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Paper 34
Date: March 29, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROKU, INC.,
Petitioner,

v.

UNIVERSAL ELECTRONICS, INC.,
Patent Owner.

IPR2019-01613
Patent 8,004,389 B1

Before PATRICK M. BOUCHER, MINN CHUNG, and SHARON FENICK, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

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

In response to a Petition (Paper 2, "Pet.") filed by Roku, Inc. ("Petitioner"), we instituted an *inter partes* review of claims 2–5 and 7–15 of U.S. Patent No. 8,004,389 B1 (Ex. 1001, "the '389 patent"). Paper 12 ("Dec."). During the trial, Universal Electronics, Inc. ("Patent Owner") filed a Response (Paper 18, "PO Resp."), to which Petitioner filed a Reply (Paper 22, "Reply") and Patent Owner filed a Sur-reply (Paper 25, "Sur-reply"). An oral hearing was held with the parties, and a copy of the transcript was entered into the record. Paper 33 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 2–5 and 7–15 are unpatentable.

I. BACKGROUND

A. The '389 Patent

1. Overview

The '389 patent is a continuation of, and claims the benefit of the filing date of, U.S. Patent Appl. No. 10/737,029 ("the parent application"), issued as U.S. Patent No. 7,589,642 B1 (Ex. 1032, "the parent patent"). Ex. 1001 at code (63), 1:7–12. The '389 patent "relates generally to remote control devices and, more specifically, to relaying key code signals through a remote control device to operate an electronic consumer device." *Id.* at 1:15–18. Each of such key code signals "corresponds to a function of the selected electronic device, such as power on, power off, volume up, volume down, play, stop, select, channel up, channel down, etc." *Id.* at 1:33–36. A

set of key codes associated with a particular electronic device is referred to as a "codeset." *Id.* at 1:31–33. The number of key code signals to be used by a remote control device may be large, particularly when a single remote control device is used to control multiple electronic devices. *Id.* at 1:46–54. Accordingly, the inventor of the '389 patent sought a system "for enabling a remote control device to control a selected one of multiple different electronic consumer devices without requiring the codeset associated with the selected electronic consumer device to be stored on the remote control device." *Id.* at 1:58–61.

Figure 1 of the '389 patent is reproduced below.

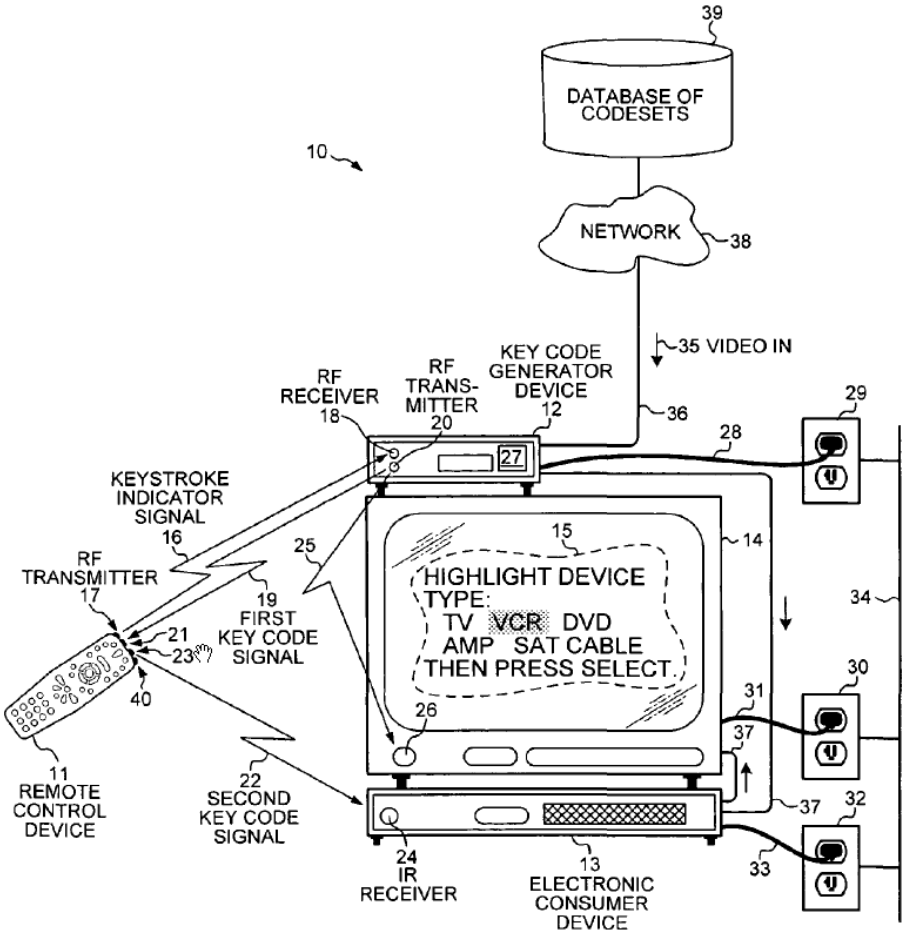


FIG. 1

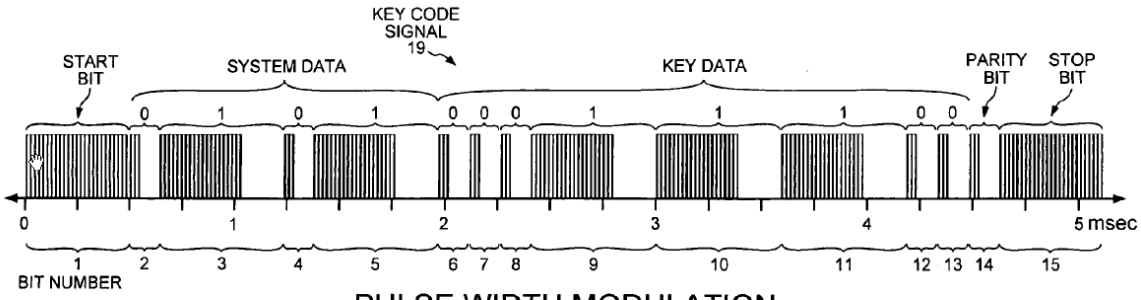
Figure 1 illustrates a system for relaying a key code through a remote control device to an electronic consumer device. *Id.* at 3:9–11. System 10 includes remote control device 11, key code generator device 12 (shown as a set-top box), first electronic consumer device 13 (shown as a video cassette recorder ("VCR")), and second electronic consumer device 14 (shown as a television set). *Id.* at 3:13–16, 3:26–29, 3:35–36. With remote control device 11, a user responds to on-screen displays 15 of television set 14, generated by key code generator device 12, "to step through a sequence of menu screens to identify the codeset corresponding to the device that is to be controlled." *Id.* at 3:20–24, 3:35–41. For example, system 10 may, in this way, identify the appropriate codeset to enable remote control device 11 to communicate with VCR 13 and television set 14. *Id.* at 3:35–43.

An alternative embodiment uses an "autoscan functionality" in which the user is "prompted by successive screens on display 15 to push the power-on key of remote control device 11 multiple times." *Id.* at 8:1–7. As the user repeatedly presses the power-on key, "key code generator device 12 in turn generates key codes using different codesets until the electronic consumer device performs a desired function," such as turning on. *Id.* at 8:14–18. The user is prompted to stop pressing the power-on key once the user sees the desired function being performed by first electronic consumer device 13. *Id.* at 8:18–21. "When the user stops pressing the power-on key, then the key code generator device 12 identifies the codeset of the last transmitted key code to be the codeset used by the electronic consumer device." *Id.* at 8:23–26.

The '389 patent explains that, in some instances, key code generator device 12 is capable of communicating with remotely maintained database

of codesets 39 over network 38, which may be the Internet. *Id.* at 8:40–43. A new codeset, such as may be associated with a new electronic consumer device introduced into the market, may thus be distributed from database 39 via network 38 and stored on a mass-storage hard disk within key code generator device 12. *Id.* at 8:43–51.

After generating a key code, key code generator device 12 modulates the key code onto a carrier signal, such as an RF signal, to generate "first key code signal 19." *Id.* at 4:43–45. Figure 5 of the '389 patent is reproduced below.



PULSE WIDTH MODULATION

FIG. 5

Figure 5 illustrates a twelve-bit key code modulated onto first key code signal 19 using pulse-width modulation. *Id.* at 5:7–8. Remote control device 11 receives first key code signal 19 on an RF transmission from key code generator device 12, and relays the key code to the appropriate electronic consumer device, such as VCR 13, in the form of second key code signal 22. *Id.* at 5:45–52. The electronic consumer device receives second key code signal 22, recovers the key code, and, if the key code is correct for the device, performs the function desired by the user. *Id.* at 6:5–9, 8:14–26.

2. Illustrative Claims

Independent claims 2, 4, and 12 are illustrative of the challenged claims and are reproduced below.

> 2. A method comprising:
>
> (a) receiving a keystroke indicator signal from a remote control device, wherein the keystroke indicator signal indicates a key on said remote control device that a user has selected;
>
> (b) generating a key code within a key code generator device using the keystroke indicator signal, wherein said key code is part of a codeset that controls an electronic consumer device;
>
> (c) modulating said key code onto a carrier signal, thereby generating a key code signal;
>
> (d) transmitting said key code signal from said key code generator device; and
>
> (e) identifying said codeset using input from a user of said remote control device, wherein said codeset is identified when said user stops pressing a key on said remote control device.

Ex. 1001, 10:36–52.

> 4. A remote control device comprising:
>
> a receiver that receives a first key code signal, wherein said first key code signal is generated by modulating a key code onto a first carrier signal, said first carrier signal falling within a radio frequency band;
>
> a transmitter that transmits a second key code signal, wherein said second key code signal is generated by modulating said key code onto a second carrier signal, said second carrier signal falling within an infrared frequency band; and
>
> a keypad that includes a key that corresponds to said key code, wherein said key code corresponds to a function of an electronic consumer device, and wherein said remote control device is contained within a single structure.

Id. at 10:56–11:2.

> 12. A remote control device, comprising:
> a keypad;
> an RF receiver;
> an IR transmitter; and
> means for receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal, said IR carrier signal with said key code modulated thereon being transmitted from said remote control device by said IR transmitter, wherein said remote control device is contained within a single structure.

Id. at 12:7–16.

3. Prosecution History

a. Prosecution History of the Parent Application

The parent application was filed with a single independent method claim:

> 1. A method comprising:
> (a) receiving a keystroke indicator signal from a remote control device;
> (b) generating a key code within a key code generator device;
> (c) modulating said key code onto a carrier signal, thereby generating a key code signal; and
> (d) transmitting said key code signal from said key code generator device.

Ex. 1007, 22. In a first, nonfinal Office Action, the Examiner rejected this claim for obviousness over the combination of U.S. Patent No. 5,963,624 ("Pope") and U.S. Patent No. 5,595,342 ("McNair"). *Id.* at 47. According

to the Examiner, Pope teaches both the "receiving" and "generating" limitations of this original claim, but "is silent on teaching modulating the key code onto a carrier signal." *Id.* Nevertheless, the Examiner found that McNair teaches that "the control signal is modulated and transmitted to the controlled apparatus as a conventional practice." *Id.* In light of this teaching, the Examiner concluded that "[i]t would have been obvious to one of ordinary skill in the art to modulate the key code onto a carrier signal in Pope because modulation of the key code enables the key code signal to be transmitted wirelessly to the appliances and this also represents a conventional practice." *Id.*

In traversing this rejection, the Applicant argued that "Pope does not receive a keystroke indicator and then generate a key code" because the "appliance control codes are not generated within the base unit 12 of Pope. Instead, the appliance control codes are transmitted from the handset 10/50 to the base unit 12, where they are translated into control signals." *Id.* at 72. The Examiner considered this argument, but found it unpersuasive in a final Office Action, reiterating that "Pope teaches receiving a keystroke indicator signal which contains an indication of a key on the remote control device 10 that was pressed[, and] generating a key code (codes for communicating the control function to the appliances) within the code generator 12." *Id.* at 88.

After a further traversal and rejection of original independent claim 1, the Applicant appealed the decision to our predecessor, the Board of Patent Appeals and Interferences ("BPAI"). *Id.* at 116–119, 132–133, 134, 219–256. The BPAI reversed the Examiner with respect to the rejection of original claim 1, agreeing with the Applicant that "McNair does not describe modulating a key code, or any code, onto a carrier signal." *Id.* at 308.

Instead, the BPAI found that "McNair merely describes frequency modulation including frequency shift keying modulation." *Id.* Concurrent with that finding, the BPAI also issued a new ground of rejection over Pope and U.S. Patent No. 4,005,428 ("Graham"):

> Although Pope does not describe modulating the keycode onto a carrier signal, attention is directed to Graham which describes modulating a digital code or binary code onto a carrier signal. . . . Graham describes that doing so offers the advantages of precluding unauthorized or accidental activation of a control associated with the receiving means and provides an exceptional degree of security and privacy. . . . It would have been obvious to one with ordinary skill in the art at the time the invention was made to modify the method of Pope to include modulating the key code onto a carrier signal since doing so offers the advantages of precluding unauthorized or accidental activation and provides an exceptional degree of security and privacy.

Id. at 310–311.

Subsequent to the BPAI appeal decision, the Applicant amended the "receiving" limitation of original claim 1 to recite that "the keystroke indicator signal indicates a key on said remote control device that a user has selected," and amended the "generating" limitation to recite "using the keystroke indicator signal." *Id.* at 315. In doing so, the Applicant characterized the BPAI's decision as based "on a broad interpretation of the claim term 'keystroke indicator signal'" that rejected the narrower interpretation of "an indication of a selected key while precluding a control code," for which the Applicant had advocated. *Id.* at 323. The Applicant stated that it "overcomes the new rejection by amending claim 1 explicitly to limit the scope of the term 'keystroke indicator signal' to indicate a key on a remote control device that a user has selected." *Id.*

The Examiner maintained the rejection because "[i]t would have been obvious to one with ordinary skill in the art at the time the invention was made to modify the method of Pope to include modulating the key code onto a carrier signal." *Id.* at 328. But the Examiner also indicated at the same time that dependent claims reciting transmission of the key code signal "to said remote control device" or "to an electronic consumer device" were allowable but for their dependence from a rejected base claim. *Id.* The Applicant accordingly canceled claim 1 and presented those dependent claims in independent form, leading to allowance of those claims as issued independent claims 1 and 2 in the parent patent. *Id.* at 333, 344–347.

b. Prosecution History of the '389 Patent

The application that matured into the '389 patent was filed with a Preliminary Amendment that provided a set of claims to substitute for those originally filed with the parent application. Ex. 1002, 41–51. Among this new set were claims that had previously also been presented by amendment during prosecution of the parent application, but rejected during prosecution of the parent application until the Applicant made further amendments. *Id.* at 48 ("Applicant now presents these claims as renumbered claims 25, 36, 38, and 44-45 respectively, for continued examination."). Ultimately, further amendments were also made by the Applicant to secure allowance of the claims that issued in the '389 patent. *See id.* at 112–119.

Notably, certain claims were initially rejected for obviousness over Pope and Graham, either alone or in combination with other art that included McNair. *See id.* at 66–68. The Applicant's position that an "appliance control code of Pope . . . does not indicate a key on a remote control device

that a user has selected" proved no more successful than during prosecution of the parent application. *See id.* at 87, 103 ("it is the examiner's position that the control code transmitted by the remote control [in Pope] is a [keystroke indicator signal] because the control code generated is based on the key that was press[ed] on the remote control"). The Applicant accordingly amended the claims into the form that they issued in the '389 patent, thereby securing a Notice of Allowance. *Id.* at 112–119, 125–127. The Examiner did not provide any express reasons for allowance with the Notice of Allowance. *See id.* at 125–127.

B. Evidence

Petitioner relies on the following references:

Mishra	US 2001/0005197 A1	June 28, 2001	Ex. 1005
Dubil	US 8,132,105 B1	Mar. 6, 2012	Ex. 1006
Caris	US 7,562,128 B1	July 14, 2009	Ex. 1008
Skerlos	US 4,426,662	Jan. 17, 1984	Ex. 1009
Lambrechts	US 6,909,378 B1	June 21, 2005	Ex. 1011
Yazolino	US 5,329,370	July 12, 1994	Ex. 1012
Van Ee	US 6,774,813 B2	Aug. 10, 2004	Ex. 1013

In addition, Petitioner relies on Declarations by Samuel H. Russ, Ph.D. Exs. 1003, 1040. Dr. Russ was cross-examined by Patent Owner, and a transcript of his deposition was entered into the record. Ex. 2009. Patent

Owner relies on a Declaration by Michael D. Sprenger, Ph.D.[1] Ex. 2003. Dr. Sprenger was cross-examined by Petitioner, and a transcript of his deposition was entered into the record. Ex. 1042.

C. Instituted Grounds of Unpatentability

Petitioner challenges claims 2–5 and 7–15 on the following grounds. Pet. 3.

Claim(s) Challenged	35 U.S.C. §[2]	References
2, 3	103(a)	Mishra, Dubil, Van Ee
4, 7–15	103(a)	Mishra, Dubil
5	103(a)	Mishra, Dubil, Lambrechts
2, 3	103(a)	Caris, Skerlos, Van Ee
4, 11	103(a)	Caris, Skerlos
5, 8	103(a)	Caris, Skerlos, Lambrechts
10, 12, 15	103(a)	Caris, Skerlos, Yazolino
13, 14	103(a)	Caris, Skerlos, Yazolino, Lambrechts

[1] Petitioner contends that "Dr. Sprenger's declaration includes many internal contradictions and lacks citation to any evidence supporting many of his claims," and that "[t]his would not be the first time that Dr. Sprenger has made unsupported statements in a patent proceeding." Reply 25–26 (citations omitted). Petitioner accordingly asks that "Dr. Sprenger's testimony should be given little to no weight." *Id.* at 26. We find insufficient basis to broadly discount Dr. Sprenger's testimony. Instead, we weigh his testimony in light of the evidence as a whole throughout this Decision. *See* Patent Trial and Appeal Board Consolidated Trial Practice Guide, 35 (Nov. 2019), https://www.uspto.gov/TrialPracticeGuideConsolidated.

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended various provisions of 35 U.S.C. Because the '389 patent was filed before March 16, 2013 (the effective date of the relevant amendment), the pre-AIA versions of those provisions apply.

D. Real Parties in Interest

The parties identify only themselves as real parties in interest. Pet. 73; Paper 4, 2.

E. Related Matters

Both parties identify *Universal Electronics, Inc. v. Roku, Inc.*, No. 8:18-cv-01580 (C.D. Cal.) ("the related litigation"), as involving the '389 patent. Pet. 73; Paper 4, 2.

The '389 patent is one of several patents owned by Patent Owner that are challenged by Petitioner in various petitions for *inter partes* review, including in IPR2019-01595, IPR2019-01608, IPR2019-01612, IPR2019-01614, IPR2019-01615, IPR2019-01619, IPR2019-01620, and IPR2019-01621. *See* Pet. 74; Paper 4, 2. The parties also note that the following applications claim the benefit of the filing date of the '389 patent: U.S. Patent Appl. No. 13/068,820 (now U.S. Patent No. 9,355,553); U.S. Patent Appl. No. 15/153,095 (now U.S. Patent No. 9,911,325); U.S. Patent Appl. No. 15/864,339; and U.S. Patent Appl. No. 16/057,544. Pet. 74; Paper 4, 2.

In addition, the parent patent was the subject of IPR2014-01082 ("the earlier IPR"), in which institution of a trial was denied. *See* Ex. 1007, 369–379. That denial is relevant to this proceeding because, like challenged independent claim 2 of the '389 patent, independent claim 2 of the parent patent recites "modulating said key code onto a carrier signal, thereby generating a key code signal." Ex. 1032, 10:30–31. Independent claim 2 of the parent patent was among the claims challenged in the earlier IPR, specifically for anticipation and single-reference obviousness by six

different references. Ex. 1007, 372–373. In considering those earlier challenges, the Board found dispositive Patent Owner's argument that "modulating a key code onto a carrier signal, thereby generating a key code signal" was disclosed by none of the six references. *Id.* at 373.

The shortcomings identified by the Board for each of the six anticipation challenges in the earlier IPR was the petitioner's reliance on an inherency argument, namely that each of the asserted references inherently discloses modulating a key code onto a carrier signal by virtue of its disclosure of transmission of key code signals. *Id.* at 373–376. Specifically, the Board rejected conclusory testimony proffered by the petitioner as lacking sufficient support for "broad statements that transmission of codes requires modulation onto a carrier signal." *See id.* at 376. The single-reference obviousness challenges suffered from a related deficiency, namely that the petitioner "appear[ed] to conflate obviousness with inherent anticipation and fail[ed] to provide a sufficient obviousness analysis." *Id.* at 376–377.

II. ANALYSIS

A. Legal Principles

A claim is unpatentable for obviousness under 35 U.S.C. § 103(a) if the differences between the claimed subject matter 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). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of

the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of nonobviousness, i.e., secondary considerations.[3] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness")); *see In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. "The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry." *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The "person of ordinary skill in the art" is a hypothetical construct, from whose vantage point obviousness is assessed. *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir.

[3] The parties do not address objective indicia of nonobviousness, which accordingly do not form part of our analysis. *See* Pet. 73 ("Petitioner is not aware of any alleged secondary considerations by Patent Owner. Petitioner believes that Patent Owner has not, to date, made any nonconclusory assertions of any secondary considerations of non-obviousness.").

1998). "This legal construct is akin to the 'reasonable person' used as a reference in negligence determinations" and "also presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan." *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

Supported by the testimony of Dr. Russ, Petitioner proposes that a person of ordinary skill in the art "would have a bachelor's degree in electrical engineering or equivalent degree with two years of work experience relating to communications and consumer electronics." Pet. 10 (citing Ex. 1003 ¶¶ 16–19). Patent Owner proposes instead that a person of ordinary skill in the art "would have had a bachelor's degree which involved computer programming coursework, for example, electrical engineering, computer engineering, computer science, cognitive science, mechanical engineering, industrial engineering, or a similar degree, and at least one year of work experience in software programming, user interfaces, or human factors." PO Resp. 9. According to Patent Owner, "[a]dditional education might substitute for some of the experience, and substantial experience might substitute for some of the educational background." *Id.*

We adopt Petitioner's articulation. Although Patent Owner's expert, Dr. Sprenger, believes Patent Owner's statement "is more appropriately tailored to the subject matter area of the '389 patent," he also concedes that "the differences between the proposed definitions of a [person of ordinary skill in the art] by Petitioner and Patent Owner are relatively minor" such that those differences "do not affect any of [his] analysis." Ex. 2003 ¶¶ 37, 40. We also would reach the same conclusions expressed herein if we adopted Patent Owner's expression of the level of ordinary skill.

C. Claim Construction

The Board uses "the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b) (2019); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). The specification may reveal a special definition given to a claim term by the patentee. *Phillips*, 415 F.3d at 1316. If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998).

The parties address the following terms.

1. "key code"

The parties agree that the term "key code," which is recited in each of challenged independent claims 2, 4, and 12, should be construed as "a code corresponding to the function of an electronic device, optionally including timing information." Pet. 11; PO Resp. 10. This construction was adopted by the district court in the related litigation. Ex. 1010, 12. The district court's construction is consistent with the ordinary and customary meaning of the phrase in light of the specification, and we adopt the proposed construction. *See, e.g.*, Ex. 1001, 4:57–61.

2. "keystroke indicator signal"

The parties nominally agree that the term "keystroke indicator signal," which is recited in challenged independent claim 2, should be construed as "a signal, distinct from a key code, corresponding to a pressed key [on a remote control]." Pet. 11; PO Resp. 11–12 (alterations in original). The district court adopted this construction in the related litigation, as did we on a preliminary basis in our Institution Decision because we found it "consistent with the ordinary and customary meaning of the phrase in light of the Specification." Ex. 1010, 12–13; Dec. 12.

Nevertheless, Patent Owner "clarifies" that its agreement with this construction "means that the keystroke indicator signal cannot contain the claimed key code." PO Resp. 10. Patent Owner contends that such an exclusion is not only "consistent with the ordinary meaning of 'distinct from a key code' and the specification," but also consistent with an express disclaimer made during prosecution of the application that matured into the '389 patent. *Id.* (citing Ex. 1001, 8:8–11; Ex. 1002, 87). In addition, Patent Owner observes that "the claims require a 'keystroke indicator signal' distinct from a 'key code signal.'" *Id.* (citing Ex. 1001, 10:41–46; *Helmsderfer v. Bodrick Washroom Equip., Inc.*, 527 F.3d 1379, 1382 (Fed. Cir. 2008)).

Petitioner does not dispute this clarification, which we find consistent both with the distinction embraced by the differences between a "key code" and a "keystroke indicator signal," and with the distinction between those terms as recited in the challenged claims. Accordingly, we adopt the parties agreed construction, with Patent Owner's clarification.

3. "key code signal"

The term "key code signal" is recited in each of challenged independent claims 2 and 4. Ex. 1001, 10:45–48, 10:57–65. In the Institution Decision, we adopted as our preliminary construction the same construction adopted by the district court in the related litigation, namely "a signal containing a modulated key code." Dec. 12 (citing Ex. 1010, 13–23). Patent Owner contends that such a construction "excludes a codeset from the same signal." PO Resp. 11. According to Patent Owner, such an exclusion is consistent both with the claim language and Specification of the '389 patent, and with statements made during prosecution of the parent application. *Id.* We are not persuaded by Patent Owner's plain-meaning or prosecution-history arguments to incorporate its proposed exclusion into the construction of "key code signal." Rather, we agree with Petitioner that the proposed exclusion improperly adds unsupported limitations to the construction. *See* Reply 3.

First, Patent Owner contends that "[k]ey code is singular and distinct from a code set in the specification," citing language from the Specification of the '389 patent that clearly describes a key code as part of a codeset. PO Resp. 11 (citing Ex. 1001, 2:36–37 ("When the key code from one of the codesets . . ."), 4:33 (". . . determines which key code of the codeset previously identified . . .")). It is thus apparent from the cited passages that a signal carrying a codeset may also be a signal carrying a key code. Patent Owner provides insufficient reasoning based on the Specification passages it cites to support the exclusion of a codeset. *See, e.g.*, *Inphi Corp. v. Netlist, Inc.*, 805 F.3d 1350, 1355 (Fed. Cir. 2015) (quoting *Santuarus, Inc. v. Par Pharm.*, 694 F.3d 1344, 1351 (Fed. Cir. 2012) ("Negative claim limitations

are adequately supported when the specification describes a reason to exclude the relevant limitation.")).

Second, Patent Owner contends that "the Applicant repeatedly argued during prosecution that 'transmitting ***a key code signal*** . . . does not recite transmitting ***a codeset***." PO Resp. 11 (quoting Ex. 1007, 75–76 (alterations by Patent Owner); citing Ex. 1007, 241–242, 121). Patent Owner's alterations in quoting the prosecution history alter the sense of the statement in an important respect. Specifically, the full sentence made by the Applicant was: "Claim 2 [of the parent application] recites transmitting a key code signal to the remote control device ***and*** does not recite transmitting a codeset to the remote control device." Ex. 1007, 75–75 (emphasis added). By omitting the word "and," Patent Owner's parsing of the phrase incorrectly gives the impression that the subject of "does not recite" was the phrase "transmitting a key code signal."

Rather, we find that the Applicant's statements during prosecution do nothing more than reflect the language recited in claim 2 of the parent application. That language generally tracks the language of challenged claim 2 of the '389 patent, but without the express requirement of transmission "to the remote control device." The Applicant's statements during prosecution do not provide "clear and unequivocal evidence" of a disavowal by the Applicant of codeset from the signal. *See Poly-America, L.P. v. API Industries, Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016) (standard for disavowal is "exacting, requiring clear and unequivocal evidence that the claimed invention includes or does not include a particular feature" and "[a]mbiguous language cannot support disavowal") (citations omitted).

Third, Patent Owner contends that the claim language itself supports its proposed exclusion. PO Resp. 11 (citing Ex. 1001, 10:42–46, 10:65–66; Ex. 2008, 57:2–17). But we do not discern any such exclusion from the language Patent Owner highlights, namely "said key code is part of a codeset" and "modulating said key code onto a carrier signal, thereby generating a key code signal." *Id.* Similar to our discussion of the Specification above, a signal carrying a codeset may also be a signal carrying a key code and nothing in the plain language of the claim says otherwise.

We accordingly construe "key code signal" as "a signal containing a modulated key code," without the additional exclusion of a codeset from the same signal.

4. "key code generator device"

In the related litigation, the parties disputed whether "key code generator device," which is recited in challenged independent claim 2, should be construed according to the provisions of 35 U.S.C. § 112 ¶ 6[4] ("An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."). Ex. 1010, 23–24. In advocating for

[4] Section 4(c) of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), re-designated 35 U.S.C. § 112 ¶ 6, as 35 U.S.C. § 112(f). Because the '389 patent has a filing date prior to September 16, 2012, the effective date of § 4(c) of the AIA, we refer to the pre-AIA version of 35 U.S.C. § 112. *See* AIA § 4(e).

construction as such a means-plus-function limitation in the related litigation, Petitioner contended that "[t]he structure is indefinite due to lack of sufficient corresponding structure." *Id.* In contrast, Patent Owner argued that the term is not governed by 35 U.S.C. § 112 ¶ 6 and should instead be construed as "an electronic consumer device, other than a remote control, that identifies a codeset and generates a key code from the identified codeset." *Id.* As an alternative position, Patent Owner contended that "[t]o the extent 35 U.S.C. § 112(6) applies, the corresponding structure is a set-top box, television, a stereo radio, a digital video disk player, a video cassette recorder, a personal computer, a set-top cable television box or a set-top satellite box and equivalents thereof." *Id.*

The absence of the word "means" in the phrase creates a rebuttable presumption that § 112 ¶ 6 does not apply. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). The district court found that "the presumption against means-plus-function claiming is overcome" and applied § 112 ¶ 6 to interpret "key code generator device." Ex. 1010, 26. In its interpretation, the court found that "the relationship between the claimed components fails to provide information to conclude that the coined term 'key code generator device' connotes sufficient structure." *Id*. In doing so, the court determined that "the claimed function is to generate a key code." *Id.*

In considering the corresponding structure, the district court rejected Petitioner's contention that the structure is indefinite. *See id.* at 29 ("The disclosure in the patent specification supports the conclusion that 'key code generator device 12' is a corresponding structure clearly linked to the recited function of 'generat[ing] a key code.'" (alteration in original)). Instead, the

district court arrived at its articulation of the corresponding structure by observing that "[t]he disclosure for 'key code generator device 12' explains that it generates a key code by (1) identifying (or being informed of) a codeset usable to communicate with the electronic device and (2) identifying the key code corresponding to a pressed key for that codeset." *Id.* Because, according to the district court, "this disclosure effectively provides a software-like algorithm describing what the key code generator device must do to 'generate' a key code," the district court incorporated such algorithmic features in its identification of the corresponding structure. *Id.* (noting testimonial evidence that off-the-shelf versions of the devices identified by the specification would require modification to be able to perform the recited function).

The district court accordingly supplemented its identification of the function of the recited "key code generator device" (i.e., "to generate a key code") with the following structure: "a set-top box, television, stereo radio, digital video disk player, video cassette recorder, personal computer, set-top cable television box or satellite box . . . performing the steps of (1) identifying a codeset usable to communicate with an electronic consumer device . . . and (2) identifying the key code corresponding to a pressed key for that codeset . . . and equivalents thereof." *Id.* at 30 (citations to specification of the parent patent omitted).

In the Institution Decision, we adopted the district court's construction as a preliminary construction of "key code generator device." Dec. 15. Neither party disputes that construction, with Patent Owner expressly "agree[ing] with the Board's preliminary finding." PO Resp. 13; *see* Reply 3–4.

In the Institution Decision, we also questioned whether the district court's construction presents any inconsistency with the "autoscan" embodiment described in the Specification of the '389 patent and embraced by challenged claim 2. Dec. 15–16. The parties agree that our concern was unfounded and that no inconsistency arises. *See* PO Resp. 14 (Patent Owner asserting that "there is no inconsistency between the district court's construction and the autoscan functionality"); Reply 3 ("Roku agrees").

Accordingly, we adopt the district court's construction of "key code generator device" as a means-plus-function limitation, with the function and structure as set forth by the district court. That is, the claimed function is "to generate a key code," and the structure that performs that function is "a set-top box, television, stereo radio, digital video disk player, video cassette recorder, personal computer, set-top cable television box or satellite box . . . performing the steps of (1) identifying a codeset usable to communicate with an electronic consumer device . . . and (2) identifying the key code corresponding to a pressed key for that codeset . . . and equivalents thereof."

5. "generating a key code within a key code generator device using the keystroke indicator signal"

Challenged independent claim 2 recites "generating a key code within a key code generator device using the keystroke indicator signal." Ex. 1001, 10:41–44. Patent Owner "proposes that this term can be understood by its plain meaning, except that it excludes receiving an appliance control code and merely translating or converting the code into another format, such as an infrared signal." PO Resp. 13–14. According to Patent Owner, "[d]uring prosecution, the Applicant expressly disclaimed that receiving an appliance

control code and merely translating the code into another format was within the scope of generating a key code within a key code generator device." *Id.* at 14. We are not persuaded that Patent Owner's argument satisfies the "exacting" standard established by the Federal Circuit for prosecution history disclaimer because the prosecution history lacks the "clear and unequivocal evidence" necessary to support the proposed exclusion. *See Poly-America*, 839 F.3d at 1136.

At best, Patent Owner directs our attention to amendments that resulted from rejection, by both the Examiner and the BPAI on appeal, of Applicant's distinction during prosecution between "generating" codes and a process of "receiving" and "translating" codes, as taught by Pope. *See* PO Resp. 6; Ex. 1007, 73–74 (Applicant arguing that Pope's base unit 12 "does not generate the appliance control codes. Instead base unit 12 receives the appliance control codes and then translates them into infrared control signals."), 88 (Examiner finding argument unpersuasive), 154–155 (Applicant repeating argument on appeal to the BPAI), 310[5] (BPAI finding that "Pope's description that base unit (i.e., key code generator) processor 84 gets an infrared control code (i.e., key code) from memory 86 based on a received appliance control code (key stroke indicator signal) meets the limitation of 'generating a key code within a key code generator device

[5] Patent Owner remarks that the Board's disagreement with the Applicant's distinctions was "under the broadest reasonable interpretation, but that is no longer the claim construction standard for IPRs." PO Resp. 7 (citing Ex. 1002, 311). We would conclude that Pope meets the "generating" limitation also under the claim-construction standard the Board applies to *inter partes* reviews.

. . .'"). Patent Owner provides the following explanation of subsequent amendments to the claims:

> In response, the Applicant amended the claim to add "wherein the keystroke indicator signal indicates a key on said remote control device that a user has selected" and "using the keystroke indicator signal," "explicitly to limit the scope of the term 'keystroke indicator signal'" to exclude the broader interpretation and to narrow "the term 'keystroke indicator signal' to mean an indication of a selected key while precluding a control code" (EX1007 at 323). The Applicant cited this amendment and reasoning as applying to the '389 Patent (EX1002 at 87).
>
> Thus, the Applicant expressly disclaimed from the scope of "keystroke indicator signal," "generates a key code within a key code generator device using the keystroke indicator signal," and "wherein the keystroke indicator signal indicates a key on said remote control device that a user has selected," a device that "receives the appliance control codes and then ***translates*** them" into another format, such as an infrared signal.

PO Resp. 6–7 (citation omitted). We are not persuaded by this explanation. The Applicant remarks identified by Patent Owner relate to the term "keystroke indicator signal," and we find Patent Owner's inferences about limiting the scope of the "generating" limitation insufficiently supported by the prosecution record. Based on the complete record, we find that there was not an unambiguous, clear, and unmistakable prosecution history disclaimer that supports Patent Owner's proposed exclusion of translation of a received code from the scope of the term "generating."

Nor do we find Patent Owner's proposed exclusion is supported by other intrinsic evidence of record. We agree with Petitioner that Patent Owner's proposed exclusion in construing the "generating" limitation "improperly imports requirements far beyond the plain and ordinary

meaning of this term." Reply 5 (citing Ex. 1040 ¶¶ 16–17). In the related litigation, for example, the district court concluded (in the context of considering its construction of "key code generator device") that "any challenge Roku has to the meaning of the term 'generate,' including a suggestion that it could only be satisfied by creating a key code from scratch, is rejected." Ex. 1010, 29. Although Patent Owner asserts that it "does not seek to impose any such requirement," Patent Owner nonetheless seeks to draw a fine line with its proposed exclusion. *See* PO Resp. 14.

Turning to the Specification, Patent Owner contends that the proposed exclusion is "consistent with the specification." *Id.* (citing Ex. 1001, 5:49–6:4; Ex. 2003 ¶¶ 135–138); *see* Sur-reply 3. In the cited paragraph of his Declaration, Dr. Sprenger states that "[t]he '389 patent specification confirms [the proposed exclusion] when it uses the terms 'translating' and 'converted' when describing the remote control receiving the key code in a first carrier signal and merely modulating that key code onto a second carrier signal." Ex. 2003 ¶ 138 (citing Ex. 1001, 5:49–6:4).

The cited portion of the Specification describes an embodiment where a key code generator device transmits key code signal 19 to a remote control device, which in turn translates it into key code signal 22 and then transmits the translated key code signal to a VCR, a consumer electronic device. Ex. 1001, 5:45–6:4 (describing steps 104 and 105 of the method for relaying key code signals depicted in Figure 2). The Specification also describes "a second example," where a key code generator device, after generating a key code signal, transmits it directly to an electronic consumer device. *See id.* at 6:15–49. It is well established that "it is improper to read limitations from a preferred embodiment described in the specification—even if it is the only

embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Epos Techs. Ltd. v. Pegasus Techs. Ltd.*, 766 F.3d 1338, 1341 (Fed. Cir. 2014). A disclaimer or disavowal of claim scope must be "clear and unmistakable, requiring 'words or expressions of manifest exclusion or restriction' in the intrinsic record." *Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1358 (Fed. Cir. 2016) (quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002)). In view of the word "example" used in the Specification, we determine that the particular embodiment cited by Patent Owner does not rise to the level of a clear and unmistakable disavowal to support the exclusion proposed by Patent Owner.

The specification of the '389 patent describes a user pressing a key on a remote control device so that the remote control device transmits a keystroke indicator signal to the key code generator device. Ex. 1001, 3:44–58. The step of "generating a key code within a key code generator device using the keystroke indicator signal" is accomplished by "determin[ing] which key code of the codeset previously identified . . . corresponds to the pressed key." *Id.* at 4:32–34. Based on this disclosure of the '389 patent, Patent Owner takes the position that "identifying a key code from a codeset is [']generating[], but translating one is not [']generating[']." Tr. 89:12–17 (Patent Owner agreeing such a characterization of its position is "exactly right").

We are not persuaded that there is sufficient basis for construing the "generating" limitation so broadly as to capture the *identification* of a key code from a codeset while simultaneously excluding *translation* of a received code. By forgoing a straightforward recitation of "identifying" in

the claims in favor of a broader recitation of "generating," the patentee clearly meant for the term not to be limited to mere identification of a key code but also to include other forms of generation of the key code.

We depart from the plain and ordinary meaning in only two instances: (1) when a patentee acts as his own lexicographer and (2) when the patentee disavows the full scope of the claim term in the specification or during prosecution. *Poly-Am.*, 839 F.3d at 1136 (citation omitted). Here, Patent Owner does not argue lexicography. Because we find no disavowal in the Specification or during prosecution that supports Patent Owner's proposed exclusion of translation of a received code from the scope of the term, we apply the plain and ordinary meaning of "generating" without such an exclusion.

6. "means for receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal . . ."

Challenged independent claim 12 recites "means for receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal . . . ." Ex. 1001, 12:11–16. The parties agree that this limitation should be construed under the provisions of 35 U.S.C. § 112 ¶ 6. Pet. 13; PO Resp. 14–15. The parties also agree that, under such a construction, the function of the recited "means" is "receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal." Pet. 13; PO Resp. 14–15.

In the preliminary phase of this proceeding, the parties appeared to agree that the corresponding structure is "a microcontroller that facilitates the receiving and sending of the key code," and we adopted that structure as part of our preliminary construction in determining whether to institute the proceeding. Dec. 17. During the trial, both parties abandoned that initial position and now dispute what structure is disclosed in the '389 patent that corresponds to the function of "receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal." Nevertheless, the parties remain agreed that the structure is some form of "microcontroller" performing an algorithm. *See* PO Resp. 15–16 (Patent Owner proposing structure of "a microcontroller that performs the algorithms described in Step 105 of Fig. 2, as further explained in detail at 5:49-6:4, and equivalents thereof"); Reply 7–8 (Petitioner proposing construction of "a microcontroller that performs the algorithm of receiving a key code from an RF receiver that has received a first key code signal and translating the key code so that the key code is modulated onto a[n] infrared carrier signal resulting in a second key code signal").[6]

Proposing an algorithm performed by the microcontroller is consistent with the requirement that "the structure disclosed in the specification be more than simply a general purpose computer or microprocessor." *Aristocrat Techs. Austl. Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333

[6] We note that the parties were afforded an opportunity not only to address their newly proposed constructions in briefing after institution of the trial, but also to address those constructions at the oral hearing. *See* Tr. 58:12–60:1 (Petitioner addressing dispute over construction of "means for receiving . . ."), 108:11–110:2 (Patent Owner addressing same).

(Fed. Cir. 2008). Specifically, to avoid purely functional claiming with such a means-plus-function limitation, it is "the algorithm that transforms the general purpose microprocessor to a 'special purpose computer programmed to perform the disclosed algorithm.'" *Id.* at 1338 (citing *WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999)). In eschewing the use of means-plus-function limitations as a mechanism for purely functional claiming, the Federal Circuit has emphasized that "the *disclosure* must identify the method for performing the function, whether or not a skilled artisan might otherwise be able to glean such a method from other sources or from his own understanding." *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1317 (Fed. Cir. 2012). And "the sufficiency of the disclosure of algorithmic structure must be judged in light of what one of ordinary skill in the art would understand the disclosure to impart." *Aristocrat*, 521 F.3d at 1337. We have considered both parties' proposals and find that Petitioner provides the more compelling structural aspect of the construction consistent with these principles.

Patent Owner contends that Petitioner's proposed structure "simply restates the function the parties have agreed on." Sur-reply 4. We disagree. As noted above, the function of the "means for receiving . . . and sending . . ." term is "receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal." In identifying the structure that performs this function, Petitioner supplements the function with a number of algorithmic characteristics: "a microcontroller that performs the algorithm of receiving a key code from an RF receiver *that has received a first key code signal* and *translating the key code* so that the key code is modulated onto an infrared

carrier signal *resulting in a second key code signal*." Reply 8 (emphases added). As noted by the emphasized portions, Petitioner's proposed structure goes beyond a mere restatement of the function by including specific reference to key code signals and translation of the key code. Petitioner supports its proposal by citing to column 5, lines 45–59, of the '389 patent, which makes specific reference to the first and second key code signals, as well as to "translating the communicated key code." *Id.*; *see also* Ex. 1040 ¶ 23. We have reviewed that portion of the specification, as well as Dr. Russ's supporting testimony, and find it sufficient. Ex. 1040 ¶ 23.

In supporting its counterproposal, Patent Owner points to a portion of the specification of the '389 patent that has some overlap with Petitioner's identification. PO Resp. 16 (citing Ex. 1001, 5:49–6:4). But as Petitioner points out, "the cited portions of the specification refer to the operations of the ***entire remote control*** rather than the specific 'means' structure of a microcontroller." Reply 7 (citing Ex. 1040 ¶¶ 21–24). Patent Owner dismisses "[t]his distinction [a]s not valid," but does not adequately explain *why* the distinction is not valid. Sur-reply 4. This is in contrast to the testimony of Dr. Russ, who specifically identifies the cited portion of the specification as stating that "remote control device 11 first receives first key code signal 19 and relays the key code communicated by first key code signal 19 . . . in the form of a second key code signal 22." Ex. 1040 ¶ 22; Ex. 1001, 5:49–52. Although this portion of the specification is also cited by Petitioner, Petitioner's proposal more effectively accommodates the distinction that "it is the 'RF receiver' that receives the first key code signal 19—not the microcontroller." Ex. 1040 ¶ 22 (citing Ex. 1001, 5:45–48).

We accordingly give weight to Dr. Russ's testimony that a person of ordinary skill in the art "would not have interpreted the claim term to be limited to every limitation recited in 5:49-6:4 of the specification," as Patent Owner seems to propose. *Id.* We have also considered the testimony on this point provided by Dr. Sprenger, but find it less helpful in resolving the dispute than Dr. Russ's testimony. Dr. Sprenger states only that "the '389 patent discloses a detailed algorithm for 'receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal' in the specification at 5:49-6:4, which also references Step 105 of Fig. 2." Ex. 2003 ¶ 142. This statement appears uncontroversial, but is of limited value because it does not address the distinction between operations performed specifically by the microcontroller as opposed to other parts of the remote control. Nor is it apparent that Dr. Sprenger considered such a distinction, particularly because he expresses no understanding of the applicable legal standard that might otherwise provide context for evaluation of his statement. *See id.* ("I have no opinion on the law or what the relevant legal standard is.").

For these reasons, we adopt, in this Final Written Decision, Petitioner's structural identification. That is, we construe "means for receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal . . . " as a means-plus-function limitation with (1) the function of "receiving a key code from said RF receiver and for sending said key code to said IR transmitter such that said key code is modulated onto an IR carrier signal"; and (2) the structure of "a microcontroller that performs the algorithm of receiving a key code from an RF receiver that has received a

first key code signal and translating the key code so that the key code is modulated onto an infrared carrier signal resulting in a second key code signal."

D. Scope and Content of the Prior Art

1. Mishra

Mishra discloses "a way to program a remote control unit to handle a variety of electronic devices in a fashion which is easy and quick for the user." Ex. 1005 ¶ 5. Figure 1 of Mishra is reproduced below.

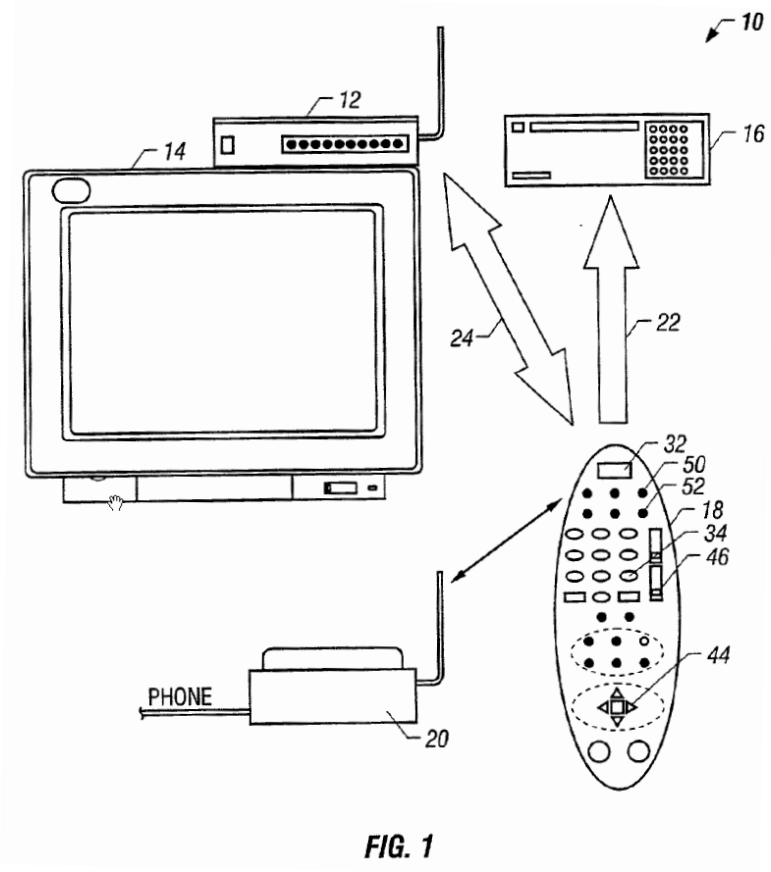


FIG. 1

Figure 1 is a schematic illustration of control system 10, which includes processor-based system 12 in communication with remote control unit 18. *Id.* ¶¶ 7, 14. System 12 may be a set-top computer system that works

together with conventional television receiver 14. *Id.* ¶ 14. Remote control unit 18 may include display 32, keypad 34, and joy-stick navigational control 44. *Id.* ¶ 15. In addition, remote control unit 18 may include telephone off-hook button 46 and buttons 50, 52 that act as "on" and "off" controls for dedicated electronic devices, such as audio/visual receiver 16. *Id.*

Remote control unit 18 may communicate with system 12 using wireless communication such as infrared or radio-frequency links, and system 12 can translate a command signal received from radio control unit 18 into a format appropriate for controlling device 16. *Id.* ¶¶ 18, 20. "That is, it is not necessary to program [remote control unit 18] independently. Instead a variety of codes may be stored in the system 12." *Id.* ¶ 20. Thus, when remote control unit 18 transmits a signal corresponding to a known function, system 12 can translate that signal and send information back to remote control unit 18 to control the particular device remote control device 18 is to operate. *Id.* Figure 1 depicts two communication pathways that illustrate this relaying process. Namely, pathway 24 provides bidirectional communication between remote control unit 18 and system 12, while pathway 22 is between remote control unit 18 and device 16. *Id.* ¶ 34.

For example, if a user presses a button on remote control unit 18, such as a "channel up button," remote control unit 18 transmits a command to system 12, which receives the signal and "in turn sends [remote control unit 18] the necessary codes to increment the channel on the TV." *Id.* ¶ 37. Remote control unit 18 takes these codes and sends them to the TV using protocols stored in its memory. *Id.*

2. Dubil

Dubil "relates to remote control devices and to a service for enabling the programming of remote controls to be used with consumer electronics (CE) equipment." Ex. 1006, 1:6–8. Figure 1 of Dubil is reproduced below.

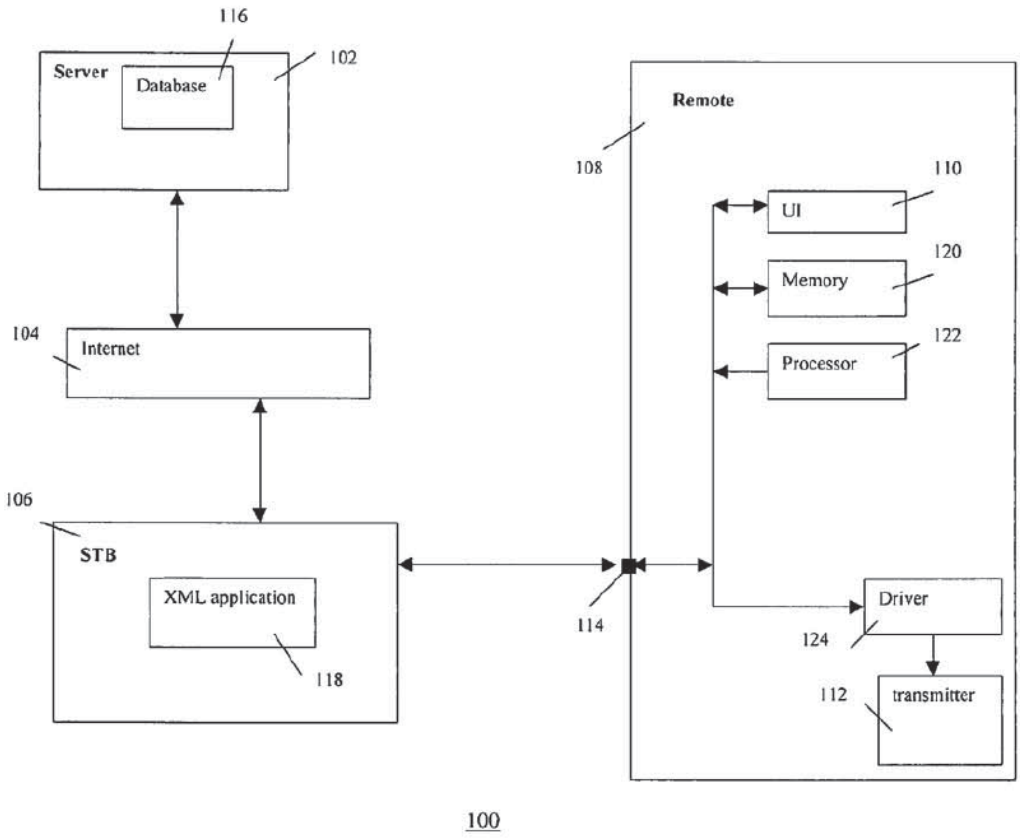


Fig.1

Figure 1 is a block diagram of system 100, which comprises server 102 connected via Internet 104 to appliance 106, such as a set-top box or personal computer, at a user's home. *Id.* at 4:48–51. Server 102 includes database 116, which maintains an inventory of control codes for commercially available consumer electronics equipment of various brands and types. *Id.* at 4:60–62.

The user has "universal programmable remote control device 108," which includes transmitter 112 for sending control codes to electronics

equipment, such as TVs, VCRs, CD players, set-top boxes, DVD players, audio pre-amplifiers and tuners, etc. *Id.* at 4:51–57. Input 114 of remote control device 108 allows for communication with appliance 106. *Id.* at 4:57–59. In operation, "[t]he user requests via appliance 106 a code set from server 102 for control of the apparatus, type, brand, serial no., etc., as specified by the user and to be controlled via remote 108." *Id.* at 5:6–8.

The codes maintained in database 116 are formatted as XML (Extensible Markup Language) documents such that "relevant parameters of a particular control code or command are defined using XML tags." *Id.* at 4:64–66. "For example, tags are defined for the relevant controllable apparatus to which a code pertains, for its type number, for the IR or RF carrier frequency, for the duty cycle, the protocol type, for the repetition time, for the on/off times of the signal, etc." *Id.* at 4:66–5:3. Dubil also discloses different modulation schemes that may be used in transmitting control codes having different bit patterns, including frequency-shift keying ("FSK"), binary phase-shift keying ("BPSK"), and pulse-width modulation ("PWM"). *Id.* at 4:33–37.

3. Caris

Caris addresses perceived disadvantages in conventional programming of a remote control to be used with consumer electronics equipment. Ex. 1008, 3:24–49. Figure 1 of Caris is reproduced below.

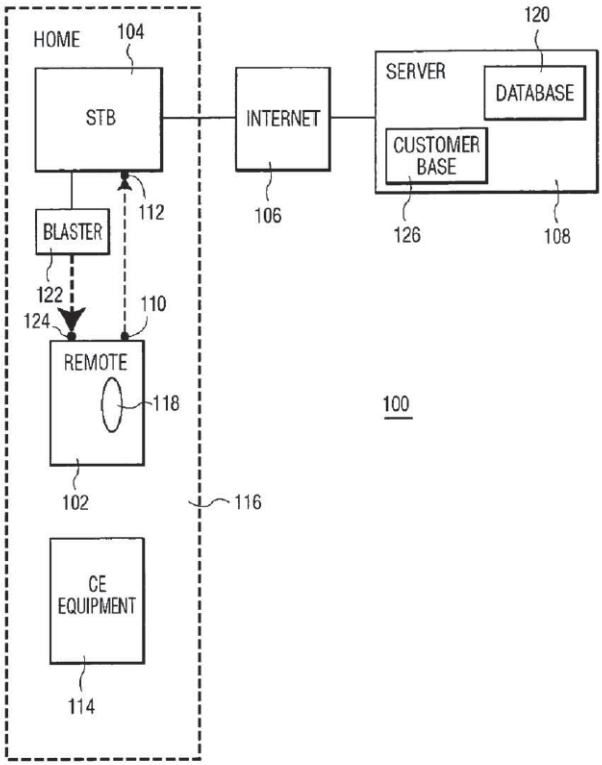


FIG. 1

Figure 1 is a block diagram of system 100, which includes remote control device 102, appliance 104 (which is connected to Internet 106), and server 108. *Id.* at 5:25–30. In this example, appliance 104 comprises a set-top box purchased by a consumer in combination with remote control device 102 for operating appliance 104 via, e.g., infrared transmitter 110 and receiver 112. *Id.* at 5:30–33. Remote control device 102 has hard buttons (such as dedicated button 118) or a touch screen, and "is programmable in order to adopt control codes for other IR- or RF-controllable equipment, e.g., appliance 114, that the consumer has installed or will install in his/her home 116." *Id.* at 5:27–29; 5:34–37. "The IR or RF code transmitted by remote 102 upon the consumer activating button 118 is interpreted by STB 104 as a request to send a message to server 108." *Id.* at 5:46–49. Server 108 has database 120, which "relates types, versions and brands of apparatus to their

individual command control code sets and [user-interface] aspects." *Id.* at 5:58–60.

Remote control device 102 may be programmed via infrared or radio-frequency blaster 122 connected to appliance 104. *Id.* at 6:4–5. When positioned close to, and with input 124 facing, blaster 122, remote control device 102 receives and processes an incoming stream of data that comprises the control codes and user-interface data requested from server 108, and potentially also certain user customizations. *Id.* at 6:5–12.

4. Skerlos

Skerlos "relates to remote control receivers and more specifically is directed to an infrared (IR) remote control detector/decoder providing improved noise immunity particularly adapted for use with a television receiver." Ex. 1009, 1:5–9. In particular, Skerlos describes a remote-control system in which pulse code modulated ("PCM") output signals are generated in response to user-operated controls. *Id.* at 2:66–3:2.

5. Lambrechts

In addition to other features, Lambrechts "relates to a universal remote control and a data processing device." Ex. 1011, 1:16–17. Lambrechts explains that it was known "to provide a universal remote control with learning which allow[s] IR codes of a new appliance[] to be learned, so that the device can subsequently be controlled with the universal remote control." *Id.* at 1:40–44. In particular, Lambrechts describes a "learning mode" used by a universal remote control to allow the association of command codes with selected keys. *Id.* at 1:47–52.

6. Yazolino

Yazolino relates particularly to "a 'view on-demand' cable television system that carries television signals in two or more signal formats, such as the NTSC, PAL, and SECAM television signal formats." Ex. 1012, 1:9–12. Figure 10 of Yazolino is reproduced below.

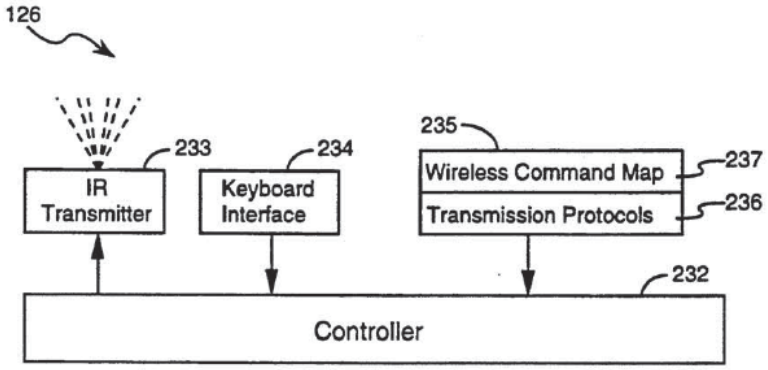


FIGURE 10

Figure 10 is a block-diagram representation of the components of a remote control device. *Id.* at 4:11–13. The remote control device includes microcontroller 232, infrared signal transmitter 233, keyboard interface 234, and memory 235 that stores transmission protocols. *Id.* at 15:21–30.

7. Van Ee

Van Ee "relates in general to a system and method for programming a programmable remote control device for controlling a consumer electronics (CE) apparatus." Ex. 1013, 1:9–12. Figure 1 of Van Ee is reproduced below.

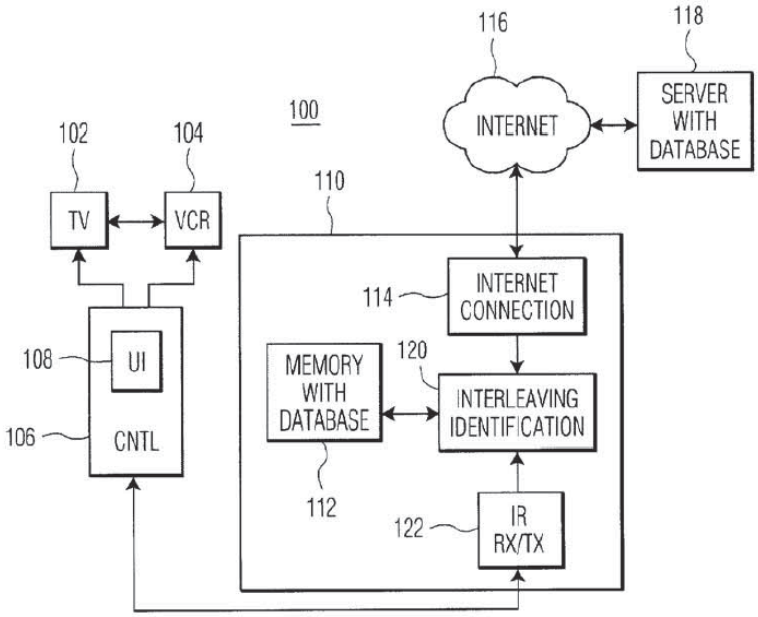


FIG. 1

Figure 1 illustrates information processing system 100, which may control a home entertainment system. *Id.* at 5:30–32. The system includes first and second apparatus 102 and 104, respectively illustrated as a TV and a VCR, each of which has multiple user-controllable functionalities. *Id.* at 5:32–38. Programmable control device 106 has user interface 108 with multiple user inputs, such as buttons or soft keys, allowing selective control of functionalities of apparatus 102 and 104 by sending particular control signals. *Id.* at 5:38–44. "In this example, device 106 is a programmable, hand held IR remote controller for consumer equipment." *Id.* at 5:44–46. "Programming means 110" allows for programming of control device 106, and "is preferably contained within a set top box connected to TV set 102 and includes a memory 112 having a database containing apparatus type/brand combinations." *Id.* at 5:50–54.

To perform this programming, Van Ee explains that a user selects a particular apparatus type/brand with programmable control device 106, prompting remote server 118 to download control codes that are transmitted to programmable control device 106. *Id.* at 5:66–6:16. The user then intermittently presses a button on user interface 108, causing transmission of an identifier code and its associated control code from among the downloaded codes. *Id.* at 6:41–47. "The user stops intermittently pressing the button on user-interface 108 once the apparatus to be controlled responds, e.g., TV set 102 turns on." *Id.* at 6:50–52. Once the user stops intermittently pressing the button, interleaver/identifier circuit 120 samples the last identifier code detected by receiver 122, and "uses the associated control code to determine to which set of control codes it belongs to and transmits the set to programming means 110." *Id.* at 6:53–7:2.

E. Obviousness Challenges Based on Mishra and Dubil

Petitioner challenges claims 2 and 3 as unpatentable under 35 U.S.C. § 103(a) over Mishra, Dubil, and Van Ee; challenges claims 4 and 7–15 as unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil; and challenges claim 5 as unpatentable under 35 U.S.C. § 103(a) over Mishra, Dubil, and Lambrechts. Pet. 3.

1. Independent Claim 2

In addressing the limitations recited in independent claim 2, Petitioner draws a correspondence between (1) the recited "remote control device" and Mishra's remote control unit 18, *id.* at 17; (2) the recited "keystroke indicator signal" and Mishra's command signal transmitted from its remote

control unit 18, *id.*; (3) the recited "key code generator device" and Mishra's system 12, *id.* at 16; and (4) the recited "key code" and Mishra's determined "remote control code," *id.* at 18. In doing so, Petitioner relies generally on Mishra's described functionality to meet the limitations of claim 2 requiring "receiving a keystroke indicator signal from a remote control device" and "generating a key code within a key code generator device using the keystroke indicator signal." *Id.* at 17–19. Petitioner relies on Dubil's disclosure in addressing the "modulating" limitation, contending that "[f]or the specific details behind Mishra's wireless transmission of control codes, a [person of ordinary skill in the art] would have looked at references, such as Dubil, which explicitly describe the transmission of control codes, such as Mishra's, via modulation onto a carrier signal." *Id.* at 19 (citing Ex. 1003 ¶ 125). And Petitioner relies on Van Ee in addressing the "identifying" limitation, contending that "Van Ee's system instructs users to intermittently press a button on the remote control corresponding to the function of the selected control code, such as a TV on button." *Id.* at 22.

Patent Owner disputes Petitioner's showing with respect to each of the five steps recited in independent claim 2, and also disputes Petitioner's rationale for combining the teachings of Mishra, Dubil, and Van Ee. We address each of these aspects of the parties' arguments below.

a. "receiving" limitation

Independent claim 2 recites "receiving a keystroke indicator signal from a remote control device, wherein the keystroke indicator signal indicates a key on said remote control device that a user has selected." Ex. 1001, 10:37–40. In addressing this limitation, Petitioner points to an

example in Mishra when a user presses a channel-up button, which "causes the appropriate command to be sent to the master telling it, for example, that the user wishes to go to the next highest channel." Pet. 29; Ex. 1005 ¶ 37. In doing so, Petitioner identifies Mishra's "command" with the "keystroke indicator signal" recited in the claim. Pet. 29.

Patent Owner disputes this identification, contending that a person of ordinary skill in the art "would understand that this command signal already includes the key code to control the appliance because Mishra states the command signal 'correspond[s] to a known function' and all that is needed is to 'translate the command into a format appropriate for controlling a particular device.'" PO Resp. 25 (citing Ex. 1005 ¶ 20; Ex. 2003 ¶¶ 176–179; Pet. 18; Ex. 1003 ¶ 107; Dec. 18–19). Patent Owner thus relies on its proposed construction of "keystroke indicator signal" as excluding the recited "key code." *See supra*, § II.C.2.

Mishra recognizes that the command signal "may not be particularly adapted to work any particular device." Ex. 1005 ¶ 20. Thus, after a user presses the channel-up button so that the remote control unit ("RCU") transmits the command signal to the "master" (i.e., set-top box), "the system . . . can translate the command into a format appropriate for controlling a particular device." *Id.* (reference numbers omitted). After such translation, the master "sends the RCU the necessary codes to increment the channel on the TV. The RCU then takes these codes and sends them . . . to the TV." *Id.* ¶ 37. As Petitioner points out, Reply 13, "the master feeds the information to the RCU each time the RCU needs information." *Id.* ¶ 39.

The parties' dispute thus hinges on whether the need for translation of the command and transmission back to the RCU sufficiently distinguishes

what is sent as Mishra's command signal from the recited key code. Patent Owner's expert, Dr. Sprenger, testifies that a person of ordinary skill in the art would have understood that "Mishra discloses sending the actual key code from the target device codeset. That is why only mere translation into an appropriate format, such as RF or IR is needed." Ex. 2003 ¶ 179. Petitioner's expert, Dr. Russ disagrees: "Mishra's RCU does not already transmit a key code in its keystroke indicator signal. Instead, Mishra's RCU generates a keystroke indicator signal (e.g. corresponding to the 'channel up button') so that its '***master [set top box]***' can identify the corresponding key code." Ex. 1040 ¶ 34.

We give greater weight to Dr. Russ's interpretation of Mishra, which is more consistent with our adopted construction of "generating a key code within a key code generator device using the keystroke indicator signal" as encompassing translation of a received code. *See supra*, § II.C.5. We accordingly conclude that, because the command signal sent by Mishra's RCU requires translation to generate the key code, the command signal does not include the key code as Patent Owner contends.

We have also considered Patent Owner's cursory argument that the combination of Mishra with Dubil "would not include a keystroke indicator signal" because "Dubil teaches away from a keystroke indicator signal and that instead 'the user fill[s] out an electronic template at the service's website.'" PO Resp. 26 (citing Ex. 1006, 5:6–11; Ex. 2003 ¶¶ 186–188; Ex. 2008, 155:3–156:1). Patent Owner advances only the limited argument that a person of skill in the art "would recognize the value in Dubil's more efficient processes," which is insufficient to demonstrate that Dubil teaches away from the combination. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed.

Cir. 2004) (a prior-art reference does not teach away from the claimed subject matter unless the prior-art reference also criticizes, discredits, or otherwise discourages the solution claimed).

We accordingly determine that Petitioner sufficiently identifies that Mishra teaches the "receiving" limitation.

b. "generating" limitation

Independent claim 2 recites "generating a key code within a key code generator device using the keystroke indicator signal, wherein said key code is part of a codeset that controls an electronic consumer device." Ex. 1001, 10:41–52. Petitioner contends that this limitation is disclosed by Mishra's determination of a corresponding control code through translation of the command signal received from the RCU into a format appropriate for controlling an appliance: "Specifically, upon receipt of the keystroke indicator signal, Mishra's set top box translates the keystroke indicator signal into a format appropriate for controlling a particular device, thereby *generating a key code*." Pet. 18. In accordance with our adopted construction of the limitation, we agree that such translation qualifies as "generating a key code," and that Mishra therefore meets the limitation. *See supra*, § II.C.5. In addition, Petitioner notes that Mishra "describes selecting the particular key code from the previously downloaded codeset," such that it is "part of a codeset that controls an electronic consumer device" as the claim requires. Pet. 18.

For the reasons discussed in connection with the "receiving" limitation, we disagree with Patent Owner's arguments that translation was expressly disclaimed during prosecution as a form of "generating," and that

there is no "keystroke indicator signal" disclosed by Mishra. *See* PO Resp. 27. In addition to these arguments, Patent Owner contends that Mishra describes transmission of "an entire codeset, not a single key code." *Id.* We also disagree with this contention because, as Petitioner points out, Mishra discloses two distinct embodiments, in one of which a single key code is transmitted. *See* Reply 13. Mishra summarizes the difference between the two embodiments by explaining that, in one embodiment, "the master feeds the information to the RCU *each time* the RCU needs information," contrasting that with the second embodiment in which "the master feeds the information needed to do all the different controls for a given device initially, and then the device handles those protocols on its own." Ex. 1005 ¶ 39 (emphasis added). Although Patent Owner argues that "Petitioner [is] raising this supposed distinction for the first time in the Reply," we find Petitioner's identification of the distinct embodiments properly responsive to Patent Owner's argument. Sur-reply 9; Tr. 91:1–93:2 (discussion at oral hearing regarding whether Petitioner's argument is properly responsive); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1078–80 (Fed. Cir. 2015) (holding that the Board may rely on new evidence submitted with a reply when the evidence is legitimately responsive to a patent owner's arguments and not needed for a prima facie case of obviousness).

We also disagree with Patent Owner's passing argument that Dubil and Van Ee "also teach identifying and transmitting an entire codeset" so that "any combination of Mishra, Dubil, and Van Ee would identify and transmit an entire codeset and would fail to satisfy the structure of the key code generator device." PO Resp. 27–28 (citing Ex. 1006, 5:6–20, 9:6–13; Ex. 1013, 3:66–4:5, 3:39–48, 2:65–3:5; Ex. 2003 ¶¶ 199–200). Although

Patent Owner supports the argument with testimony by Dr. Sprenger, we give that testimony minimal weight because it does not adequately explain *why* a skilled artisan would have rejected one of Mishra's embodiments in light of Dubil's and Van Ee's disclosure. 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

We accordingly determine that Petitioner sufficiently identifies disclosure of the "generating" limitation.

c. "modulating" limitation

Independent claim 2 recites "modulating said key code onto a carrier signal, thereby generating a key code signal." Ex. 1001, 10:45–46. For this limitation, Petitioner relies on the combination of Dubil with Mishra, observing that Mishra teaches wireless transmission of control codes to a remote control in response to user selection of a button on the remote control. Pet. 19 (citing Ex. 1005 ¶¶ 20, 26, 37). Petitioner further asserts that, "[f]or the specific details behind Mishra's wireless transmission of control codes, a [person of ordinary skill in the art] would have looked to references, such as Dubil, which explicitly describe the transmission of control codes, such as Mishra's, via modulation onto a carrier signal." *Id.* (citing Ex. 1003 ¶ 125).

In addition to reiterating its unpersuasive argument that Mishra transmits an entire codeset, rather than an individual key code, Patent Owner suggests that at least a portion of Petitioner's argument is grounded in inherency. PO Resp. 28–29 ("the Board previously rejected this exact inherency argument"). To the extent Patent Owner implies that Petitioner's

argument in this proceeding is akin to the arguments advanced in the earlier IPR, we disagree. On its face, the Petition advances neither an anticipation ground nor a single-reference obviousness ground that requires finding a reference inherently to disclose modulation of a key code onto a carrier signal. *See* Ex. 1007, 373–376. Instead, unlike the conflation of inherent anticipation with single-reference obviousness that the Board found problematic in the earlier IPR, the instant Petition identifies additional prior art that describes modulation in the form of Dubil, and articulates reasons for effecting the proposed combination.

Patent Owner attacks that combination by contending that it would not include the required "modulating" "because the XML tags relied on for modulation in Dubil only pertain to 'data required to have the *remote* send the particular code' to an electronic device." PO Resp. 29 (quoting Ex. 1006, 4:42–45 (emphasis by Patent Owner), 4:34–41, 4:60–64; Ex. 2008, 150:17–151:20). Rather, Patent Owner observes, "Dubil does not disclose the *key code generator device* modulating a key code onto a carrier signal." *Id.* Although we recognize that Dr. Sprenger identifies differences in the information that might be modulated when transmitting from a key code generator device as opposed to a remote control device, Ex. 2003 ¶ 219, we disagree that such differences meaningfully impugn Petitioner's articulated rationale for modifying Mishra to modulate the key code onto a carrier signal. *See* Ex. 1040 ¶ 46 (Dr. Russ explaining that "Mishra already describes the wireless transmission of key codes to its RCU using an IR or RF link" and that "Dubil describes well-known parameters that a [person of skill in the art] would have used to wirelessly transmit a key code."). It is not necessary for the prior art to serve the same purpose as that disclosed in

the challenged patent's specification to support the conclusion that the claimed subject matter would have been obvious. *See In re Lintner*, 458 F.2d 1013, 1016 (CCPA 1972); *see also KSR Int'l Co.*, 550 U.S. at 419 ("neither the particular motivation nor the avowed purpose of the patentee controls").

We accordingly determine that Petitioner sufficiently demonstrates that it would have been obvious to modulate Mishra's control code onto a carrier signal using the techniques disclosed by Dubil. Based on the complete record, Petitioner has shown sufficiently that the proposed combination of Mishra and Dubil teaches the "modulating" limitation.

d. "transmitting" limitation

Independent claim 2 recites "transmitting said key code signal from said key code generator device to said remote control device." Ex. 1001, 10:47–48. For this limitation, Petitioner observes that Mishra describes system 12 as "send[ing] information back to [remote control unit 18]" after translating what Petitioner identifies as the keystroke indicator signal "to enable [remote control unit 18] to control the particular device [remote control unit 18] is to operate." Pet. 21. This identification is sufficient, and Patent Owner disputes it only by reiterating its arguments addressed above, namely that Mishra, Dubil, and Van Ee do not disclose a "key code signal" because none of those references "discloses a key code generator device modulating a[n] individual key code onto a carrier signal." PO Resp. 27.

We accordingly determine that Petitioner sufficiently identifies disclosure of the "transmitting" limitation.

e. "identifying" limitation

Independent claim 2 recites "identifying said codeset using input from a user of said remote control device, wherein said codeset is identified when said user stops pressing a key on said remote control device." Ex. 1001, 10:49–52. In addressing this limitation, Petitioner notes that Van Ee teaches a user repeatedly pressing a button, thereby causing repeated transmission of a control code and corresponding identifier code, until some action occurs, such as a television turning on. Pet. 22 (citing Ex. 1013, 6:36–52). At that point, the user "stops intermittently pressing the button." Ex. 1013, 6:50–51. According to Petitioner, "[t]he STB then identifies a corresponding codeset." Pet. 22. We agree with this analysis and that Van Ee teaches the "identifying" limitation through this procedure.

Patent Owner disputes Petitioner's showing. First, even though the limitation does not recite the "key code generator device," which is instead recited as part of the "generating" limitation, Patent Owner contends that "the key code generator device must perform this step," i.e., the "identifying" step. PO Resp. 30. According to Patent Owner, this is "an agreed construction" that follows from our adopted means-plus-function construction of "key code generator device," which requires a set-top box (or certain other structure) "performing the steps of (1) identifying a codeset usable to communicate with an electronic consumer device." Tr. 84:17–85:4; *supra* § II.C.4. We are not persuaded by such bootstrapping. As Petitioner correctly pointed out at the oral hearing, "there is no explicit requirement here for [the 'identifying' step] to be performed at a key code generator device." Tr. 47:9–13. Moreover, according to our adopted

construction, the function of the "key code generator device" recited in the "generating" step is "to generate a key code." *Supra* § II.C.4.

But even if we agreed with Patent Owner that the "identifying" step must be performed by the set-top box for Van Ee to teach the limitation, we would still find that Petitioner makes a sufficient showing. That is, we do not agree that the evidence of record adequately supports Patent Owner's contention that "Petitioner is wrong that 'Van Ee teaches an STB identifying a codeset,'" and that, instead, "Van Ee teaches that the remote server identifies the codeset." PO Resp. 30 (citing Pet. 22; Ex. 1003 ¶ 130; Ex. 1013, 6:67–7:2, 7:66–8:2, 3:39–3:48; Ex. 2003 ¶¶ 231–234; Ex. 2009, 63:3–65:2). Rather, the evidence supports Petitioner's position.

Dr. Russ explains that Van Ee's set-top box 110 includes infrared receiver 122, which detects the identifier code causing the response and matching it with a corresponding code stored in memory 112. Ex. 1040 ¶ 47 (citing Ex. 1013, 6:53–62). Because the set-top box then retrieves the corresponding codeset from remote server 118, Dr. Russ testifies that Van Ee has a "clear teaching that its STB is the device that identifies the functioning interleaved signal and is therefore the device that identifies the correct codeset." *Id.* (citing Ex. 1013, 6:53–7:10, Ex. 1003 ¶¶ 115–118, 130–132). Although Patent Owner dismisses this explanation as "immaterial," Patent Owner does not adequately explain why the disclosure highlighted by Dr. Russ does not meet the "identifying" limitation. *See* Sur-reply 12–13. In this context, we have also reviewed Dr. Russ's cross-examination testimony that Patent Owner points to as an admission that "the remote server [of Van Ee] identifies the codeset," apparently rather than the

set-top box, but we discern no inconsistency with Dr. Russ's direct testimony. *See id.*; Ex. 2009, 63:3–65:2.

We accordingly determine that Petitioner sufficiently identifies disclosure of the "identifying" limitation.

e. Rationale for Combining Mishra, Dubil, and Van Ee

As summarized above, Petitioner relies on Mishra for all limitations of independent claim 2, but relies on the combination of Mishra with Dubil for the "modulating" limitation and the further combination with Van Ee for the "identifying" limitation.

Mishra discloses, for example, that after the master (set-top box) receives a command signal corresponding to a channel-up instruction, "[t]he master in turn sends the RCU the necessary codes to increment the channel on the TV." Ex. 1005 ¶ 37. Mishra further explains that wireless communications within its system may be implemented using "infrared or radio-frequency links." *Id.* ¶ 18. Accordingly, Petitioner reasons that a person of ordinary skill in the art "would have understood that the wireless transmission of such key codes using a radio frequency or an infrared frequency link would have been accomplished by modulating the key code onto a carrier signal, as such wireless transmission protocols were well-known, as acknowledged by the '389 patent." Pet. 19 (citing Ex. 1001, 1:42–46; Ex. 1003 ¶ 124). For example, the "BACKGROUND" section of the '389 patent states that it was known that "[t]he codesets can differ from each other not only by the bit patterns assigned to various functions of the associated electronic consumer device, but also by the timing information

that describes how the key codes should be *modulated onto carrier signals* to generate key code signals." Ex. 1001, 1:42–47 (emphasis added).

Petitioner's expert, Dr. Russ, explains that "Mishra does not explicitly describe the modulation of a control code onto a carrier frequency." Ex. 1003 ¶ 109. Accordingly, Dr. Russ asserts, a person of skill in the art "would have known to look to references, such as Dubil, for the specific details behind Mishra's wireless transmission of control codes." *Id.* ¶ 125. The combination of this testimony, Mishra's disclosure of infrared or radio-frequency transmission, and the '389 patent's acknowledgment that carrier-signal modulation was known provide rational underpinning that supports Petitioner's articulated reasoning for combining the teachings of Mishra and Dubil in the manner proposed by Petitioner.

With respect to the further combination of Van Ee with Mishra and Dubil, Petitioner observes that Mishra expresses a desire for automatic configuration that avoids "the elaborate and time consuming process of programming a remote control." Pet. 22 (citing Ex. 1003 ¶¶ 132–133; Ex. 1005 ¶ 3). Supported by the testimony of Dr. Russ, Petitioner reasons that a person of ordinary skill in the art "would have looked to Van Ee to provide a more streamlined programming method via the codeset identification technique." *Id.* at 23 (citing Ex. 1003 ¶¶ 134–136). For example, Dr. Russ notes his direct personal "experience at Scientific-Atlanta that determining the correct remote-control code set was surprisingly difficult" in opining that a person of ordinary skill in the art "would have been motivated to use an identification process such as that of Van Ee that would be used as a backup plan if other methods failed." Ex. 1003 ¶ 134. In presenting its reasoning, Petitioner notes that both Mishra and Van Ee

describe set-top boxes that wirelessly transmit key codes to remote controls, and receive data from remote controls. *Id.* Such similarities add weight to Dr. Russ's further testimony that "[i]mplementing the codeset identification process described in Van Ee would further be merely combining known elements to yield predictable results." *Id.* ¶ 136.

Patent Owner advances a number of arguments disputing the sufficiency of Petitioner's showing. First, Patent Owner argues that a person of ordinary skill in the art "would not have combined Mishra and Dubil because neither Petitioner nor its expert provides any reason why a [person of ordinary skill in the art] would seek to modulate the signals in Mishra onto a carrier signal." PO Resp. 20. This argument is not persuasive. Although Mishra may not be explicit in suggesting carrier-signal modulation, Dr. Russ provides sufficient basis, in light of the well-known practice of using carrier-signal modulation for RF and IR transmission, that a person of skill in the art would have understood such a suggestion from Mishra's disclosure of such transmission techniques. Indeed, Dr. Russ devotes a significant section of his Declaration to an overview of such techniques to support his assertion that "it was well-known to utilize modulation techniques to wirelessly transmit key codes." Ex. 1003 ¶¶ 83–94.

Patent Owner's expert, Dr. Sprenger, also acknowledges that carrier-signal modulation was widely known for transmission of IR and RF signals. Ex. 2003 ¶ 54 ("All of these methods were widely known and available in 2003); *see also* Ex. 1041, 54:10–55:3, 105:14–106:16. Nevertheless, Dr. Sprenger emphasizes that "the claimed modulating onto a carrier signal is only one of several options for transmitting a signal," and describes various

tradeoffs that a person of skill in the art might consider when selecting among those several options. Ex. 2003 ¶¶ 148–149. But the availability of alternatives does not negate an otherwise-supported motivation to combine reference teachings. *See In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (even the availability of better alternatives in the prior art "does not mean that an inferior combination is inapt for obviousness purposes").

Patent Owner also contends that a person of skill in the art would not have combined the teachings of Mishra and Dubil because they "are not analogous art." PO Resp. 21. In advancing this contention, Patent Owner provides a distorted characterization of the references, describing Mishra as focused on "a telephone unit" and Dubil as relating to "an XML (Extensible Markup Language) data format, in a service for supplying IR or RF commands for being installed on a remote control." *Id.* But as Dr. Russ testifies, both references "describe set-top boxes capable of transmitting control codes to a remote control device" and both references "describe a set-top box that downloads control codes from an external server and database via the Internet." Ex. 1003 ¶ 114. In light of this commonality, we find that both references are from the same field of endeavor as the '389 patent and reasonably pertinent to the particular problem faced by the inventor of the '389 patent. *See In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (articulating tests for analogous art).

In addition, Patent Owner contends that Mishra and Dubil are "fundamentally incompatible." PO Resp. 21. But Patent Owner cites no authority supporting its apparent position that the teachings of references can only be combined for obviousness purposes if they are compatible in every

respect. And we agree with Petitioner that the distinction highlighted by Patent Owner is "irrelevant" to the grounds as presented. Reply 10.

With respect to the further combination with Van Ee, Patent Owner advances arguments that generally parallel those it presents against combining Dubil with Mishra, namely that "Mishra and Van Ee are not analogous art," that "Mishra and Van Ee are fundamentally incompatible," and that "Van Ee teaches away from Mishra." PO Resp. 22–24. These arguments are unpersuasive. Patent Owner's characterization of Van Ee as "hav[ing] nothing to do with telephones" is too narrow, and we find instead that Van Ee is both in the same field of endeavor and reasonably pertinent to the particular problem faced by the inventor of the '389 patent. *See Bigio*, 381 F.3d at 1325. Patent Owner's incompatibility argument is grounded in its position that "Van Ee . . . teaches that the codeset is determined at a remote server," which we disagree with for the reasons expressed above. PO Resp. 23 (citing Ex. 1013, 6:67–7:2, 7:66–8:1). And, while we have considered Patent Owner's teaching-away argument, we disagree that the distinctions Patent Owner identifies rise to the level of the type of specific criticism or discouragement required. *See Fulton*, 391 F.3d at 1201.

Patent Owner also argues that "Petitioner bases motivation to combine on a faulty premise," namely that "Van Ee cannot be 'a backup plan if other methods fail' . . . because Dr. Russ admits Van Ee requires the same step that a [person of ordinary skill in the art] would allegedly be trying to avoid." PO Resp. 23 (citing Ex. 2003 ¶¶ 160–162; Ex. 2009, 57:2–63:2). But Petitioner adequately explains that "Van Ee is not presented as a replacement to Mishra, but rather to operate in conjunction with Mishra to identify the desired codeset." Reply 12 (citing Pet. 21–23). In assessing this

explanation, we have reviewed Dr. Russ's direct testimony at paragraphs 132–136 of his Declaration and find that, as a whole, it provides adequate support for the specific articulation of the combination set forth by Petitioner.

For these reasons, we determine that Petitioner articulates sufficient reason, supported by rational underpinning, for effecting the combination of teachings from Mishra, Dubil, and Van Ee that it proposes.[7]

f. Summary

In light of the above considerations, we conclude that Petitioner identifies all limitations of independent claim 2 in the prior art it cites, and provides sufficient reason for combining the teachings as it proposes. We accordingly conclude that Petitioner shows, by a preponderance of the

[7] Patent Owner also argues that "[n]either Petitioner nor Dr. Russ assert why a [person of ordinary skill in the art] would have combined Dubil with Van Ee," and that, "[t]herefore, motivation to combine Mishra, Dubil, and Van Ee is fatally deficient." PO Resp. 24 (citing *Intelligent Bio-Sys., Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1368 (Fed. Cir. 2016); *VIZIO, Inc. v. Nichia Corp.*, IPR2017-01608, Paper 72 (PTAB Jan. 9, 2019)); *see* Tr. 53:24–55:23 (discussion with Petitioner regarding requirement to show motivation for pairwise combinations of art), 103:12–105:9 (discussion with Patent Owner regarding same). Although we have reviewed the authority cited by Patent Owner, we agree with Petitioner that "a reason to pair wise combine [the references] . . . is not needed. All that's needed is a reason to combine all three references together." Tr. 54:24–55:5; *see Gen. Elec. Co. v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1352 (Fed. Cir. 2020) ("[T]he law has always evaluated the motivation to combine elements based on the combination of prior art *references* that **together disclose all of the elements** of the invention." (bolded emphasis added) (citation omitted)).

evidence, that independent claim 2 is unpatentable under 35 U.S.C. § 103(a) over Mishra, Dubil, and Van Ee.

2. Dependent Claim 3

Claim 3 depends from claim 2 and recites that "said user is prompted by autoscan functionality to press said key on said remote control device." Ex. 1001, 10:53–55. For this limitation, Petitioner relies on Van Ee's description of the system instructing a user to repeatedly press a button until some action occurs, such as turning on a television, as discussed above in connection with the "identifying" limitation of independent claim 2. Pet. 22, 24 (citing Ex. 1013, 2:6–13, 6:36–52). Supported by the testimony of Dr. Russ, Petitioner reasons that, because the user is prompted to perform this procedure, the lack of an expected response (such as the television remaining off) in light of the prior instruction acts as a "prompt." *Id.* (citing Ex. 1003 ¶¶ 130, 137–138). Although Patent Owner disagrees, arguing that "[t]he Petition fails to identify (and Van Ee fails to disclose) any prompt," PO Resp. 31, we find the instruction described in Van Ee and the intermittent lack of response identified by Petitioner sufficient to meet the claim requirement that the "user is prompted by autoscan functionality." *See* Reply 17 (Petitioner arguing that Patent Owner "improperly narrows its interpretation of 'prompt'").

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 3 is unpatentable under 35 U.S.C. § 103(a) over Mishra, Dubil, and Van Ee.

3. Independent Claim 4

In addressing the recited structural limitations of a "remote control device" recited in independent claim 4, Petitioner draws a correspondence between the recited "receiver," "transmitter," and "keypad" respectively with components of Mishra's remote control unit 18. Pet. 25–32. Although Petitioner generally relies on aspects of Mishra and Dubil that parallel those discussed above for method claim 2 in addressing the functional aspects of the claim, Petitioner specifically elaborates on the requirement that the transmitter "transmits a second key code signal." *Id.* at 28–30.

In particular, Petitioner observes that Mishra's remote control unit 18 "includes a repeater and IR transmitter that outputs either a bidirectional or a unidirectional infrared signal." *Id.* at 29. Petitioner contends the transmission of a second key code signal is disclosed through an example in which a user pushes a "channel up button," causing the command to be sent to system 12, which sends remote control unit 18 the necessary codes to increment the channel. *Id.* Remote control unit 18 "then takes these codes and sends them, for example using a unidirectional infrared signal, to the TV." Ex. 1005 ¶ 37. According to Petitioner, "[i]n this way Mishra discloses the key code being used to generate a second key code signal that is used to control a television." Pet. 29–30. Similar to its contention addressed above in the context of independent claim 2, Petitioner further contends that "it would have been obvious to use Dubil's disclosures of IR and RF modulation to implement those transmissions." *Id.* at 30. Petitioner supports its analysis with testimony by Dr. Russ. Ex. 1003 ¶ 146. With these identifications, Petitioner makes a sufficient showing.

Patent Owner disputes aspects of Petitioner's analysis with arguments that parallel arguments also made in the context of Petitioner's challenge to independent claim 2, and which we address above. PO Resp. 32–34. Although we have considered Patent Owner's arguments, we find them unpersuasive for the reasons expressed above.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 4 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

4. Dependent Claim 5

Claim 5 depends from claim 4 and recites that "said remote control device is taken from the group consisting of: a learning remote control device, a cell phone, an RF-enabled personal digital assistant (PDA), an RF-enabled wrist watch, and an RF-enabled keyboard." Ex. 1001, 11:3–7. In addressing this limitation, Petitioner relies on Lambrechts in further combination with Mishra and Dubil. Pet. 42–43. According to Petitioner, a person of ordinary skill in the art "would have understood that Lambrechts'[s] remote control would have been implemented with Mishra's system," and Dr. Russ testifies that such a person would "easily" have done so. *Id.* at 42 (citing Ex. 1003 ¶ 173); Ex. 1003 ¶ 173. As Petitioner points out, "[b]oth Mishra and Lambrechts explain that their remote controls are capable of communicating with STBs in a wireless manner and 'learning' new control codes." Pet. 42–43 (citing Ex. 1005 ¶ 17; Ex. 1011, 4:59–62). Dr. Russ also testifies that "using the learning remote described in Lambrechts with Mishra would have resulted in merely combining well-known elements to generate predictable results." Ex. 1003 ¶ 173. Because

Lambrechts provides an example of a "learning remote control" as recited in the Markush group of claim 5, and Petitioner provides sufficient reasoning with rational underpinning to support the additional combination with Lambrechts, Petitioner makes a sufficient showing.

Patent Owner disputes Petitioner's showing by arguing that "Petitioner and Dr. Russ exclusively rely on 'programming a remote control by placing it and the remote control of another appliance "face to face."'" PO Resp. 43 (citing Pet. 42; Ex. 1003 ¶ 172). According to Patent Owner, Lambrechts "expressly teaches *not* to use this methodology" such that "any combination of Mishra, Dubil, and Lambrechts would not include 'face to face' learning upon which the Petition solely relies." *Id.* (citing Ex. 1011, 1:44–2:18; Ex. 2003 ¶¶ 320–321). We are not persuaded by Patent Owner's contention. Instead, we agree with Petitioner that "the Petition does not rely on programming using two remotes," but instead "explains that a [person of ordinary skill in the art would have used Mishra's STB with a learning remote, such as the one described in Lambrechts." Reply 22 (citing Pet. 42–43). We thus find Petitioner's reasoning sufficient to implement the learning remote control of Lambrechts with the system that results from the combination of Mishra and Dubil.[8]

[8] Patent Owner also contends that "motivation to combine Mishra, Dubil, and Lambrechts is fatally deficient" because "Petitioner and Dr. Russ never assert why a [person of ordinary skill in the art] would have combined Dubil with Lambrechts. PO Resp. 42 (citing *Intelligent Bio-Sys.*, 821 F.3d at 1368). But, as we note above in connection with independent claim 2, we disagree that Petitioner must provide a motivation to combine the teachings of all pairwise combinations of the references it relies upon. *Supra*, n.7.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 5 is unpatentable under 35 U.S.C. § 103(a) over Mishra, Dubil, and Lambrechts.

5. Dependent Claim 7

Claim 7 depends from claim 4 and recites that "said key code is part of a codeset, and wherein said codeset is not stored on said remote control device." Ex. 1001, 11:16–18. Petitioner relies on the embodiment of Mishra, discussed above in the context of the "receiving" limitation of independent claim 2, in which Mishra's remote control unit obtains a key codes each time a button is pressed. Pet. 32–33 (citing Ex. 1005 ¶ 37). Petitioner infers that this "demonstrates that the codeset is not stored on the remote control." *Id.* at 33.

Although Patent Owner contends that Petitioner's showing is deficient because it relies on an inference, PO Resp. 34, we find the inference both reasonable and supported by other statements in Mishra and by Dr. Russ's testimony. *See* Ex. 1005 ¶ 21 ("In this way, it is not necessary to undergo elaborate programming of the [remote control unit] 18, but instead, databases within the system 12 may contain information about how a conventional device 16 may be operated."); Ex. 1003 ¶ 149.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 7 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

6. Dependent Claim 8

Claim 8 depends from claim 4 and recites that "said modulating to generate said first key code signal is performed according to a first codeset, and wherein said remote control device stores no codeset other than said first codeset." Ex. 1001, 11:19–22. The parties disagree as to the meaning of the last clause of claim 8, with Patent Owner contending that "[t]he plain language requires that the first codeset is stored" and Petitioner contending that "claim 8 does not require the storage of an entire codeset." PO Resp. 35; Reply 20. Under Petitioner's reading, "claim 8 refers to no other codesets being stored other than the key code representing the 'first codeset.'" Reply 20 (citing Pet. 33–34).

Both parties' positions are supported by respective expert testimonial evidence, but we find that Petitioner articulates the more compelling position in light of the specification of the '389 patent. *See* Ex. 1003 ¶¶ 151–153; Ex. 1040 ¶¶ 58–59; Ex. 2003 ¶¶ 277–279. The specification of the '389 patent states its objective as follows: "A system is sought for enabling a remote control device to control a selected one of multiple different electronic consumer devices *without requiring the codeset associated with the selected electronic consumer device to be stored on the remote control device*." Ex. 1001, 1:58–62 (emphasis added). "Based on this explanation," Dr. Russ asserts, "a [person of ordinary skill in the art] would not have interpreted claim 8 to require the storage of an entire codeset." Ex. 1040 ¶ 59. We agree with this assertion, which is reinforced by the lack of any express language in claim 8 that recites storage of the entire codeset.

With this understanding, we find Petitioner's showing sufficient that additional limitations of claim 8 are disclosed by Mishra. *See* Pet. 33–34. In

particular, Petitioner reasons that "[i]n view of the storage of codesets at the STB and not at Mishra's remote, when the remote receives the first key code signal, the remote does not store any other key codes from any other codesets." *Id.* at 34 (citing Ex. 1003 ¶¶ 151–152). Thus, "[w]hen Mishra's remote receives the first key code signal containing the key code from the first codeset, the remote briefly stores the key code similar to well-known relay devices and represents a storage of an element of the first codeset as claims." *Id.* (citing Ex. 1003 ¶¶ 151–152; Ex. 1005 ¶ 37).

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 8 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

7. Dependent Claim 9

Petitioner's reasoning for claim 8 also informs its analysis of claim 9, which recites that "said key code is part of a codeset that includes a plurality of key codes, wherein each one of said plurality of key codes corresponds to a different function of the electronic consumer device, and wherein no more than a single one of said plurality of key codes is present on said remote control device at any given time." Ex. 1001, 11:23–29. That is, the limitation is met because Mishra teaches that various control buttons correspond to such functions as "on/off, channel change, volume change, program VCR and the like." Pet. 34–35; Ex. 1005 ¶ 2, 38. Because Mishra includes an embodiment in which the remote control obtains a key code from the set-top box each time a button is pressed, no more than a single key code is stored on the remote control at any given time. Pet. 35; Ex. 1005 ¶¶ 21, 37. To the extent that Patent Owner implies that Petitioner relies on

an inference that, in Mishra, "no two key codes correspond to the same function," we find such an inference reasonable as part of an obviousness analysis in light of the full teachings of Mishra.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 9 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

8. Dependent Claim 10

Claim 10 depends from claim 4 and recites "a microcontroller that determines that a user of said remote control device has selected said key and that modulates said key code onto said second carrier signal." Ex. 1001, 11:32–35. As Petitioner points out, Mishra expressly discloses that its remote control includes a controller that may be a "microcontroller or microprocessor," and which is connected to its infrared transmitter. Pet. 35–36 (quoting Ex. 1005 ¶ 22). Supported by the testimony of Dr. Russ, Petitioner thus reasons that a person of ordinary skill in the art "would have understood that Mishra's controller 26 controls the properties of the signal generated by the IR transmitter by using a modulation scheme as disclosed by Dubil." *Id.* at 36 (citing Ex. 1003 ¶¶ 157–158). Although Patent Owner contends that "Petitioner and Dr. Russ are wrong" because "any combination of Mishra and Dubil would perform the alleged modulating at a driver separate from Mishra's microcontroller," that contention improperly relies upon the bodily incorporation of one reference into another, rather than maintaining focus on the teachings of the references. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 10 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

9. Dependent Claim 11

Claim 11 depends from claim 4 and recites that "said modulating said key code onto said first carrier signal is performed by an electronic consumer device taken from the group consisting of: a television, a stereo radio, a digital video disk player, a video cassette recorder, a personal computer, a set-top cable television box and a set-top satellite box." Ex. 1001, 12:1–6. Petitioner identifies the system 12, shown in Figure 1 of Mishra, reproduced above, as a member of the recited Markush group. Pet. 37; *see* Ex. 1005 ¶ 14 ("The system 12 may be a so-called set-top computer system that may work together with a conventional television receiver 14."). This identification is sufficient, which Patent Owner does not dispute outside of its arguments directed to the underlying independent claim. *See* PO Resp. 38.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 11 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

10. Independent Claim 12

Similar to its analysis of independent claim 4, Petitioner addresses the recited non-means-plus-function limitations of the "remote control device" of independent claim 12 by drawing a correspondence between the recited "keypad," "RF receiver," and "IR transmitter" respectively with components

of Mishra's remote control unit 18. Pet. 38–40. For the "means for receiving a key code," Petitioner identifies the microcontroller, discussed above in connection with dependent claim 10, which controls reception of a key code from an RF transceiver, and transmits the key code with an IR transmitter. *Id.* at 39. Because this identification is sufficient under our adopted construction of the "means for receiving a key code," and because Petitioner makes explicit reference to its analysis of modulating key codes in light of Dubil, we conclude that Petitioner makes a sufficient showing. *See id.*

As we note above, both parties abandoned their initial (and apparently agreed) claim-construction positions set forth during the preliminary phase of this proceeding. Nevertheless, although Patent Owner contends that "Petitioner does not present an algorithm" to address the structural aspect of the construction we adopt herein (*see* PO Resp. 39–40), the Petition does refer in its analysis of claim 12 to its analysis of claim 4. *See* Pet. 39 (citing Pet. § VII.A). In turn, Petitioner's analysis of claim 4, which we discuss at length above, explains how a key code is received from an RF receiver that has received a first key code signal and is translated so that the key code is modulated onto an IR carrier signal, resulting in a second key code signal. *See id.* at 25–32.

Patent Owner also contends that "the Petition improperly ignores that Dubil teaches the alleged modulating at a driver separate from a processor or microcontroller." PO Resp. 39. This contention is not persuasive because it attacks the references relied on by Petitioner individually rather than addressing the combination. *See* Reply 21 ("But [Patent Owner] again mischaracterizes the Petition's grounds, which rely on Mishra's

microcontroller 26 and operations in combination with Dubil's modulation techniques and parameters to teach this claim element."); *Keller*, 642 at 425.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 11 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

11. Dependent Claim 13

Claim 13 depends from claim 12 and recites that "said key code is not stored on said remote control device immediately prior to said means receiving the key code." Ex. 1001, 12:17–19. For this limitation, Petitioner relies on the embodiment of Mishra, discussed above, in which key codes are stored in its set-top box and not sent to the remote control device until a button is pressed on the remote control device and the corresponding key code transmitted from the set-top box to the remote control device. Pet. 40 (citing Ex. 1005 ¶¶ 20, 21, 37). In light of this embodiment, we agree with Petitioner that a person of ordinary skill in the art "would have understood that Mishra discloses the key code not being stored on the RCU immediately prior to the RCU receiving the key code." *Id.* (citing Ex. 1003 ¶ 165).

In disputing Petitioner's showing, Patent Owner seeks to draw a distinction between the remote control unit identified by Petitioner and the microcontroller embodied within the remote control unit. PO Resp. 40 (citing Ex. 2003 ¶¶ 304–306). This distinction is not persuasive because Petitioner's mapping of Mishra and Dubil to the limitations of underlying claim 12 require that the key code be received by the "means for receiving a key code," i.e. Mishra's microcontroller, which is embodied within the remote control unit.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 13 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

12. Dependent Claim 14

Claims 14 depends from claim 12 and recites that "said key code is part of a codeset, and wherein said codeset is not stored on said remote control device." Ex. 1001, 12:20–22. This limitation corresponds to the limitation of claim 7, which depends instead from claim 4, and Petitioner relies on the same analysis. *See id.* at 11:16–18; Pet. 41. Patent Owner raises no additional argument beyond its argument directed at claim 7, which we address above and find unpersuasive.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 14 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

13. Dependent Claim 15

Claim 15 depends from claim 12 and recites that "said means is a microcontroller." Ex. 1001, 12:23–24. Because we find that Petitioner makes a sufficient showing in its analysis of claim 12 by identifying Mishra's microcontroller as meeting the recite "means for receiving a key code," we also find that Petitioner makes a sufficient showing with respect to claim 15. *See* Pet. 41 (Petitioner referring to analysis of claim 12); PO Resp. 40–41 (Patent Owner referring to its arguments directed at claim 12).

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 15 is unpatentable under 35 U.S.C. § 103(a) over Mishra and Dubil.

F. Obviousness Challenges Based on Caris and Skerlos

Petitioner challenges claims 2 and 3 as unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, and Van Ee; challenges claims 4 and 11 as unpatentable under 35 U.S.C. § 103(a) over Caris and Skerlos; challenges claims 5 and 8 as unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, and Lambrechts; challenges claims 10, 12, and 15 as unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, and Yazolino, and challenges claims 13 and 14 as unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, Yazolino, and Lambrechts. Pet. 3.

1. Claims 2 and 3

In addressing the limitations recited in independent claim 2, Petitioner draws a correspondence between (1) the recited "remote control device" and Caris's remote control device 102, *id.* at 45–46; (2) the recited "keystroke indicator signal" and Caris's "IR or RF code" transmitted by remote control device 102 upon activation of dedicated button 118, *id.*; (3) the recited "key code generator device" and Caris's appliance 104, *id.* at 46–47; and (4) the recited "key code" and the control codes in the data stream transmitted from server 108 and received by remote control device 102, *id.* In doing so, Petitioner relies generally on Caris's described functionality to meet the limitations of claim 2 requiring "receiving a keystroke indicator signal from

a remote control device" and "generating a key code within a key code generator device using the keystroke indicator signal." *Id.* at 45–47.

In the Institution Decision, we noted a deficiency in Petitioner's treatment of the recited "key code generator device" under our preliminary means-plus-function construction, which we have now adopted for this Final Written Decision. Dec. 32–34. Specifically, although Petitioner adequately identifies a correspondence in Caris to the claimed function, Petitioner's identification of the corresponding structure is insufficient. That is, Petitioner asserts, without citing supporting evidence, that the set-top box described by Caris "generates a key code, identifies a codeset usable to communicate with an electronic consumer device, and *identifies the key code corresponding to a pressed key* for that codeset as construed by the district court." Pet. 46–47 n.3 (emphasis added). But rather than identifying a command code corresponding to a pressed key for a codeset, the remote control in Caris is programmed with the entire code set from the server. Ex. 1008, 6:4–10. We thus found that "Petitioner provides insufficient explanation for its assertion that Caris 'identifies the key code corresponding to a pressed key.'" Dec. 34.

Petitioner does not dispute this finding nor provides any further explanation in support of its position. *See* Reply 22 (stating only that "Caris in view of Skerlos renders obvious claims 2 and 3 for the reasons stated in the Petition."). We thus see no reason to deviate from preliminary finding, and we make the same finding for this Final Written Decision. Because claim 3 depends from claim 2, Petitioner's analysis of that claim suffers from the same deficiency.

We accordingly conclude that Petitioner does not show, by a preponderance of the evidence, that claims 2 or 3 are unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, and Van Ee.

2. Claims 4 and 11

In addressing the recited structural limitations of a "remote control device" recited in independent claim 4, Petitioner draws a correspondence between the recited "receiver," "transmitter," and "keypad" respectively with components of Caris's remote control device 102. Pet. 55–61. Notably, independent claim 4 does not recite a "key code generator device" such that Petitioner's analysis suffers from the same deficiency we identify with respect to claim 2. For claim 11's Markush group-limitation of an electronic consumer device which performs the key-code modulation, Petitioner relies on Caris's disclosure of a set-top box. *Id.* at 61.

In its analysis of independent claim 4, Petitioner contends that the limitation requiring that the "first key code signal is generated by modulating a key code onto a first carrier signal," embraced by the "receiver" limitation, is disclosed by the combination of Caris and Skerlos. *Id.* at 56. According to Petitioner, a person of ordinary skill in the art "would have understood that the modulation techniques described in Skerlos would have easily been implemented to operate Caris' RF blaster to transmit a key code using the 'ON/OFF pulsing' described in Skerlos," and Petitioner supports that assertion with testimony by Dr. Russ. *Id.* (citing Ex. 1009, 3:20–36; Ex. 1003 ¶¶ 215–217). Patent Owner disputes this contention "because the remote control only receives the entire codeset, which the prosecution history makes clear cannot satisfy 'key code signal.'" PO

Resp. 52. But for the reasons we discuss above, we disagree that the prosecution history supports Patent Owner's proposed exclusion of a codeset from the recited "key code signal," and we do not construe the term with such an exclusion. *See supra*, § II.C.3.

In the context of both the "receiver" and "transmitter" limitations, Patent Owner also contends that "Skerlos teaches away from using RF" and that "Skerlos teaches using IR only," but these contentions are unpersuasive. PO Resp. 53–54. As Petitioner emphasizes, "Caris already discloses communications in the RF spectrum," and Petitioner relies on Skerlos as "simply illustrat[ing] a common modulation technique used to transmit key codes that would have also been used interchangeably in the RF spectrum." Reply 23 (citing Pet. 56). As we discuss above in the context of a similar argument advanced by Patent Owner with respect to the Mishra-Dubil-based grounds, Dr. Sprenger acknowledges that such modulation schemes were well-known and would have been used for RF signals as well as for IR signals. *See* Ex. 1041, 54:10–55:3, 105:14–106:16, 112:17–20.

We also find sufficient Petitioner's contention that a person of ordinary skill in the art would have combined the teachings of Caris and Skerlos in the manner Petitioner proposes. Supported by testimony of Dr. Russ, Petitioner provides a motivation for the combination of teachings by explaining that a person of ordinary skill in the art "implementing Caris'[s] process of transmitting control codes from an STB to a remote control would have known that Caris accomplishes this through well-known modulation techniques, as described in Skerlos." Pet. 49 (citing Ex. 1003 ¶ 190). Patent Owner disputes Petitioner's reasoning to combine the teachings because "Caris and Skerlos are not analogous art," because "Caris and Skerlos teach

away from one another," and because "neither Petitioner nor its expert provides any reason why a [person of ordinary skill in the art] would seek to modulate the signals transmitted in Caris onto a carrier signal." PO Resp. 45–46.

With respect to whether Caris and Skerlos are analogous art to the '389 patent, Patent Owner characterizes Caris too narrowly in describing its "focus" as "a web service." *Id.* at 46. Rather, as we note above, Caris specifically addresses perceived disadvantages in conventional programming of a remote control to be used with consumer electronics equipment. Ex. 1008, 3:24–49. Indeed, Caris itself describes its invention as based on an "insight" meant to "make[] the programmable remote of the set-top box an attractive feature." *Id.* at 3:24, 3:49–52. We thus find that both references are from the same field of endeavor as the '389 patent and reasonably pertinent to the particular problem faced by the inventor of the '389 patent. *See Bigio*, 381 F.3d at 1325. We accordingly disagree with Patent Owner's position that a person of skill in the art would not have looked to a combination of Caris with "Skerlos's 'remote control detector/decoder' on a television." PO Resp. 46 (quoting Ex. 1009, abst.).

We also find unpersuasive Patent Owner's argument that Caris and Skerlos teach away from one another because "Caris teaches a remote using IR or RF, but Skerlos specifically instructs only to use IR." *Id.* (citing Ex. 1008, 5:34–37; Ex. 1009, abst.; Ex. 2003 ¶ 331). We have reviewed Skerlos's abstract, which Patent Owner cites as support for its contention. While Skerlos is clearly principally concerned with an infrared remote control detector/decoder, we do not discern an "instruct[ion]" to limit its teachings to IR applications. *See* Ex. 1009, abst. Certainly, we do not

discern the kind of disparagement that would rise to the level of a teaching away. *See Fulton*, 391 F.3d at 1201.

Finally, we also disagree with Patent Owner's contention that Petitioner provides insufficient reason for modulating Caris's signals onto a carrier signal. As Patent Owner acknowledges, this argument parallels the argument made in connection with the Mishra-Dubil-based grounds, with Patent Owner contending that "[b]oth Petitioner and Dr. Russ simply assume that modulation onto a carrier signal is inherently required, which was rejected by the Board previously." PO Resp. 45 (citing Ex. 1007, 376 and asserting that "[t]he discussion in [§] IV.A.4.a [of Patent Owner's Response] applies equally here"). To the extent Patent Owner again implies that Petitioner's argument in this proceeding is like those rejected by the Board in the earlier IPR, we disagree because the Petition advances neither an anticipation ground nor a single-reference obviousness ground that requires finding a reference inherently to disclose modulation of a key code onto a carrier signal. *See* Ex. 1007, 373–376. Rather, the instant Petition identifies additional prior art that describes modulation in the form of Skerlos, and articulates reasons for effecting the proposed combination.

For these reasons, we conclude that Petitioner shows, by a preponderance of the evidence, that claims 4 and 11 are unpatentable under 35 U.S.C. § 103(a) over Caris and Skerlos.

3. Claims 5 and 8

In addition to Caris and Skerlos, Petitioner relies on Lambrechts in addressing the limitations of claims 5 and 8, both of which depend from claim 4. Pet. 62–66. That is, Petitioner relies on Lambrechts to meet the

Markush limitation of claim 5 through its disclosure of a "learning remote control device," and to meet the limitation of claim 8 because it describes remote controls that are initially "empty" by not having any "prestored command codes." *Id.*; Ex. 1011, 2:27–3:33. According to Petitioner, a person of ordinary skill in the art "would have understood that Caris in view of Lambrechts would have disclosed the received key code being part of the first codeset and that the remote control device stores no other key codes from any other codesets." Pet. 66 (citing Ex. 1003 ¶ 239). We agree with this contention, which finds evidentiary support in Dr. Russ's testimony. Ex. 1003 ¶ 239.

In articulating its reasons for further combining the teachings of Lambrechts with the combination of Caris and Skerlos, Petitioner observes that Caris "indicates limitations" with its automated remote-control programming process, "especially when users are unable to enter appliance identification information correctly or when no information exists on an external database." Pet. 62–63. Petitioner accordingly reasons that a person of ordinary skill in the art "would have known to use other streamlined remote control programming processes like the learning remote described in Lambrechts to provide an additional way for programming the remote control." *Id.* at 63 (citing Ex. 1003 ¶¶ 232–233). Further, Dr. Russ testifies that the combination "would have resulted in merely combining well-known elements to generate predictable results as STBs and learning remotes were well-known in the art," and that such would have been "easily implemented . . . without undue experimentation and with a reasonable expectation of success." Ex. 1003 ¶ 234.

In disputing this reasoning, Patent Owner repeats its unpersuasive argument that "Lambrechts expressly teaches away from 'face to face' learning," and further argues that "neither Petitioner nor Dr. Russ assert why a [person of skill in the art] would have combined Skerlos with Lambrechts." PO Resp. 55. But Petitioner does not rely on programming two remotes any more in the Caris-Skerlos-based grounds than it does in the Mishra-Dubil-based grounds.[9]

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claims 5 and 8 are unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, and Lambrechts.

4. Claims 10, 12, and 15

In addition to Caris and Skerlos, Petitioner relies on Yazolino in addressing limitations of claims that recite a "microcontroller" in some form. Pet. 66–71. This includes claim 10, which depends from claim 4; independent claim 12, whose "means for receiving a key code . . . and for sending said key code . . ." we have construed as a means-plus function limitation with the structure of a microcontroller that performs a specified algorithm; and claim 15, which depends from claim 12. Ex. 1001, 11:30–34, 12:7–16, 12:23–24.

Dr. Russ testifies that, in Petitioner's proposed combination of Caris and Skerlos, the modulation described in Skerlos "would be performed by a

[9] Patent Owner also contends that "neither Petitioner nor Dr. Russ assert why a [person of ordinary skill in the art] would have combined Skerlos with Lambrechts." PO Resp. 55. But as we note above, we disagree that Petitioner must provide a motivation to combine the teachings of all pairwise combinations of the references it relies upon. *Supra*, n.7.

microcontroller in the remote control," but that "Caris does not explicitly describe these operational details." Ex. 1003 ¶ 240. Petitioner accordingly reasons that a person of ordinary skill in the art "would have known to look to references, such as Yazolino, which explicitly describes the circuitry of a remote control such as the one disclosed by Caris." Pet. 66–67 (citing Ex. 1012, 15:16–30; Ex. 1003 ¶ 240). In light of Petitioner's evidence, we find this reasoning, which is supported by rational underpinning, sufficient to effect the combination of those teachings with those of Caris and Skerlos.

Patent Owner disputes this combination on the basis that "there are many structures other than a microcontroller that could be used, such as that disclosed by Dubil." PO Resp. 59. But the availability of alternatives does not negate an otherwise-supported motivation to combine reference teachings. *See Mouttet*, 686 F.3d at 1334. Patent Owner also disputes the combination because "Caris and Yazolino" are not analogous art, but again provides an unduly narrow characterization of Yazolino as "relat[ing] to a converter coupling so that the STB can be hidden from view." PO Resp. 57–58. In fact, Petitioner relies on Yazolino for a limited purpose, namely its teaching of a microcontroller structure for a remote control device. Within this context, we find that Yazolino is both in the same field of endeavor as Caris and Skerlos, as well as reasonably pertinent to the

problem faced by the inventor of the '389 patent. *See Bigio*, 381 F.3d at 1325.[10]

With respect to claim 10, Patent Owner additionally contends that "Yazolino does not 'explicitly describe[] the circuitry of a remote control such as the one disclosed by Caris' . . . because Yazolino does not disclose any circuitry to receive or demodulate a carrier signal." PO Resp. 59 (quoting Pet. 67, citing Ex. 1012, Fig. 10; Ex. 2003 ¶ 424; Ex. 2009, 143:21–144:8). This contention is not persuasive because it improperly relies upon the bodily incorporation of one reference into another. *Keller*, 642 F.2d at 425.

With respect to claim 12, Patent Owner additionally contends that "Yazolino's remote control does not have circuitry to receive or demodulate any signal, let alone an RF signal." PO Resp. 60. This contention is not persuasive because Petitioner relies on Caris, not Yazolino, for the functionality based on its description of communicating IR and RF codes. *See* Reply (citing Pet. 43–44, 69–70; Ex. 1008, 6:4–20). In this respect, Patent Owner's argument that "[t]he Petition does not present an algorithm or offer any analysis thereof" is also unpersuasive because Caris discloses the functionality of the algorithm that is part of our adopted construction, as we discuss in greater detail above.

[10] Patent Owner also contends that Petitioner's reasoning to effect the combination is "fatally deficient" because "neither Petitioner nor Dr. Russ assert why a [person of ordinary skill in the art] would have combined Skerlos with Yazolino." PO Resp. 58. But as we note above, we disagree that Petitioner must provide a motivation to combine the teachings of all pairwise combinations of the references it relies upon. *Supra*, n.7.

In light of these considerations, we conclude that Petitioner shows, by a preponderance of the evidence, that claims 10, 12, and 15 are unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, and Yazolino.

5. Claims 13 and 14

For claims 13 and 14, both of which depend from claim 12, Petitioner relies on Lambrechts (in addition to its reliance on Yazolino for the "means for receiving a key code . . . and for sending said key code . . ." limitation of underlying claim 12). As noted above, Lambrechts explains that remote control devices may be "initially 'empty'" with "no prestored command codes." Ex. 1011, 2:27–30. For claim 13, Petitioner reasons that Lambrechts thus "explicitly discloses a remote control that does not store a key code immediately prior to receiving the key code," and supports this reasoning with testimony by Dr. Russ. Pet. 71 (citing Ex. 1003 ¶ 256). In an argument similar to that made in the context of the Mishra-Dubil-based grounds, Patent Owner disputes this reasoning by seeking to draw a distinction between the remote control unit identified by Petitioner and the microcontroller embodied within the remote control unit. PO Resp. 61. But this distinction is again not persuasive because Petitioner's mapping of Caris and Lambrechts to the limitations of underlying claim 12 require that the key code be received by the "means for receiving a key code," i.e., Lambrechts microcontroller as embodied within Caris's remote control device. We thus determine that Petitioner makes a sufficient showing with respect to claim 13.

For claim 14, Petitioner provides only the perfunctory statement that "Caris teaches this claim element," and cites to its analysis of claim 13. But

Petitioner's analysis of claim 13 relies specifically on Lambrechts's "initially empty" remote control devices, and Petitioner does not explain how—or even allege that—such a teaching meets the limitation of claim 14. *See* PO Resp. 61 ("the cited discussion only describes that command codes were not stored prior to receiving them, and not whether codesets are stored after the remote control receives them").[11]

We conclude that Petitioner shows, by a preponderance of the evidence, that claim 13 is unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, Yazolino, and Lambrechts, but does not show that claim 14 is unpatentable under 35 U.S.C. § 103(a) over Caris, Skerlos, Yazolino, and Lambrechts.

IV. CONCLUSION[12]

The table below summarizes our conclusions as to the challenged claims.

[11] We note that, but for their dependence from different underlying independent claims, claims 7 and 14 recite the same limitation. Ex. 1001, 11:16–18, 12:20–22. Petitioner has not challenged the patentability of claim 7 under the Caris-Skerlos-based grounds.

[12] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
2, 3	103(a)	Mishra, Dubil, Van Ee	2, 3	
4, 7–15	103(a)	Mishra, Dubil	4, 7–15	
5	103(a)	Mishra, Dubil, Lambrechts	5	
2, 3	103(a)	Caris, Skerlos, Van Ee		2, 3
4, 11	103(a)	Caris, Skerlos	4, 11	
5, 8	103(a)	Caris, Skerlos, Lambrechts	5, 8	
10, 12, 15	103(a)	Caris, Skerlos, Yazolino	10, 12, 15	
13, 14	103(a)	Caris, Skerlos, Yazolino, Lambrechts	13	14
Overall Outcome			2–5, 7–15	

V. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 2–5 and 7–15 of U.S. Patent No. 8,004,389 B1 have been shown to be unpatentable;

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

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