

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMERSON ELECTRIC CO.,
Petitioner,

v.

SIPCO, LLC,
Patent Owner.

Case IPR2017-00216
Patent 8,013,732 B2

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

WHITE, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background

Emerson Electric Co. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) seeking to institute an *inter partes* review of claims 1–7 of U.S. Patent No. 8,013,732 B2 (Ex. 1001, “the ’732 patent”) pursuant to 35 U.S.C. §§ 311–319. SIPCO, LLC (“Patent Owner”) filed a Preliminary Response. (Paper 7). Based on our review of these submissions and associated evidence, we instituted *inter partes* review of claims 1–7 of the ’732 patent on all asserted grounds. Paper 8 (“Dec.”). The instituted grounds are as follows:

References	Claims Challenged
Kahn, ¹ APA, ² Cerf, ³ and Cunningham ⁴	1, 2, 6, and 7
Kahn, APA, Cerf, and Ehlers ⁵	1–7

Id. at 29.

Patent Owner filed a Patent Owner’s Response (Paper 21, “PO Resp.”), and Petitioner filed a Reply (Paper 33, “Reply”). An oral hearing was held on February 5, 2018. Paper 32 (“Tr.”).

¹ Robert E. Kahn, *Advances in Packet Radio Network Protocols*, Proceedings of the IEEE, Vol. 66, No. 11, Nov. 1978 (Ex. 1002) (“Kahn”).

² Petitioner relies upon the disclosures found in column 1, lines 54 through 65, column 2, lines 27 through 29, column 5 lines 32 through 44, and Figure 1 of the ’732 patent as Admitted Prior Art (“APA”). See Pet. 19–20.

³ Vinton G. Cerf & Peter T. Kirstein, *Issues in Packet-Network Interconnection*, Proceedings of the IEEE, Vol. 66, No. 11, Nov. 1978 (Ex. 1011) (“Cerf”).

⁴ U.S. Patent No. 6,124,806 (Ex. 1014) (“Cunningham”).

⁵ U.S. Patent No. 5,924,486 (Ex. 1012) (“Ehlers”).

We have jurisdiction under 35 U.S.C. § 318(a). For the reasons discussed below, Petitioner has demonstrated by a preponderance of the evidence that claims 1–7 of the ’732 patent are unpatentable.

B. Related Proceedings

We have been informed that *SIPCO, LLC, v. Emerson Electric Co.*, No. 1:15-cv-0319-AT (N.D. Ga); *SIPCO LLC v. Acuity Brands, Inc.*, No. 1:16-cv-00480 (D. Del.); and *SIPCO, LLC v. Streetline, Inc.*, No. 1:16-cv-00830 (D. Del.), may be impacted by this proceeding. Papers 5, 32, 36. Also, a final written decision has been issued in *inter partes* review between these same parties involving claims 13, 14, 16–22, and 23–35 of the ’732 patent. *SIPCO, LLC, v. Emerson Electric Co.*, IPR2015-01973 (PTAB Mar. 27, 2017) (Paper 25) (finding that Petitioner had not carried its burden to prove the challenged claims unpatentable). That decision has been appealed. IPR2015–01973, Paper 26. The parties also are involved in a number of other proceedings before the Board involving related patents. Paper 31, 2; Paper 32. In addition, there are several pending patent applications that claim priority to the ’732 patent. Pet. 3.

C. The ’732 Patent

The ’732 patent is titled “Systems and Methods for Monitoring and Controlling Remote Devices.” Ex. 1001, at [54]. It describes “a system for monitoring a variety of environmental and/or other conditions within a defined remotely located region.” *Id.* at Abstract. “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.” *Id.* at 3:19–24. Figure 2 of the ’732 patent is reproduced below.

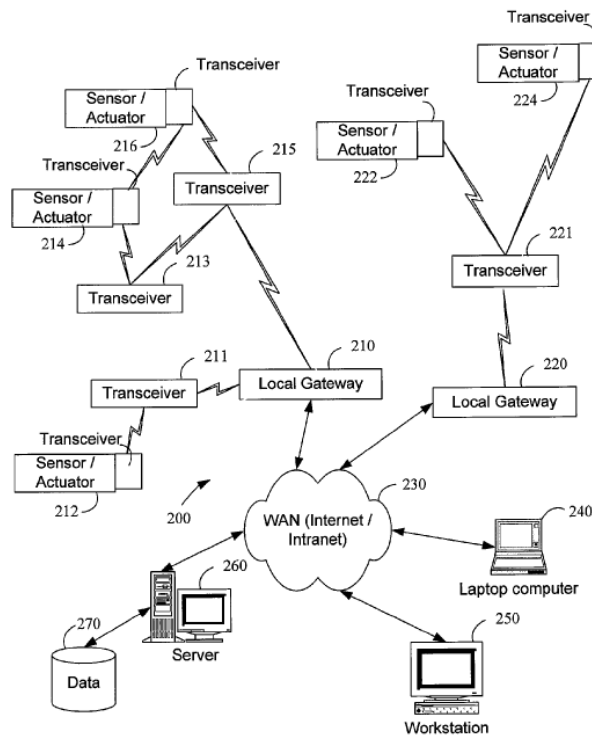


FIG. 2

Figure 2 is a block diagram of the monitoring and control system of a preferred embodiment of the invention. *Id.* at 4:42, 7:33–56. Control system 200 includes one or more sensor/actuators 212, 214, 216, 222, and 224. *Id.* at 5:65–67. Each of these sensor/actuators is integrated with a transceiver. *Id.* Transceivers 212, 214, 216, 222, and 224 may be located within an environment to be monitored such as an automobile, rainfall gauge, or parking lot access gate. *Id.* at 7:34–37. These devices may be used to monitor vehicle diagnostics, total rainfall and sprinkler supplied water, and access gate position. *Id.* The control system also includes a plurality of stand-alone transceivers 211, 213, 215, and 221. *Id.* at 6:15–17. Local gateways 210 and 220 receive transmissions from the transceivers and analyze and convert these transmissions as necessary in order to retransmit the information via a wide area network. *Id.* at 6:37–40.

D. Illustrative Claim

As noted above, we instituted Petitioner's challenges as to claims 1–7 of the '732 patent, of which claim 1 is independent. Claim 1 is illustrative of the challenged claims and is reproduced below:

1. A system for remote data collection, assembly, storage, event detection and reporting and control, comprising:
 - a computer configured to execute at least one computer program that formats and stores select information for retrieval upon demand from a remotely located device, said computer integrated with a wide area network (WAN);
 - a plurality of transceivers dispersed geographically at defined locations, each transceiver electrically interfaced with a sensor and configured to receive select information and identification information transmitted from another nearby wireless transceiver electrically interfaced with a sensor in a predetermined signal type and further configured to wirelessly retransmit in the predetermined signal type the select information, the identification information associated with the nearby wireless transceiver, and transceiver identification information associated with the transceiver making retransmission;
 - at least one gateway connected to the wide area network configured to receive and translate the select information, the identification information associated with the nearby wireless transceiver, and transceiver identification information associated with one or more retransmitting transceivers, said gateway further configured to further transmit the translated information to the computer over the WAN and wherein at least one of said plurality of transceivers is also electrically interfaced with an actuator to control an actuated device.

E. Person of Ordinary Skill in the Art

Patent Owner and Petitioner provide similar definitions of the person of ordinary skill in the art. Petitioner's declarant, Dr. Stephen Heppe, opines that this individual would have, through formal education or practical experience, the equivalent of a Bachelor's Degree in Electrical Engineering and two to three years of experience in the development and design, or technical marketing, of radio communications or computer network systems. Pet. 15 (citing Ex. 1004 ¶ 8). Patent Owner's declarant, Dr. Kevin Almeroth, opines that this individual would have 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. Ex. 2001 ¶ 79. We are persuaded that there is no substantive difference in these proposals and we find that the person of ordinary skill in the art would have a bachelor's degree or equivalent experience in electrical engineering, computer science, or a related discipline and also would have at least two years of experience directed to network development and design.

II. CLAIM CONSTRUCTION

In an *inter partes* review, "[a] claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b). Under this standard, we construe claim terms using "the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the

applicant’s specification.” *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

At the Petition stage, Petitioner sought construction of the terms “gateway,” “sensor,” and “actuator.” Pet. 10–13. In our Decision to Institute we determined that, at that time, no terms required express construction. Dec. 6. In its Response, Patent Owner proffered constructions for “sensor” and “actuator.” PO Resp. 15–20. Petitioner argues that no construction is needed for these terms and points out that none of Patent Owner’s arguments are tied to these proposed constructions. Reply 1. We have reviewed the full record in this matter and based on the issues before us, we conclude that no terms require express construction for the purposes of this Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

III. ANALYSIS

We turn to Petitioner’s asserted grounds of unpatentability to determine whether Petitioner has met its burden under 35 U.S.C. § 316(e).

A. Analysis of Asserted Grounds Based on Kahn, APA, Cerf, and Cunningham

Petitioner asserts that claims 1, 2, 6, and 7 of the ’732 patent are unpatentable under 35 U.S.C. § 103 as obvious over Kahn, APA, Cerf, and Cunningham. Pet. 15–48. Petitioner relies on a Declaration from Dr. Stephen Heppe to support its allegations. Ex. 1004.

1. Overview of Kahn

Kahn discusses “the basic concepts of packet radio.” Ex. 1002, Abstract. In particular, Kahn describes PRNET, a multi-hop, multiple access packet radio 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.

Each of the packet radios (“PRs”) in Kahn’s network “contains 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 semiconductor memory for packet buffering and software. *Id.* Each PR 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 1479 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 PR for processing. *Id.* The PR adds network routing and control information and transmits the packet to a nearby PR, called a repeater, which is identified within the packet. *Id.* at 1477, col.1, 1477, col. 2. The repeater processes the header to ascertain whether it should relay the packet, deliver it to an attached device, or discard it. *Id.* at 1477, col. 2. The packet will be relayed repeater to repeater until it reaches the final repeater, which broadcasts the packet to the destination PR. *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; Fig. 8. In routing the packet, a station can send the entire path directly to the sending or receiving PR and in this case, the transmitted

packet “could then contain the entire set of selectors in its header.” *Id.* at 1479, col. 2.

Kahn’s PR’s have measurement capabilities “designed-in as an integral part of the experimental network.” *Id.* at 1494, col. 2–1495, col. 1. Data are collected and delivered over the radio channel while an experiment is being conducted. *Id.* at 1495, col. 1. “At the conclusion of a measurement run, the data can be automatically spooled over the ARPANET to a remote site (e.g., UCLA) for analysis.” *Id.* Kahn describes four primary measurement tools—cumulative statistics (“CUMSTATS”), snapshots, pickup packets, and neighbor tables. *Id.*

CUMSTATS consist of a variety of activity counters in each node. Snapshots periodically record the disposition of packet buffers and other node resources. Pickup packets are ‘crates’ that start out empty at a traffic source, and pick up information at each node they traverse enroute to their destination, thus providing a trace of their history. Neighbor tables are a table of counts of packets received from each ‘neighbor’ PR in range.

Id. CUMSTATS are written in the measurement file by internal packet handling processes (such as those found at a gateway or forwarding node).

Id. “Network connectivity, labeling, and route updates are all written on the measurement file as they occur.” *Id.* The final destination for the PRNET measurement data is a computer at UCLA. *Id.*

2. Overview of Cerf

Cerf is a paper titled “Issues in Packet-Network Interconnection.” Ex. 1011. Kahn cited Cerf as part of its discussion of gateways. Ex. 1002, 1494, col. 2. n.34. Cerf “introduces the wide range of technical, legal, and political issues associated with the interconnection of packet-switched data communication networks.” Ex. 1011, Abstract. One of the issues addressed

in Cerf is the interconnection of networks using different protocols. *Id.* at 1387, col. 1. Cerf defines a protocol translator as “[a] collection of software, and possibly hardware, required to convert the high level protocols used in one network to those used in another.” *Id.* at 1387, col. 2. Cerf’s Protocol Translation Gateways translate the packets from one network for use in another network. *Id.* at Fig. 13, 1398, col. 2–1399, col. 1.

3. Overview of Cunningham

Cunningham is a U.S. patent titled “Wide Area Remote Telemetry.” Ex. 1014, at [54]. Cunningham describes a “system which monitors and controls remote devices by means of an information control system.” *Id.* at Abstract. The system uses sensor interface modules to monitor devices for triggering events and transmits the sensor information to at least one data collection module. Figure 2 of Cunningham is reproduced below.

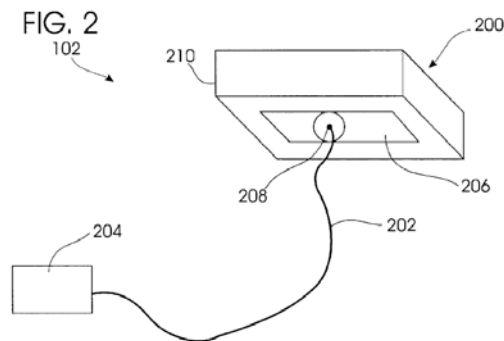


Figure 2 depicts sensor interface module 102. *Id.* at 7:46. “Sensor interface modules 102 are intelligent communications devices which attach to gas, electric, and water meters and other types of monitored equipment.” *Id.* at 7:32–34. As shown in Figure 2, sensor interface main body 200 is connected to external hardware sensor 204. *Id.* at 7:46–56. “Sensor interface modules 102 include an appropriate hardware sensor for the device being monitored; a computerized monitoring system with associated firmware; battery power supply and/or converter for external power; and a

transmitter.” *Id.* at 7:39–44. An example of a preferred embodiment of sensor interface module 102 is depicted in Figure 3. *Id.* at 7:62–63. That exemplar of sensor interface module 102 is attached to a gas meter. *Id.* There, the sensor monitors the rotation of the dials of the gas meter display. *Id.* at 8:13–14. The system may be used for a variety of applications “such as monitoring and control of lights, security monitoring devices, utility disconnect actions, utility outage reporting, or other control functions.” *Id.* at 30:66–31:2.

Figure 49 of Cunningham is reproduced below.

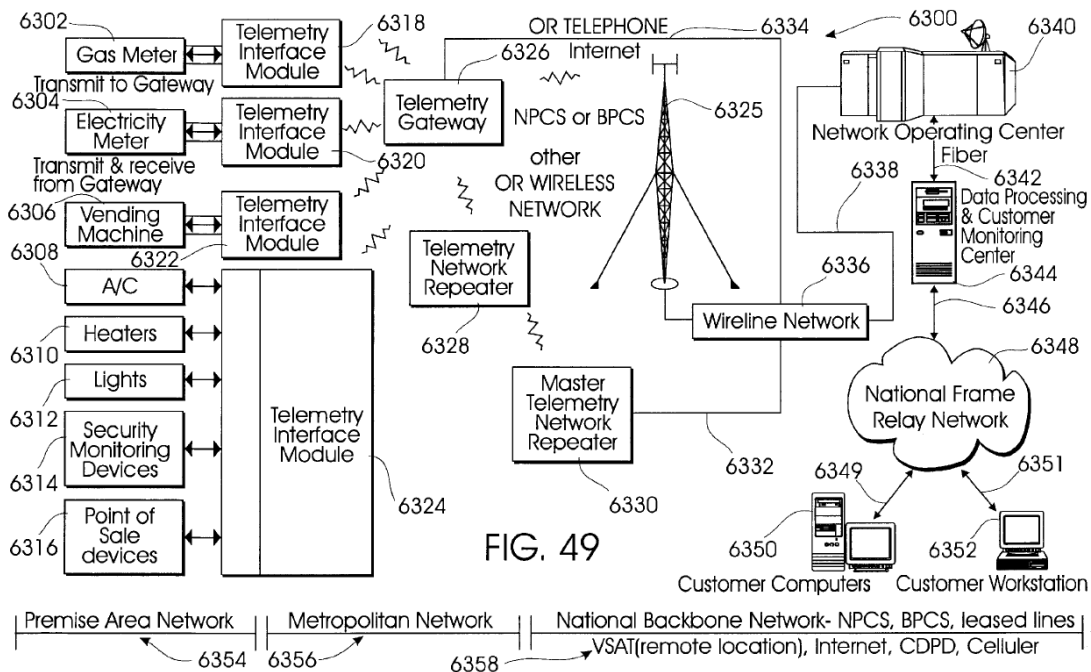


Figure 49 depicts “an example of an overall network schematic implementing the present invention.” *Id.* at 6:1–2. The network includes a number of devices such as gas meter 6302, electricity meter 6304, air conditioning system 6308, heaters 6310, lights 6312, security monitoring devices 6314, and point of sale devices 6316. *Id.* at Fig. 49. The devices communicate with their associated telemetry interface modules 6318, 6320,

and 6324. *Id.* at 47:15–30. Data from those devices are sent through the various telemetry interface modules to telemetry gateway 6326 (also called data collection module 6326). *Id.* Data are routed from the gateway to host module 6344 and customer computers 6350 or workstations 6352. *Id.* at 47:44–54.

4. Overview of APA

The '732 patent describes a variety of known “systems for monitoring and controlling manufacturing processes, inventory systems, emergency control systems, and the like.” Ex. 1001, 1:54–56. Representative systems include “[h]eating, ventilation, air-conditioning systems, fire reporting and damage control systems.” *Id.* at 2:27–30. These systems “use remote sensors and controllers to monitor and automatically respond to system parameters.” *Id.* at 1:56–59. “A number of control systems utilize computers to process system inputs, model system responses, and control actuators to implement process corrections within the system.” *Id.* at 1:59–61. Figure 1 of the '732 patent is reproduced below.

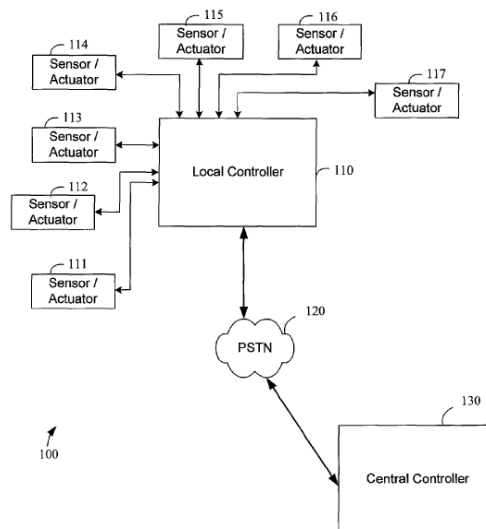


FIG. 1
(PRIOR ART)

Figure 1 “is a block diagram of a prior art control system.” *Id.* at 4:41. Prior art control system 100 includes a plurality of sensor/actuators 111–117. *Id.* at 5:32–36. The sensors are “electrically coupled to a local controller 110.” *Id.* at 5:36–37. The local controller often is coupled with the public telephone network and a central controller 130. The wiring between the elements of the prior art system is described as “a dangerous and expensive proposition.” *Id.* at 5:59–61.

5. *Independent Claim 1*

Petitioner asserts that claim 1 would have been obvious over the teachings of Kahn, APA, Cerf, and Cunningham. Pet. 26–46. Petitioner’s contentions regarding the unpatentability of claim 1 are summarized as follows: Claim 1 recites at least one computer program that formats and stores select information for retrieval from a remotely located device. Petitioner relies on Kahn and Cunningham to teach the recited computer integrated with a wide area network (“WAN”) that formats and stores select information. See Pet. 28–31. Specifically, Petitioner cites Kahn’s discussion of transmitting PRNET measurement data over the ARPANET to a computer at UCLA. *Id.* at 28. Petitioner also directs us to Kahn’s discussion of software developers in Texas and Boston that could debug and install software on PRs in San Francisco over the ARPANET. *Id.* at 29. In addition, Petitioner cites Cunningham’s teaching of a computer that uses application software to compile received information into a readable format and then make that formatted information available at a separate computer or workstation. *Id.* at 29.

Claim 1 further recites a plurality of transceivers that are interfaced with a sensor and those transceivers are configured to receive select

information and identification information from another transceiver that is interfaced with a sensor. Petitioner argues that Kahn's PRs are geographically distributed and they include an RF transmitter/receiver. *Id.* at 31–32. As to the recited sensors, Petitioner cites APA's discussion of sensors for monitoring and controlling processes and systems. *Id.* at 35. Petitioner cites Kahn to teach or at least suggest the recited select information and identification information transmitted from another transceiver. *Id.* at 35. Petitioner asserts that Kahn's PRs have unique identifiers ("selectors") and select information ("text"). *Id.* According to Petitioner, Kahn discusses sending its packets, which include the selector and text, from one transceiver to another. *Id.* at 36, 38. Petitioner argues that Kahn's radios have a "digital section" with a microprocessor that assembles packets before they are transmitted to other radios. *Id.* at 37. Petitioner asserts that one of ordinary skill in the art would have used Kahn's microprocessor to assemble packets containing data from the APA's sensors. *Id.*

Additionally, Petitioner asserts that "Cunningham discloses a system that monitors and controls remote devices. A host module receives data from a plurality of sensor interface modules through data collection modules and data repeater modules." *Id.* at 23 (citing Ex. 1014, 7:19–27, 44:12–41, 44:53–64, 47:44–54). Further, Cunningham describes "gas, electric and water meters, and other types of monitored equipment, and include[s] both an appropriate hardware sensor for the device being monitored and a transmitter for communicating sensor data to data collection modules." *Id.* Cunningham's sensor interface modules 102 "are intelligent communication devices" for use with a variety of monitored equipment. Ex. 1014, 7:32–34.

Cunningham describes that “sensor interface modules 102 can be connected to external hardware sensor 204.” *Id.* at 9:49–52. Examples of sensors 204 include “flow sensor 600, pressure sensor 602, and temperature sensor 604 which gather information about the flow of gas or other liquids 606 through a pipeline 608.” *Id.* at 9:52–55. Petitioner asserts that one of ordinary skill in the art “would have also been motivated to combine the teachings of Cunningham’s sensors and post-collection analysis tools with Kahn’s radio communication system to provide additional capabilities to the Kahn system that would allow the combined system to be used in other applications.” Pet. 25.

Claim 1 also recites a plurality of transceivers further configured to wirelessly retransmit select information and identification information (for both the sending and receiving transceivers). Here, Petitioner relies upon Kahn’s disclosure of a routing technique in which the selector for each PR along the route is included in the packet header that is relayed to the next transceiver. *Id.* at 39. According to Petitioner, “[t]he claim does not require the ‘repeating’ transceiver to insert its unique ID into the message before retransmission. The claim element is satisfied if the ‘repeating’ transceiver’s ID is already in the message when it is received and retransmitted.” *Id.* The header relied upon by Petitioner includes the “*entire set of unique identifiers/selectors*” and thus, Petitioner asserts that the packet includes identification for both the sending and receiving transceivers. *Id.*

Claim 1 further recites at least one gateway connected to the WAN configured to receive and translate the select information and identification information (for both the sending and receiving transceivers) and retransmit the translated information over the WAN. Petitioner relies upon the

disclosures of Kahn, Cerf, and Cunningham to teach the recited gateway that is connected to a WAN and configured to receive and translate the select, identification, and transceiver information. *Id.* at 39–42. According to Petitioner, Kahn describes a PRNET network that is connected to ARPANET using a gateway. *Id.* at 39. Petitioner asserts that Kahn’s gateway receives information from PRNET and transmits the received information to computers over the ARPANET, a predecessor to the internet. *Id.* According to Petitioner, because “ARPANET does not support the link-layer protocols employed by the PRNET, networking protocols must be converted or translated. Cerf provides the additional teaching for this aspect of the system.” *Id.* (citing Ex. 1004 ¶¶33, 69–71, 72). Petitioner also directs us to Cunningham’s disclosure of telemetry gateway 6326, which transmits data from the sensor interface modules to the internet. *Id.* at 41.

Finally, claim 1 recites that at least one of the plurality of transceivers also is electrically interfaced with an actuator. Petitioner relies upon APA and/or Cunningham to teach the recited actuators that control an actuated device. *Id.* at 42–43. APA discusses actuators that implement commands from local controllers. *Id.* at 42. Cunningham discusses monitoring and controlling devices including A/C, heaters, lights, point of sale devices, and security monitoring devices. *Id.* at 45. Petitioner asserts that these devices would teach the claimed “actuated devices.” *Id.*

We have analyzed Petitioner’s assertions of unpatentability in light of Patent Owner’s arguments and evidence to the contrary and we determine that Petitioner has met its burden under 35 U.S.C. § 316(e). As noted by Dr. Heppe, “Kahn provides an overview of the basic concepts of packet radio, including a then-current (1978) description of a particular packet radio

network (‘PRNET’), a multi-hop, multi-access packet radio network sponsored by the Advanced Research Projects Agency (‘ARPA’).” Ex. 1004 ¶ 17 (citing Ex. 1002, 1468–69). Further, “Cerf, which Kahn explicitly identified in his paper in relation to the ‘gateway process’ between Kahn’s PRNET and the ARPANET, describes four different options for creating an ‘internetwork.’ Each of these options uses a gateway between the networks.” *Id.* ¶ 20 (citing Ex. 1002, 1494, col. 2 n. 34; Ex. 1011, 1393–1399) (internal citations omitted). Dr. Heppe goes on to note that Cerf “provides for translating protocols of the networks coupled by the gateway.” *Id.* ¶ 21 (citing Ex. 1011, 1398–1399). Dr. Heppe further discusses Cunningham’s “sensor interface modules [that] attach to gas, electric and water meters, and other types of monitored equipment, and include an appropriate hardware sensor for the device being monitored and a transmitter for communicating sensor data to data collection modules using low-power radio-frequency transmissions.” *Id.* ¶ 22 (citing Ex. 1014, 6:11–19, 7:30–8:21). As to APA, Dr. Heppe explains that “the applicants admitted that it was known to use sensors and actuators to monitor and automatically respond to system parameters.” *Id.* ¶ 28. APA further describes coupling sensors and actuators to a local control system that may be integrated with a network such as a public switched telephone network. *Id.*

Dr. Heppe brings these teachings together by noting that “both Kahn and Cunningham are directed to networks of wireless transceivers dispersed over a wide area.” *Id.* ¶ 32. According to Dr. Heppe, Kahn provides for the collection and delivery of measurement data over a radio channel in real time and Cunningham addresses the need for near real-time information

from remote monitored locations. *Id.* Dr. Heppe testifies that Kahn may be combined with Cunningham “with or without [the teachings] of the APA.” *Id.* Dr. Heppe opines that a person of ordinary skill in the art “would have been motivated to use Cunningham’s sensors in Kahn’s system in order to further extend Kahn’s ability to conduct ‘the collection and delivery of measurement data’ . . . [and] to provide additional capabilities to Kahn’s system.” *Id.* According to Petitioner, “[i]mplementing Cunningham’s teachings would, for example, advantageously allow remote users to easily access collected data from a central location instead of having to physically visit a single computer.” Reply 22. Dr. Heppe testified that one of ordinary skill in the art “would have been motivated and found it obvious and straightforward to implement Cunningham’s teaching of a computer that ‘formats and stores information for retrieval upon demand from a remotely located device.’” Ex. 1046 ¶ 65. We are persuaded that Cunningham’s “technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person’s skill.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007). We credit Dr. Heppe’s testimony that it would have been within the skill of one of ordinary skill in the art to modify Kahn to include prior art sensors. Ex. 1004 ¶ 31

In addition, a person of ordinary skill in the art would have looked to Cerf for additional teachings regarding Kahn’s gateway because Cerf was cited on the face of Kahn for that specific purpose. *Id.* ¶ 33; see Ex. 1002, 1494, col. 2 (citing Cerf as part of its discussion of gateways). We find Dr. Heppe’s testimony to be persuasive and well supported by the record.

Patent Owner disputes Petitioner's assertions by arguing that several of the claim limitations are not taught by the cited art. PO Resp. 24–55. Patent Owner also argues that Petitioner's combination of cited art improperly relied upon hindsight. *Id.* at 57–71. We address Patent Owner's arguments in turn.

First, as noted above “claim 1 requires a system comprising a gateway that receives and translates select information, identification information of a nearby transceiver and identification information of retransmitting transceivers and to transmit the translated information to a computer over a WAN.” PO Resp. 24. Patent Owner argues that this limitation is not taught by the cited art because Kahn's pickup packets are not transmitted from PRNET to ARPANET via a gateway and as such, the cited art does not teach the translation of data before transmission to ARPANET. *Id.* at 24–30, 34–41. Patent Owner further argues that Kahn's measurement file does not contain the recited identifiers. *Id.* at 30–34.

Petitioner relies upon Kahn's discussion of transmitting PRNET measurement data over the ARPANET to a computer at UCLA. Pet. 28. Four measurement tools are described in Kahn—CUMSTATS, snapshots, pickup packets, and neighbor tables. Ex. 1002, 1495, col. 2. A PR's measurement software “collects subnet CUMSTATS and snapshots; enters local data into pickup packets; and periodically sends collected data to station measurement process.” *Id.* Kahn's stations contain measurement software that “controls experiments and collects the resulting measurement data” including data collected from internal packet handling processes. *Id.* This information is collected and written to a measurement data file. *Id.* “Network connectivity, labeling, and route updates are all written on the

measurement file as they occur.” *Id.* Finally, “[t]he data are sent from the station over the ARPANET and are stored at UCLA, for use by several analysis programs.” *Id.*

Patent Owner argues that Kahn’s station does not perform any protocol conversion/translation of a pickup packet because Kahn does not transmit a pickup packet to the ARPANET. PO Resp. 29. According to Patent Owner, Kahn only transmits the measurement data file and this file is created for the purpose of transmission over the ARPANET, so that no translation of the measurement data file is required. *Id.* Dr. Almeroth supports this argument by testifying that “Petitioner and Dr. Heppe conflate the data transmitted within the PRNet with the data transmitted by Kahn’s station over the ARPANET” and asserting that the information sent over the ARPANET is “***new packets with the measurement file as payload.***” Ex. 2014 ¶¶ 117, 118. Petitioner responds by arguing that “nothing in the claim would require the pickup packet itself to be translated and sent over the APRANET. What the claims require is that the *information within the pickup packet* be received at the station, translated, . . . and then then transmitted over to the ARPANET.” Tr. 28:26–29:4 (emphasis added). We agree with Petitioner.

Claim 1 recites “a network configured to receive and translate the select information.” The claim language does not require the information to remain in the same packet prior to its translation; instead, the claim recites a gateway that is “configured to receive and translate” the select information and identification information. Ex. 1001, 18:64–66. In Kahn, the measurement data are received at the gateway and then translated by packaging that data into a measurement data file that is in a format suitable

for transmission over the ARPANET. *See* Ex. 1002, 1494, col. 2.

Dr. Heppe testified that “[s]ince the ARPANET does not support the linklayer protocols employed by the PRNET, networking protocols must be converted or translated.” Ex. 1004 ¶ 33. We find Dr. Heppe’s testimony to be credible. Thus, we are persuaded that the information received by the gateway must undergo a translation before it can be transmitted to the remote developers.

Patent Owner further argues that Kahn’s measurement data file does not contain the recited identifiers and thus, the information sent over the ARPANET does not satisfy the claim limitation. Dr. Almeroth testifies that

When information contained in ‘pickup packets’ arrive[s] at the station, the information is written onto the measurement file as cumulative statistics of multiple packet radios over a period of time. For at least the reason that the data in the measurement file is cumulative (aggregated from many nodes in the PRNET), a POSITA would have understood that it would not be important to know which packet radios sent the data in its original form to the station.

Ex. 2014 ¶ 119.

We disagree because we do not find Kahn’s disclosures to be so limited. Based on our analysis of the record, we are persuaded that Kahn provides for individualized analysis of particular elements of the PRNET. Dr. Heppe opines that, “[t]he memory of any packet radio’s microprocessor can be remotely examined or altered through the use of the X-RAY debugger by a person at the station.’ And, by using internet protocols to access the station’s X-RAY process, the radios can be remotely debugged from the ARPANET.” Ex. 1004 ¶ 64 (citing Ex. 1002, 1494, col. 2) (internal citations omitted). Thus, the debugging process can be focused on particular aspects of the PRNET. “From the station, parameters in each PR

and terminal device in the network can be set remotely, selected elements can be halted, if appropriate, the collection of statistical data from selected devices may be enabled, traffic sources may be turned on or off, and data collection may be initiated.” Ex. 1002, 1495, col. 1. This allows measurement data to be focused on a particular “selected device” and as such, Kahn is not limited to aggregated data for many nodes. As described in Kahn, “[p]ickup packets are ‘crates’ that start out empty at a traffic source, and pick up information at each node they traverse enroute to their destination, thus providing a trace of their history.” *Id.* “Network connectivity, labeling, and route updates are all written on the measurement file as they occur.” *Id.* As such, we are persuaded that the reference teaches or at least suggests a measurement file that includes an entire set of selectors for a message and is not limited to providing anonymized aggregated data. Therefore, we determine that Kahn describes collecting pickup packets for a selected device and that device’s pickup packets are described as containing identification information for each node on a particular transmission path.

Second, Patent Owner asserts that Kahn does not teach a transceiver that wirelessly retransmits the recited select information and identification information. PO Resp. 41. Specifically, Patent Owner, as supported by Dr. Almeroth, argues that “neither the portion of Kahn cited by the Petitioner nor any other portion teaches a system comprising a transceiver that wirelessly retransmits i) select information, ii) identification information of a nearby transceiver and iii) its own identification information.” *Id.* at 42 (quoting Ex. 2014 ¶ 135). In particular, “[n]one teach the inclusion into the message header of the identification information of the transceiver that is retransmitting the message.” *Id.* (quoting Ex. 2014 ¶ 136). “Indeed, as

explained by Dr. Almeroth, a person of ordinary skill in the art ‘would have included only the next downstream repeater, or even the next few repeaters in the packet header and would have not included the retransmitting transceiver’s own identifier because it would not be helpful for routing the packet to its next destinations.’” *Id.* at 44 (citing Ex. 2014 ¶ 140).

Petitioner responds by arguing that “Kahn discloses a plurality of transceivers in a wireless packet radio network (PRNET), wherein a repeater packet radio wirelessly retransmits both payload data and identification information of a nearby transceiver (such as an originating transceiver or another repeater transceiver) and itself (as the transceiver making retransmission) to a station.” Reply 3. Kahn contemplates and discloses both header files that contain a limited subset of selectors and header files that include “the entire set of selectors.” Ex. 1002, 1479, col. 2.

One possibility is for it to distribute the information to the individual repeaters along the point-to-point route. In this case, each succeeding packet would only require some form of source and/or destination identifier but would not have to carry the entire route in its header. Alternatively, the station can send it directly to the digital section of the sender’s (or receiver’s) packet radio. *In this case, each packet originating at that radio could then contain the entire set of selectors in its header.*

Id. (emphasis added). Petitioner relies upon the alternate version of the header file, which contains the full set of selectors. Thus, Petitioner reasonably argues, and we agree, that “the retransmitting transceiver identification information is in the packet transmission, because the retransmitting transceiver is part of the route—thus, its ‘selector’ is in ‘the entire set of selectors.’” Reply 5.

Third, Patent Owner contends that the cited art does not teach the recited sensors. PO Resp. 46–53. Patent Owner argues that the processor

and keyboard found in Kahn's radio cannot teach the recited sensor. *Id.* at 46. In addition, according to Patent Owner, the other cited references do not remedy Kahn's lack of sensors. *Id.* at 52–53.

We agree with Patent Owner's argument that Kahn's keyboard and processor do not teach or suggest the recited sensors. Petitioner references an argument from another petition in a different *inter partes* review in which Petitioner asserted that Kahn's keyboard teaches the recited sensor. Pet. 34 n.10. Such an argument is not properly before us because Petitioner may not incorporate by reference arguments from other papers. 37 C.F.R. § 42.6(a)(3). Further, even if we were to consider that argument, it would not be persuasive because the '732 patent specifically distinguishes sensors from keyboards and other input devices. *See* Ex. 1001, 6:8–14 (describing that sensors may optionally include a keypad)).

Petitioner also contends that Kahn's discussion of the radio's measurement facilities would have taught the claimed sensor. Pet. 32. Thus, in Petitioner's view, the radio would have taught both the claim sensor and transceiver. *Id.* Petitioner asserts that the '732 patent specification supports its view that the transceiver and the sensor do not have to be separate. Pet. 32–33. As support for this argument, Petitioner directs us to the '732 patent's discussion of a transceiver 360 that is integrated with a sensor 310 and an actuator 380. Pet. 33 (citing Ex. 1001, 9:65–10:1). Claim 1, however, does not use the word “integrated” to describe the relationship between the sensor and transceiver. *Compare* Ex. 1001, 18:56–57 (“electrically interfaced with a sensor”) *with* 18:50–51 (“computer integrated with a wide area network (WAN)”). We are persuaded that in order for elements to be “interfaced” they first need to be separate elements.

Thus, we find persuasive Patent Owner’s argument that the ’732 patent contemplates sensors that are separate from the transceiver and therefore, the claimed sensor and transceiver may not be taught by the same radio. *See* PO. Resp. 47. Therefore, we determine that Kahn alone does not teach or suggest the recited sensors.

Petitioner, however, cites to Cunningham and APA for alternative teachings of a sensor. Pet. 23, 37. Cunningham describes external hardware sensors interfaced with communication devices. *See e.g.*, Ex. 1014, 7:32–34, 9:49–55. Similarly, APA discusses sensors for monitoring and controlling processes and systems. Pet. 35 (citing Ex. 1001, 1:54–59). Dr. Heppe opines that one of ordinary skill in the art would have combined Kahn with Cunningham “with or without” APA. Ex. 1004 ¶ 32. As discussed above, Dr. Heppe explains how and why one of ordinary skill in the art would have combined these teachings with those found in Kahn. Ex. 1004 ¶¶ 30–32.

Patent Owner contends that Cunningham’s discussion of sensors is inadequate to render obvious the recited sensors. PO Resp. 3. For example, Patent Owner points out that “[t]he thermostat in Cunningham is adjusted based on the results of analysis performed at a remote server (e.g., utility prices), not a condition sensed by a sensor that is electrically interfaced to the same transceiver as the actuator.” *Id.* at 3–4 (citing Ex. 1014, 46:62–47:10); *see id.* at 22–23. This, however, is an overly narrow reading of the reference. Cunningham’s “sensor interface module 102 receives information from external hardware sensors attached to the device or devices being monitored.” Ex. 1014, 13:29–31. Cunningham broadly discusses the use of hardware sensors that are appropriate for the particular device being

monitored. *Id.* at 7:39–43. Cunningham describes sensors that monitor the rotation of dials on a gas meter. *Id.* at 8:14–16. Cunningham also lists flow sensors, pressure sensors, and temperature sensors as sensors that may be used in its system. *Id.* at 9:52–55. We find Cunningham to be replete with examples of device monitoring sensors and we are persuaded that these sensors would have taught the sensors recited in claim 1.

Patent Owner also asserts that the APA sensors could not be modified to work with Kahn because the APA sensors would not be able to communicate with the packet-based stations described in Kahn. PO Resp. 52–53. We credit Dr. Heppe’s testimony that, “[p]rior art sensors and actuators, intended for ‘third-party’ integration into control systems such as the HVAC system disclosed in the APA of the ’732 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. 1004 ¶ 31; Reply 18. This testimony is in harmony with the ’732 specification, which 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, 1:54–61. 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. Thus, we are persuaded by Petitioner’s assertion that Kahn and APA and/or Cunningham would have taught the recited transceivers electrically interfaced with a sensor.

Fourth, Patent Owner argues that claim 1's actuators would not have been taught by the cited art. PO Resp. 53. Patent Owner disputes Petitioner's contention that the claimed actuators could be taught by Kahn's disclosure of a terminal interface unit ("TIU") or its associated software. *Id.* As described in Kahn, a TIU is a microprocessor-based device, which supports the user's terminal by providing certain processing services (e.g., formatting, local echoing, and end-to-end protocol processing). Ex. 1002, 1481, col. 1. The TIU also supports debugging of the stations. *Id.* at 1494, col. 2. "Operating software in the PRU's, TIU's, and station performs the collection of measurement data and uses the system protocols for delivery of this data to a measurement file located at the station." *Id.* at 1495, col. 1. Petitioner asserts that these disclosures would have taught one of ordinary skill in the art the recited actuator. Pet. 42; *see* Ex. 1004 ¶ 73. We, however, are not persuaded that these disclosures would have taught an actuator. According to Petitioner, an actuator is "anything that controls the state or status of another thing." Pet. 12. Petitioner has not provided sufficient argument or evidence to persuade us that the TIU or its software "control the state or status" of its associated user terminal. *See id.* at 42. Thus, we agree with Patent Owner that Petitioner has not shown sufficiently that Kahn's disclosure of a TIU or its associated software would have rendered obvious the recited actuator.

Petitioner, however, provides two other alternative arguments regarding the recited actuator. Petitioner asserts that the APA's disclosure of actuators would have taught the recited actuators. Pet. 43–44. In the alternative, Petitioner cites Cunningham's disclosure of device control modules and sensor interface modules which monitor and control lights,

thermostats, utility disconnect actions, and other control functions. *Id.* at 44 (quoting Ex. 1014, 30:66–31:2), 45 (citing Ex. 1014, 46:64–47:10). Patent Owner contends that Petitioner merely concludes that the cited art would have taught this limitation without providing the necessary analysis as to how the references would have been combined or why such a combination would have been successful. PO Resp. 54. We are persuaded that each of these alternatives would have taught the disputed limitation and below, we address Patent Owner’s concerns as to the adequacy of Petitioner’s arguments regarding the motivation to combine the cited art and the likelihood of success.

Patent Owner’s last argument directed to claim 1 goes to the sufficiency of Petitioner’s stated rationale for combining the teachings of Kahn, APA, Cerf, and Cunningham. PO Resp. 57–73. According to Patent Owner, Petitioner’s motivation to combine the recited references is rooted in improper hindsight. *Id.* at 57–58. We disagree. For reasons explained below, we are persuaded that Petitioner has put forth sufficient argument and evidence to establish a rationale for why one of ordinary skill in the art would have combined the cited references.

As an initial matter, we note that we have addressed the combination of Kahn and APA in previous proceedings involving these parties. In IPR2015-01973 (the “1973IPR”) (directed to the ’732 patent), we determined that Petitioner did not put forth a sufficient case to establish that one of ordinary skill in the art would have combined the teachings of Kahn and APA. IPR2015-01973, slip op. at 12–13 (PTAB Mar. 27, 2017) (Paper 25). Specifically, we found that Petitioner failed to establish that “Kahn provides a rationale, separate and apart from hindsight, which would

motivate one of ordinary skill in the art to combine the teachings of Kahn and the APA.” *Id.* at 13. In IPR2016-00984 (the “984IPR”) (directed to a related patent with the same specification), we found that Petitioner provided a sufficient rationale for combining Kahn and APA. IPR2016-00984, slip op. at 40–48 (PTAB Oct. 25, 2017) (Paper 43).⁶

An important factor contributing to the differing determinations made in these cases was Petitioner’s evidence that the issue of cost and complexity related to wired systems was known in the art. *Id.* at 40. In the 1973IPR, “our narrow focus on Kahn [was] dictated by Petitioner’s arguments.” 1973IPR at 9. We noted that this narrow focus was appropriate due to Petitioner’s arguments, but that “a much broader range of arguments would have been permissible” under *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007). *Id.* In the 984IPR, Petitioner put forth a more robust analysis and provided evidence, including the Greeves⁷ reference, as to the state of the art at the relevant time that demonstrated that the cost and complexity issues relied upon as part of Petitioner’s rationale were recognized problems at that time. 984IPR at 41–42.

In the instant proceeding, we are presented with another factor that was not present in either of those previous cases. Specifically, Petitioner’s

⁶ Both the 984IPR and the 1973IPR are on appeal to the Federal Circuit.

⁷ Patent Owner submitted the Greeves reference as Exhibit 2004 in the 984IPR proceeding. Petitioner cited Greeves as part of its reply brief in support of its argument that persons of ordinary skill in the art were concerned with the cost and complexity of wired networks. 984IPR at 41. Greeves was not relied on as part of the asserted ground of unpatentability, but rather, it was cited as evidence of the knowledge possessed by one of ordinary skill in the art at the relevant time. *Id.* at 47.

grounds in this matter rely upon a different combination of references from those previously considered in the 1973IPR and the 984IPR. This difference is key because in determining obviousness a reference “must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole.” *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (citing *In re Keller*, 642 F.2d 413, 425 (CCPA 1981)). Thus, an asserted ground based on Kahn and APA (as in the 1973IPR) requires a different analysis (or at least an explanation as to why the same analysis may be applicable) as compared to the ground currently before us based on the combination of Kahn, APA, Cerf, and Cunningham. *See generally In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1379 (Fed. Cir. 2016) (finding it to be error to rely on petitioner’s arguments regarding motivation to combine one set of references as part of the analysis of motivation to combine a different set of references).

Here, Cunningham adds another dimension to the analysis because Cunningham’s teachings directly relate to disclosures found in both Kahn and APA. Petitioner argues that “[l]ike Kahn and the APA, Cunningham discloses a system that monitors and controls remote devices. A host module receives data from a plurality of sensor interface modules through data collection modules and data repeater modules.” Pet. 23. Dr. Heppe points out that both Kahn and Cunningham are directed to networks of wireless transceivers dispersed over a wide geographic area and that both reference address real-time data collection. Ex. 1004 ¶ 32. Thus, the commonalities among these three references lend credence to Petitioner’s argument that one of ordinary skill in the art would have had several reasons to combine the cited references. *See* Ex. 1004 ¶ 29. The Supreme Court has

held that, “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417. Petitioner asserts that Cunningham’s data collection “could be applied to data collected in both the APA and Kahn.” Pet. 25. Petitioner also contends that a person of ordinary skill in the art “would have been motivated to use Cunningham’s actuators in order to further enhance Kahn’s ability to remotely turn on or off traffic sources, as well as other remote control functions.” *Id.* at 45–46. In addition, an ordinarily skilled artisan also would have recognized that Kahn’s use of transceivers with two-way transmissions would have taught or at least suggested that “Kahn’s system would be easily adaptable to use Cunningham’s actuators, which also use two-way transmissions.” *Id.* at 46. We find these stated rationale to be reasonable and supported by the record.

Further, Petitioner asserts that Kahn and the APA would have been combined to address “one of the recognized problems with the prior art control systems.” Pet. 20. Dr. Heppe discusses “a well-known problem in the art,” which is “the costs associated with the sensor-actuator infrastructure required to monitor and control functions within such systems.” Ex. 1004 ¶ 31 (citing Ex. 1001, 2:34–37). According to Petitioner, “[c]ombining Kahn’s wireless packet radio network with the monitoring and control systems described in the APA would have allowed a POSITA to avoid the expense associated with installing physical cables and wiring in order to connect the APA’s sensors and actuators at remote locations with Kahn’s gateway and wide area network, ARPANET.” Pet. 21.

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. 57–61. Patent Owner's argument is supported by testimony from Dr. Almeroth. In this testimony, Dr. Almeroth states that Dr. Heppe's characterization of the problem identified in the '732 patent as a "known problem to be solved" was based on analysis of non-APA portions of the '732 patent and thus, Dr. Heppe's opinion was based on improper hindsight. Ex. 2014 ¶ 164. Further, Dr. Almeroth opines that the problem the '732 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.* ¶ 167. Patent Owner's argument is a straw man. Even if the '732 patent set out to address problems other than the cost of wiring, as alleged by Dr. Almeroth, that would not negate the existence of a known problem in regard to the cost of installing hard-wired connections. In particular, we find persuasive the discussion in the '732 specification, addressing "prior art control systems," which includes an express disclosure that "appropriately wiring an existing industrial plant can be a dangerous and expensive proposition." See Ex. 1001, 5:52–61. We find that this 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 '732 patent.

We further note that Dr. Almeroth does not deny that it was well known at the time of the '732 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 '732 disclosure and would have been insignificant in comparison to other costs the '732 invention sought to address. Ex. 2014 ¶ 164. Accordingly, Dr. Almeroth acknowledges that the expense of installing wiring was not one of the problems purportedly discovered by the inventors of the '732 patent because according to Dr. Almeroth such cost was not something the inventors sought to address.

Greeves provides evidence that supports a finding 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 16. Greeves is a journal article dated 1994, and is cited in Petitioner's Reply as demonstrating the state of the art at the time of the alleged '732 invention. Greeves relates to communication networks that employ radio telemetry, which Greeves describes as ideal for industries such as water-supply and treatment, where multi-locational sites require a sophisticated communications network. Ex. 2018, 31. Greeves discusses radio telemetry as a "means of communication without the existence of a physical connection between the transmitter and the receiver" (*id.*), and states that radio's "benefits over physical links include . . . ease of set-up and operation and greater cost-effectiveness." (*id.* at 32). Greeves states that radio is "relatively cost-effective when compared with other physical links." *Id.* Greeves, therefore, provides strong evidence that corroborates Petitioner's argument by explaining that one of ordinary skill in the art would have recognized that the cost of wiring was an expense that needed to be addressed. Greeves also provides evidentiary support for Dr. Heppe's opinion that a skilled artisan at the time of alleged invention of the '732 patent would have understood that using wireless network links was

less costly than installing wires and cables in buildings for communications. See Ex. 1046 ¶ 31.

We are persuaded that Petitioner has made a sufficient showing that the combination of Kahn and the APA is based upon only knowledge that was within the level of ordinary skill at the time the claimed invention was made. Specifically, we find that Petitioner has shown sufficiently that the costs associated with the prior art wired infrastructure were a well-known and recognized problem in the art and that one of ordinary skill would have been motivated to combine Kahn and the APA to achieve a cost savings.

As to Cerf, we are persuaded by Petitioner's arguments that a person of ordinary skill in the art would have looked to Cerf for additional teachings regarding Kahn's gateway because Cerf was cited on the face of Kahn for that specific purpose. *Id.* ¶ 33; see Ex. 1002, 1494, col. 2 (citing Cerf as part of its discussion of gateways). We credit this argument and determine that Petitioner has put forth sufficient evidence to establish that one of ordinary skill of the art would have been motivated to combine the teachings of Kahn, APA, Cerf, and Cunningham.

Additionally, we note that Dr. Heppe opines that one of ordinary skill in the art would have combined Kahn with Cunningham "with or without" APA. Ex. 1004 ¶ 32. Thus, Petitioner also puts forth the argument that APA may be excised from this ground. Here, APA is relied upon for its teaching of actuators and sensors. Cunningham also is cited as providing alternate teachings for these elements of claim 1. As discussed above, Petitioner provides evidence and sound rationale to support its argument that Cunningham teaches or suggests these elements of claim 1. Thus, as an

additional finding, we are persuaded that the combination of Kahn, Cunningham, and Cerf renders obvious the subject matter of claim 1.

For all of the foregoing reasons, we are persuaded that Petitioner has put forth sufficient argument and evidence to establish by a preponderance of the evidence that claim 1 of the '732 patent would have been obvious over Kahn, APA, Cerf, and Cunningham. We also find that Petitioner has established by a preponderance of the evidence that claim 1 would have been obvious over Kahn, Cerf, and Cunningham.

6. Dependent Claims 2, 6, and 7

Claims 2, 6, and 7 depend directly or indirectly from claim 1. Petitioner asserts that these claims would have been obvious over the combined teachings of Kahn, APA, Cerf, and Cunningham. Pet. 46–48. These dependent claims, in relevant part, recite additional limitations regarding the claimed actuation device.

Claim 2 recites, in relevant part, that the control of the actuation device corresponds to a sensed condition detected by the sensor. Petitioner cites to the APA's discussion of HVAC systems "which 'utilize real-time monitoring and often require immediate feedback and control.'" *Id.* at 46–47 (quoting Ex. 1001, 2:26–33). Patent Owner argues that Cunningham fails to teach this limitation. PO Resp. 55–56. Petitioner, however, is not relying upon Cunningham to teach this limitation, and as such, Patent Owner's arguments do not address the ground before us. Reply 3 n.4. We are persuaded by Petitioner's argument that the APA would have taught this limitation to one of ordinary skill in the art.

Claim 6 further recites that the actuated device of claim 1 is a home appliance, and claim 7 depends from claim 6 and recites that the home

appliance is a home temperature control system. Petitioner persuasively argues that one of ordinary skill in the art would have understood the APA's HVAC system to teach a home appliance for heating and cooling. *Id.* at 47–48. We find this assertion to be credible and we agree with Petitioner's contention that Kahn, APA, Cerf, and Cunningham would have taught all of the limitations of these dependent claims. Patent Owner does not proffer any additional arguments directed to claims 6 and 7. *See generally* PO Resp.

In view of the arguments made in the Petition and Petitioner's supporting evidence and Patent Owner's arguments, we determine Petitioner has demonstrated by a preponderance of the evidence that claims 2, 6, and 7 would have been obvious under 35 U.S.C. § 103 over the combined teachings of Kahn, APA, Cerf, and Cunningham.

B. Analysis of Asserted Grounds of Obviousness Based on Kahn, APA, Cerf, and Ehlers

Petitioner asserts that claims 1– 7 of the '732 Patent are unpatentable under 35 U.S.C. § 103 as obvious over Kahn, APA, Cerf, and Ehlers. Pet. 48–69. Petitioner relies on a Declaration from Dr. Stephen Heppe to support its allegations. Ex. 1004.

1. Overview of Ehlers

Ehlers is directed to “[a]n indoor environmental condition control and energy management system.” Ex. 1012, Abstract. Figure 3 of Ehlers is reproduced below.

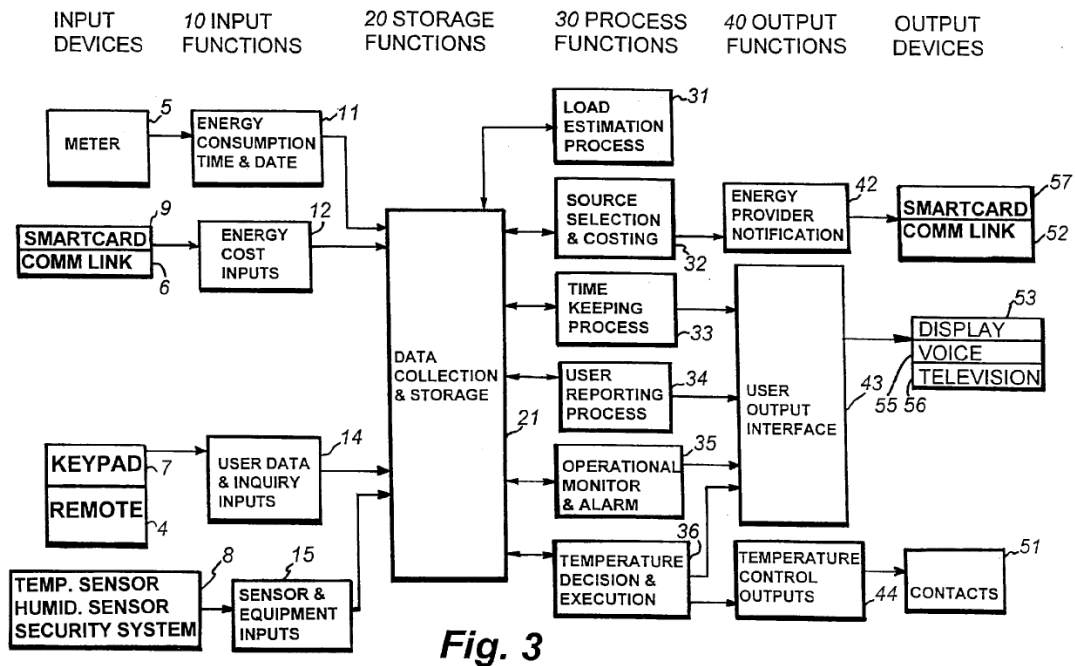


Fig. 3

Figure 3 depicts an enhanced residential embodiment of Ehlers's system. *Id.* at 30:46–47. At a high level, Ehlers's system “includes at least one input device 10, a memory 20, a processor 30, a user interface and device control block 40 and an external device 50.” *Id.* at 7:1–3. As shown in Figure 3, the input devices for this embodiment include temperature sensors, humidity sensors, and security systems. *Id.* at Fig. 3, element 8. “Input function 15 provides for interfacing with sensors and equipment as well any other data sources that may be appropriate.” *Id.* at 10:15–17. “Sensor types supported will sense internal and external environmental conditions including temperature and humidity.” *Id.* at 10:18–20. Output functions, such as temperature control outputs 44, “control and provide data to output devices, communication links and environmental equipment.” *Id.* at 13:25–27; *see also id.* at 14:12–13 (“Output function 44 provides control for heating and cooling equipment.”). In addition, “communications link 52 also may be available to communicate to equipment remote to the system.” *Id.* at 14:17–18.

2. *Independent Claim 1*

Petitioner asserts that claims 1–7 would have been obvious over Kahn, APA, Cerf, and Ehlers. Pet. 48–69. Petitioner relies upon substantially the same teachings from Kahn, APA, and Cerf as discussed above in reference to the previous ground. *See* § III.A.5. Thus, we will discuss the additional disclosures from Ehlers that are relied upon as part of this asserted ground.

Petitioner cites Ehlers as an additional disclosure of the recited computer integrated with a WAN. Pet. 57. Specifically, Petitioner directs us to Ehlers’s communication link 52, which allows for two-way communication between the system components. *Id.* According to Petitioner, “Ehlers’s communications link 52 allows for the results from process functions 30 to be ‘provided ... to output devices, service providers or external equipment.’” *Id.* at 58 (citing Ex. 1012, 11:11-14). Ehlers’s external equipment can include a computer. *Id.* (citing Ex. 1012, 3:43–49, 10:66–11:6, 11:17–20). Petitioner asserts that the output and processing steps described in Ehlers confirms that Ehlers stores “select information for retrieval upon demand from a remotely located device,” as required by the claim language. Ex. 1004 ¶46. “For example, process function 34 ‘provides a user-reporting process in response to user inquiry.’ [Ex. 1012,] 12:16-17. The results of this process ‘may be provided as output to the user ... through output functions to output devices, service providers or external equipment.’” Pet. 59. Ehlers’s teachings also are relied upon to teach the recited actuator to control an actuated device. Petitioner asserts that Ehlers provides an alternative teaching of the recited actuator through disclosures

such as its description of output 44's control for heating and cooling equipment based on the result of process function 36. *Id.* at 61.

Patent Owner asserts that this ground must fail because a person of ordinary skill in the art would not have been motivated to combine the teachings of Ehlers with the other cited references and there is not a reasonable expectation of success due to the combination because of the significant differences between Ehlers and the claimed invention. PO Resp. 61–71. According to Patent Owner, Ehlers's devices individually connect to a computer and therefore, are unable to retransmit packets from one another. *Id.* at 61. Thus, Patent Owner argues that there is no teaching or suggestion in Ehlers that the input functions should have the capability to retransmit packets from other input functions. *Id.* at 63. Patent Owner also asserts that Ehlers's processors do not transmit and receive information wirelessly. *Id.* at 64.

Petitioner, however, argues that the packet retransmission limitations are taught by Kahn. *See* Pet. 60. Petitioner asserts that one of ordinary skill in the art would have been motivated to combine Ehlers with the other cited references in order to use Ehlers's control system to implement the HVAC system recited in the APA. *Id.* at 54–55. According to Petitioner, a person of ordinary skill in the art would have been motivated to use the APA/Ehlers HVAC system in conjunction with Kahn's communication network in order to have a lower cost, flexible, and expandable radio network for communications. *Id.* at 55–56. Further, Petitioner contends that “[r]egardless of whether Ehlers teaches retransmission, it would have been obvious to a POSITA to use Ehlers' HVAC control system in APA's HVAC

system, as Ehlers specifically describes a known way to implement continuous monitoring and control in an HVAC system.” Reply 23.

Patent Owner asserts that Petitioner’s arguments for combining Ehlers and Kahn are based on mischaracterizations of Ehlers’s disclosures. PO Resp. 65. According to Patent Owner, “Petitioner conflates the retransmission among interconnected transceivers/repeaters in the ’732 patent with the conventional two way/bidirectional communication between Ehlers’ local unit processors and energy supply companies.” *Id.* (citing Ex. 2014 ¶ 192). Petitioner responds that Patent Owner

again ignores that the Petition relies on Ehlers’ teaching of a HVAC control system as implemented in APA’s wired HVAC system, and relies on Kahn’s wireless teachings in implementing the combined system of APA and Ehlers, which is wired. Thus, a POSITA would have been motivated to implement Kahn’s wireless teachings in the combined wired system of APA and Ehlers to beneficially save costs and achieve flexibility and expandability by avoiding the need for wires.

Reply 24. We are persuaded by Petitioner’s assertions. The recited combination does not rely upon or otherwise require any particular communication configuration in Ehlers; instead, the communication network in the proposed combination arises solely from the description found in Kahn. Thus, for all of the foregoing reasons, we are persuaded that Petitioner has put forth sufficient rationale to support its argument that the cited references would have been successfully combined by one of ordinary skill in the art to achieve the system found in claim 1 of the ’732 patent.

In view of the arguments made in the Petition and Petitioner’s supporting evidence and Patent Owner’s arguments, we determine Petitioner has established by a preponderance of the evidence that independent claim 1

would have been obvious under 35 U.S.C. § 103 over the combined teachings of Kahn, APA, Cerf, and Ehlers.

3. Dependent Claims 2–7

Claims 2–7 depend directly or indirectly from claim 1. Petitioner asserts that these claims would have been obvious over the combined teachings of Kahn, APA, Cerf, and Ehlers. Pet. 62–69. These dependent claims, in relevant part, recite additional limitations such as the addition of a keypad or provide further limitations directed to the claimed actuation device. For example, claim 2 recites, in relevant part, that the control of the actuation device corresponds to a sensed condition. Petitioner directs us to Ehlers’s disclosure of an HVAC system which includes input device 10 that may “include sensed environmental conditions such as temperature and humidity.” *Id.* at 62 (citing Ex. 1014, 7:8–10, 7:45–47, Fig. 1). We are persuaded by Petitioner’s arguments as to claim 2 and the other challenged dependent claims. Patent Owner does not advance additional arguments regarding this asserted ground. *See generally* PO Resp. We have reviewed Petitioner’s arguments and evidence, and we find that Petitioner has demonstrated by a preponderance of the evidence that claims 2–7 would have been obvious under 35 U.S.C. § 103 over the combined teachings of Kahn, APA, Cerf, and Ehlers.

IV. CONCLUSION

For the foregoing reasons, we determine Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, 6, and 7 would have been obvious under 35 U.S.C. § 103 over the combined teachings of Kahn, APA, Cerf, and Cunningham, as well as over the combined teachings of Kahn, Cerf, and Cunningham. Petitioner also has shown by a preponderance

of the evidence that claims 1–7 would have been obvious under 35 U.S.C. § 103 over the combined teachings of Kahn, APA, Cerf, and Ehlers.

V. ORDER

For the reasons given, it is

ORDERED that claims 1–7 of the '732 patent have been shown to be unpatentable; 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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