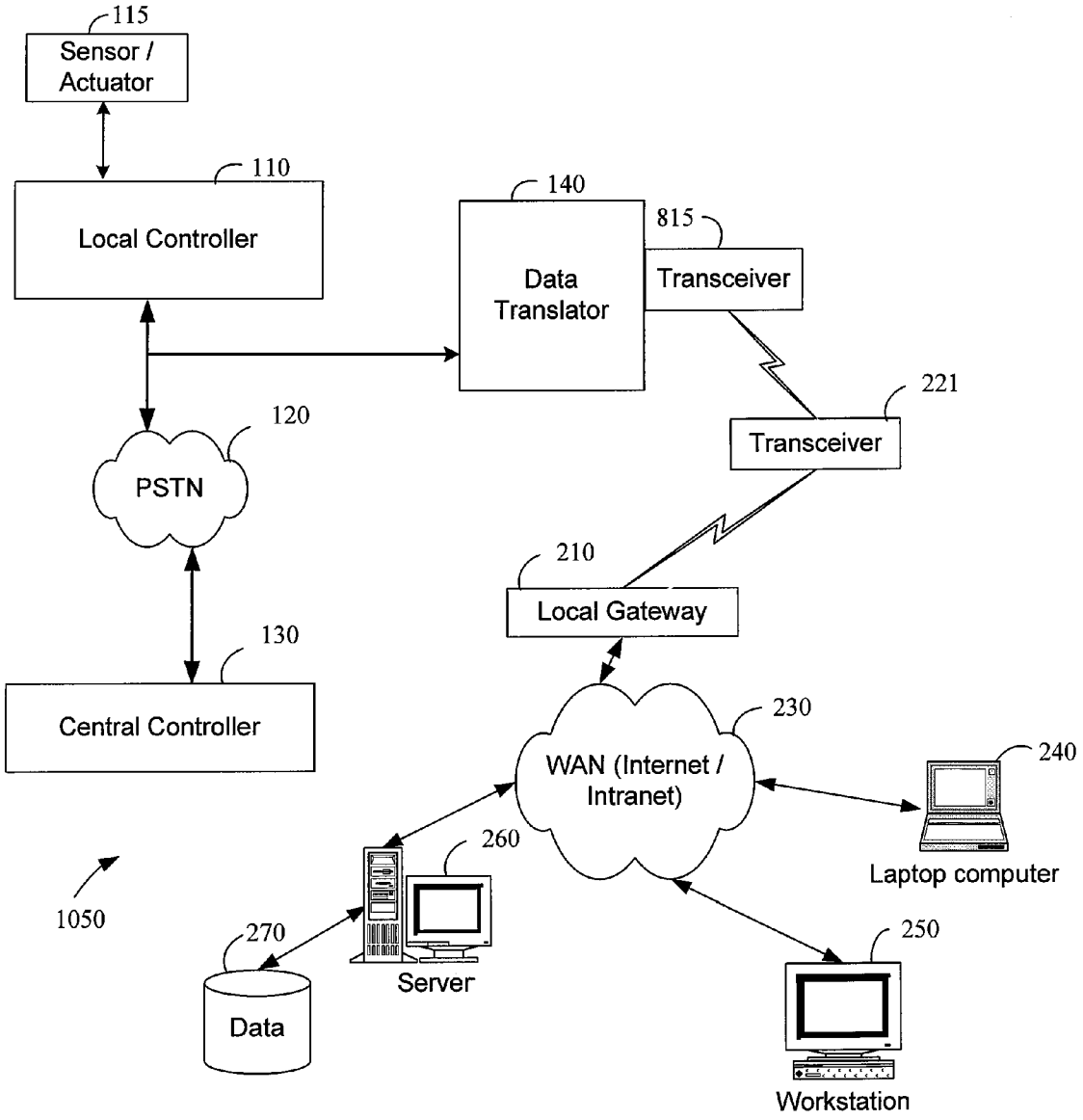

115
Sensor / Actuator
110
Local Controller
140
Data Translator
815
Transceiver
221
Transceiver
120
PSTN
210
Local Gateway
130
Central Controller
230
WAN (Internet / Intranet)
240
Laptop computer
260
Server
270
Data
250
Workstation
1050

FIG. 13

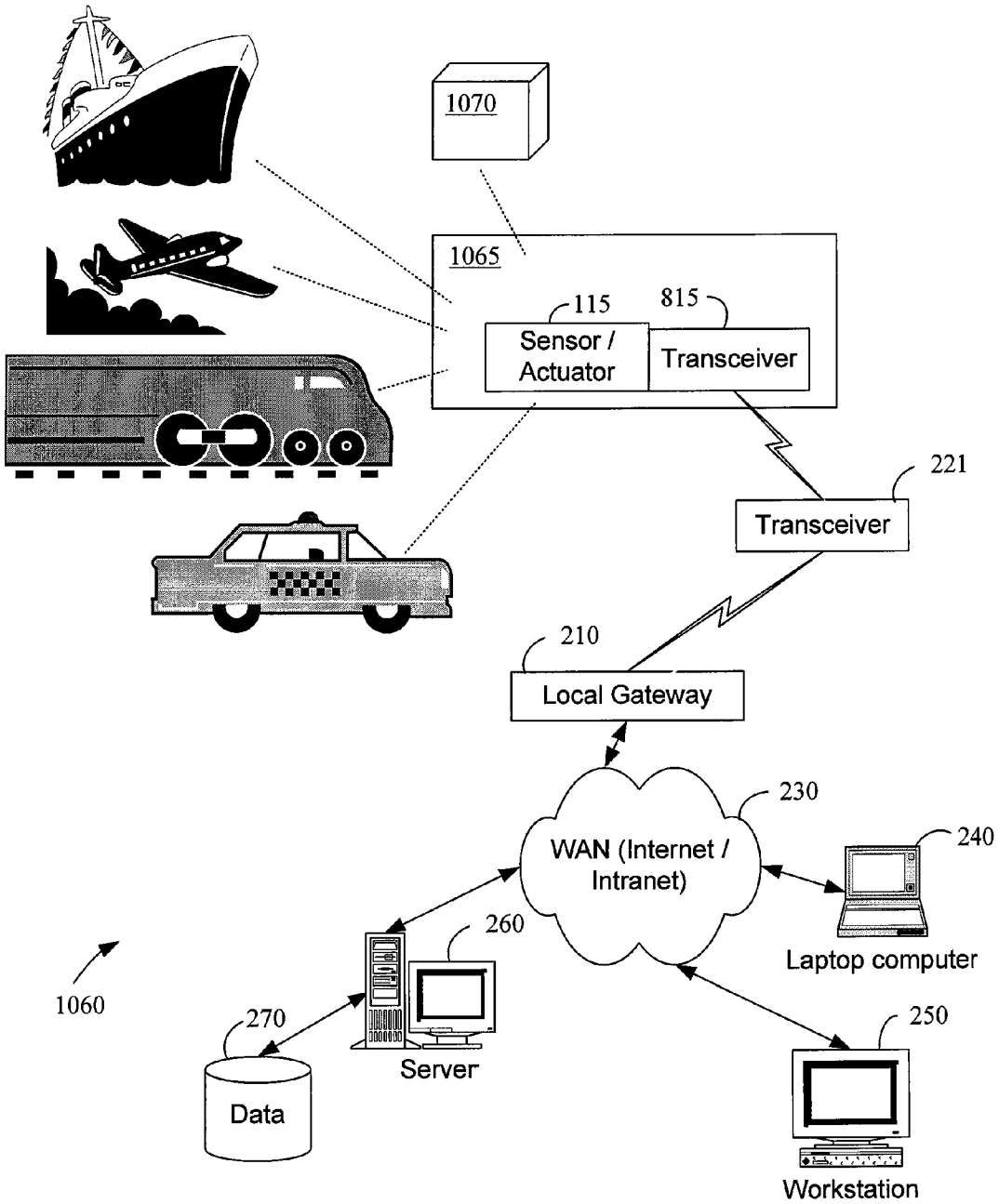

1070
1065
115
815
Sensor / Actuator
Transceiver
221
Transceiver
210
Local Gateway
230
WAN (Internet / Intranet)
240
Laptop computer
260
Server
270
Data
250
Workstation
1060

FIG. 14

SYSTEMS AND METHODS FOR MONITORING AND CONTROLLING REMOTE DEVICES

CROSS REFERENCE TO RELATED APPLICATIONS & PRIORITY CLAIMS

This application is a continuation of copending U.S. patent application Ser. No. 13/173,499, entitled, "Automotive Diagnostic Data Monitoring Systems and Methods," filed on Jun. 30, 2011; which is a continuation of U.S. patent application Ser. No. 12/477,329, entitled, "Systems and Methods for Monitoring and Controlling Remote Devices," filed on Jun. 3, 2009, issued as U.S. Pat. No. 8,013,732; which is a continuation of U.S. patent application Ser. No. 12/337,739, entitled System and Method for Monitoring and Controlling Remote Devices and filed on 18 Dec. 2008, issued as U.S. Pat. No. 7,978,059; which is a continuation of U.S. patent application Ser. No. 11/395,685, entitled, "System and Method for Monitoring and Controlling Remote Devices," filed on Mar. 31, 2006, issued as U.S. Pat. No. 7,468,661; which is a continuation of U.S. patent application Ser. No. 10/139,492, entitled, "System and Method for Monitoring and Controlling Remote Devices," filed on May 6, 2002 and now U.S. Pat. No. 7,053,767; which is a continuation of U.S. patent application Ser. No. 09/439,059, filed on Nov. 12, 1999 and entitled "System and Method for Monitoring and Controlling Remote Devices," now U.S. Pat. No. 6,437,692. U.S. Pat. No. 6,437,692 is a continuation-in-part of U.S. patent application Ser. No. 09/271,517, filed Mar. 18, 1999 and entitled, "System for Monitoring Conditions in a Residential Living Community", which is a continuation-in-part of U.S. patent application Ser. No. 09/102,178 filed Jun. 22, 1998 and entitled, "Multi-Function General Purpose Transceiver," now U.S. Pat. No. 6,430,268, which is a continuation-in-part of U.S. patent application Ser. No. 09/412,895, filed Oct. 5, 1999 and entitled, "System and Method for Monitoring the Light Level Around an ATM," now U.S. Pat. No. 6,218,953; which is a continuation-in-part of U.S. patent application Ser. No. 09/172,554, filed Oct. 14, 1998 and entitled, "System for Monitoring the Light Level Around an ATM," now U.S. Pat. No. 6,028,522; and further claims the benefit of U.S. Provisional Application Ser. No. 60/146,817, filed Aug. 2, 1999 and entitled, "System and Method for Monitoring and Controlling Residential Devices." Each of the above identified applications and patents are incorporated herein by reference in their entireties.

TECHNICAL FIELD

Embodiments of the present invention generally relate to remotely operated systems, and more particularly to a computerized system for monitoring, reporting on, and controlling remote systems by transferring information signals through a wide area network (WAN) and using software applications hosted on a connected server to appropriately process the information.

BACKGROUND

As is known, there are a variety of systems for monitoring and controlling manufacturing processes, inventory systems, emergency control systems, and the like. Most automatic systems use remote sensors and controllers to monitor and automatically respond to system parameters to reach desired results. A number of control systems utilize computers to process system inputs, model system responses, and control actuators to implement process corrections within the system.

Both the electric power generation and metallurgical processing industries have had success controlling production processes by implementing computer controlled control systems in individual plants.

One way to classify control systems is by the timing involved between subsequent monitoring occurrences. Monitoring processes can be classified as aperiodic or random, periodic, and real-time. A number of remotely distributed service industries implement the monitoring and controlling process steps through manual inspection and intervention.

A periodic monitoring systems (those that do not operate on a predetermined cycle) are inherently inefficient as they require a service technician to physically traverse an area to record data, repair out of order equipment, add inventory to a vending machine, and the like. Such service trips are carried out in a number of industries with the associated costs being transferred to the consumers of the service.

Conversely, utility meter monitoring, recording, and client billing are representative of a periodic monitoring system. In the past, utility providers sent a technician from meter to meter on a periodic basis to verify meter operation and to record utility use. One method of cutting operating expenses in the utility industry involved increasing the period at which manual monitoring and meter data recording was performed. While this method decreased the monitoring and recording expense associated with more frequent meter observation and was convenient for consumers who favor the consistent billed amounts associated with "budget billing," the utility provider retained the costs associated with less frequent meter readings and the processing costs associated with reconciling consumer accounts.

Lastly, a number of environmental and safety systems require constant or real-time monitoring. Heating, ventilation, and air-conditioning systems, fire reporting and damage control systems, alarm systems, and access control systems are representative systems that utilize real-time monitoring and often require immediate feedback and control. These real-time systems have been the target of control systems theory and application thereof for some time.

A problem with expanding the use of control systems technology to distributed systems are the costs associated with the sensor-actuator infrastructure required to monitor and control functions within such systems. The typical approach to implementing control system technology is to install a local network of hard-wired sensors and actuators along with a local controller. Not only is there expense associated with developing and installing appropriate sensors and actuators but the added expense of connecting functional sensors and controllers with the local controller. Another prohibitive cost associated with applying control systems technology to distributed systems is the installation and operational expense associated with the local controller.

Accordingly, an alternative solution to applying monitoring and control system solutions to distributed systems that overcomes the shortcomings of the prior art is desired.

SUMMARY OF EXEMPLARY EMBODIMENTS

Certain objects, advantages and novel features of the invention will be set forth in part in the description that follows and in part will become apparent to those skilled in the art upon examination of the following or may be learned with the practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

To achieve the advantages and novel features, the present invention is generally directed to a cost effective method of monitoring and controlling remote devices. More specifically, the present invention is directed to a computerized system for monitoring, reporting, and controlling remote systems and system information transfer by transmitting information signals to a WAN gateway interface and using applications on a connected server to process the information. Because the applications server is integrated on a WAN, Web browsers can be used by anyone with Internet access (and the appropriate access permissions) to view and download the recorded data.

In accordance with a broad aspect of the invention, a system is provided having one or more sensors to be read and/or actuators to be controlled remotely, ultimately through a computer on the Internet. The sensors and/or actuators are interfaced with wireless transceivers that transmit and/or receive data to and from the Internet. In this regard, additional wireless transceivers may relay information between the transceivers disposed in connection with the sensors and actuators and a gateway to the Internet. It should be appreciated that, a portion of the information communicated includes data that uniquely identifies the sensors and/or actuators.

In accordance with one aspect of the invention, a system is configured to monitor and report system parameters. The system is implemented by using a plurality of wireless transceivers. At least one wireless transceiver is interfaced with a sensor, transducer, actuator or some other device associated with the application parameter of interest. In this regard, the term "parameter" is broadly construed and may include, but is not limited to, a system alarm condition, a system process variable, an operational condition, etc. The system also includes a plurality of transceivers that act as signal repeaters that are dispersed throughout the nearby geographic region at defined locations. By defined locations, it is meant only that the location of each transceiver is known to a central computer. The central computer may be informed of transceiver physical locations after permanent installation, as the installation location of the transceivers is not limited. Each transceiver that serves to repeat a previously generated data signal may be further integrated with its own unique sensor or a sensor actuator combination as required. Additional transceivers may be configured as stand-alone devices that serve to simply receive, format, and further transmit system data signals. Further, the system includes a local data formatter that is configured to receive information communicated from the transceivers, format the data, and forward the data via the gateway to one or more servers interconnected with the WAN. The server further includes means for evaluating the received information and identifying the system parameter and the originating location of the parameter. The server also includes means for updating a database or further processing the reported parameters.

Consistent with the broader concepts of the invention, the "means" for evaluating the received information and the "means" for reporting system parameters are not limited to a particular embodiment or configuration. Preferably, these "means" will be implemented in software that is executed by a processor within a server integrated with the Internet. However, dedicated WANs or Intranets are suitable backbones for implementing defined system data transfer functions consistent with the invention.

In one embodiment, a client retrieves configured system data by accessing an Internet Web site. In such an embodiment, a system consistent with the present invention acts as a data collector and formatter with data being delivered upon client request, with availability twenty-four hours a day, seven days a week.

In more robust embodiments, a system can be configured to collect, format, and deliver client application specific information on a periodic basis to predetermined client nodes on the WAN. In these embodiments, client intervention would serve to close the feedback loop in the control system.

In yet another embodiment, a system can be configured to collect, format, and control client application specific processes by replacing a local control computer with a WAN interfaced server and integrating system specific actuators with the aforementioned system transceivers.

It should be further appreciated that the information transmitted and received by the wireless transceivers may be further integrated with other data transmission protocols for transmission across telecommunications and computer networks other than the Internet. In addition, it should be further appreciated that telecommunications and computer networks other than the Internet can function as a transmission path between the networked wireless transceivers, the local gateways, and the central server.

In yet a further embodiment, a system can be configured using the present invention to translate and transmit control signals from an existing local controller via the networked wireless transceivers. In this regard, the system of the present invention would require a data translator to tap into the data stream of an existing control system. Distinct control system signals may be mapped to function codes used by the present invention in order to provide customer access to control system data. In this way, the system of the present invention can be integrated with present data collection and system controllers inexpensively, as customers will only have to add a data translator and a wireless transmitter or transceiver as the application demands. By integrating the present invention with the data stream generated by present monitoring and control systems, potential customers enjoy the benefits of the present invention without the difficulties associated with integrating sensors and actuators to monitor individual system parameters.

BRIEF DESCRIPTION OF FIGURES

The accompanying drawings incorporated in and forming a part of the specification, illustrate several aspects of the present invention, and together with the description serve to explain the principles of the invention. In the drawings:

FIG. **1** is a block diagram of a prior art control system;

FIG. **2** is a block diagram illustrating a monitoring/control system of the present invention;

FIG. **3**A is a functional block diagram that illustrates a transmitter in accordance with the present invention integrated in a portable device with user operable buttons that trigger data transmissions as desired;

FIG. **3**B is a functional block diagram that illustrates the integration of a sensor with a transmitter in accordance with the invention;

FIG. **3**C is a block diagram illustrating a transceiver in accordance with the present invention integrated with a sensor and an actuator;

FIG. **3**D is a functional block diagram further illustrating the transceiver of FIG. **3**C as applied to a heating, ventilation, and air conditioning system controller;

FIG. **3**E is a functional block diagram illustrating the combination of the transceiver of FIG. **3**D with a global positioning system (GPS) receiver;

FIG. **4** is a functional block diagram that illustrates the functional components of a local WAN gateway constructed in accordance with the invention;

FIG. **5** is a diagram illustrating WAN connectivity in a system constructed in accordance with the invention;

FIG. **6** is a block diagram illustrating a client specific application in accordance with the invention (simple data collection or monitoring);

FIG. **7** is a block diagram illustrating another data monitoring and reporting application consistent with the present invention;

FIG. **8** is a block diagram illustrating a third client specific application in accordance with the invention (monitoring and controlling a process);

FIG. **9** is a block diagram illustrating the present invention as deployed in a particular business application;

FIG. **10** is a block diagram further illustrating the present invention as deployed in a plurality of business applications;

FIG. **11** is a table illustrating the message protocol of the present invention;

FIG. **12** illustrates three sample messages using the message protocol of the present invention;

FIG. **13** is a block diagram illustrating the system of the present invention integrated with the local controller of FIG. **1**; and

FIG. **14** is a block diagram illustrating the system of the present invention integrated with a mobile inventory unit.

DETAILED DESCRIPTION OF PREFERRED & ALTERNATIVE EMBODIMENTS

Having summarized the invention above, reference is now made in detail to the description of the invention as illustrated in the drawings. While the invention will be described in connection with these drawings, there is no intent to limit it to the embodiment or embodiments disclosed therein. On the contrary, the intent is to cover all alternatives, modifications and equivalents included within the spirit and scope of the invention as defined by the appended claims.

Referring now to the drawings, reference is made to FIG. **1**, which is a block diagram illustrating certain fundamental components of a prior art control system **100**. More particularly, a prior art control system **100** includes a plurality of sensor actuators **111**, **112**, **113**, **114**, **115**, **116**, and **117** electrically coupled to a local controller **110**. In a manner well known in the art of control systems, local controller **110** provides power, formats and applies data signals from each of the sensors to predetermined process control functions, and returns control signals as appropriate to the system actuators. Often, prior art control systems are further integrated via the public switched telephone network (PSTN) **120** to a central controller **130**. Central controller **130** can be further configured to serve as a technician monitoring station or to forward alarm conditions via PSTN **120** to appropriate public safety officers.

Prior art control systems consistent with the design of FIG. **1** require the development and installation of an application-specific local system controller, as well as, the routing of electrical conductors to each sensor and actuator as the application requires. Such prior art control systems are typically augmented with a central controller **130** that may be networked to the local controller **110** via PSTN **120**. As a result, prior art control systems often consist of a relatively heavy design and are subject to a single point of failure should local controller **110** go out of service. In addition, these systems require electrical coupling between the local controller and system sensors and actuators. As a result, appropriately wiring an existing industrial plant can be a dangerous and expensive proposition.

Having described a prior art control system and delineated some of its shortcomings, reference is now made to FIG. **2**, which is a block diagram that illustrates a control system in accordance with the present invention. Control system **200** consists of one or more sensor/actuators **212**, **214**, **216**, **222**, and **224** each integrated with a transceiver. The transceivers are preferably RF (Radio Frequency) transceivers, that are relatively small in size and transmit a relatively low power RF signal. As a result, in some applications, the transmission range of a given transceiver may be relatively limited. As will be appreciated from the description that follows, this relatively limited transmission range of the transceivers is an advantageous and desirable characteristic of control system **200**. Although the transceivers are depicted without a user interface such as a keypad, in certain embodiments of the invention the transceivers may be configured with user selectable buttons or an alphanumeric keypad. Often, the transceivers will be electrically interfaced with a sensor or actuator, such as a smoke detector, a thermostat, a security system, etc., where external buttons are not needed.

Control system **200** also includes a plurality of stand-alone transceivers **211**, **213**, **215**, and **221**. Each stand-alone transceiver **211**, **213**, **215**, and **221** and each of the integrated transceivers **212**, **214**, **216**, **222**, and **224** may be configured to receive an incoming RF transmission (transmitted by a remote transceiver) and to transmit an outgoing signal. This outgoing signal may be another low power RF transmission signal, a higher power RF transmission signal, or alternatively may be transmitted over a conductive wire, fiber optic cable, or other transmission media. The internal architecture of a transceiver integrated with a sensor/actuator **212** and a stand-alone transceiver **211** will be discussed in more detail in connection with FIGS. **3**A through **3**C. It will be appreciated by those skilled in the art that integrated transceivers **212**, **214**, **216**, **222**, and **224** can be replaced by RF transmitters (not shown) for client specific applications that require data collection only.

Local gateways **210** and **220** are configured and disposed to receive remote data transmissions from the various stand-alone transceivers **211**, **213**, **215**, and **221** or integrated transceivers **212**, **214**, **216**, **222**, and **224** having an RF signal output level sufficient to adequately transmit a formatted data signal to the gateways. Local gateways **210** and **220** analyze the transmissions received, convert the transmissions into TCP/IP format and further communicate the remote data signal transmissions via WAN **230**. In this regard, and as will be further described below, local gateways **210** and **220** may communicate information, service requests, control signals, etc. to remote sensor/actuator transceiver combinations **212**, **214**, **216**, **222**, and **224** from server **260**, laptop computer **240**, and workstation **250** across WAN **230**. Server **260** can be further networked with database server **270** to record client specific data.

It will be appreciated by those skilled in the art that if an integrated transceiver (either of **212**, **214**, **216**, **222**, and **224**) is located sufficiently close to local gateways **210** or **220** such that its RF output signal can be received by a gateway, the RF data signal need not be processed and repeated through stand-alone transceivers **211**, **213**, **215**, or **221**.

It will be further appreciated that a monitoring system constructed in accordance with the teachings of the present invention may be used in a variety of environments. In accordance with a preferred embodiment, a monitoring system such as that illustrated in FIG. **2** may be employed to monitor

and record utility usage by residential and industrial customers as illustrated in FIG. **6**. Another preferred monitoring system is illustrated in FIG. **7**. FIG. **7** depicts the transfer of vehicle diagnostics from an automobile via a RF transceiver integrated with the vehicle diagnostics bus to a local transceiver that further transmits the vehicle information through a local gateway onto a WAN.

It will be further appreciated that a monitoring and control system consistent with the present invention may be used in a variety of environments. In accordance with a preferred embodiment, a control system such as that illustrated in FIG. **2** may be employed to monitor and control an irrigation system as illustrated in FIG. **8**. Another preferred control system is illustrated in FIG. **9**. FIG. **9** depicts a business application of a control system wherein the operation of a parking facility may be automated.

As will be further appreciated from the discussion herein, transceivers **212**, **214**, **216**, **222**, and **224** may have substantially identical construction (particularly with regard to their internal electronics), which provides a cost effective implementation at the system level. Furthermore, a plurality of stand-alone transceivers **211**, **213**, **215**, and **221**, which may be identical, are disposed in such a way that adequate coverage in an industrial plant or community is provided. Preferably, stand-alone transceivers **211**, **213**, **215**, and **221** may be dispersed sufficient that only one stand-alone transceiver will pick up a transmission from a given integrated transceiver **212**, **214**, **216**, **222**, and **224** (due in part to the low power transmission nature of each transmitter). However, in certain instances two, or even more, stand-alone transceivers may pick up a single transmission. Thus, the local gateways **210** and **220** may receive multiple versions of the same data transmission signal from an integrated transceiver, but from different stand-alone transceivers. The local gateways **210** and **220** may utilize this information to triangulate, or otherwise more particularly assess the location from which the transmission is originating. Due to the transmitting device identification that is incorporated into the transmitted signal, duplicative transmissions (e.g., transmissions duplicated to more than one gateway, or to the same gateway, more than once) may be ignored or otherwise appropriately handled.

In accordance with the preferred embodiment shown in FIG. **2**, integrated transceivers **212**, **214**, **216**, **222**, and **224** may be disposed within automobiles (see FIG. **7**), a rainfall gauge (see FIG. **8**), or a parking lot access gate (see FIG. **9**) to monitor vehicle diagnostics, total rainfall and sprinkler supplied water, and access gate position, respectively. The advantage of integrating a transceiver, as opposed to a one-way transmitter, into a monitoring device relates to the ability of the transceiver to receive incoming control signals, as opposed to merely transmitting data signals. Significantly, local gateways **210** and **220** may communicate with all system transceivers. Since local gateways **210** and **220** are permanently integrated with WAN **230**, server **260** can host application specific software which was typically hosted in an application specific local controller as shown in FIG. **1**. Of further significance, the data monitoring and control devices of the present invention need not be disposed in a permanent location as long as they remain within signal range of a system compatible transceiver that subsequently is within signal range of a local gateway interconnected through one or more networks to server **260**. In this regard, small application specific transmitters compatible with control system **200** can be worn or carried about one's person as will be further described below.

In one embodiment, server **260** collects, formats, and stores client specific data from each of the integrated transceivers **212**, **214**, **216**, **222**, and **224** for later retrieval or access from workstation **250** or laptop **240**. In this regard, workstation **250** or laptop **240** can be used to access the stored information through a Web browser in a manner that is well known in the art. In another embodiment, server **260** may perform the additional functions of hosting application specific control system functions and replacing the local controller by generating required control signals for appropriate distribution via WAN **230** and local gateways **210** and **211** to the system actuators. In a third embodiment, clients may elect for proprietary reasons to host control applications on their own WAN connected workstation. In this regard, database **270** and server **260** may act solely as a data collection and reporting device with client workstation **250** generating control signals for the system.

It will be appreciated by those skilled in the art that the information transmitted and received by the wireless transceivers of the present invention may be further integrated with other data transmission protocols for transmission across telecommunications and computer networks other than the Internet. In addition, it should be further appreciated that telecommunications and computer networks other than the Internet can function as a transmission path between the networked wireless transceivers, the local gateways, and the central server.

Reference is now made to FIG. **3**A, which is a block diagram that illustrates the functional components of a RF transmitter **320**, of a type worn or carried by a person, in more detail. Blocks **327** and **329** represent physical buttons, which a user may actuate to cause the RF transmitter **320** to initiate different signal transmissions. In the illustrated embodiment, these include a "transmit" button **327** and a panic or "emergency" button **329**. Of course, additional, fewer, or different buttons may be provided on a given transmitter, depending upon the system or implementation desired. Each of these buttons may be electrically wired to a data interface **321** which is configured to receive electrical signals from buttons **327** and **329**, and ultimately convey that information to a data formatter **324**. In one embodiment, data interface **321** may simply comprise an addressable port that may be read by the data formatter **324**.

For example, each of the signal lines extending between the buttons and the data interface **321** may be pulled up by individual pull up resistors (not shown). Depressing any of the individual buttons may ground the electrical signal line interconnecting the respective button and the data interface **321**. Data formatter **324** may constantly read from the port defined by data interface **321**, and all bit positions should remain high at any given time, if no buttons are depressed. If, however, the data formatter **324** reads a zero in one or more of the bit positions, it then recognizes that one or more of the buttons **327** and **329** have been depressed.

Each transmitter unit may be configured to have a unique identification code (e.g., transmitter identification number) **326**, that uniquely identifies the transmitter to the functional blocks of control system **200** (see FIG. **2**). This transmitter identification number may be electrically programmable, and implemented in the form of, for example, an EPROM. Alternatively, the transmitter identification number may be set/configured through a series of DIP switches. Additional implementations of the transmitter identification number, whereby the number may be set/configured, may be implemented consistent with the broad concepts of the present invention.

Finally, an additional functional block of the transmitter **320** is a RF transmitter **328**. This circuit is used to convert information from digital electronic form into a format, fre-

quency, and voltage level suitable for transmission from antenna **323** via an RF transmission medium.

The data formatter **324** operates to format concise data packets **330** that may be transmitted via RF to a nearby transceiver. From a substantive basis, the information conveyed includes a function code, as well as, a transmitter identification number. As previously mentioned, the transmitter identification number is set for a given transmitter **320**. When received by server **260** (see FIG. **2**), the transmitter identification number may be used to access a look up table that identifies, for example, the person assigned to carry that particular transmitter. Additional information about the person may also be provided within the lookup table, such as, a physical description, and/or any other information that may be deemed appropriate or useful under the circumstances or implementation of the particular system.

In addition, a function code is communicated from RF transmitter **320** to the nearby transceiver. FIG. **3**A illustrates a lookup table **325** that may be provided in connection with data formatter **324**. Lookup table **325** may be provided to assign a given and unique function code for each button pressed. For example, transmit button **327** may be assigned a first code to identify the party depressing the button. The emergency button **329** may be assigned a second code. Furthermore, additional codes may be provided as necessary to accommodate additional functions or features of a given transmitter **320**. Thus, in operation, a user may depress the emergency button **329**, which is detected by the data formatter **324**. The data formatter **324** may then use the information pertaining to the emergency button **329** to access a look up table **325** to retrieve a code that is uniquely assigned to emergency button **329**. The data formatter **324** may also retrieve the pre-configured transmitter identification number **326** in configuring a data packet **330** for communication via RF signals to a nearby transceiver.

Reference is now made briefly to FIG. **3**B, which is a block diagram illustrating certain functional blocks of a similar transmitter **340** that may be integrated with sensor **310**. For example, sensor **310** in its simplest form could be a two-state device such as a smoke alarm. Alternatively, the sensor **310** may output a continuous range of values to the data interface **321**. If the signal output from the sensor **310** is an analog signal, the data interface **321** may include an analog-to-digital converter (not shown) to convert signals output to the actuator **340**. Alternatively, a digital interface (communicating digital signals) may exist between the data interface **321** and each sensor **310**.

As illustrated, many of the components of RF transmitter **340** are similar to that of RF transmitter **320** and need not be repeated herein. The principal difference between the configurations of RF transmitter **320** of FIG. **3**A and the RF transmitter **340** of FIG. **3**B lies at the input of the data interface **321**. Specifically, RF transmitter **320** included user interface buttons **327** and **329**. RF transmitter **340**, illustrates electrical integration with sensor **310**. Unique transmitter identification code **326** coupled with a function code for a smoke alarm on condition is formatted by data controller **324** for transformation into a RF signal by RF transmitter **328** and transmission via antenna **323**. In this way, data packet **330** communicated from transmitter **340** will readily distinguish from similar signals generated by other RF transmitters in the system. Of course, additional and/or alternative configurations may also be provided by a similarly configured RF transmitter. For example, a similar configuration may be provided for a transmitter that is integrated into, for example, a carbon monoxide detector, a door position sensor and the like. Alternatively, system parameters that vary across a range of values may be transmitted by RF transmitter **340** as long as data interface **321** and data controller **324** are configured to apply a specific code, consistent with the input from sensor **310**. As long as the code was understood by server **260** or workstation **250** (see FIG. **2**) the target parameter could be monitored with the present invention.

Reference is now made to FIG. **3**C, which is a block diagram similar to that illustrated in FIGS. **3**A and **3**B, but illustrating a transceiver **360** that is integrated with a sensor **310** and an actuator **380**. In this illustration, data interface **321** is shown with a single input from sensor **310**. It is easy to envision a system that may include multiple sensor inputs. By way of example, a common home heating and cooling system might be integrated with the present invention. The home heating system may include multiple data interface inputs from multiple sensors. A home thermostat control connected with the home heating system could be integrated with a sensor that reports the position of a manually adjusted temperature control (i.e., temperature set value), as well as, a sensor integrated with a thermister to report an ambient temperature. The condition of related parameters can be input to data interface **321** as well, including the condition of the system on/off switch, and the climate control mode selected (i.e., heat, fan, or AC). In addition, depending upon the specific implementation, other system parameters may be provided to data interface **321** as well.

The addition of actuator **380** to the assembly permits data interface **321** to apply control signals to the manual temperature control for the temperature set point, the climate control mode switch, and the system on/off switch. In this way, a remote workstation **250** or laptop **240** with WAN access (see FIG. **2**) could control a home heating system from a remote location.

Again, each of these various input sources are routed to data interface **321** which provides the information to a data controller **324**. The data controller may utilize a look up table to access unique function codes that are communicated in data packet **330**, along with a transceiver identification code **326** via RF, to a local gateway and further onto a WAN. In general, the operation of transceiver **360** will be similar to that described for a transmitter as previously illustrated in FIGS. **3**A and **3**B. It is significant to note that data packet **330** will include a concatenation of the individual function codes selected for each of the aforementioned input parameters. As by way of example, server **260** may provide client workstation **250** with a Web page display that models a common home thermostat. As previously described, either server **260** or workstation **250** may include application software that would permit a user with access to remotely adjust the controls on a home heating system by adjusting related functional controls on a graphical user interface updated with feedback from the aforementioned control system.

Reference is now made to FIG. **3**D, which is a block diagram further illustrating the transceiver of FIG. **3**C in light of the home heating system described above. Specifically, transceiver **360** is shown with four specific parameters related to four specific function codes as illustrated in look up table **325**. In this regard, sensor(s) **310** (one sensor shown for simplicity) inputs a data signal to data interface **321**. Data controller receives an input from data interface **321** that it associates with a specific function code as shown in look up table **325**. Data controller **324** assembles data packet **332** by concatenating received data packet **330** with its own transceiver identification code **326** and its own specific function codes. Data packet **332** is configured by RF transceiver **350** for transmission via antenna **323** to either a stand-alone transceiver as

shown in FIG. **2**, or alternatively, to local gateway **210**. It will be appreciated by persons skilled in the art that data interface **321** may be uniquely configured to interface with specialized sensor(s) **310**. This circuit, therefore, may differ from transceiver to transceiver, depending upon the remote system parameter that is monitored and the related actuator to be controlled. Implementation of data interface **321** will be understood by persons skilled in the art, and need not be described herein.

Reference is now made to FIG. **3**E, which is a block diagram further illustrating the transceiver of FIG. **3**C in combination with a GPS receiver. Specifically, GPS receiver **327** replaces data interface **321**, sensor **310**, and actuator **380** as illustrated in FIG. **3**C. In this regard, GPS receiver **327** inputs a data signal containing latitude and longitude coordinates to data controller **324**. Data controller **324** assembles data packet **332** by concatenating received data packet **330** with its own transceiver identification code **326** and the coordinates received from GPS receiver **327**. Data packet **332** is configured by RF transceiver **350** for transmission via antenna **323** to either a stand-alone transceiver as shown in FIG. **2**, or alternatively, to local gateway **210** as previously described.

Having illustrated and described the operation of the various combinations of RF transmitters and transceivers consistent with the present invention, reference is now made to FIG. **4**, which is a block diagram illustrating certain principal components and the operation of a local gateway **210** of a control system **100** (see FIG. **2**) constructed in accordance with the present invention. The primary physical components that may be provided within local gateway **210** are a transceiver **420**, a CPU **422**, a memory **424**, a network card **426**, a DSL modem **428**, an ISDN card **430**, as well as other components not illustrated in the FIG. **4** that would enable a TCP/IP connection to WAN **230**. The transceiver **420** is configured to receive incoming signals consistently formatted in the convention previously described. Local gateway **210** may be configured such that memory **424** includes look up table **425** to assist in identifying the remote and intermediate transceivers used in generating and transmitting the received data transmission. Program code within the memory **424** may also be provided and configured for controlling the operation of a CPU **422** to carry out the various functions that are orchestrated and/or controlled by local gateway **210**. For example, memory **424** may include program code for controlling the operation of the CPU **422** to evaluate an incoming data packet to determine what action needs to be taken. In this regard, look up tables **425** may also be stored within memory **424** to assist in this process. Furthermore, memory **424** may be configured with program code configured to identify a remote transceiver **427** or identify an intermediate transceiver **429**. Function codes, transmitter and or transceiver identification numbers, may all be stored with associated information within look up tables **425**.

Thus, one look up table may be provided to associate transceiver identification numbers with a particular user. Another look up table may be used to associate function codes with the interpretation thereof. For example, a unique code may be associated by a look up table to identify functions such as test, temperature, smoke alarm active, security system breach, etc. In connection with the lookup tables **425**, memory **424** may also include a plurality of code segments that are executed by CPU **422**, and which largely control the operation of the computer. For example, a first data packet segment **330** may be provided to access a first lookup table to determine the identity of the transceiver which transmitted the received message. A second code segment may be provided to access a second lookup table to determine the proximate location of the message generating transceiver, by identifying the transceiver that relayed the message. A third code segment may be provided to identify the content of the message transmitted. Namely, is it a fire alarm, a security alarm, an emergency request by a person, a temperature control setting, etc. Consistent with the invention, additional, fewer, or different code segments may be provided to carryout different functional operations and data signal transfers throughout the transceiver network.

The local gateway **210** may also include one or more mechanisms through which to communicate with remote systems. For example, the gateway may include a network card **426**, which would allow the gateway **210** to communicate across a local area network to a network server, which in turn may contain a backup gateway to WAN **230**. Alternatively, local gateway **210** may contain a DSL modem **428**, which may be configured to provide a direct dial link to a remote system, by way of the PSTN. Alternatively, local gateway **210** may include an ISDN card **430** configured to communicate via an ISDN connection with a remote system. Other communication gateways may be provided as well to serve as primary and or backup links to WAN **230** or to local area networks that might serve to permit local monitoring of gateway health and data packet control.

Reference is now made to FIG. **5**, which is a diagram illustrating WAN connectivity in a system constructed in accordance with the invention. In this regard, local gateway **210** is configured to transmit control signals and receive data signals using the open data packet protocol as previously described. Local gateway **210** is preferably interconnected permanently on WAN **230** and configured to translate received data signals for WAN transfer via TCP/IP. A server **530** configured with web applications and client specific applications as required is connected to WAN **230** via router **510** and further protected and buffered by firewall **520**. Consistent with the present invention, server **530** is assisted in its task of storing and making available client specific data by database server **540**. A workstation **560** configured with a Web browser is connected to WAN **230** at client premises by any suitable means known by those of skill in the art. Alternatively, clients may access WAN **230** via remote laptop **550** or other devices configured with a compatible Web browser. In this way, server **530** may provide client specific data upon demand.

Having described the control system of FIG. **2**, reference is now made to FIG. **6** which illustrates a specific monitoring embodiment consistent with application of the invention. More specifically, FIG. **6** illustrates a remote utility meter monitoring system **600**. Remote utility meter subsystem **610** consists of utility meter **613** and an appropriately integrated sensor **612** wherein the current utility meter operational status and current utility meter usage total is transmitted via functional codes along with a transceiver identification code in a manner previously described by transmitter **614** to stand-alone transceiver **221**. Stand-alone transceiver **221** further processes and transmits the encoded data to local gateway **210** which translates the data packet information into TCP/IP format for transfer across WAN **230** to server **260**. Server **260** collects and formats the utility meter information for viewing and or retrieval upon client demand in a manner previously described.

Having described a specific client application consistent with the present invention wherein the remote transmitter is permanently integrated with a stationary data input point (a utility meter), reference is now made to FIG. **7** which more fully illustrates the flexibility of the invention. More specifically, FIG. **7** illustrates a remote automotive diagnostics

monitoring system **700**. Remote automotive diagnostics interface unit **710** consists of sensor **712** integrated with the vehicle diagnostics data bus **711**, and transmitter **714** wherein contents of the vehicle diagnostics can be downloaded upon a control signal to sensor **712** from a remote location serviced by local gateway **210**. In this manner, a vehicle in need of service but still capable of accessing the vehicle diagnostics codes can be remotely diagnosed by uploading the information through remote automotive diagnostics monitoring system **700** and accessing a custom report created by server **260** in a manner previously described. In this regard, server **260** could be configured to perform any of a number of levels of diagnostics and provide service manual instructions, figures, and local authorized service contact information via WAN **230** on a fee basis or per a predetermined level of service plan.

Having described a monitoring system consistent with the present invention wherein the control signal initiates the monitoring process, reference is now made to FIG. **8**. FIG. **8** illustrates a client specific control system consistent with both monitoring and control functions of the invention. More specifically, FIG. **8** illustrates a remote irrigation control system **800**. For simplicity, controlled area **810** is represented by a single rain gauge **813** and a single related spray head **817**. It is easy to see that such a system could be modified and expanded to monitor and control any of a number of irrigation systems integrated with the present invention.

Controlled area **810** is configured with a rain gauge **813** integrated with sensor **811** wherein rainfall and applied water to the adjacent area is transmitted via functional codes by transmitter **812** along with a related transceiver identification code in a manner previously described to stand-alone transceiver **221**. Stand-alone transceiver **221** further processes and transmits the encoded data to local gateway **210** which translates the data packet information into TCP/IP format for transfer across WAN **230** to server **260**. Server **260** collects and formats the rain gauge data for viewing or retrieval upon client demand in a manner previously described. Additionally, server **260** may be configured to communicate data to operate spray head **817** by opening water supply valve **816** integrated with actuator **814** by sending a control signal to transceiver **815**, per a client directed water application control schedule. Alternatively, a customer workstation **250** could periodically download and review the rain gauge data and could initiate an automatic control signal appropriate with the customer's watering requirements. In yet another embodiment, a customer technician could initiate a control signal upon review of the rain gauge information and making the determination that more water is required.

Reference is now made to FIG. **9** which illustrates the operation of an automated parking control system **900** consistent with the present invention. Automated parking facility **910** consists of a controlled access area with ingress gate **920** and egress gate **930**. Both gates **920** and **930** are further configured with a position sensor, an actuator, and transceiver illustrated as ingress assembly **922** and egress assembly **932**, respectively. Parking spaces **940** may be configured with vehicle sensors. Sensor-transceiver assembly **932** may be configured to transmit a function code associated with the condition of parking spaces **1**, **2**, **3**, and **4**. It will be appreciated by those skilled in the art that the single row of four appropriately configured parking spaces illustrated can be expanded by adding parking spaces configured with vehicle sensors integrated with control system **900** via multiple sensor-transceiver assemblies. Automated parking control system **900** collects data signals from each sensor-transceiver assembly **932**, integrated in the system, and compiles a master schedule consisting of scheduled use for each parking space in the automated parking facility. In this manner, a customer with access to WAN **230** and server **530** may make a reservation and or check the availability of parking spaces at the automated parking facility from her home or office (or through any Internet portal). For example, a customer that will be out of town on business for 2 days next week, may access the automated parking control system server **530** by using a Web browser to view parking availability for the target travel dates. The customer may reserve the parking slot by providing a personal transmitter identification code (or other identification code) that the customer intends to use to access and exit the facility the following week. When the customer arrives at the ingress gate **920**, the customer may enter the automated parking facility **910** by depressing a button on her personal portable transmitter (see FIG. **3**A). Ingress assembly **922** receives and forwards the customer's transmitted identification code to server **530** via gateway **210** and WAN **230** in a manner previously described. Server **530** confirms the customer's reservation, alternatively checks space availability to determine if access should be granted. In addition, server **530** may be further programmed to determine if the particular customer has an established account with the facility owner or whether a credit card payment transaction is in order. Automatic parking facility control system **900** would record the actual use of the reserved parking space for storage on database server **540**. Server **530** could retrieve the stored usage information on a periodic basis from database server **540** and generate appropriate bills for each customer.

Alternatively, the customer could reserve the slot by providing billing information via WAN **230** and ingress gate **920** could be further configured with a credit card reader and an alphanumeric keypad interface. Both the credit card reader and the alphanumeric keypad interface could be interconnected to the automated parking facility control system **900** by their own appropriately configured transceiver. Either or both the credit card reader and the alphanumeric keypad interface could be used to identify customers with reservations.

The operator of parking facility control system **900**, can expand both the level of security of the parking facility and the services provided by adding networked peripherals in a manner previously described and upgrading the software applications on server **530**. For example, by adding automated ingress and egress gates configured to allow the entry and exit of parking facility customers and authorized personnel and configuring the egress gate **930** for vehicles such that only identified customers may exit with a vehicle, both customers and their vehicles are protected from thieves.

A further example of expanding the services offered by automated parking facility control system **900** might consist of offering a schedule of vehicle services that could be scheduled and performed on the vehicles of long-term parking customers. By adding the appropriate interface to server **530**, parking facility customers could be prompted when making their reservation with a list of potential vehicle services that could be scheduled and performed by vehicle service technicians during the duration of the customer's business trip. A customer interested in having her automobile's oil changed and tires rotated would authorize and schedule the desired services when arranging her parking reservation. Upon leaving the parking facility at the start of her business trip, the customer could leave her vehicle valet key in an appropriately identified lock box. After her trip is complete, the customer returns to the lot. She gains access to the lot by any of the aforementioned methods and retrieves her valet key by similarly identifying herself as the vehicle owner.

Having illustrated specific applications using the present invention in FIGS. **6** through **9**, reference is now made to FIG. **10** which illustrates a system **1000** that monitors and controls remote data points associated with a plurality of systems. In this embodiment, server **530** may be configured with monitor/control remote services **1010** application-specific software. For example, the controlled area **810** of the irrigation control system shown in FIG. **8**, the remote utility meter subsystem **610** of FIG. **6**, and the automated parking facility **910** of FIG. **9** may be monitored and remotely controlled (where required) by server **530**. In a manner previously described herein, server **530** collects and processes data information transferred and sent over WAN **230** by local gateways coupled via RF links to transceivers and transmitters associated with systems **1020**, **1030**, and **1040**. Alternatively, server **530** initiates control signals that may be sent via the gateways to the appropriate transceivers and transmitters as required. For ease of illustration and description, FIG. **10** shows each of the systems serviced by server **530** requiring its own dedicated local gateway. It will be appreciated by those skilled in the art that small-scale systems jointly located within a geographic area served by an array of transceivers and a gateway may be configured to share the transceiver and gateway infrastructure of a previously installed local system.

Having described the physical layer of a system consistent with the present invention, reference is now made to FIG. **11** which describes the data structure of messages sent and received using the invention. In this regard, the standard message consists of: to address; from address; packet number; maximum packet number, packet length; command; data; packet check sum (high byte); and packet check sum (low byte). The "to address" or message destination consists from 1 to 6 bytes. The "from address" or message source device is coded in a full 6 byte designator. Bytes **11** through **13** are used by the system to concatenate messages of packet lengths greater than 256 bytes. Byte **14** is a command byte. Byte **14** works in conjunction with bytes **15** through **30** to communicate information as required by system specific commands. Bytes **31** and **32** are packet check sum bytes. The packet check sum bytes are used by the system to indicate when system messages are received with errors. It is significant to note that bytes **31** and **32** may be shifted in the message to replace bytes **15** and **16** for commands that require only one byte. The order of appearance of specific information within the message protocol of FIG. **11** remains fixed although the byte position number in individual message transmissions may vary due to scalability of the "to address," the command byte, and scalability of the data frame.

Having described the general message structure of a message of the present invention, reference is directed to FIG. **12** which illustrates three sample messages. The first message illustrates the broadcast of an emergency message "FF" from a central server with an address "0012345678" to a personal transceiver with an address of "FF."

The second message illustrated reveals how the first message might be sent to a transceiver that functions as a repeater. In this manner, emergency message "FF" from a central server with address "0012345678" is first sent to transceiver "F0." The second message, further contains additional command data "A000123456" that may be used by the system to identify further transceivers to send the signal through on the way to the destination device.

The third message illustrated on FIG. **12** reveals how the message protocol of the present invention may be used to "ping" a remote transceiver in order to determine transceiver health. In this manner, source unit "E112345678" originates a ping request by sending command "08" to a transceiver identified as "A012345678." The response to the ping request can be as simple as reversing the "to address" and the "from address" of the command, such that, a healthy transceiver will send a ping message back to the originating device. The system of the present invention may be configured to expect a return ping within a specific time period. Operators of the present invention could use the delay between the ping request and the ping response to model system loads and to determine if specific system parameters might be adequately monitored and controlled with the expected feedback transmission delay of the system.

Having described the message structure of a message of the present invention, reference is directed to FIG. **13** which illustrates the integration of the system of the present invention with the control system of FIG. **1**. Having previously illustrated several variations consistent with the principles of the present invention, it will be appreciated by those skilled in the art that multiple variations of the present invention may be integrated with existing control systems. In this regard, an existing control system with local controller **110** and a plurality of sensor actuators **115** (one shown for simplicity of illustration) are in communication with central controller **130** via PSTN **120** as previously described. In a manner well known in the art of control systems, local controller **110** transmits appropriate status information via PSTN **120** to central controller **130**.

Control systems consistent with the design of FIG. **1**, as further illustrated in FIG. **13**, require the routing of electrical conductors to each sensor and actuator as the application requires. It will be appreciated by those skilled in the art that the system of the present invention can take advantage of the infrastructure of an existing system by inserting data translator **140** such that system data is sent to both the central controller **130** in the old configuration, as well as, the data translator **140**. Data translator **140** serves to convert system data to function codes as previously described. Once data translator **140** successfully converts the system data stream to the message protocol of the present invention, transceiver **815** further converts the system data stream to a RF signal.

As previously described in connection with FIG. **2**, stand-alone transceiver **221** receives and repeats the RF data transmission received from transceiver **815**. Local gateway **210** receives the RF data transmission repeated by stand-alone transceiver **221** and converts the RF data transmission into TCP/IP for further transmission across WAN **230** to server **260**. In this regard, server **260** may further manage the data for internal storage or alternatively storage in database **270**. Customers with WAN **230** access may access the system data from workstation **250** or laptop computer **240**.

Having described integration of the system of the present invention with the control system of FIG. **1** in FIG. **13**, reference is now directed to FIG. **14** which illustrates integration of the system of the present invention with mobile inventory units. In this regard, system **1060** consists of the system of the present invention as previously illustrated and described in FIGS. **1** and **13**. Having previously illustrated several variations consistent with the principles of the present invention, it will be appreciated by those skilled in the art that multiple variations of the present invention may be integrated with mobile inventory units **1070**. In this regard, sensor/actuator **115** integrated with transceiver **815** in sensor-transceiver assembly **1065** is further integrated with any of a number of mobile inventory units **1070** (one sensor-transceiver unit **1065** shown for simplicity of illustration). It will be appreciated by those skilled in the art that as long as a mobile inventory unit **1070**, herein represented by a package, ship, airplane, train, and a taxi are within the radio-frequency trans-

mission and receiving range of stand-alone transceiver **221**, the system of the present invention may be used to monitor, store and report information of and relating to mobile inventory unit **1070**.

It will be further appreciated by those skilled in the art that the system of the present invention may be used to transfer information to adequately equipped mobile inventory units **1070**. In this regard, shipping companies may use the present invention to update a database containing location and status information for each mobile inventory unit **1070** in the company fleet. Shipping companies may also transfer informative messages or other information using the system of the present invention.

In one embodiment, the present invention may be used to store, retrieve, and update maintenance information related to individual mobile inventory units. For example, federally registered airplanes must keep a maintenance log with the craft detailing all inspections, maintenance, and repairs. The system of the present invention could be used by fixed base operators (FBOs) who perform inspections and maintenance on aircraft to retrieve and update the aircraft maintenance log. In this way, FBOs located throughout the world will be able to retrieve and update an electronic version of the maintenance history of an aircraft. In addition, a properly configured system could also contain maintenance directives and other service bulletins related to the particular aircraft.

In yet another embodiment, a properly integrated sensor/actuator **115** with transceiver **815** may be used to monitor mobile inventory unit system parameters. For example, an airplane could be configured to monitor and report engine run time, time elapsed since the last recorded inspection of a particular type, and related system information. It will be appreciated by those skilled in the art that the system of the present invention may be integrated with remote units other than those shown. The ship, package, airplane, train, and taxi shown in FIG. **14** are for example only and not meant to limit the scope of the present invention.

It will be appreciated that the foregoing description has illustrated certain fundamental concepts of the invention, but that other additions and/or modifications may be made consistent with the inventive concepts. For example, the one-way transmitters illustrated in FIG. **3**A and implemented in a control system as illustrated in FIG. **6** may be adapted to monitor the current status of water, gas, and other utility meters. One-way transmitters might further be used to monitor and report actual operational hours on rental equipment or any other apparatus that must be serviced or monitored on an actual run-time schedule.

The two-way transceivers of the current invention, may be adapted to monitor and apply control signals in an unlimited number of applications. By way of example only, two-way transceivers of the current invention can be adapted for use with pay type publicly located telephones, cable television set converter boxes, as well as, for use with a host of residential appliances and devices to enable a remote controllable home automation and security system.

In a geographic area appropriately networked with permanently located transceivers consistent with the invention, personal transmitters consistent with the invention can be used to monitor and control personnel access and egress from specific rooms or portions thereof within a controlled facility. Personal transmitters can further be configured to transfer personal information to public emergency response personnel, personal billing information to vending machines, or to monitor individuals within an assisted living community.

Two-way transceivers consistent with the present invention can be integrated to monitor and control a host of industrial and business applications as well. By way of example only, building automation systems, fire control systems, alarm systems, industrial trash compactors, and building elevators can be monitored and controlled with devices consistent with the present invention. In addition, courier drop boxes, time clock systems, automated teller machines, self-service copy machines, and other self-service devices can be monitored and controlled as appropriate. By way of further example, a number of environment variables that require monitoring can be integrated with the system of the present invention to permit remote monitoring and control. For instance, light levels in the area adjacent to automated teller machines must meet minimum federal standards, the water volume transferred by water treatment plant pumps, smokestack emissions from a coal burning power plant or a coke fueled steel plant oven may also be remotely monitored.

The two-way transceivers of the present invention may be further integrated with a voice-band transmitter and receiver. As a result, when a person presses, for example, the emergency button on his/her transmitter, medical personnel, staff members, or others may respond by communicating via two-way radio with the party in distress. In this regard, each transmitter may be equipped with a microphone and a speaker that would allow the person to communication information such as their present emergency situation, their specific location, etc.

The foregoing description has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obvious modifications or variations are possible in light of the above teachings. For example, it should be appreciated that, in some implementations, the transceiver identification number is not necessary to identify the location of the transmitter. Indeed, in implementations where the transmitter is permanently integrated into an alarm sensor other stationary device within a system, then the control system server and or local gateway could be configured to identify the transmitter location by the transmitter identification number alone. In will be appreciated that, in embodiments that do not utilize repeating transceivers, the transmitters will be configured to transmit at a higher RF power level, in order to effectively communicate with the control system local gateway.

The embodiment or embodiments discussed were chosen and described illustrate the principles of the invention and its practical application to enable one of ordinary skill in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth to which they are fairly and legally entitled.

We claim:

1. In a system comprising a plurality of wireless devices, a device comprising:

a transceiver having a unique identification code and being electrically interfaced with a sensor, the transceiver being configured to receive select information and identification information transmitted from a second wireless transceiver in a predetermined signal type;

the transceiver being further configured to wirelessly retransmit in the predetermined signal type the select information, the identification information associated with the second wireless transceiver, and transceiver identification information associated with the transceiver making retransmission; and

a controller operatively coupled to the transceiver and the sensor, the controller configured to control the trans-

ceiver and receive data from the sensor, the controller configured to format a data packet for transmission via the transceiver, the data packet comprising data representative of data sensed with the sensor.

2. The device of claim **1**, wherein the controller is configured to receive data packets comprising control signals and in response to the control signals provide a control signal to an actuator for implementation of a command.

3. The device of claim **1**, wherein the device is at least one of a thermostat, sized and shaped to be worn/carried by a person, disposed within an automobile/vehicle, a utility meter, a rain gauge, a mobile inventory unit and an irrigation control system.

4. The device of claim **1**, wherein the controller is configured to receive data packets comprising a function code, and in response to the function code, implement a function.

5. The device of claim **1**, wherein the controller is configured to format data packets for transmission via the transceiver, the data packets comprising a function code corresponding to sensed data and the unique identification code that identifies the transceiver.

6. The device of claim **1**, further comprising a memory to store one or more function codes corresponding to the device, the function codes corresponding to a number of functions the controller can implement.

7. The device of claim **1**, further comprising an actuator configured to receive command data from the controller and in response implement the command.

8. The device of claim **1**, wherein the second transceiver is nearby to the transceiver.

9. For use in a system including wireless devices, a thermostat device comprising:

a wireless transceiver having a unique identification code and being interfaced with a sensor, the wireless transceiver being configured to receive select information and identification information transmitted from a second wireless transceiver in a predetermined signal type; the wireless transceiver being further configured to retransmit in the predetermined signal type the select information, the identification information associated with the second wireless transceiver, and transceiver identification information associated with the wireless transceiver making retransmission; and

a controller operatively coupled to the wireless transceiver and the sensor, the controller configured to control wireless transceiver operations and receive data from the sensor, the controller configured to format data packets for transmission via the wireless transceiver, the data packet comprising data representative of data sensed with the sensor.

10. The thermostat device of claim **9**, further comprising an actuator, operatively coupled to the controller, the actuator configured to receive a command from the controller and implement the command thereby adjusting a condition associated with temperature.

11. The thermostat device of claim **9**, wherein the unique identification code of the transceiver is electrically programmable.

12. The thermostat device of claim **9**, wherein the thermostat device is coupled to a user device via a network and wherein the user device provides user control signals responsive to user input, and wherein the transceiver receives the user control signals and the controller implements control of temperature conditions based on the user control signals.

13. The thermostat device of claim **9**, further comprising a memory to store one or more function codes corresponding to the thermostat device, the function codes corresponding to a number of functions the data controller can implement.

14. The thermostat device of claim **9**, further comprising an actuator configured to receive command data from the controller and in response implement the command.

15. The thermostat device of claim **9**, wherein the second transceiver is nearby to the transceiver.

* * * * *

CERTIFICATE OF SERVICE

I hereby certify that on April 13, 2020, this Brief of Appellant SIPCO, LLC was filed electronically using the CM/ECF system and served via the CM/ECF system on registered counsel.

/s/ *Gregory J. Gonsalves*
Gregory J. Gonsalves

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