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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIZIO, INC.
Petitioner
v.
MAXELL, LTD
Patent Owner

IPR2022-01459

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 7,730,507 CHALLENGING CLAIMS 1, 2, 8-10, AND 13

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I. INTRODUCTION

Petitioner VIZIO, Inc. ("VIZIO" or "Petitioner") requests *inter partes* review ("IPR") of claims 1, 2, 8-10 and 13 ("Challenged Claims") of U.S. Patent No. 7,730,507 ("'507 Patent").[1,2]

II. MANDATORY NOTICES, STANDING, AND FEES

A. Real Party-In-Interest

Pursuant to 37 C.F.R. §42.8(b)(1), Petitioner certifies that VIZIO is the real party-in-interest, and that no other party exercised control over, could have exercised control over, or funded VIZIO's participation in this proceeding, the filing of this Petition, or the conduct of any ensuing trial. *Uniloc 2017 LLC v. Facebook Inc.*, 989 F.3d 1018, 1029 (Fed. Cir. 2021).

B. Related Matters

Petitioner is aware of the following pending proceeding involving the '507 Patent: *Maxell, Ltd. et al v. VIZIO, Inc.*, Case No. 2:21-cv-06758 (C.D. Cal.) (the "Litigation").

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[1] Only claims 1, 2, 10, and 13 have been asserted against VIZIO in the Litigation identified in §II.B.

[2] The Challenged Claims are reproduced in EX1004. The individual limitations of the Challenged Claims discussed herein by the corresponding designations in EX1004.

C. Lead and Backup Counsel

Petitioner provides the following designations of counsel:

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E. Certification of Grounds for Standing

Pursuant to 37 C.F.R. §42.104(a), Petitioner certifies that the '507 Patent is available for IPR and that Petitioner is not barred or estopped from requesting this review.[3]

F. Fees

Pursuant to 37 C.F.R. §42.103(a), Petitioner authorizes the Office to charge the fee set forth in 37 C.F.R. §42.15(a) to Deposit Account No. 50-2310, as well as any additional fees that might be due in connection with this Petition.

III. IDENTIFICATION OF GROUNDS

Petitioner requests review of the Challenged Claims in view of the following prior art references and grounds:[4]

[3] VIZIO was served with the Complaint in the Litigation on September 13, 2021. *See* EX1005.

[4] Petitioner also submits the declaration of Dr. Andrew Wolfe (EX1003), an expert in the field of the '507 Patent.

Ground	Claims	Basis	Reference(s)
1	1, 2, 10, 13	§103	Tichelaar and POSITA Knowledge
2	1, 2, 8-10, 13	§103	Tichelaar, Relan, and POSITA Knowledge
3	1, 2, 10, 13	§103	Tichelaar, Kim'616, and POSITA Knowledge
4	1, 2, 8-10, 13	§103	Tichelaar, Relan, Kim'616, and POSITA Knowledge
5	1, 2, 13	§103	Kitamura, Kim'616, and POSITA Knowledge
6	10	§103	Kitamura, Kim'616, Tichelaar, and POSITA Knowledge

Tichelaar (EX1008, published May 5, 2005), Relan (EX1010, published October 13, 2005), and Kim'616 (EX1011, published February 28, 2002) are all prior art under §§102 (a), (b), and/or (e).

Kitamura (EX1012, published March 1, 2007 from an application filed July 7, 2006) is prior art under §§102 (a) and/or (e).

These prior art references were not cited by the Examiner. Nor are they cumulative of the prior art of record in the '507 Patent examination or any related patent application. EX1003, ¶¶51-57.

IV. THE '507 PATENT

The '507 Patent was filed on May 14, 2007 and claims priority to Japanese Application JP 2006-228804, filed August 25, 2006. For purposes of this Petition

only, and without waiver, Petitioner has assumed August 25, 2006 as the earliest effective filing date.[5]

A. '507 Patent Disclosure

The '507 Patent is generally directed to a system (*e.g.*, television) that allegedly provides fast start-up (boot-up) times through the use of two low-power "waiting conditions" (*e.g.*, standby modes). EX1001, Abstract, 2:31-3:55, 6:4-51, FIG. 2; EX1003, ¶¶40-43.

The '507 Patent sought to address two known problems in the field: (1) slow start-up of a main CPU and (2) excessive power consumption in prior "standby" modes. EX1001, 1:51-65, 2:29-30; EX1003, ¶¶40-43, 63-73.

First, the '507 Patent acknowledges that start-up time for a CPU from a powered-down state was an "already known" problem. EX1001, 1:51-65; EX1003, ¶¶40-43. The '507 Patent states that this "consum[ed] much times [*sic*] for startup of the system" relative to other components, as the CPU was required to install (or otherwise initialize) software (*e.g.*, an operating system ("OS")). *Id.*

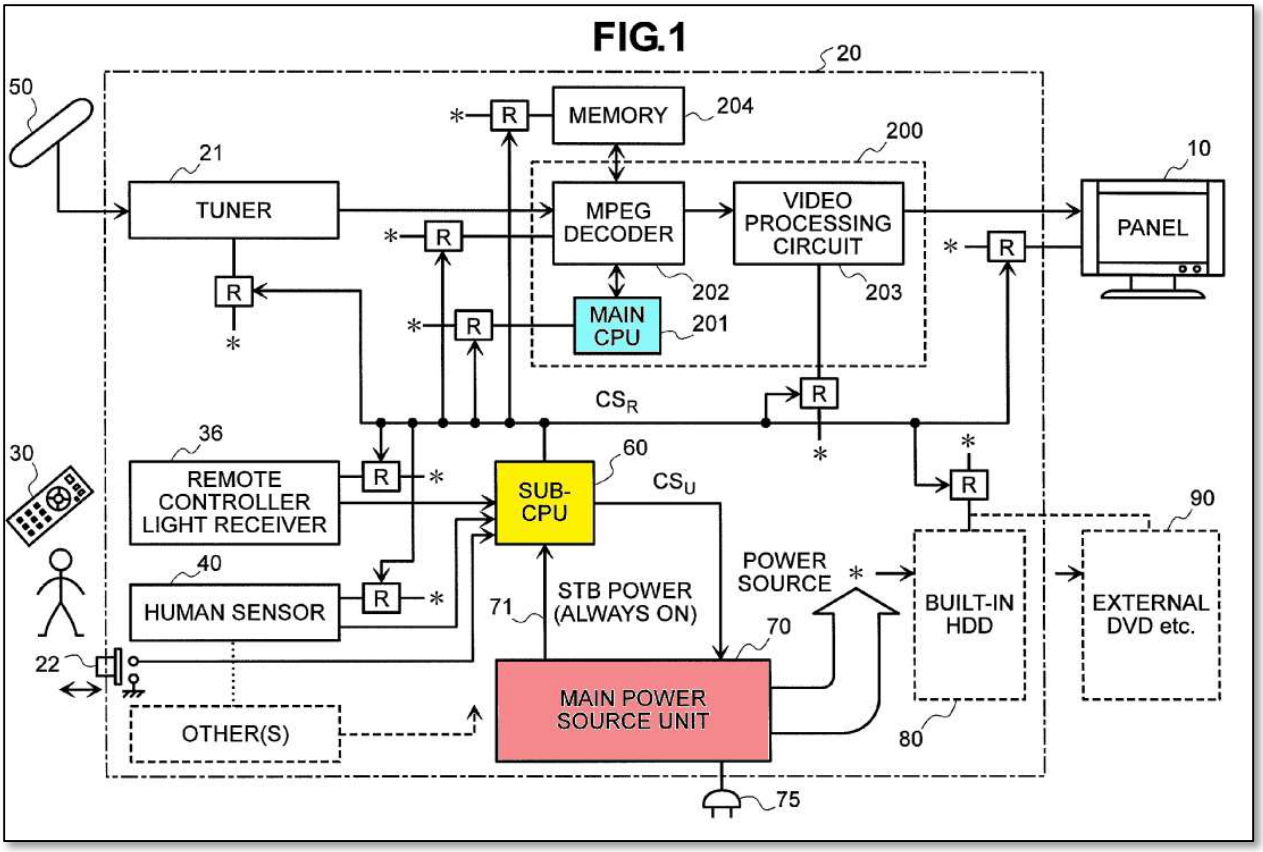
Second, while the Applicant acknowledged that the use of "waiting conditions" to address start-up time was generally known in the prior art, the '507 Patent further states that it was desirable to "suppress" excessive power consumption

[5] Pre-AIA provisions of Title 35 apply to the '507 Patent.

by the main CPU during a "waiting condition." EX1001, 2:23-30, 3:46-54, 8:51-64, 9:6-17, 10:53-58; EX1002, 60-68.

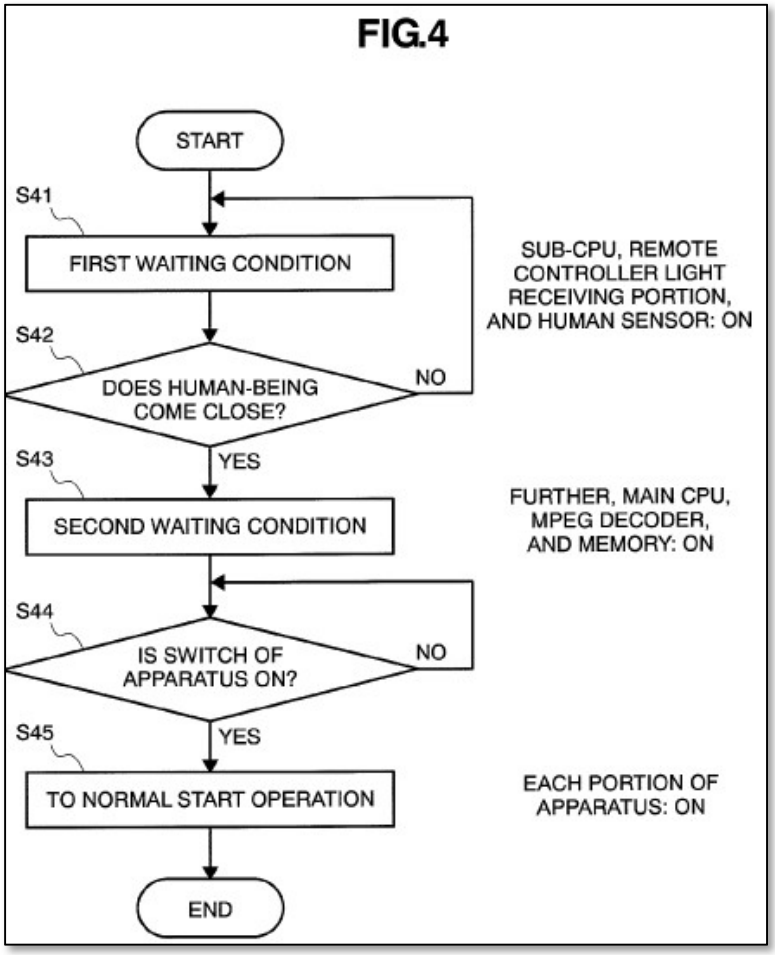
The '507 Patent addresses these purported problems by providing a low-power CPU (processer) in addition to a main CPU to control the power supplied to the other system components for each of its two "waiting conditions." EX1001, Abstract, 2:31-3:55, 6:4-51, FIG. 2; EX1003, ¶¶40-43, 63-73. Thus allowing the system to "suppress the consumption of electric power" in the "waiting conditions," while also "shortening the waiting time after starting up that apparatus." *Id.*

Figure 1 (annotated below) depicts the structure of a Broadcast Receiving Apparatus 20, including (in relevant part) a low-power Sub-CPU 60 (highlighted in yellow), a Main Power Source Unit 70 (red), and a Video Processing Portion 200 which includes a Main CPU 201 (blue). EX1001, 6:4-51; EX1003, 40-43.



Sub-CPU 60, which is "always on," is connected to Main Power Source Unit 70 via "STB Power [terminal] 71." *Id.* Sub-CPU 60 is "smaller in the consumption of electric power than the [M]ain CPU [201]" and controls the power supplied to the other components of Apparatus 20 by sending "control signals" (*i.e.*, CS_U and CS_R) to the Main Power Source Unit 70. *Id.* These control signals allow the Sub-CPU 60 to manage the Main Power Source Unit 70 such that "each [component (*e.g.*, 201-04, 10, 21, 80, 90)] can be turned ON/OFF, electrically." *Id.*

As shown in Figure 4 below, the Sub-CPU 60 transitions Apparatus 20 between two "waiting conditions" (S41 and S43). EX1001, 2:54-3:20, 7:28-41, 7:54-8:12, 8:65-9:5, 11:34-51, FIG. 4; EX1003, 40-43.



During the "first waiting condition," the Sub-CPU 60 instructs the Main Power Source Unit 70 to turn off components consuming a relatively large amount of power, *e.g.*, Display 10 and Main CPU 201, MPEG Decoder 202, and Memory 204. EX1001, Abstract, 1:51-65, 2:23-30, 2:48-3:55, 6:4-19, 6:42-51, 7:28-41, 7:54-8:12, 8:51-9:5, 11:34-51, FIGS. 2 and 4; EX1003, 40-43.

During the "second waiting condition," Sub-CPU 60 causes power to be supplied to Main CPU 201, MPEG Decoder 202, and Memory 204 (in anticipation of a user turning on the television). *Id.*

Sub-CPU remains powered on during each "waiting condition." As shown in Figure 4, when in either "waiting condition," the Sub-CPU determines whether to shift the device into the other "waiting condition," based on various external factors (S42) such as a "timer" and/or a user's interaction with the Broadcast Receiving Apparatus 20. *Id.*

B. Prosecution History

The Examiner initially rejected all pending claims over prior art. In relevant part, the Examiner found Challenged Claim 1 (original claim 16) anticipated by Nomoto (EX1014), which the Examiner found expressly disclosed the claimed "*first*" and "*second waiting condition*[s]." EX1002, 70-85.[6]

In response, the Applicant canceled all of the pending claims except for Claim 1, amended Claim 1 to its issued form, and filed new claims (*i.e.*, the remaining issued '507 Patent claims). *Id.*, 52-68.

[6] Unless otherwise indicated, all language "*italicized and quoted*" represents recited limitations of the Challenged Claims.

The Examiner allowed the amended claims without further rejection, specifically citing only the "*first controller*"/"*sub-control circuit*" as the alleged point of novelty. *Id*., 35-40 ("**Nomoto discloses a single controller** to better manage power source of a set top box by switch the set top box from rest state to active state") (emphasis added).[7]

Thus, the Examiner found every limitation of the Challenged Claims—including the "*first* [and *second*] *waiting condition*[s]"—to be disclosed in the art of record except for the use of a specific component (*i.e.*, the "*first controller*"/"*sub-control circuit*") to control the "*waiting condition*[s]." *Id.*

However, as discussed below, the prior art cited herein expressly discloses the use of a dedicated component (*e.g.*, Tichelaar's "delegate micro-controller") to control the various "*waiting conditions.*"

Recently, on July 18, 2022, Patent Owner requested a Certificate of Correction pursuant to 35 U.S.C. §255, amending Limitation 1A (*see* EX1004) of Challenged Claim 1 as follows:

[7] Throughout, all emphasis added unless otherwise indicated.

a first controller configured to control a waiting [[mode]] condition.

EX1002, 17-19. Patent Owner stated that this correction was made "to establish antecedent support" for the "*waiting condition*[s]" recited in Limitations 1G-I. *Id.* The Certificate issued on August 23, 2022. EX1002, 1.[8]

V. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA would have held a bachelor's degree in computer science, electrical engineering, or a closely related field, and at least two years of experience in designing systems for broadcast receiving apparatuses.[9] EX1003, ¶¶44-50.

[8] Petitioner has addressed the amended version of Challenged Claim 1 for purposes of this IPR only. However, Petitioner contests that this error was "clerical or typographical nature, or of minor character" and/or that the nature of the error and/or correction would have been obvious. *See Novo Indus., L.P. v. Micro Molds Corp.,* 350 F.3d 1348 (Fed. Cir. 2003). Petitioner reserves the right to present defenses regarding the issued (un-corrected) Challenged Claim 1 and/or the Certificate of Correction in any other action and/or forum, including the Litigation.

[9] Dr. Wolfe was a POSITA at least as of the '507 Patent's earliest priority date. EX1003, ¶¶5–19, 44–50.

Alternatively, a POSITA would have held a master's degree in computer science, electrical engineering, or a closely related field, and fewer years of experience. *Id.*

VI. CLAIM CONSTRUCTION

Except as identified below, Petitioner submits that no explicit construction (beyond plain and ordinary meaning under the *Phillips* standard) is required for the terms of the Challenged Claims.[10] EX1003, ¶¶58-62.

[10] No inference is intended nor should any be drawn that any term satisfies the requirements of 35 U.S.C. §112, ¶¶1–2. Petitioner reserves the right to challenge the validity of the Challenged Claims under 35 U.S.C. §112 in any other action and/or forum, including the Litigation. *See Target Corp. v. Proxicom Wireless, LLC*, IPR2020-00904, Paper 11 at 12–13 (PTAB, Nov. 10, 2020) ("alternative pleading before a district court is common practice, especially where it concerns issues outside the scope of *inter partes* review [*e.g.*, §112 indefiniteness]").

Petitioner submits that the following terms below should be construed pursuant to 35 U.S.C. §112, ¶6, with the function(s) and corresponding structure identified below. [11,12,13]

Challenged Claim 1	
Claim Term	**Proposed Construction**
(Claim 1): "*a first controller*" configured to perform its	§112, ¶6 applies

[11] The claim limitations construed under §112, ¶6 are highlighted in yellow in EX1004.

[12] The constructions proposed below are consistent with VIZIO's positions in the Litigation. *See* EX1026.

[13] Challenged Claim 1 recites "*A broadcast program receiving apparatus*" comprising, *inter alia*, a "*first controller*" and a "*second controller*." Challenged Claim 2 recites "*A display apparatus*" comprising, *inter alia*, a "*sub-control circuit*" and a "*main control circuit*." The recited functions of the "*first controller*" and "*sub-control circuit*" are substantially similar (though not identical) and both are directed to functionality performed by the sub-CPU 60 disclosed in the specification. *See supra* §IV.B; EX1003, ¶¶58–62. Likewise, the "*second controller*"/"*main control circuit*" are both directed to functionality performed by the disclosed main CPU 201. *Id*.

Challenged Claim 1	
Claim Term	**Proposed Construction**
specified function(s) [11:65-67, 12:11-22]	**Limitation**: "*first controller*" (Limitations 1A, 1F, 1G) **Function:**[14] (F1.1) "*control a waiting condition of the broadcast program receiving apparatus*" [Limitation 1A]; (F1.2) "*control the electric power supplied from the electric power source unit, responsive to the remote control signal received by the remote control signal receiving portion*" [1F]; and (F1.3) "*the waiting condition in which an image is not displayed after stopping a supply of the electric power to the display portion, is controlled by the first controller, so as to be placeable into either of a first waiting condition or a second waiting condition*" [1G] **Corresponding Structure:** a sub-CPU configured to: (S1.1) set the broadcast program receiving apparatus into the first waiting condition or the second waiting condition; (S1.2)(a) receive a signal from the remote control signal receiving portion corresponding

[14] For each term construed under §112, ¶6, each recited function and corresponding structure is discussed below with its limitation designation (*e.g.*, function (F1.1) and structure (S1.1) of the "*first controller"* are discussed with Limitation 1A in §VIII.B.2).

Challenged Claim 1	
Claim Term	**Proposed Construction**
	to a remote control signal; and (b) responsively transmit a control signal to the electric power source unit to control the electric power supplied from the electric power source unit; and (S1.3)(a) when the waiting condition in which an image is not displayed after stopping a supply of the electric power to the display portion is in a first or second waiting condition, determine whether to place the waiting condition into a first or second waiting condition; and (b) place the waiting condition into the first or second waiting condition according to the determination EX1001, Abstract, FIGS. 1 (sub-CPU 60, control signals CS_U and CS_R), 4 (steps S41-S43), 6:4-8:30, 11:33-52; *see also id*., 2:15-3:54, 8:51-10:53, 11:10-59
(Claim 1) "*a second controller*" configured to perform its specified function(s) [12:1-3; 12:49-51]	§112, ¶6 applies **Limitation**: "*second controller*" (Limitation 1B) **Function:** "*control a processing of a received digital broadcasting signal via a decoder*" [1B] **Corresponding Structure:** a processor, configured to control: (1) a video decoder to decode a video signal and (2) providing the decoded signal to the display portion EX1001, Abstract, FIGS. 1 (main CPU 201), 4:63-5:58, 7:54-9:17; *see also id.*, 2:15-3:54, 10:10-11:9

Challenged Claim 2	
Claim Term	**Proposed Construction**
(Claim 2): "*a sub-control circuit*" configured to perform its specified function(s) [11:65-67, 12:11-36; 12:52-13:10]	§112, ¶6 applies **Limitation**: "*sub-control circuit*" (Limitations 2G, 2H) **Function:** (F2.1) "*control the electric power supplied from the electric power source unit, responsive to the remote control signal received by the remote control signal receiving portion*" [2G]; and (F2.2) "*wherein a waiting condition of the display apparatus in which an image is not displayed after stopping a supply of the electric power to the display portion, is controlled by the sub-control circuit, so as to be placeable into either of a first waiting condition or a second waiting condition*" [2H] **Corresponding Structure:** a sub-CPU configured to: (S2.1)(a) receive a signal from the remote control signal receiving portion corresponding to a remote control signal; and (b) responsively transmit a control signal to the electric power source unit to control the electric power supplied from the electric power source unit; (S2.2)(a) when a waiting condition in which an image is not displayed after stopping a supply of the electric power to the display portion is in a first or second waiting condition, determine whether to place the waiting condition into a first or second waiting condition and (b) place the waiting condition into the first or second

Challenged Claim 2	
Claim Term	**Proposed Construction**
	waiting condition according to the determination EX1001, FIGS. 1 (sub-CPU 60, control signals CS_U and CS_R) and 4 (steps S41-S43), 6:4-8:30, 11:33-52; *see also id.*, Abstract, 2:15-3:54, 8:51-10:53, 11:10-32
(Claim 2) "*main control circuit*" configured to perform its specified function(s) [12:1-3; 12:49-51]	§112, ¶6 applies **Limitation**: "*main control circuit*" (Limitation 2F) **Function:** "*control parts of the display portion*" **Corresponding Structure:** a processor configured to control providing a decoded signal to the display portion EX1001, Abstract, FIGS. 1 (main CPU 201), 4:63-5:58, 7:54-9:17; *see also id.*, 2:15-3:54, 10:10-11:9

The foregoing corresponding structures also include equivalents thereof. EX1003, 60.

Patent Owner contends that the foregoing are not means-plus-function terms, and proposes that all claim terms should have plain and ordinary meaning. *See* EX1027, EX1030.

Regardless, the prior art presented below renders the Challenged Claims invalid under any reasonable construction(s).

VII. STATE OF THE PRIOR ART

Well before the priority date, television industry leaders had already solved the problems purportedly addressed by the '507 Patent (*i.e.*, "standby" power consumption and slow start up). EX1003, ¶¶63-73, 80-87.

As the '507 Patent acknowledges, slow boot-up times for a television CPU from a powered down state was also a well-known problem. EX1001, 1:52-65; EX1003, ¶¶63-73; EX1011, [0014], [0005], [0033] (disclosing the "need" for faster start up four years before the '507 Patent); EX1012, [0008].

Also known in the prior art was the need for enhanced functionality while in a "standby" mode (*e.g.*, "recording [of broadcast video], without using the display"). EX1007, 4:48-54; *see also* EX1010, [0073], [0108]; EX1008, [0005], [0045-47]; EX1003, ¶¶63-73.

The prior art used multiple "standby" power modes and controlling power with a sub-controller conserve "standby" power while providing enhanced standby functionality and faster start-up times. *See* EX1012, [0012], [0009]; EX1003, ¶¶63-88 (citing EX1009, 2:3-18; 2:39-51; 4:51-5:3; EX1007, 1:59-67, 3:33-45, 4:29-54).

VIII. GROUNDS 1-2: TICHELAAR IN VIEW OF POSITA KNOWLEDGE ALONE, OR IN FURTHER VIEW OF RELAN, RENDERS OBVIOUS THE CHALLENGED CLAIMS

Tichelaar discloses the claimed '507 Patent subject matter, using a sub-controller circuit to control power, in standby modes ("*waiting condition*[s]"), to a

"high performance main [micro-controller]" of a television's SoC). EX1003, ¶¶90-95.

To the extent, however, Patent Owner argues that Tichelaar does not expressly disclose:

- Limitation 1B/2F: It would have been obvious to a POSITA to modify Tichelaar, as discussed in §VIII.H.1.a. *Id.*, ¶¶90-92.
- Limitation 1G/2H and/or Limitation 1J/2K: Relan explicitly provides this disclosure. EX1003, ¶¶90-91, 93-95. As discussed below, Relan discloses two power conservation modes ("*first*" and "*second waiting condition*[s]") in which power is not supplied to a display (Limitation 1G/2H). *Id*. Further, in Relan's (active) "STAND-BY," power is supplied to a main controller and decoder ("*[supplying electric power] to the remote control signal receiving portion and the second controller including the decoder, under the second waiting condition*") (Limitation 1H/2K). *Id*. The proposed combination incorporates Relan's explicit disclosures of Limitations 1G/2H and/or 1J/2K into Tichelaar's system. *See infra* §VIII.I.2.

A. Grounds 1 and 2 Overview

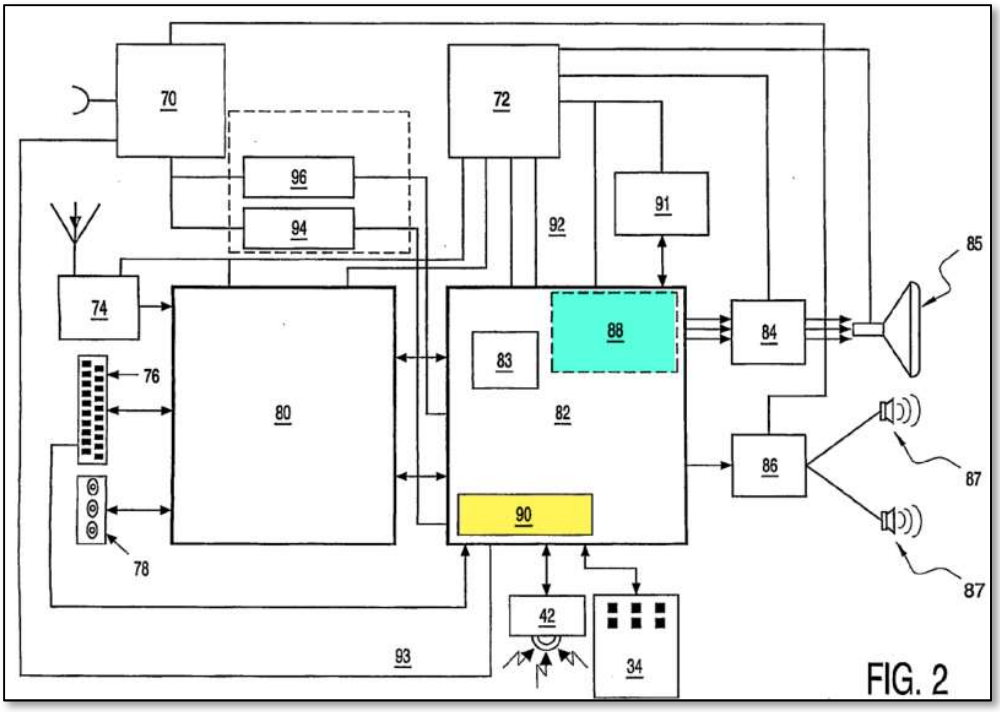
1. Tichelaar[15]

Tichelaar is directed to using a "delegate micro-controller (μC)"[16] to implement a "standby program" for lower power consumption in an "audiovisual device." EX1008, [0008], [0012], [0035]; EX1003, ¶96. To address the power consumption problem, Tichelaar "delegate[es] low power standby tasks from a main micro-controller … to a low speed, (ultra) low-power and small but adequate 'delegate' controller [DμC]." EX1008, [0035]; EX1003, ¶96. For example, the when "DμC 90" receives a remote control command ("*signal*"), it "power[s] up" the television "from low-power standby." EX1008, [0036]; EX1003, 96.

The "DμC" (highlighted yellow) and "main micro-controller" (highlighted blue) are shown in Figure 2 below:

[15] Tichelaar is analogous art. *See In re Bigio*, 381 F.3d at 1325; EX1003, ¶¶96–102. Tichelaar is within the '507 Patent field of endeavor because it relates to a broadcast receiving apparatus for receiving a television broadcasting signal. EX1003, ¶¶96–102. Tichelaar is also reasonably pertinent to at least one of the primary problems purportedly addressed by the '507 Patent (standby power conservation). *Id*.

[16] Also referred to as "delegate μC" or "DμC."



EX1008, [0018], FIG 2.

"The [DμC] can have its own local power management control" and "can control via a power regulator … the power supply voltage to part(s) or the whole SoC [System-on-Chip] 82," including the "main micro-controller 88." *See* EX1008, [0035-36], [0043], [0052], [0063]; EX1003, ¶¶98-99.

Tichelaar discloses that the "DμC" controls power by "signaling a switched mode power supply (SMPS) 70." EX1008, [0049], [0063]; EX1003, ¶99. SMPS 70 provides "power supply voltages to parts for [*sic*] the whole system-on-chip, including main controller and resources" and, in combination with "an extra high tension (EHT) generator 72," provides "all required power supply voltages" for the

"extended TV system," including a display "screen 85." *Id*. In addition, the "DμC" can "control a standby LED." EX1008, [0057-58]; EX1003, ¶99.

Tichelaar further discloses two standby modes: (1) "[l]ow-power standby (or standby passive)" ("*first waiting condition*") and (2) "[a]ctive standby" ("*second waiting condition*"). EX1008, [0045].

"The low-power standby" is characterized by preferably very low power consumption." EX1008, [0038], [0046], [0050]; EX1003, ¶100. In "low-power standby," power is provided to the "DμC" but "tak[en] away" from SoC modules that are inactive, such as the "main micro-controller 88." *Id*.

"Active standby" provides enhanced standby functionality. EX1008, [0047]; EX1003, ¶101. In "active standby," power is provided to additional SoC modules, such as "main micro-controller." *Id*. This allows the television to perform "additional [standby] tasks," such as "MPEG transport stream (TS) monitoring for specific data or programs," "demultiplexing, descrambling, software downloads, etc." EX1008, [0047].

Like the '507 Patent, Tichelaar's "screen 85" ("*display*") is not powered in either "standby" mode. EX1003, ¶102.

2. Relan

Relan, is also directed to electronic devices with reduced power consumption. EX1010, [0014-15], [0246]. Relan discloses "a plurality of power-saving modes"

in a "digital TV product" without powering a display and other components.[17] EX1010, Title, Abstract; [0101], EX1003, ¶103.

In particular, Relan discloses two power saving modes: (1) an inactive "HIBERNATE" and (2) an active "STAND-BY." EX1010, [0071], [0111]; EX1003, ¶¶104-06.

Relan explains:

> In the "**HIBERNATE mode**," **all of the circuits, except the "wakeup-related" circuits** may be **switched off**…
> In the **STAND-BY state/mode**, **all functions** related to the electronic device may be **accessible, except for the display/broadcast functions**.

EX1010, [0246-48].

In both of these "power saving modes," no power is provided to the display, as depicted in annotated Figure 6 below:

[17] Relan balances enhanced functionality and power consumption. For example, Relan discloses that a user may desire to "record at least one or a plurality of [broadcast] multimedia-programs" without "the end-user [being] physically present at broadcast time to initiate the recording procedure." EX1010, [0258]. Thus, Relan provides such enhanced functionality with respect to its "power-saving modes."

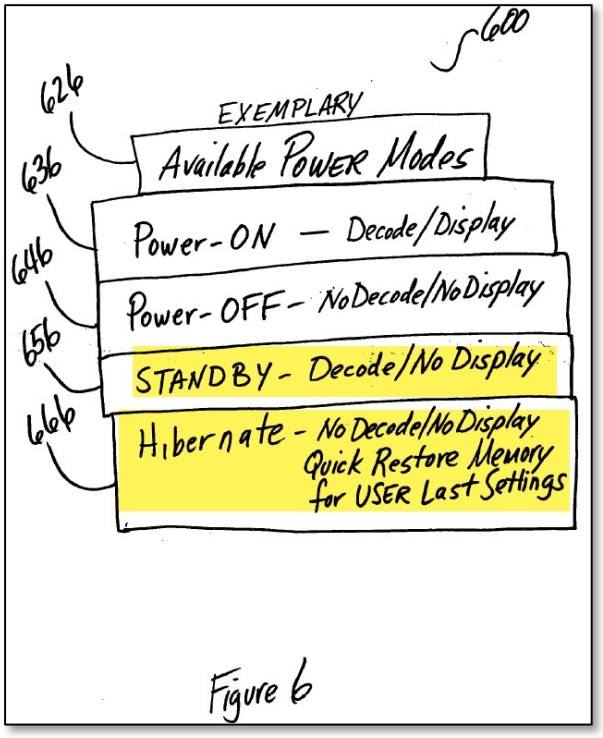


Figure 6

See EX1010, [0108-09], [0111], [0149], [0235], [0242], [0246-48]; EX1003, ¶¶104-06.

In addition, similar to Tichelaar, Relan uses a "power control processor" that is "connected to a power [supply]" and "adapted to regulate the power usage[,] reduce the power consumption," and "control" the "power-saving states/modes." EX1010, [0133], [0137], [0222]. The "power control processor" is separate from a main "processor 561." EX1010, [0170-71], [0209], [0217-18], [0220], [0232]; EX1003, ¶¶104-06.

B. Claim 1

1. Preamble

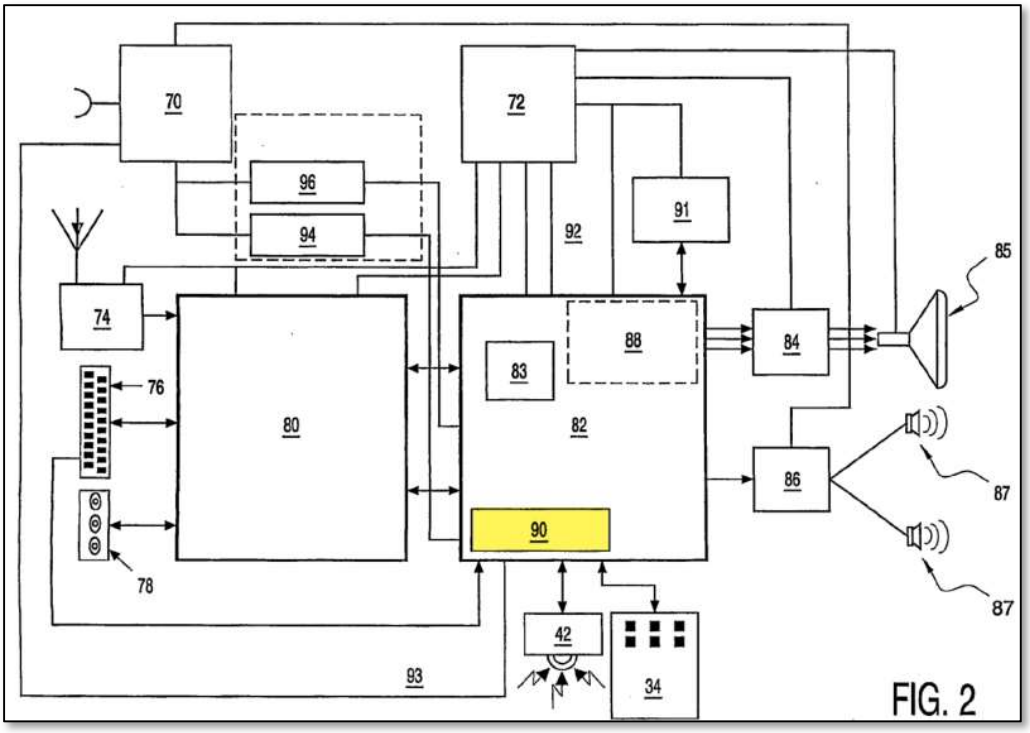
To the extent the preamble is limiting, Tichelaar discloses it. EX1003, ¶¶107-09.

Tichelaar discloses an "audiovisual device" "capable of receiving … digital TV standards" ("*broadcast program receiving apparatus to display a program broadcast via a digital broadcasting signal*"). EX1008, [0016], [0045], [0047], [0049]; EX1003, ¶¶107-09.

2. Limitation 1A

Tichelaar discloses Limitation 1A. EX1003, ¶¶110-18.

Tichelaar discloses a "DμC 90" (highlighted in yellow below) ("*first controller*") of the "audiovisual device" ("*broadcast program receiving apparatus*").



EX1008, [0017-18], FIG. 2 (annotated); EX1003, ¶¶110-18.

To the extent "*first controller*" is governed by §112, ¶6, Tichelaar discloses the recited first function (F1.1) and corresponding structure (S1.1) identified above in §VI. EX1003, ¶¶112-15.

With respect to function F1.1, "DμC 90" controls placing the audiovisual device into and "power[ing] up" out of a "standby" mode ("*control a waiting condition of the broadcast program receiving apparatus*"). EX1008, [0019], [0035-36]; EX1003, ¶¶115-18; *see also*, EX1008, [0005], [0038], and [0045]. To control the "return from standby mode," "[DμC] 90 issue[s] a signal or command … to initiate this start-up from low power." EX1008, [0052]; EX1003, ¶¶115-18.

"DμC 90" includes a "control line" and "port" specifically for this task. EX1008, [0043], [0050], [0057-58], [0060]; EX1003, ¶¶115-18.

As to structure S1.1, Tichelaar's "*first controller*" is a sub-CPU ("DμC 90") configured to set the "*broadcast program receiving apparatus*" ("audiovisual device") into the "*first waiting condition*" ("low-power standby") or the "*second waiting condition*" ("active standby").[18] EX1008, [0045-47], EX1003, ¶118.

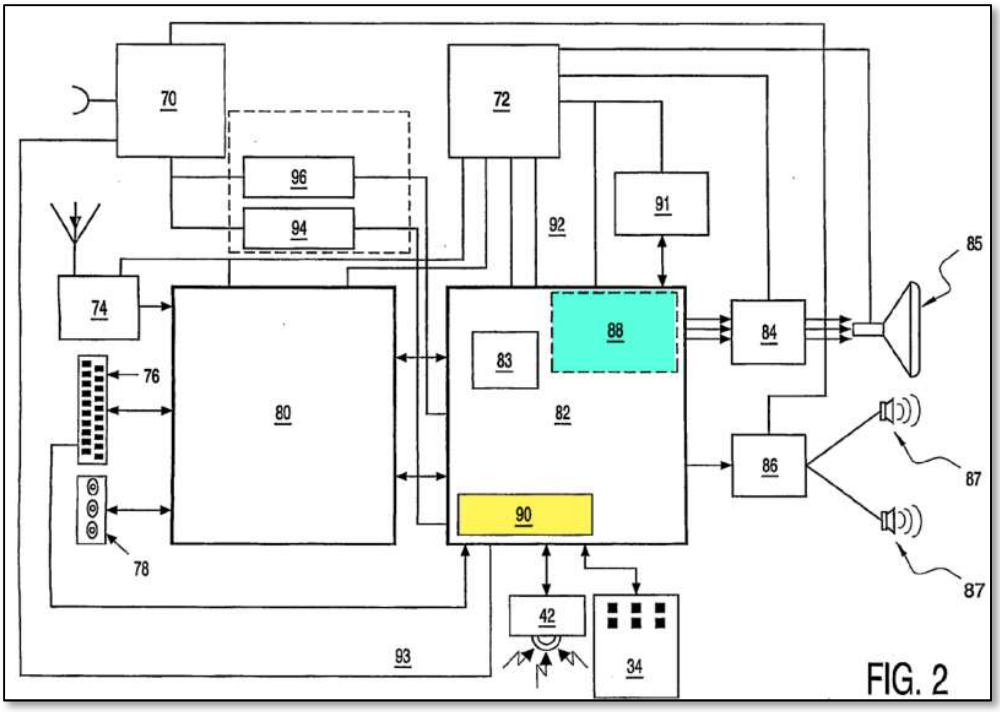
3. Limitation 1B

Tichelaar discloses Limitation 1B. EX1003, ¶¶121-32.

Tichelaar discloses "main TV micro-controller 88" (highlighted blue below) ("*second controller*") of the "digital one-chip TV IC 82" ("SoC 82"):[19]

[18] Any differences between Tichelaar and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶118. Further, Tichelaar discloses performing F1.1 in substantially the same way with substantially the same result. *Id*.

[19] "The digital one-chip TV IC 82 is a system-on-chip (SoC) that has next to its main TV micro-controller 88 an embedded delegate micro-controller 90 to deal with low-power standby tasks." EX1008, [0049].



EX1008, [0049-50], FIG. 2 (annotated); EX1003, ¶¶121-32.

To the extent "*second controller*" is governed by §112, ¶6, Tichelaar discloses the recited function and corresponding structure identified above in §VI. EX1003, EX1003, ¶¶123-28.

With respect to the corresponding structure, Tichelaar's "*second controller*" is a processor ("main micro-controller 88") configured to control: (1) a video decoder to decode a video signal ("main micro-controller 88" controls "**video decoding**," "RGB processing," "demultiplexing," and "de-scrambling") and (2) providing the decoded signal to the display portion (the output of "main micro-

controller 88" is provided to the "screen 85").[20] EX1008, [0045-47], EX1003, ¶¶121-24.

"Main micro-controller 88" ("*second controller*") also performs the recited function ("*control a processing of a received digital broadcasting signal via a decoder*"). EX1008, [0004-05], [0008]. [0049-50]; EX1003, ¶¶122, 125-28. For example, "main micro-controller 88" provides "TV set control," causing the SoC to implement, *inter alia*, "**video decoding**," "RGB processing," "demultiplexing," and "de-scrambling." EX1008, [0004-05], [0008]. [0049-50]; EX1003, ¶¶122, 125-28 (citing EX1017, 1:18-19; EX1015, 3:60-4:3, 4:17-21).

Tichelaar also discloses the remainder of Limitation 1B. "Main micro-controller 88" is a conventional OS-based controller (processor) ("*started up by a predetermined OS")* to control the processing discussed above (*"to control a processing of a received digital broadcasting*"). EX1003, ¶¶122, 125-32.

The '507 Patent itself acknowledges, in its background section, that such OS were conventional. Further, the '507 Patent does not suggest the use of anything

[20] Any differences between Tichelaar and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶124. Further, Tichelaar discloses performing the recited function in substantially the same way with substantially the same result. *Id*.

other than a conventional OS. *Compare* EX1001, 1:51-65 *with id.,* 5:52-58; EX1003, ¶¶122, 125-32.

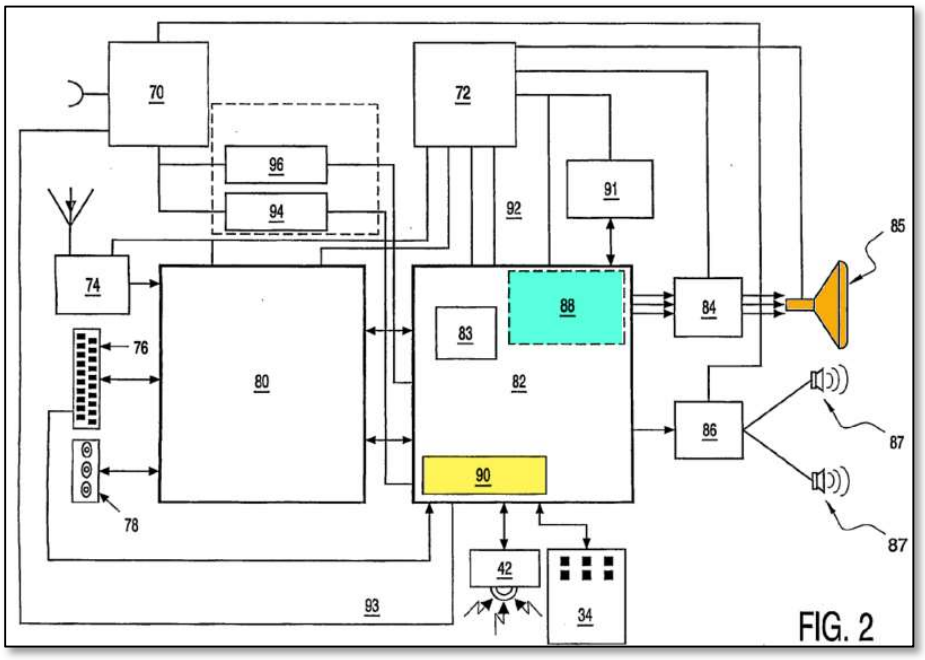
Likewise, Tichelaar's "main micro-controller 88" accesses "(high performance) SoC resources for doing **loads and stores of code and data**" (*e.g.*, an "*OS*"). EX1008, [0012]; EX1003, ¶¶122, 125-32. Tichelaar also specifically references "**software downloads,**" implicating OS capabilities. EX1008, [0047]; *see also* EX1020, 1:17-46 (OS for "download[ing] information"); EX1003, ¶¶122, 125-32. For example, Tichelaar's disclosure of a "main" micro-controller begins with reference to Steinfatt's "Television Control Processor (TCP)" (of which Tichelaar is a co-author), which includes features "required for certain **operating systems**." *See* EX1008, [0004]; EX1016, 354; EX1003, ¶¶122, 125-32. In particular, Steinfatt discloses that the TCP is "for use in high-end TV sets" and "allows TVs to implement [the] **WindowsCE" operating system** and "applications like Internet TV." *Id*.

To the extent Patent Owner argues that Tichelaar does not disclose the claimed "*OS*," it would have been obvious to a POSITA to modify Tichelaar's "main micro-controller" to utilize an OS. *See infra* §VIII.H.1.a.

4. Limitation 1C

Tichelaar discloses Limitation 1C. EX1003, ¶¶133-35.

Tichelaar's "screen 85" (highlighted in orange below) ("*display portion*") displays decoded video that is supplied by the "main micro-controller 88" ("*second controller*") via the "SoC 82" and "RGB amplifier 84" ("*display an image using a signal processed by the second controller*"):

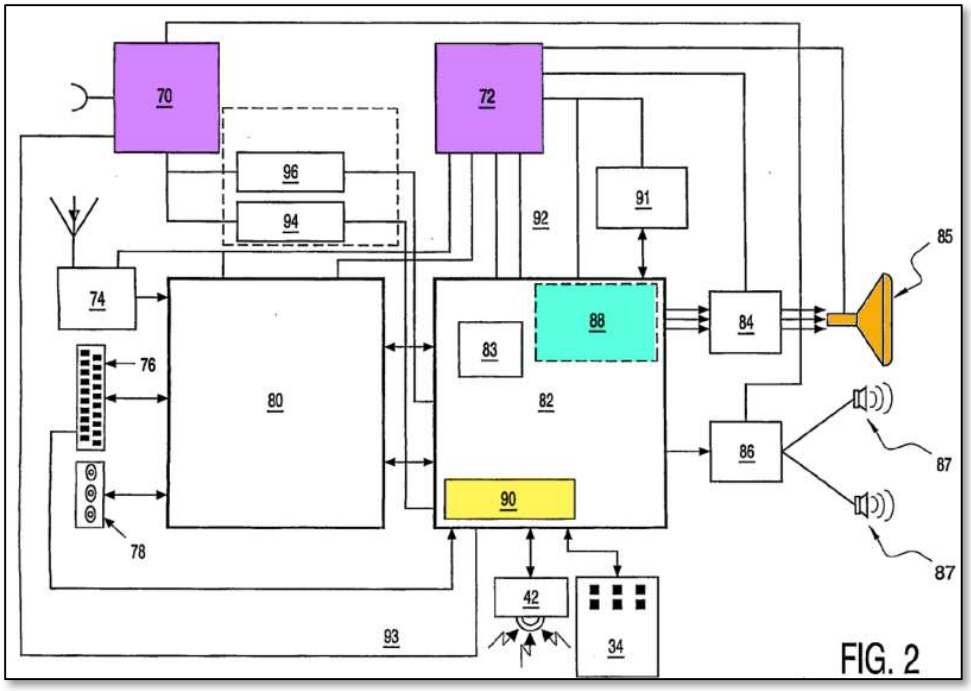


EX1008, [0049], FIG. 2 (annotated); EX1003, ¶¶133-35.

5. Limitation 1D

Tichelaar discloses Limitation 1D. EX1003, ¶¶136-39.

Tichelaar discloses "a switched mode power supply (SMPS) 70 and an extra high tension (EHT) generator 72 providing all required power supply voltages" ("*an electric power source unit which is configured to supply predetermined electric power*"). EX1008, [0049-54], [0059-60], FIG. 2; EX1003, ¶¶136-39. SMPS 70 and EHT generator 72 are highlighted purple below:



Id.

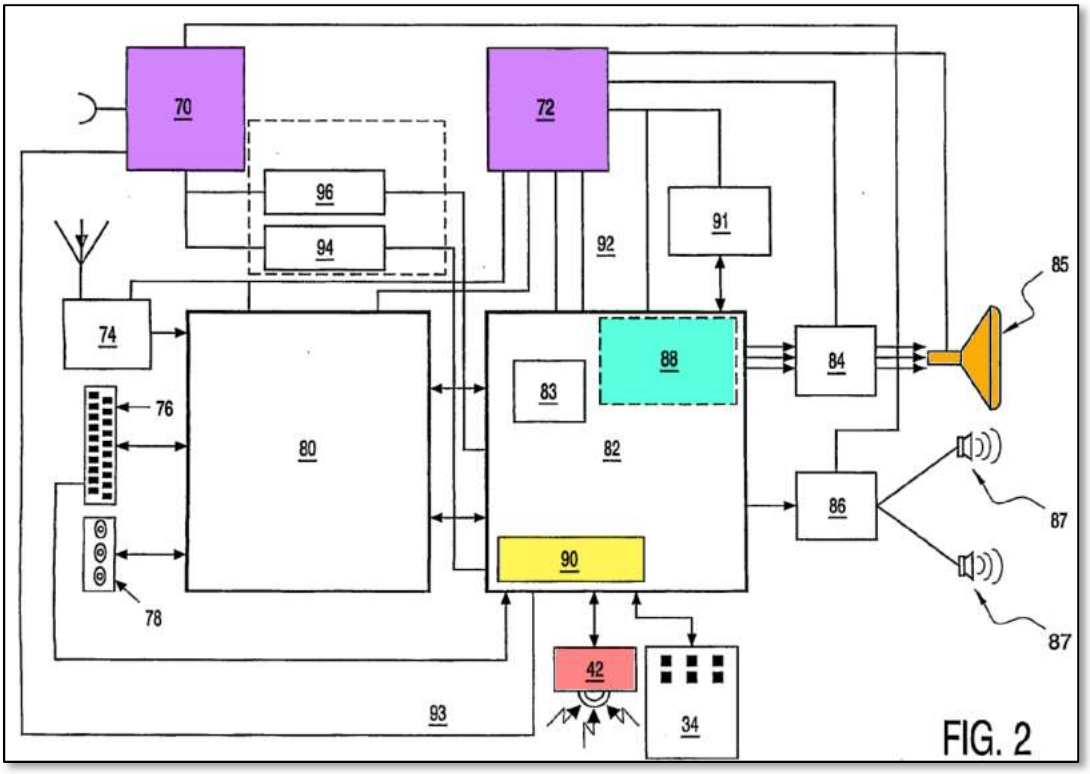
Power is supplied from SMPS 70 directly and/or via EHT generator 72. *Id*.

6. Limitation 1E

Tichelaar discloses Limitation 1E. EX1003, ¶¶140-43.

As shown in Figure 2 (annotated below), Tichelaar discloses "[a]n infrared remote control receiver front-end" 42[21] (highlighted in red) ("*a remote control signal receiving portion*") connected to the "DμC":

[21] "Infrared remote control receiver front-end" is also reference as 144.



EX1008, [0059], [0008-09]; EX1003, ¶¶140-43.

The "infrared remote control receiver front-end" receives remote control commands ("*signals*"), including "channel, standby or power-on." ("*receive a remote control signal for operating the display portion*"). EX1008, [0046]; EX1003, ¶¶140-43.

7. Limitation 1F

Tichelaar discloses Limitation 1F. EX1003, ¶¶144-51.

Tichelaar's "DμC 90" ("*first controller*") is "low speed, **(ultra) low-power** and small" with a "minimal set of local resources" and a "thin (light weight) interface towards the main [micro-controller 88]." EX1008, [0035]; EX1003, ¶¶145-48. Further, it is "powered by preferably a **reduced power supply voltage**" due to the

"rather low speed signal processing and control [that] is required" ("*smaller in consumption of electric power than the second controller*"). EX1008, [0040], [0021-22], [0028], [0035], [0037], [0044], [0053], [0059], [0062]; EX1003, ¶¶145-48.

To the extent §112, ¶6 applies, Tichelaar discloses the recited second function (F1.2) and corresponding structure (S1.2) identified above in §VI.[22] EX1003, ¶¶146-50.

With respect to function F1.2, "DμC 90" "signal[s]" SMPS 70 to control "supply voltages to parts for the whole system-on-chip, including main controller and resources" ("*control the electric power supplied from the electric power source unit*").[23] EX1008, Claim 1; [0043], [0052], [0058-59], [0061-63]; EX1003, ¶¶147-49.

Tichelaar further discloses that the "DμC 90" responds to remote control commands ("*signals*") received via "infrared remote control receiver front-end 42" ("*remote control signal receiving portion*") and controls the voltage supply "upon

[22] The same analysis applies to function F2.1 and corresponding structure S2.1 for Claim 2.

[23] In addition, the "DμC" may control "an "H-drive section "160 driving the EHT generator 142 for power generation." EX1008, [0059].

receipt" of a valid command ("*responsive to the remote control signal received by the remote control signal receiving portion*"). *See* EX1008, [0036], [0057], Claim 1; EX1003, ¶¶147-49.

As to structure S1.2, Tichelaar's "*first controller*" is a sub-CPU ("DμC 90") configured to: (a) receive a signal ("command") from the "*remote control signal receiving portion*" corresponding to a "*remote control signal*" (the "DμC" receives signals corresponding to remote control inputs from "infrared remote control receiver front-end 42") and (b) responsively transmits a control signal to the "*electric power source unit*" ("SMPS 70") to "*control the electric power supplied from the electric power source unit*" (when the "DμC" receives a remote control command, it "signal[s]" SMPS 70 to supply power to specific components of the system).[24] EX1008, [0043], [0052], [0058-59], [0061-63]; EX1003, ¶150.

8. Limitation 1G

Tichelaar, alone and/or in combination with Relan, discloses or at least renders obvious Limitation 1G. EX1003, ¶¶152-67.

[24] Any differences between Tichelaar and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶150. Further, Tichelaar discloses performing F1.2 in substantially the same way with substantially the same result. *Id*.

To the extent §112, ¶6 applies, Tichelaar's "DμC" ("*first controller*") alone and/or in combination with Relan, discloses the recited third function (F1.3) and corresponding structure (S1.3) identified in §VI.[25] EX1003, ¶¶153-67.

With respect to function F1.3, Tichelaar discloses that its "standby" mode ("*waiting condition*") may be placed into a "low-power standby" or an "active standby" ("*placeable into either of a first waiting condition or a second waiting condition*"). EX1003, ¶¶154-66; EX1008, [0045].

Tichelaar's "low-power standby" ("*first waiting condition*") "is characterized by preferably very low power consumption and the capability of waking up." EX1008, [0046-47]; EX1003, ¶¶154-66.

Tichelaar's "active standby" ("*second waiting condition*") has additional functionality enabled, including:

> MPEG transport stream (TS) monitoring for specific data or programs. Monitoring of the TS requires the additional tasks of demultiplexing, descrambling, software downloads, etc.

Id.[26]

[25] The same analysis applies to function F2.2 and corresponding structure S2.2.

[26] While the Tichelaar's "focus" is on the "low-power standby" mode, Tichelaar also discloses "active standby." EX1008, [0047], [0054]. Tichelaar further

Tichelaar's "DμC 90" controls entering into and leaving these standby modes ("*the waiting condition … is controlled by the first controller*"). *See* EX1008, Claim 1; [0043], [0052], [0058-59], [0061], [0063]; EX1003, ¶¶154-66; §VIII.B.7, *supra*. As discussed for Limitations 1A and 1F, the "DμC 90" controls switching on and off power supply voltages (and clocks). *Id.* For this purpose, the "DμC has a standby mode on/off line 93 (burst mode control) to the SMPS 70" and can "signal low-power standby mode (or burst mode on/off) to the SMPS 70." *See* EX1008, [0050], [0057], [0060]; EX1003, ¶¶154-66.

To the extent the Patent Owner contends that Tichelaar does not explicitly state that "screen 85" is turned off in both standby modes, ("*after stopping a supply of the electric power to the display portion*"), it stands to reason that this would be the case and that also would be a POSITA's reasonable understanding. *See* EX1008, [0004-05], [0041], [0056], [0050]; EX1003, ¶¶154-66, 235-41, 255-59. For example, Tichelaar discloses that entering into either "standby" mode "deactivate[s] functions or modules that are not used in power standby mode [*e.g.*, display functions]" by "**[s]witch[ing] off power supply voltages** or activate logic cells' sleep mode." EX1008, [0041]. Further, only a "small subset" of "very low power

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discloses that digital TVs generally implement both "standby" modes. EX1008, [0045].

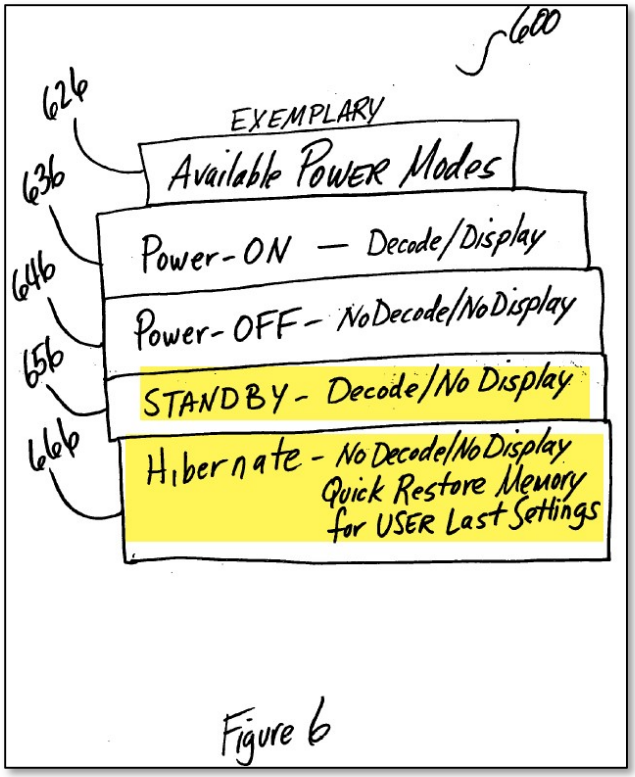
consumption" components receive power in "low-power standby." *See id*. Similarly, none of Tichelaar's "**active** standby" functionality requires a display. *See* EX1008, [0050], FIG. 4; EX1003, ¶¶159-61.[27]

Similarly, Relan discloses, or at least renders obvious, Limitation 1G. Relan discloses a "plurality of power-saving modes" (*i.e.*, a "*waiting condition*"). EX1010, [0021], [0041], [0059], [0061], [0071-74], [0105], [0108-11], [0149], [0235-36], [0242-43], [0246-48], [0263]; EX1003, ¶¶152-66.

In particular, Relan discloses a "HIBERNATE" mode (similar to Tichelaar's "low-power standby") ("*first waiting condition*") and a "STAND-BY" mode (similar to Tichelaar's "active standby") ("*second waiting condition*"). *Id*.

As shown in Figure 6, Relan explicitly discloses that power is not supplied to a "display" in these power saving modes:

[27] Tichelaar also defines a "standby active/low mode" as "dissipating less than 10 W." EX1008, [0004–05]; EX1003, ¶160.



EX1010, FIG. 6 (annotated).

Relan further discloses:

> the electronic device may … **switch-off the display** device/entity, **the decoding device**/entity, and all other circuitry, associated respectively, with the display and decoding devices/entities, and **enter one of the power-saving states/modes** set forth above.

EX1010, [0149]; *see also id.,* [0073-74], [0108-09], [0235-36], [0242], [0246-47], FIG. 6; EX1003, ¶¶162-66.

The display is turned off in these modes, "to reduce power consumption." EX1010, [0242]; EX1003, ¶¶162-66. As discussed for Limitation 1A, Relan's

"power control processor" "ensur[es] that power is not being wasted when the electronic devices are idle or when an end-user is not present." EX1010, [0137], [0222-23], [0276], FIG. 5A; EX1003, ¶¶162-66.

Accordingly, Tichelaar's "DμC 90" ("*first controller*") (alone or combined with Relan) discloses the corresponding structure S1.3. Tichelaar's "*first controller*" is a sub-CPU ("DμC 90") configured to: (a) when the "*waiting condition*" ("standby mode") "*in which an image is not displayed after stopping a supply of the electric power to the display portion*" is in a "*first waiting condition*" (Tichelaar's "low-power standby"/Relan's "HIBERNATE") or "*second waiting condition*" (Tichelaar's "active standby"/Relan's "STAND-BY"), determine whether to place the "*waiting condition*" into a "*first*" or "*second waiting condition*" (when "screen 85" ("*display*") is off, "DμC 90" determines whether to place the "audiovisual device" in "active standby" or "low-power standby" or "active standby"); and (b) place the "*waiting condition*" into a "*first*" or "*second waiting condition*" according to the determination (the "DμC" initiates the determined "low-power standby" or

"active standby").[28] EX1008, [0045-47]; EX1010, [0137], [0222-23], [0276], FIG. 5A; EX1003, ¶167.

9. Limitation 1H

Tichelaar discloses Limitation 1H. EX1003, ¶¶168-74.

Tichelaar discloses that "SMPS 70 standby supply" supplies power to a separate "standby power supply domain" that is specifically designated for the "DμC 90" ("*supply of the electric power from the electronic power source unit thereto*"). EX1008, [0050], [0059]. Although Tichelaar "focuses" on "low power standby," it stands to reason that "DμC 90" receives power from "SMPS 70" in "active standby" as well. *See* EX1008, [0036], [0044-47], [0050], [0057], FIG. 4, ABSTRACT, [0005]; EX1003, ¶¶169-71.

For example, a POSITA would understand that "DμC 90" is responsible for responding to remote control commands ("*signals*") (*e.g.,* by controlling which components receive power from "SMPS 70") in "active standby," as well as "low-

[28] Any differences between Tichelaar and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶167. Further, Tichelaar discloses performing F1.3 in substantially the same way with substantially the same result. *Id*.

power standby," and thus requires power in that mode as well.[29] *Id*. *See* EX1008, ABSTRACT, [0036], [0059], FIGS. 2, 4; EX1003, ¶¶168-74.[30]

10. Limitation 1I

Tichelaar discloses or at least renders obvious Limitation 1I. EX1003, ¶¶175-83.

As discussed for Limitation 1F, the "DμC" controls voltage supplied from SMPS 70, including to "resources" ("*the electric power supplied from the power source unit is controlled*"). EX1008, Claim 1; [0043], [0052], [0058-59], [0061], [0063]; EX1003, ¶¶176-78.

As discussed for Limitations 1F and 1H, "infrared remote control receiver front-end 42" provides "received remote control signals" to "DμC 90" in both standby modes. EX1008, [0036]. Accordingly, in both "low-power" and "active standby," power is supplied to the "infrared remote control receiver front-end 42" ("*the electric power supplied from the power source unit is controlled, so as to*

[29] For example, Figures 2 and 4 show that "infrared remote control receiver front-end 42" provides remote control commands directly to "DμC 90" in all modes.

[30] In Figure 4, the "DμC" is number 140 and "infrared remote control receiver front-end" is number 144. EX1008, [0059].

supply the electric power to the remote control signal receiving portion … under the first waiting condition"). EX1008, [0036], [0059]; EX1003, ¶¶176-78.

In addition, during the "low-power standby" mode, power is **not** supplied to the "main micro-controller 88," including the decoding functionality ("*not to supply the electric power to the second controller including the decoder, under the first waiting condition*"):

> The SoC [82] is fully powered off in low-power standby mode…**only the [DμC] 90** and a small part of the DOP 83 **is powered by SMPS 70 standby supply** … whereas **the rest of the SoC 82 is not powered**.

See EX1008, [0044], [0050]; *see also id.*, [0036], [0046]; EX1003, ¶¶179-81.

11. Limitation 1J

Tichelaar discloses or at least renders obvious, Limitation 1J. EX1003, ¶¶184-94.

Again, the "DμC" controls voltage supplied from SMPS 70 ("*the electric power supplied from the power source unit is controlled*"). *See* §VIII.B.7.

As discussed, Tichelaar's "active standby" provides power to the "remote control receiver front-end 144" ("*supply the electric power to the remote control signal receiving portion ... under the second waiting condition*"). *Id.;* EX1008, ABSTRACT, [0036], [0059]; EX1003, ¶¶184-94.

In "active standby", the TV is "powered up," in response to a remote control command. *Id*. Accordingly, "infrared remote control receiver front-end 144" must be powered on. *Id*.

Further, a POSITA would have understood Tichelaar to disclose, or at least render obvious, that in "active standby," power is supplied to the "main micro-controller 88" and decoder functionality ("*supply the electric power to the remote control signal receiving portion and the second controller including the decoder, under the second waiting condition*"). EX1003, ¶188. For example, in "active standby," the "main micro-controller 88" performs "additional tasks" (*e.g.*, "software downloads," "MPEG transport stream (TS) monitoring," "demultiplexing," and "descrambling") that would have required the "main micro-controller" and "decoding" functionality to be supplied with power, as discussed in Limitation 1B above. *See* EX1008, [0005], [0012] [0045], [0047], [0049], [0054], [0063]; EX1003, ¶188; *see* EX1017, 1:18-19. Thus, power is supplied to these components in "active standby." *Id*.

Similarly, Relan discloses Limitation 1J. EX1003, ¶¶189-94. In Relan's "STAND-BY state/mode," the "internal power supply apparatus 516A" and "power distributor 562A" supply power to" "**all functions** related to the electronic device…

except for the display/broadcast functions"[31] ("*supply the electric power to the remote control signal receiving portion and the second controller including the decoder*"). EX1010, [0246]; EX1003, ¶¶184-94. Such powered-on functions include the "processor 561" ("*second controller*"), "decoding-related" components ("*decoder*"), and "wakeup-related' circuits" ("*remote control signal receiving portion*"). EX1003, ¶¶184-94.

In Relan's "STAND-BY," "Processor 561" is supplied with power to perform video processing tasks. *Id*. Relan discloses that, in "STAND-BY," a user can record a multimedia-program—requiring processing, decoding and saving the program. *See* EX1010, [0170], [0217-18], [0232], [0236], [0247], [0258]; EX1003, ¶¶184-94. For example, "processor 561 … convey[s] the multimedia-program transmission to [an] audio/video decoder." EX1010, [0111], [0218], [0232], [0243]; EX1003, ¶¶184-94.

Relan also discloses that in "STAND-BY":

> the display device/entity may be powered off and **the decoding device/entity may remain powered on**.

EX1010, [0242-43], [0246]; *see also id.* [0108], [0235]; EX1003, ¶¶184-94.

[31] The "broadcast" function here refers to audio output from the electronic device. *See* EX1010, [0032], [0054]; EX1003, ¶¶184–94.

Thus, "multimedia-program recording may be commenced … in the STAND-BY state/mode," without powering the display. EX1010, [0111], [0246]; EX1003, ¶¶184-94.

Finally, in "STAND-BY," power is supplied to "'wakeup-related' circuits," including the remote control receiver. EX1003, ¶¶184-94. Relan discloses that "**all functions**," "except for the display/broadcast functions," are accessible. EX1010, [0246]; EX1003, ¶¶184-94. In addition, Relan discloses evaluating remote control commands while in various power saving modes. *See* EX1010, [0113] ("**evaluate the commands [to] … disable** … **power-saving states/modes**…"), [0024]; EX1003, ¶¶184-94.

C. Claim 2

Claim 2 is similar but not identical to Claim 1. However, the differences are immaterial with respect to the prior art, which discloses them, or at least renders them obvious. EX1003, EX1003, ¶¶195-98. For example, Tichelaar's "micro-controllers" are included on an "integrated circuit (IC)" and are themselves circuits ("*control circuit[s]*"). EX1008, [0001], [0019], [0020], [0022]; EX1003, ¶¶195-98; *see also* EX1001, 6:6-8. Similarly, Relan's "processors" are circuits and are integrated into circuits. *See* EX1010, [0073-74]; EX1003, ¶¶195-98.

In addition, OS-based controllers used "*to control parts of the display portion*" were known in the prior art. *See, e.g.*, EX1008, [0004]; EX1016; EX1011,

[0005], [0010-11], [0013], [0032] [0041-42]; EX1003, ¶¶195-98. For example, the "WindowsCE" controller disclosed in Steinfatt controlled a display. EX1008, [0004].

Thus, for the same reasons discussed for Claim 1, Tichelaar, in view of POSITA knowledge and/or Relan, discloses or at least renders obvious every element of the Claim 2.[32]

1. Preamble

See Preamble 1, *supra*; EX1003, ¶199.

2. Limitation 2A

See Preamble 1, *supra*; EX1003, ¶200.

3. Limitation 2B

See Limitation 1B, *supra*, regarding the decoder; EX1003, ¶201.

4. Limitation 2C

See Limitation 1C, *supra*; EX1003, ¶202.

5. Limitation 2D

See Limitation 1D, *supra*; EX1003, ¶203.

[32] To the extent Patent Owner argues there is a substantive difference between the "*decoder*" in Claims 1 and 2, a POSITA would have understood that the decoder could be handled by a controller and/or dedicated circuitry. EX1003, ¶¶195–98; *see, e.g.,* EX1015, 3:60-21; EX1022, 2:24-26.

6. Limitation 2E

See Limitation 1E, *supra*; EX1003, ¶204.

7. Limitation 2F

See Limitation 1B, *supra*; EX1003, ¶205.

8. Limitation 2G

See Limitation 1F, *supra*; EX1003, ¶206.

9. Limitation 2H

See Limitation 1G, *supra*; EX1003, ¶207.

10. Limitation 2I

See Limitation 1H, *supra*; EX1003, ¶208.

11. Limitation 2J

See Limitation 1I, *supra*; EX1003, ¶209.

12. Limitation 2K

See Limitation 1J, *supra*; EX1003, ¶210.

D. Claim 8

Tichelaar, in view of Relan and POSITA knowledge renders obvious, Challenged Claim 8. EX1003, ¶¶211-14.

Relan expressly discloses that the television apparatus includes a "real-time clock" to "determine a current correct local time/date" ("*a timer, which is configured to detect a present time*"). EX1010, [0120-21]; EX1003, ¶¶211-14. Relan further discloses, "**the real-time clock may also support and be associated with the**

power-saving states/modes active in the electronic device." *Id.* Tichelaar also discloses that the "audio/visual device" includes both a "timer" and a "real-time clock." EX1008, *e.g.*, [0005], [0008-12]; EX1003, ¶¶211-14.

Relan discloses that the system can "autonomously/unilaterally" enter the "STAND-BY" and/or "HIBERNATE" modes either based on a detected period of inactivity and/or at specified dates/times according to a preset schedule. *Id.*, [0140-49], [0202], [0251-70], [280-85], FIGS. 6-10; EX1003, ¶¶211-14.

In one example, the user may schedule a time for the system to record a program when the user will not be home. *See* EX1010, [0251-70]; EX1003, ¶¶211-14. When the "the real-time clock" ("*timer*") determines that the scheduled recording time has arrived ("*when the present time detected by the timer lies within a predetermined time range*"), the device transitions from "HIBERNATE" to "STAND-BY" so that the program can be recorded ("*wherein under the first waiting condition, the apparatus is shifted from the first waiting condition into the second waiting condition*"). EX1010, [0263-64]; EX1003, ¶¶211-14. When the program concludes ("*when the present time does not lie within a predetermined time range*"), the system then shifts the system back into "HIBERNATE" ("*the apparatus is shifted from the second waiting condition into the first waiting condition*"). *Id.*

E. Claim 9

With respect to claim 9, Relan further expressly discloses that the parameters for the system to autonomously transition between "HIBERNATE" and "STAND-BY" are determined according to a user's interaction (*e.g.*, scheduling the device to record a program at a specific date/time) with the system ("*wherein the predetermined time range can be changed in accordance with a user's instruction*"). EX1010, [0140-49], [0202], [0251-70], [280-85], FIGS. 6-10; EX1003, ¶¶215-16.

F. Claim 10

Tichelaar, in view of POSITA knowledge, discloses or at least renders obvious, Claim 10. EX1003, ¶¶217-21.

As shown in Figure 3 (annotated below), "DμC 90" (highlighted yellow) includes "PORTS 116" (highlighted green) which interfaces with ports 124, 126, 128, 130, 131, and 132:

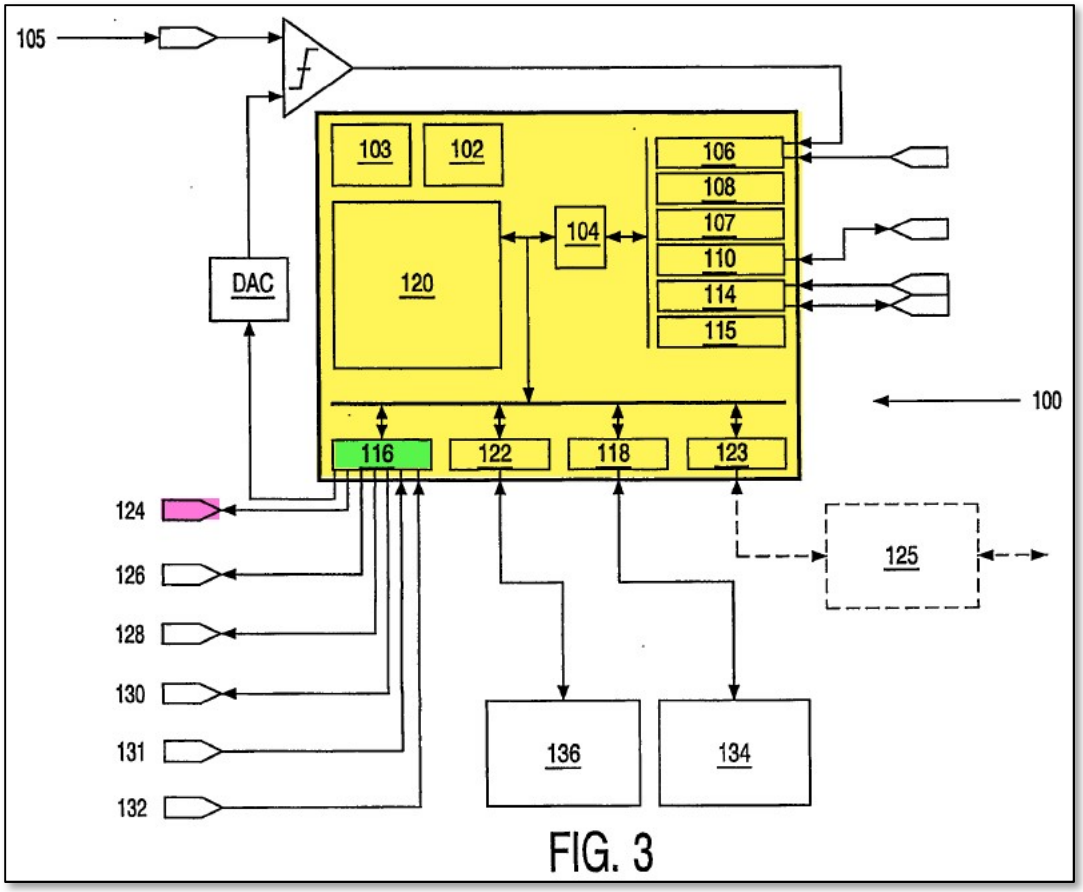


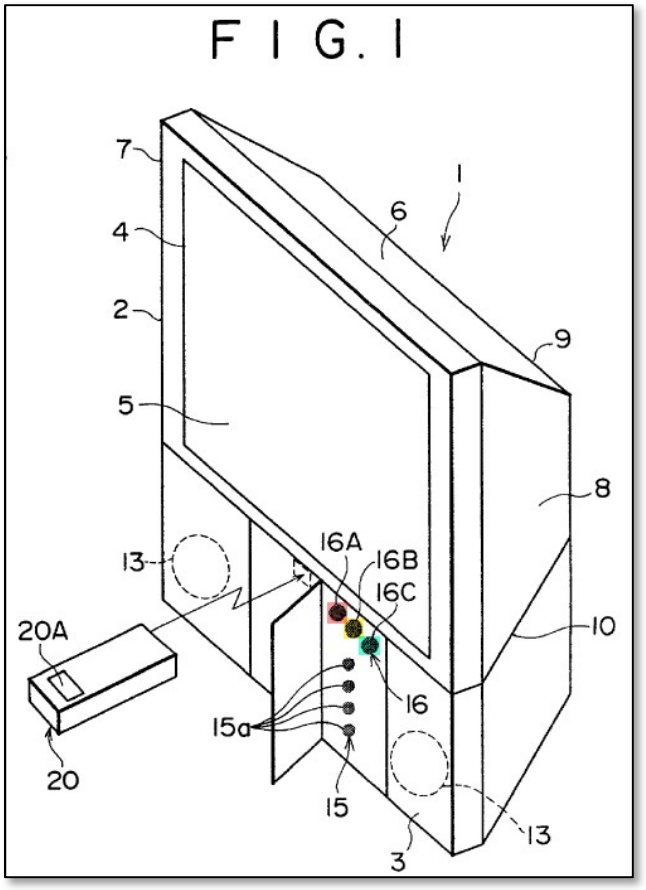
FIG. 3

EX1008, [0057-58], FIG. 3 (annotated); EX1003, ¶¶217-21.

Tichelaar further discloses, "[a] first output 124 port is used to control a **standby LED**" (highlighted pink) ("*a light emitting element*"). *Id*. A POSITA would have found it obvious that the "DμC" could control the "standby LED" to indicate "low-power standby" and "active standby" ("*changes an emitting condition thereof depending on whether the display apparatus is in the first waiting condition or the second waiting condition, and wherein the light emitting element makes the display portion distinguishable whether the display apparatus is in the first waiting condition or the second waiting condition*"). EX1003, ¶¶217-21. For example, in

the case of a single color LED, in "low-power standby" mode, the LED could be off and in "active standby," it could be illuminated. EX1003, ¶¶217-21.

In addition, it would have been obvious to locate the "standby LED" in manner that "*make[s] the display portion distinguishable.*" EX1003, ¶¶217-21. Placing LEDs in a television display apparatus (which is how the '507 Patent describes the LED placement (*see* EX1001, 10:59-11:9)) to indicate its power status, including the state of a "standby" mode, had long been known in the art. EX1003, ¶¶217-21; EX1018, [0028], [0059], FIG. 1. For example, a POSITA would have been aware of Hamakada *et al.*, assigned to Sony Corporation, which discloses a television with three LEDs, including a "power LED 16A," a "standby LED 16B," and a "BS [('broadcast signal')] power LED 16C", as shown in annotated Figure 1 below:



Id. Thus, Tichelaar, in view of POSITA knowledge, renders Claim 10 obvious.

G. Claim 13

Tichelaar discloses Claim 13. EX1003, ¶¶222-27.

In the "standby" modes ("*first waiting condition or the second waiting condition*"), the "DμC" ("*sub-control circuit*") "validates autonomously a remote control command …" and the "TV system is powered up only when a command is valid, *e.g.* remote control channel, standby or **power on key pressed**, **keypad on key pressed** etc" ("*when a power button of the display apparatus is turned ON ...*

supply the electric power to the receiving portion and the display portion, so as to operate the display apparatus in a normal manner"). EX1008, [0062].

As discussed for Limitations 1A and 1F, "DμC 90" causes the television to "return from standby" by controlling the supply of electric power from SMPS 70 ("*the sub-control circuit controls the electronic power source unit*"), including via EHT generator 142. EX1008, [0017-19], [0023-24], [0027], [0035-36], [0038], [0042-44], [0052], [0057-61], Claim 1; EX1003, ¶¶222-27.

H. It would have been Obvious to Modify Tichelaar in view of POSITA Knowledge (Ground 1)

In the event that the Patent Owner argues that Tichelaar does not expressly disclose one or more limitations of Limitations 1B/2F, 1G/2H, or 1J/2K, those limitations would have been obvious in view of POSITA knowledge, and accomplished with a reasonable expectation of success. EX1003, ¶¶228-51.

1. Obviousness Rationales

a. <u>Limitations 1B/2F</u>

To the extent Patent Owner argues that Tichelaar does not expressly disclose that "main TV micro-controller 88" "*configured to be started up by a predetermined OS*," Tichelaar suggested to and/or motivated a POSITA to implement "main TV micro-controller 88" as an OS-based main micro-controller. *See* EX1008, [0012], [0047]; EX1003, ¶¶229-34, 64-73.

As discussed above, Tichelaar's "main micro-controller 88" loads and stores "code and data" and specifically references "software downloads." *Id*. A POSITA would have understood this to at least suggest (if not expressly disclose) the use of an OS-based "main micro-controller" to perform such tasks. EX1003, ¶¶229-34, 64-73; *see* EX1020, 1:17-46; EX1003, ¶¶229-34, 64-73. Additionally, a POSITA would have understood Tichelaar's incorporation and discussions of Steinfatt as additional suggestions and/or motivation. *See* EX1008, [0004]; EX1016, 354; EX1003, ¶¶229-34, 64-73.

Further, a POSITA would have been well-aware of other prior art that disclosed and/or provided motivations to use OS-based "main micro-controllers." *See* EX1011, [0005]; EX1006, [0004-05]; EX1023, 2:46-56, 3:18-39; EX1003, ¶¶229-34, 64-73. For example, Kim'616 discloses that televisions conventionally were "based on [an] operating system" and included OS-based controllers to control processing of a digital broadcast and display thereof. [33] EX1011, [0005], [0009], [0011], [0013], [0032-33], [0040-42]; EX1003, ¶¶229-34, 64-73. Kim also discusses the prior art reference Vaughan that discloses "computer/television (PC/TV) convergence systems." EX1020, 1:17-46; EX1003, ¶¶229-34, 64-73. According to Vaughan, OS-based systems provided several benefits over traditional

[33] As discussed in §IX.A, Kim'616 is analogous art in the same field of endeavor.

televisions, such as the ability to display "TV programs and computer applications," "utilize[e] the communications bandwidth, mass storage and graphics application of the computer to deliver, store and display applications within a television viewing environment," and "download information." *Id*. A POSITA would have been aware of such benefits of using a conventional OS-based processor, including to control a television, video processing, and a display. *Id*.

b. Limitations 1G/2H

Tichelaar also would have suggested to and/or motivated a POSITA to implement both the disclosed "low-power standby" or "active standby" ("*waiting condition … placeable into either of a first waiting condition or a second waiting condition*") (Limitations 1G/2H). EX1003, ¶¶235-41, 74-79. As discussed above regarding Limitation 1G, although Tichelaar "focus[es]" on "low-power standby" mode, it also "supports" an additional "active standby."

Indeed, Tichelaar explicitly discloses that TVs "in general [have] four **power modes** of operation: Off, **Low-power standby** (or standby passive), **Active standby**, Running (System operational)." *See* EX1008, [0045]; EX1003, ¶¶235-41, 74-79. Moreover, Tichelaar discloses that "active standby" provides desirable additional functionality including: (1) "small signal functions," (2) "activat[ing] … FM radio," (3) "rout[ing] SCART signals," (4) "fetch[ing] VBI data," (5) "MPEG transport stream (TS) monitoring for specific data or programs," and (6) "software

downloads." EX1008, [0047]; EX1003, ¶¶235-41, 74-79. These disclosures would have provided ample suggestion and motivation to implement both standby modes. *Id*. Tichelaar also would have at least suggested to a POSITA to control "active standby" with the "DμC" in the same manner as it controls "low-power standby" mode. EX1003, ¶¶235-41, 74-79.

As discussed regarding Limitation 1G, Tichelaar further discloses: (1) the need to conserve "standby" power, (2) a standby power "code of conduct" that requires less power than the power consumed by a CRT display (*i.e.*, less than 10 W), (3) "active standby" functionality that does not require a display (*e.g.*, monitoring an MPEG transport stream), and (4) the ability to stop the supply of power to "screen 85." *See* EX1008, [0004], [0050], FIG. 4; EX1003, ¶¶235-41, 74-79.

In addition, a POSITA would have been aware of other prior art that would have provided other and similar suggestions and motivations to not supply power to a display during "standby," such as reducing user "inconvenien[ce]" and "quickly power[ing] up when the television is turned back on." EX1009, 4:51-5:3, EX1011, [0005]; EX1012, [0008]; EX1006, [0004-05]; EX1001, 1:51-65. EX1003, ¶¶235-41, 74-79.

c. Limitations 1J/2K

Tichelaar would have further suggested to, and motivated, a POSITA to provide power to the "infrared remote control receiver front-end," the "main micro-controller," and "decoder" functionality, in its "active standby" (*e.g.*, "*the electric power supplied from the power source unit is controlled so as to supply the electric power to the remote control signal receiving portion and the second controller including the decoder, under the second waiting condition*") (Limitations 1J/2K). *See* section __ (Limitation 1J) *supra;* EX1003, ¶¶242-45. For example, the "main micro-controller" and "decoder" would have been required to support "active standby" desirable additional functionality, including "MPEG transport stream (TS) monitoring for specific data or programs," "demultiplexing," "descrambling," and "software downloads," as discussed above. EX1003, ¶¶242-45. And as discussed for Limitations 1F, 1H, and 1I, a POSITA would have understood power is supplied to the "infrared remote control receiver front-end 144" in "active standby" to provide "signals" to the "DμC" for validation. *See* EX1008, ABSTRACT (**not** limiting "standby" to "low-power" standby), [0036], [0059]; EX1003, ¶¶242-45.

2. Reasonable Expectation of Success

a. Limitations 1B/2F

It would have been a matter of routine skill and design choice to use an OS-based "main micro-controller," and a POSITA would have had a reasonable expectation of success in doing so. EX1003, ¶¶246-48. In view of Tichelaar—and

with a POSITA's knowledge of prior art OS-based systems, such as the admitted prior art in the '507 Patent, Kim'616, and Steinfatt (referenced by Tichelaar)—would have understood that "main micro-controllers" were known to be "*started up by a predetermined OS*." EX1003, ¶¶242-45. For example, Tichelaar expressly discloses that its "DμC" works with an OS-based "main micro-controller." *Id*. Indeed, a conventional OS-based "main micro-controller" would have been able to perform all of Tichelaar's "main micro-controller" functions. *Id*. And nothing in Tichelaar is inconsistent with using an OS-based main micro-controller. *Id*. For example, Tichelaar's delegation of low-power standby tasks to the "DμC" would not have interfered with the tasks performed by an OS-based main micro-controller. *Id*.

b. Limitations 1G/2H and 1J/2K

A POSITA would have had a reasonable expectation of success that Tichelaar's "DμC" could control power from SMPS 70 and/or EHT generator 72 to various television components and resources to implement an active, non-display "standby" mode. EX1003, ¶¶249-51. Tichelaar discloses the ability to selectively choose whether (or not) to supply power to certain circuity, including to sections of the "SoC 82," "RGB amplifier 84" and "screen 85" ("*display*"), as discussed previously (*see* Limitations 1F and 1G). *Id.*

Accordingly, a POSITA would have had a reasonable expectation of success in using Tichelaar's "DμC" to implement an "active standby" to control the supply

of power to the "main micro-controller," "decoder," and "infrared remote control receiver front-end" in "active standby." *Id*.

I. It would have been Obvious to Modify Tichelaar in view of POSITA Knowledge and Relan (Ground 2)

In the event that the Patent Owner argues that Tichelaar does not expressly disclose one or more limitations of Limitations 1G/2H or 1J/2K, those limitations also would have been obvious in view of POSITA knowledge, as discussed above, in further view of Relan, and accomplished with a reasonable expectation of success. EX1003, ¶¶252-60.

1. Relan is Analogous Art

Relan is within the same field of endeavor as Tichelaar, and the '507 Patent, at least because it relates to implementing television power conservation modes, including "STAND-BY"/"HIBERNATE," by controlling power to various television components, including a display. EX1010, [0014-15], [0021], [0041], [0071-74], [0105], [0108-11], [0149], [0235-36], [0242-43], [0246-48], [0263]; EX1003, ¶¶252-54. Relan is also reasonably pertinent to one of the problems purportedly addressed by the '507 Patent: "suppress[ing] power consumption" in standby modes. *See* EX1001, 3:46-55, 7:54-8:30; EX1003, ¶¶252-54.

2. Obviousness Rationales

a. Limitations 1G/2H and 1J/2K

First, Relan would have suggested to and/or motivated a POSITA to modify Tichelaar to provide an "active standby" in which: (1) power is not supplied to "screen 85" (Limitations 1G/2H), and (2) power is supplied to the "infrared remote control receiver front-end," the "main micro-controller," and the "decoder" functionality (Limitations 1J/2K). EX1003, ¶¶255-59, 63-87. In particular, Relan would have provided a strong suggestion and/or motivation to conserve power in "active standby" while providing enhanced non-display functionality. EX1003, ¶¶255-59, 63-87. Relan discloses that a user may desire to record broadcast programs when the user is not present to watch them. *See* EX1010, [0103-05], [0258]. Relan also discloses that "the display/broadcast functions … consume more power than other electronic device functions." EX1010, [0014-15], [0246], [0275]; EX1003, ¶¶255-59, 63-87. Thus, as discussed for Limitations 1G/2H above, Relan discloses enabling certain functionality to process and record video (*e.g.*, the main processor, decoder, and remote control receiver) while disabling the unnecessary and power-rich display functionality. *Id*.

In addition, a POSITA would have recognized that such non-display video recording would have allowed for a better user experience and utilized less power (thus lowering cost of use). EX1003, ¶¶255-59, 63-87. A POSITA would have

recognized that such recording (without the program being displayed) would have allowed users to do other activities while the video is being broadcast and watch the video at a more convenient time. *Id*. A POSITA would have been well aware of these benefits, which consumers would have expected to see present in 2006, because this functionality had been in wide-scale use since at least the 1980s (if not earlier) in the form of various recording devices such as VCR, DVD, and the later DVR/PVR devices, such as the branded TiVo device, for video-on-demand and streaming video content. *Id*.

Second, modifying Tichelaar's "active standby" to provide power to the "main micro-controller 88" and decoding functionality, as taught by Relan, would have been the application of a known technique (*i.e.*, implementing non-display functionality in "standby mode") to a known device (*i.e.*, Tichelaar's "audiovisual device," including "main micro-controller 88" and "DμC 90) ready for improvement (*i.e.*, an enhanced active, non-display standby mode). A POSITA would have recognized that this would yield predictable results (*i.e.*, an "audiovisual device" capable of providing non-display video recording). EX1003, ¶¶255-59, 63-87.

Third, a POSITA would have recognized this as using a known technique (*i.e.*, providing Relan's enhanced non-display standby functionality) to improve a similar device (*i.e.*, Tichelaar's "audiovisual device") in the same way (*i.e.*, modifying Tichelaar to provide enhanced non-display standby functionality, such as

video broadcast recording during standby). EX1003, ¶¶255-59, 63-87. A POSITA would have known that implementing Relan's standby recording functionality in Tichelaar's "audiovisual device" could be achieved by using Tichelaar's "DμC" to control power supplied to the SoC 82 and its non-display related resources, as discussed below. EX1003, ¶¶255-59, 63-87.

b. Claims 8/9

As discussed above, it would have been obvious to a POSITA to modify Tichelaar's "active standby" to further include the advantages (*e.g.*, lower-power recording) of Relan's "STAND-BY." EX1003, ¶¶260, 63-87. Thus, it would have further been obvious to modify Tichelaar's system to incorporate Relan's ability to autonomously shift the device from "low-power standby" ("*first waiting condition*") to "active standby" ("*second waiting condition*") when the time for a user-scheduled recording arrived and then back to "low-power standby." *Id.* A POSITA would have recognized that this would have enabled Tichelaar to maximize the power-saving benefits of the "low-power standby" by only leaving this mode for the time required to complete the scheduled recording. *Id.*

3. Reasonable Expectation of Success

Modifying Tichelaar accordingly would have been accomplished with a reasonable expectation of success. EX1003, ¶¶261-63. As discussed, Relan's enhanced, non-display "standby" functionality primarily concerns the ability to

record broadcast video without powering a display. EX1003, ¶¶261-63. A POSITA would have understood that this functionality is similarly relevant to Tichelaar's "audiovisual device." *See* EX1008, [0016]; EX1003, ¶¶261-63. Tichelaar's "audiovisual device" included functionality that would have allowed it to easily access and record digitally broadcast video programs, while in "active standby." EX1003, ¶¶261-63.

For example, the "audiovisual device" "monitors" an MPEG transport stream in "active standby" "for specific … programs." EX1008, [0047]. The "audiovisual device" further includes a "time-shift recorder" and several memories capable of recording broadcast video. *Id*.; EX1003, ¶¶261-63. Further, the "main micro-controller 88" has access to "high performance" resources "for … stor[ing] … data," including "cache, scratch-pad memory 21, external memory 29," "flash memory 91," and "non-volatile memory 163." EX1008, [0012], [0050], [0060]. For at least this reason, a POSITA would have recognized that Tichelaar's "audiovisual device" was ready for the improvement of implementing Relan's enhanced functionality "standby" mode, *e.g.*, to record video while a user was not present. EX1003, ¶¶261-63.

In addition, both Tichelaar and Relan use well-known architectural elements, such as one micro-controller/processor to control a television, a second micro-controller/processor to control power and standby modes, a power supply, a decoder,

a display, a remote control, and a remote control receiver, all performing their well-known and intended functions. EX1003, ¶¶261-63. For example, both Tichelaar and Relan use a "second" micro-controller/processor, during standby, to receive and process remote control signals and to control power to other components of the television, including a main micro-controller/processor, decoder, and display. EX1003, ¶¶261-63; *see* §§VIII.B.2 and .9, *supra*.

Providing enhanced, non-display functionality would have been a natural extension of Tichelaar's system. EX1003, ¶¶261-63. A POSITA would have recognized that Tichelaar already included all the necessary hardware, code, processing circuitry, memory, and interfaces to record broadcast video (*e.g.*, the SoC, its "main micro-controller," the "decoder," "tuner 74", "MPIF 80," various memories, and signals). *See, e.g.*, EX1008, [0035]; EX1003, ¶¶261-63. In addition, a POSITA would have further understood, that Tichelaar's "DμC" could selectively control the supply of power to non-display functionality of the "audiovisual device" in "active standby," as discussed above. EX1008, FIG. 2, [0059], [0063]; EX1003, ¶¶261-63. Thus, a POSITA would have had a reasonable expectation of success. EX1003, ¶¶261-63.

IX. GROUNDS 3-4: TICHELAAR, IN VIEW OF RELAN, KIM'616, AND POSITA KNOWLEDGE RENDERS OBVIOUS THE CHALLENGED CLAIMS

The combination of Tichelaar, POSITA knowledge, and Kim'616 (Ground 3), and the combination of Tichelaar, POSITA knowledge, Relan, and Kim'616 (Ground 4) are based on Grounds 1 and 2, respectively, with the addition of Kim'616.

A. Kim'616 is Analogous Art

Kim'616 is within the same field of endeavor as the '507 Patent, at least because it relates to providing "a television based on an operating system" capable of displaying a program without a prolonged start-up time. EX1011, [0014-15]. Kim'616 is also reasonably pertinent to one of the problems purportedly addressed by the '507 Patent: "shortening the waiting time after starting up." *Id.*; *see* EX1001, 3:46-55; EX1003, ¶267.

B. Overview of Kim'616

Kim'616 discloses a television that includes a main controller ("CPU") that installs an OS at start-up to control processing of a digital broadcast and display thereof. EX1011, [0005] ("the user cannot manipulate the television until the loading of the operating system is completed"), [0010-11], [0013], [0032], [0041-42]; EX1003, ¶¶264-66.

Kim'616 discloses that "[d]uring [a] booting process, RAM 130 loads the operating system and the application programs, which are stored in HDD 150, by a

control of the CPU." EX1011, [0031]. "CPU [] then loads an application program stored in HDD [] into RAM" and "performs the application program" "**to view the television broadcast** output through the television card." *See* EX1011, [0032], [0040-42]; EX1003, ¶¶264-66.

C. Obviousness Rationales for Limitations 1B/2F

With respect to Limitations 1B/2F, the proposed combinations incorporate into Tichelaar's "audiovisual device" Kim'616's OS-based main controller. EX1003, ¶¶268-70.

First, for the reasons cited in Ground 1 above, a POSITA would have sought to use an OS-based main processor, such as disclosed by Kim'616, in Tichelaar's "audiovisual device." *See supra* §§VIII.B.3, VIII.H; *see also* EX1020, 1:17-46; EX1003, ¶¶268-70.

Second, to the extent not already disclosed by Tichelaar, using an OS-based main micro-controller, as disclosed in Kim'616, would have been the simple substitution of one known element for another to obtain predictable results. EX1003, ¶¶268-70. Each reference uses a main micro-controller/CPU in a digital television to process and display video received from a digital broadcast. EX1003, ¶¶268-70. In addition, Tichelaar already discloses storage (*e.g.*, "external memory 29," "flash memory 91" and "non-volatile memory 163"), and "software download" functionality to implement an OS-based system, as well as the necessary

hardware, memory, circuitry, and interfaces. *See, e.g.*, EX1008, [0012], [0035], [0049-50], [0060]; EX1003, ¶¶268-70. In addition, nothing in Tichelaar or Relan conflicts with substituting an OS-based main micro-controller, such as that disclosed by Kim'616, for the main micro-controller disclosed by Tichelaar. EX1003, ¶¶268-70. And such substitution would have been well within the capabilities of a POSITA. EX1003, ¶¶268-70.

D. Reasonable Expectation of Success

For at least the same reasons as discussed above, a POSITA would have had a reasonable expectation of success in implementing Kim'616's OS-based main micro-controller in Tichelaar. EX1003, ¶271.

X. GROUND 5: KITAMURA, IN VIEW OF KIM'616 AND POSITA KNOWLEDGE, RENDERS OBVIOUS CLAIMS 1, 2, AND 13

Kitamura in view of Kim'616 and POSITA knowledge renders obvious every element of Challenged Claims 1, 2, and 13. Kitamura discloses a sub-CPU that controls power to a main CPU, and other television components, in multiple standby modes. EX1003, ¶¶272-79.

Kitamura discloses a "television receiver having a **plurality of standby power modes**." EX1012, [0003], [0005-06]; EX1003, ¶¶272-79. Kitamura acknowledges that the time required to load software when exiting a low-power state could cause user "inconvenien[ce]":

> … **a startup from the above-mentioned full standby or the partial standby** requires restarting in view of software … [and] **takes time** till displaying a program guide and programs … **thus making the user to feel inconvenient** even though standby power can be reduced.

EX1012, [0008]; EX1003, ¶¶272-79.

To address this problem, Kitamura discloses (and claims) a television with three standby modes:

> [1] a standby power mode for supplying power only to hardware, such as a remote control receiver (**full standby**), [2] a standby power mode for supplying power also to a security module other than the hardware supplied with power in the full standby (**partial standby**), and [3] a standby power mode for stopping supply of power only to a monitor at minimum (**false standby**) …

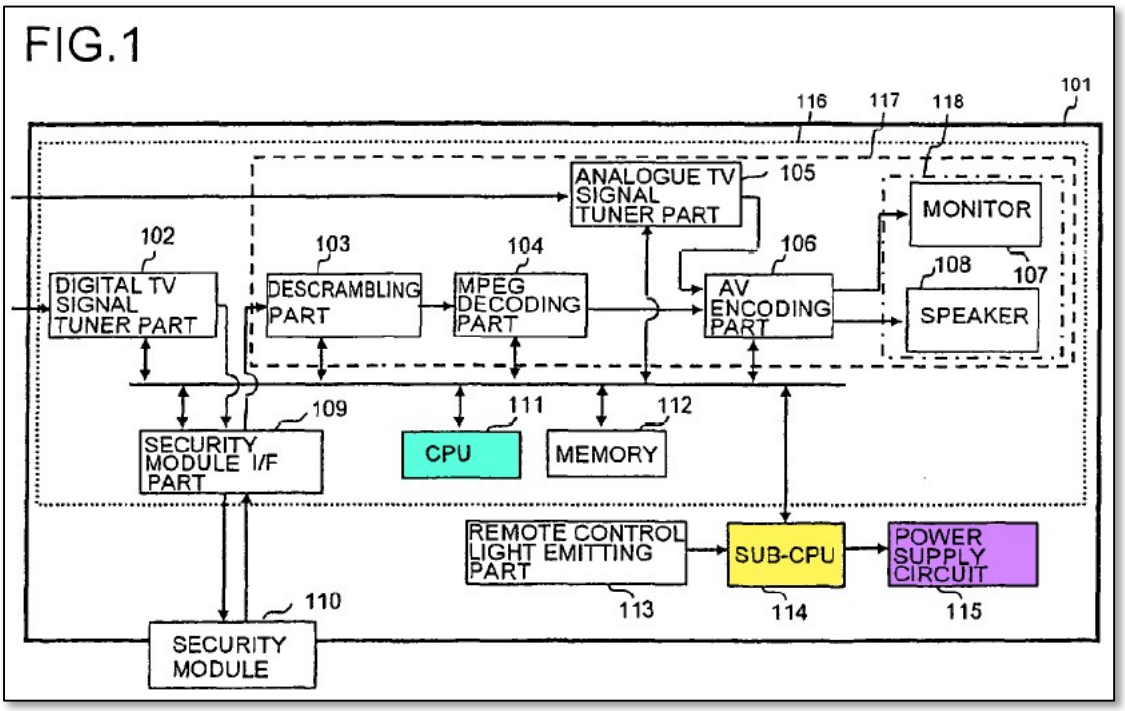
EX1012, [0009]; EX1003, ¶¶272-79.

Kitamura discloses this strikes a "good balance" between conserving "standby power" and "ease of use" (reduced startup time). EX1012, [0012], [0033], [0037-38]; EX1003, ¶¶272-79.

To control the standby modes, Kitamura discloses a "sub-CPU 114" that "analyzes[] remote control signals for controlling a power supply circuit 115." EX1012, [0029]. "Power supply circuit 115" supplies power to components of the

television, including a main "CPU 111" and a decoder. EX1012, [0028-29] (main CPU), [0031], [0025] (decoding part), [0040], FIG. 1; EX1003, ¶¶272-79.

The "sub-CPU" (highlighted yellow), main "CPU 111" (highlighted blue), and "power supply circuit 115" (highlighted purple) are shown in Figure 1 below:



EX1012, FIG. 1.

The main CPU 111 "controls entirely [*sic*] using the programs and data stored in a memory 112." *Id.*

As discussed below, Kitamura discloses all of the limitations of the Challenged Claims. EX1003, ¶¶272-79.

To the extent, however, that Patent Owner argues Kitamura does not explicitly disclose a "*second controller*" that is "*configured to be started up by a*

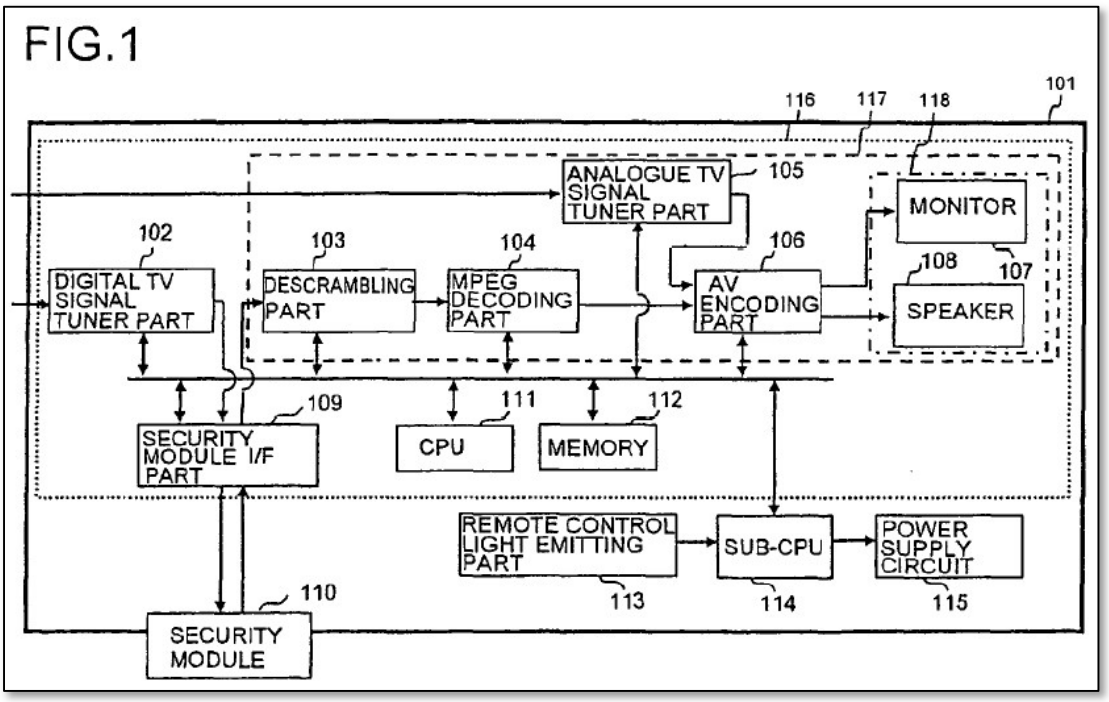
predetermined OS to control a processing of a received digital broadcasting signal via a decoder" or "*to control parts of the display*" (Limitations 1B/2F), this is explicitly disclosed in Kim'616, as discussed above for Grounds 3 and 4. *See e.g.*, EX1011, Abstract; [0005], [0009], [0011], [0013], [0016], [0032], [0040-42]; EX1003, ¶¶272-79.

A. Claim 1

1. Preamble

To the extent the preamble is limiting, Kitamura discloses it. EX1003, ¶¶280-81.

Kitamura discloses "a television receiver [101]" ("*broadcast program receiving apparatus*"), as shown in Figure 1:



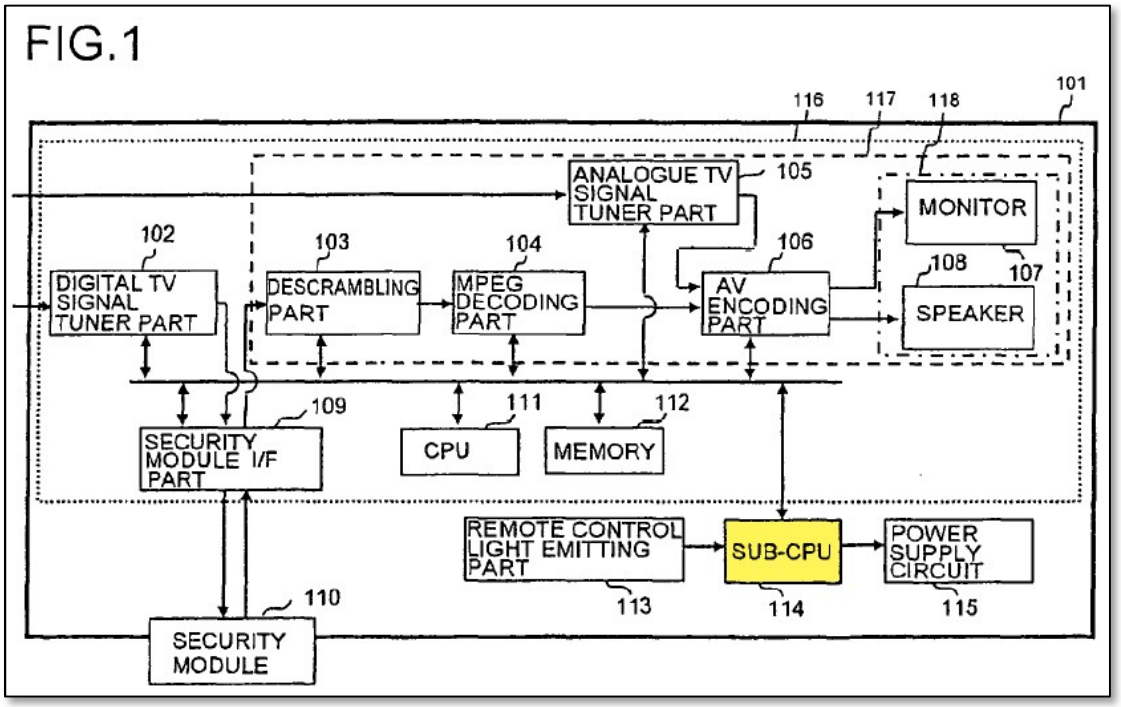
EX1012, Abstract, [0009], [0018-20], FIG. 1; EX1003, ¶¶280-81.

The "television receiver" includes a "digital TV signal tuner part 102" ("*receiving portion*") that receives "digital broadcast" signals, including "MPEG (Moving Picture Experts Group) transport stream[s]," and a "monitor 107" ("*display portion*") that displays received broadcast programs ("*display a program broadcast via a digital broadcasting signal*"). EX1012, [0027], [0006]; [0008], [0022], [0035], [0038-39], FIG. 1; EX1003, 280-81.

2. Limitation 1A

Kitamura discloses Limitation 1A. EX1003, ¶¶282-85.

Kitamura discloses a "sub-CPU" ("*first controller*") (highlighted yellow), as shown in Figure 1:



EX1012, [0029], FIG. 1 (annotated); EX1003, ¶¶282-85.

To the extent "*first controller*" is governed by §112, ¶6, Kitamura discloses the recited first function (F1.1) and corresponding structure (S1.1) identified in §VI. EX1003, ¶¶283-85.

With respect to function F1.1, "sub-CPU 114" is responsible for "controlling a power supply circuit 115," which in turn "supplies power/stops supply of power so that [the television] may have [] three **standby power modes**…" ("*control a waiting condition*"). EX1012, [0030]; EX1003, ¶284

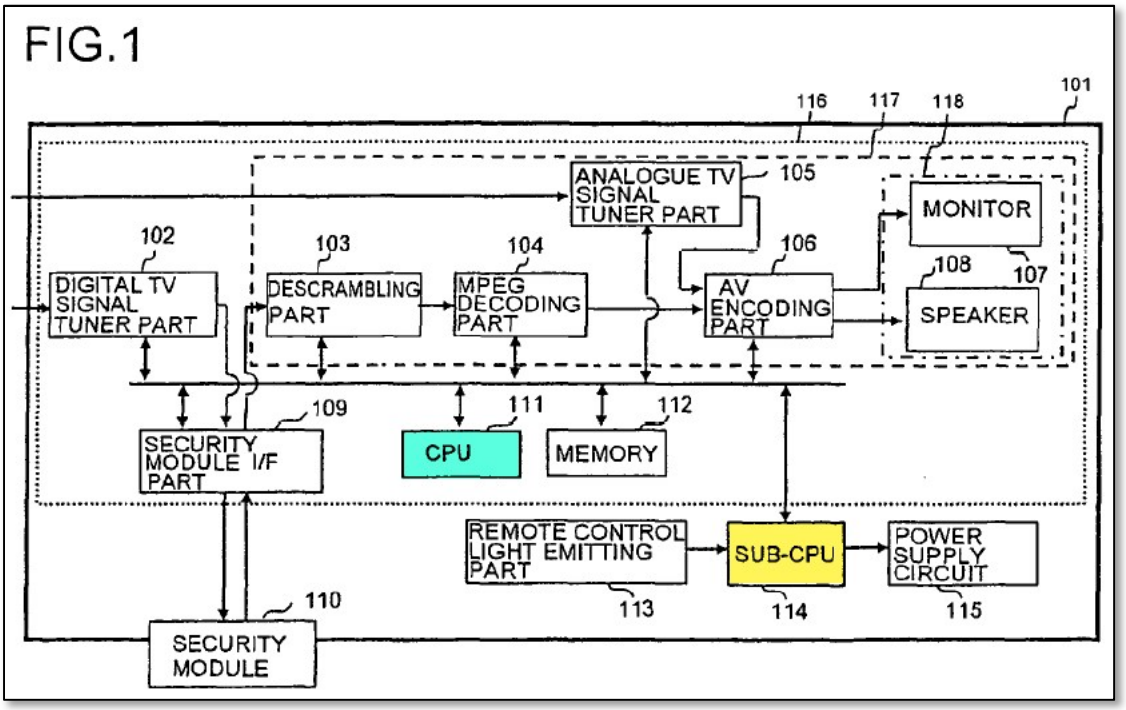
As to structure S1.1, Kitamura's "*first controller*" is a sub-CPU ("sub-CPU 114") configured to set the "*broadcast program receiving apparatus*" ("television receiver 101") into the "*first waiting condition*" ("full standby") and "*second waiting condition*" ("false standby").[34] EX1012, [0030-31]; EX1003, ¶285.

3. Limitation 1B

Kitamura discloses or at least renders obvious, Limitation 1B. EX1003, ¶¶286-91.

[34] Any differences between Kitamura and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶285. Further, Kitamura discloses performing F1.1 in substantially the same way with substantially the same result. *Id*.

Kitamura discloses a main "CPU 111" ("*second controller*") (highlighted blue), as shown in Figure 1:



EX1012, [0028], FIG. 1 (annotated); EX1003, ¶¶286-91.

To the extent "*second controller*" is governed by §112, ¶6, Kitamura discloses the recited function and corresponding structure identified in §VI. EX1003, ¶¶287-89.

With respect to the corresponding structure, Kitamura's "*second controller*" is a processor ("CPU 111") configured to control: (1) a video "*decoder*" (CPU 111 controls, *inter alia*, "descrambling part 103" and "MPEG decoding part 104") to decode a video signal and (2) providing the decoded signal to the display portion

(CPU 111 controls the television "entirely," including causing the decoded video to be displayed by monitor 107).[35] EX1012, [0030-31]; EX1003, ¶¶287-89.

"CPU 111" ("*second controller*") further performs the recited function ("*control a processing of a received digital broadcasting signal via a decoder*"). EX1012, [0025], [0028], [0040]; EX1003, ¶¶287-89. Again, Kitamura discloses that CPU 111 controls the television "entirely," including controlling a processing of the digitally broadcast MPEG transport stream signal that is decoded by "descrambling part 103" and "MPEG decoding part 104" ("*control a processing of a received digital broadcasting signal*"). *Id.*

In addition to the recited function discussed above, Kitamura's "CPU 111" also discloses remainder of Limitation B. At "startup," the television must "restart[] … software," and "CPU 111 controls entirely using the programs and data stored in a memory 112" ("*a second controller configured to be started up by a predetermined OS*"). *See* EX1012, [0008], [0028]; EX1003, ¶¶290-91. A POSITA would have understood this to disclose, or at least render obvious, an OS-based main CPU.

[35] Any differences between Kitamura and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶288. Further, Kitamura discloses performing the recited function in substantially the same way with substantially the same result. *Id*.

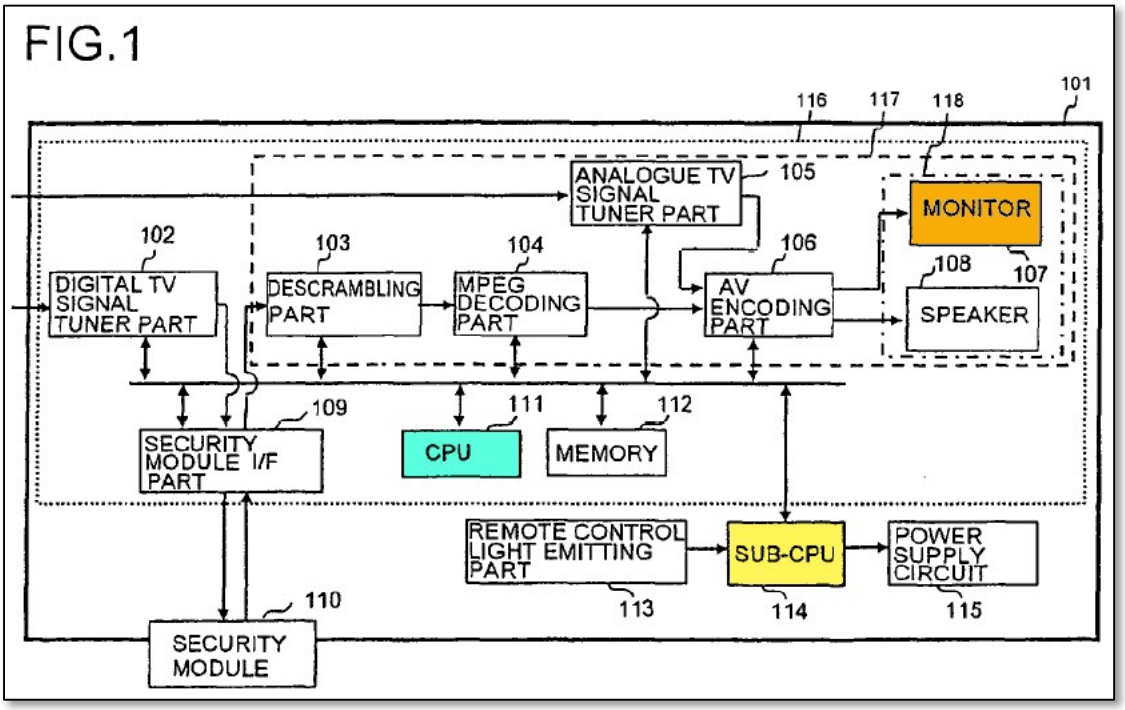
EX1003, ¶¶290-91. A POSITA would have been motivated to use an OS-based CPU at least for the reasons discussed in Ground 1, and would have had a reasonable expectation of success in making the modification—to the extent not already disclosed by Kitamura. EX1003, ¶¶290-91.

To the extent, however, that Patent Owner argues that Kitamura does not disclose, or render obvious, an OS-based main CPU, as claimed, Kim'616 discloses it, as discussed in Grounds 3 and 4 above. EX1003, ¶¶290-91.

4. Limitation 1C

Kitamura discloses Limitation 1C. EX1003, ¶¶292-94.

Kitamura discloses "monitor 107" ("*display portion*") (highlighted orange), as shown in Figure 1:



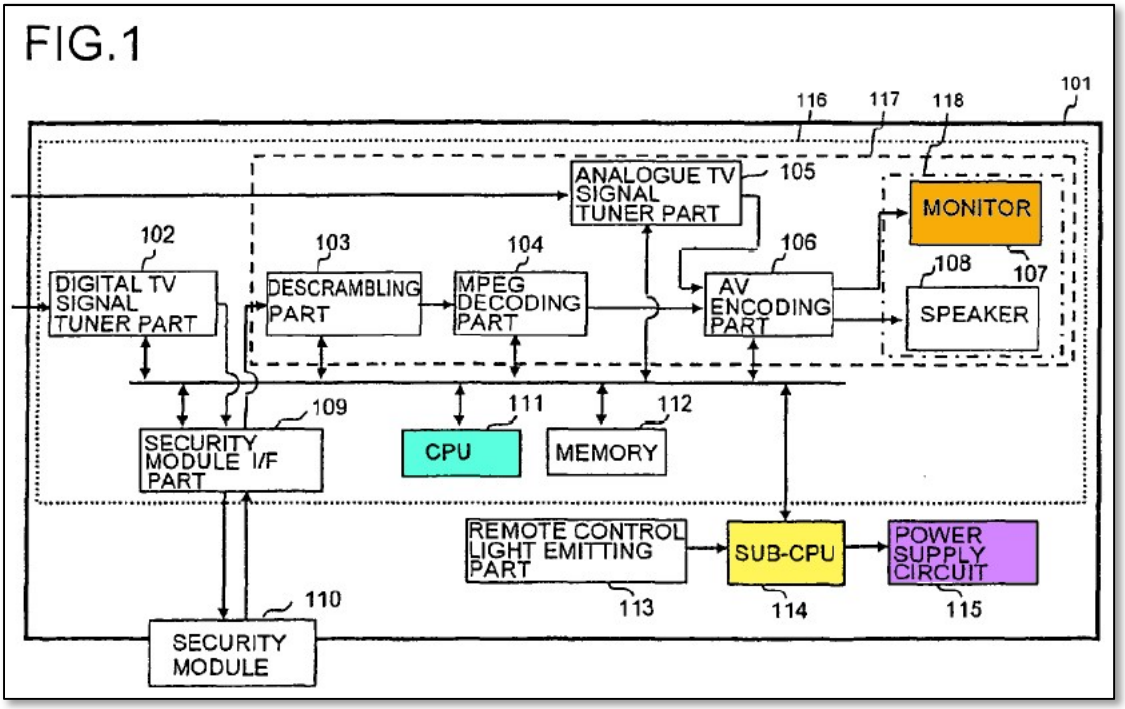
EX1012, [0027], FIG. 1 (annotated); EX1003, ¶¶292-94.

"Monitor 107" displays images sent from "MPEG decoding part 104" via "AV encoding part 106." *See id*. As discussed above (Limitation 1B), "CPU 111" controls this process ("*display an image using a signal processed by the second controller*"). *See* EX1012, [0028]; EX1003, ¶¶292-94.

5. Limitation 1D

Kitamura discloses Limitation 1D. EX1003, ¶¶295-97.

Kitamura discloses "power supply circuit 115" ("*an electric power source unit*") (highlighted purple), as shown in Figure 1:



EX1012, [0030], FIG. 1 (annotated); EX1003, ¶¶295-97.

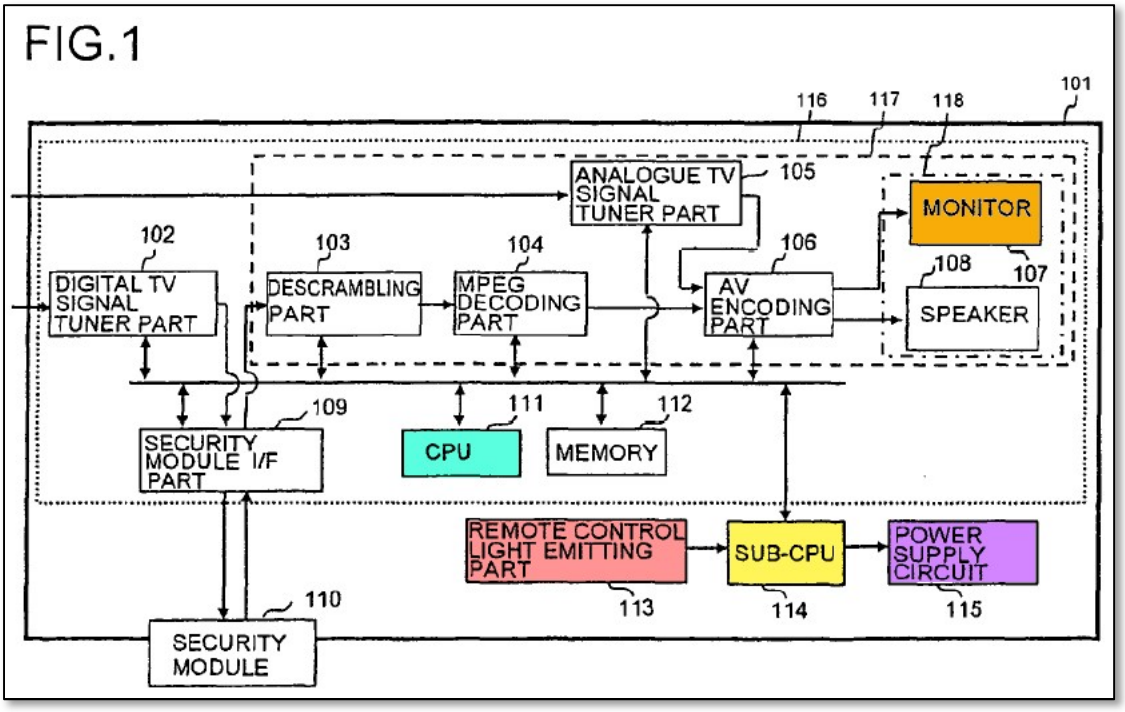
"[P]ower supply circuit 115" selectively "supplies power/stops supply of power" to portions of the television ("*to supply predetermined electric power*"). EX1012, [0030-31]; EX1003, ¶¶295-97. For example, it selectively starts/stops the supply power to the hardware "enclosed with dotted lines 116," "enclosed with dashed lines 117," and/or "enclosed with chain lines 118." *Id*.

6. Limitation 1E

Kitamura discloses Limitation 1E. EX1003, ¶¶298-300.

Kitamura discloses "remote control light receiving part 113" ("*remote control signal receiving portion*") (highlighted red), as shown in annotated Figure 1:[36]

[36] The label of element 113 in Figure 1 as "…Light **Emitting** Part" appears to be a drafting error. *See* EX1012, [0029] (identifying 113 as the "remote control light **receiving** part").



EX1012, [0029]; EX1003, ¶¶298-300.

The "remote control light receiving part 113 receives remote control signals" providing "remote control operations and the like from a user" for the television ("*configured to receive a receive a remote control signal for operating the display portion*"). EX1012, [0029], [0005]; EX1003, ¶¶298-300. This includes operating "monitor 107." *Id*.

7. Limitation 1F

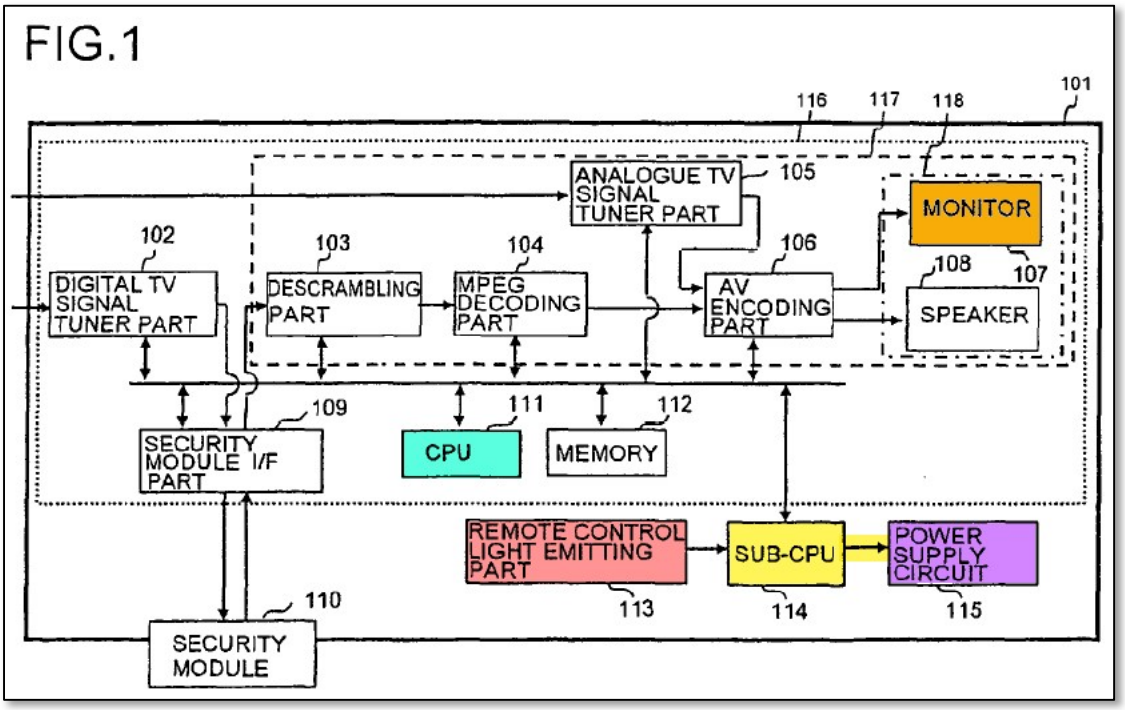
Kitamura discloses or at least renders obvious, Limitation 1F. EX1003, ¶¶301-07.

Kitamura's sub-CPU 114 ("*first controller*") consumes less power than CPU 111 ("*being smaller in consumption of electric power than the second*

controller"), as it is tasked with performing fewer functions than a "main" CPU and is provided with fewer resources. EX1003, ¶¶301-07; *see, e.g.*, EX1021, ABSTRACT ("a sub-CPU having power consumption lower than that of the main CPU"); EX1003, ¶¶301-07.

To the extent §112, ¶6 applies, Kitamura discloses the recited second function (F1.2) and corresponding structure (S1.2) identified in §VI. EX1003, ¶¶304-07.

With respect to function F1.2, Kitamura discloses that "Sub-CPU 114" (highlighted yellow) "control[s] power supply circuit 115" (highlighted purple) to supply the television with power ("*configured to control the electric power supplied from the electric power source unit*"), as shown in Figure 1:



EX1012, [0029-30], FIG. 1 (annotated); EX1003, ¶¶304-06.

In particular, Kitamura discloses that "remote control light receiving part 113 receives remote control signals, and a sub-CPU 114 analyzes the remote control signals for controlling a power supply circuit 115" ("*responsive to the remote control signal received by the remote control signal receiving portion*"). *Id*.

As to structure S1.2, Kitamura's "*first controller*" is a sub-CPU ("sub-CPU 114") configured to (a) receive a signal from the "*remote control signal receiving portion*" corresponding to a "*remote control signal*" (sub-CPU 114 "receives remote control signals" and "analyzes the remote control signals for controlling a power supply circuit 115") and (b) responsively transmits a control signal (a POSITA would have understood that the arrow from Sub-CPU 114 to Power Supply Circuit 115 indicates a control signal, or at least it would have been obvious to use one based on this disclosure) to the "*electric power source unit*" ("Power Supply Circuit 115") to "*control the electric power supplied from the electric power source unit*" ("Sub-CPU 114" "control[s] power supply circuit 115").[37] EX1012, [0029-30]; EX1003, ¶¶301-07.

[37] Any differences between Kitamura and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶307. Further, Kitamura discloses performing F1.2 in substantially the same way with substantially the same result. *Id*.

8. Limitation 1G

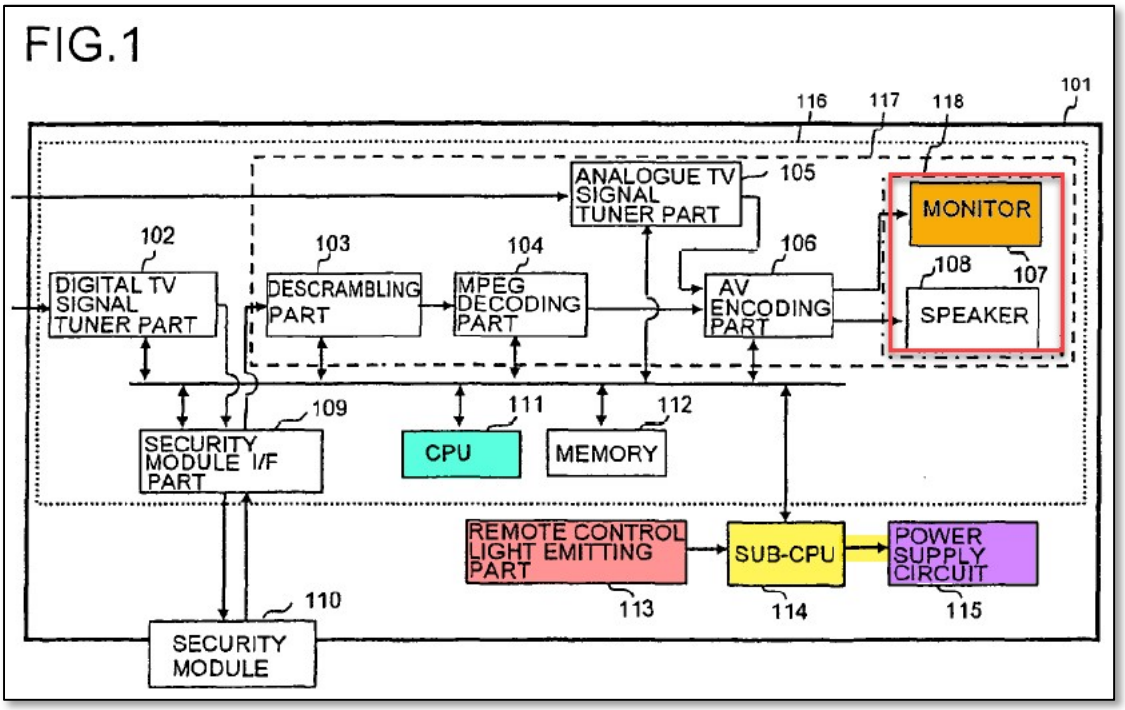
Kitamura discloses Limitation 1G. EX1003, ¶¶308-13.

To the extent §112, ¶6 applies, Kitamura discloses the recited third function (F1.3) and corresponding structure (S1.3) identified in §VI. EX1012, [0030-31], EX1003, ¶¶308-13.

With respect to function F1.3, Kitamura discloses that "sub-CPU 114" controls "power supply circuit 115" to supply, and stop the supply of, power so that the television may have "three standby power modes" ("*the waiting condition ... is controlled by the first controller, so as to be placeable into either of a first waiting condition or a second waiting condition*"). *See* EX1012, [0030]; EX1003, ¶¶308-13. These include the "full standby" ("*first waiting condition*") and "false standby" ("*second waiting condition*"). EX1012, [0030-31]; EX1003, ¶¶308-13.

Further, in both the "full" ("*first waiting condition*") and "false" standby modes ("*second waiting condition*"), power is "stopped" "to hardware enclosed with chain lines 118," as shown in Figure 1, including "Monitor 107" ("*the waiting*

condition in which an image is not displayed after stopping a supply of the electric power to the display portion"):



EX1012, [0030-31] ("to hardware enclosed with dotted lines 116,") ("to hardware enclosed with chain lines 118") (lines 118 is a subset of lines 116), FIG. 1 (annotated); EX1003, ¶¶308-13.[38]

As to structure S1.3, Kitamura's "*first controller*" is a sub-CPU ("sub-CPU 114") configured to: (a) when the "*waiting condition*" ("standby mode") "*in which an image is not displayed after stopping a supply of the electric power to the display*

[38] Power is also not supplied to monitor 107 in Kitamura's third ("partial") standby mode. EX1012, [0031], FIG. 1; EX1003, ¶312.

portion" is in a "*first waiting condition*" ("full standby") or "*second waiting condition*" ("false standby"), determine whether to place the "*waiting condition*" into a "*first*" or "*second waiting condition*" (when "monitor 118" is off, the "sub-CPU 114" determines whether to place the "television 101" into "false" or "full standby"); and (b) place the "*waiting condition*" into a "*first*" or "*second waiting condition*" according to the determination ("sub-CPU 114" initiates the determined "standby").[39] *Id*.

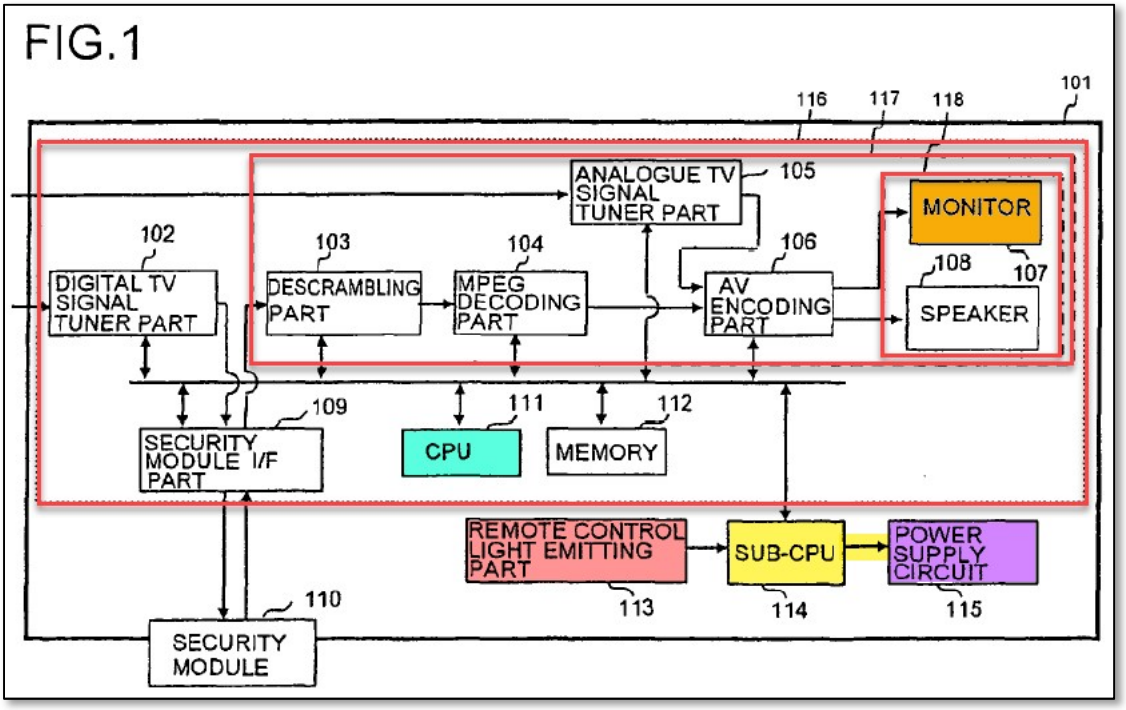
9. Limitation 1H

Kitamura discloses Limitation 1H. EX1003, ¶¶314-17.

Kitamura discloses that "power supply circuit 115" supplies power to "sub-CPU 114" in each "standby mode," including "full standby" and "false standby" ("*the first controller is controlled to be set in operation via supply of the electric power from the electronic power source unit thereto, under the first or second waiting condition*"). EX1012, [0030-31]; EX1003, ¶¶314-17.

[39] Any differences between Kitamura and the structure disclosed in the '507 Patent are insignificant. EX1003, ¶313. Further, Kitamura discloses performing F1.3 in substantially the same way with substantially the same result. *Id*.

In particular, "power supply circuit 115" ("*electronic power source unit*") is controlled to selectively stop the supply power to the hardware enclosed in 116, 117, and 118, for each standby mode, respectively, as shown in Figure 1:



EX1012, [0029-31], FIG. 1 (annotated); EX1003, ¶¶314-17.

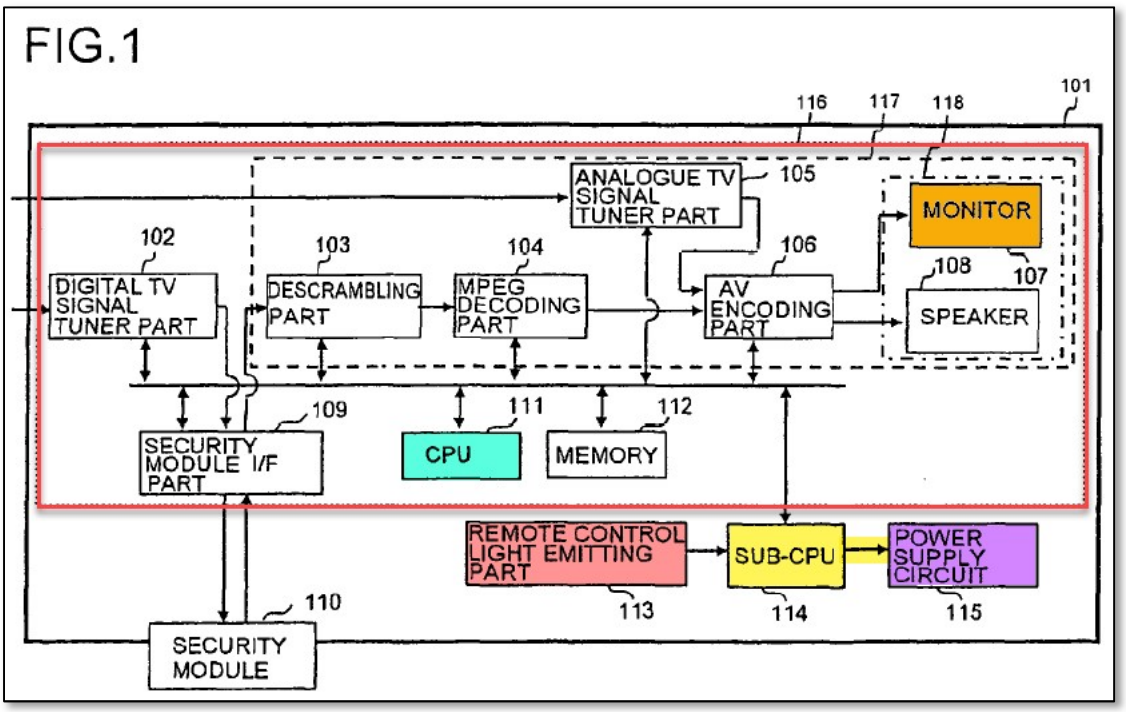
As shown above, "sub-CPU 114" (highlighted yellow) is not enclosed in any of lines 116, 117, or 118. *Id*. Thus, power is supplied to sub-CPU 114 in each standby mode. *Id*.

10. Limitation 1I

Kitamura discloses Limitation 1I. EX1003, ¶¶318-20.

In "full standby" ("*first waiting condition*"), "sub-CPU 114" ("*first controller*") controls "power supply circuit 115" ("*power source unit*") to supply

power to "the minimum required hardware, such as a remote control reception part and the like (to stop power supply to hardware enclosed with dotted lines 116)" ("*the electric power supplied from the power source unit is controlled, so as to supply the electric power to the remote control signal receiving portion, as well as, not to supply the electric power to the second controller including the decoder, under the first waiting condition*"), as shown in Figure 1:



EX1012, [0029-30], FIG. 1 (annotated); EX1003, ¶¶318-20.

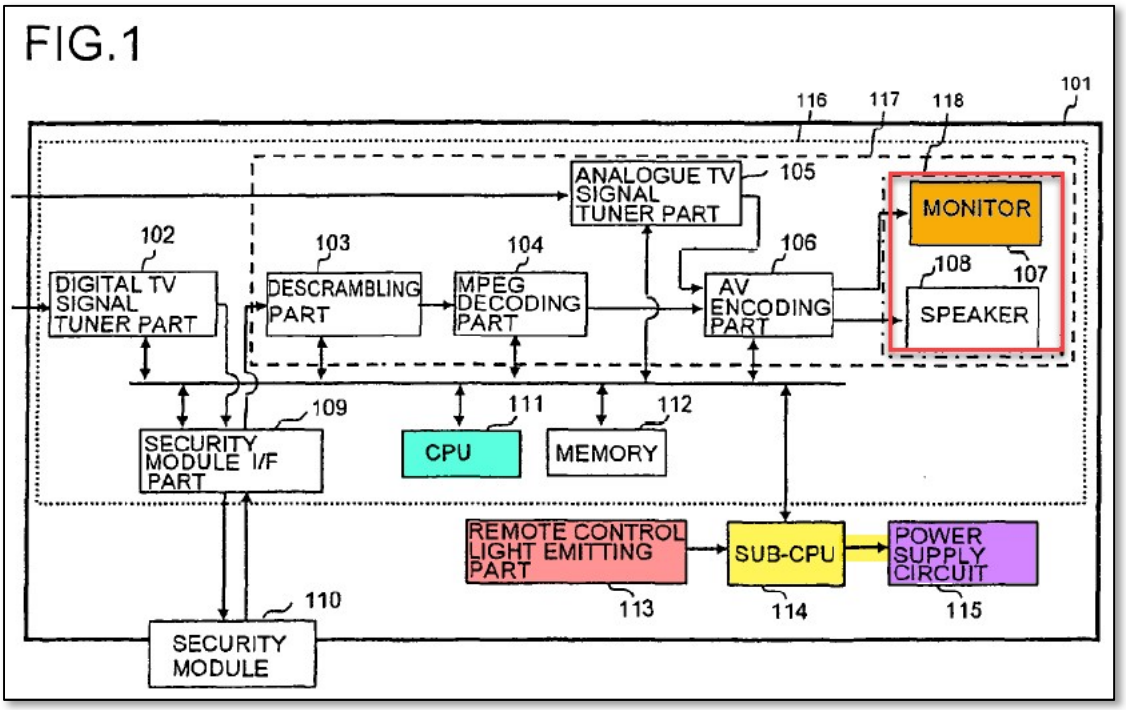
As shown above, "**remote control light receiving part 113**" (highlighted red) is not enclosed by dotted lines 116, and thus **is supplied with power**. *Id*. On the other hand, **CPU 111 (highlighted blue), "descrambling part 103," and "MPEG**

decoding part 104" are enclosed by dotted lines 116, and thus **are not supplied with power**. *Id.*

11. Limitation 1J

Kitamura discloses Limitation 1J. EX1003, ¶¶321-23.

In "false standby" mode, sub-CPU 114 controls "power supply circuit 115" to "stop power supply only to a monitor and a speaker (to stop power supply to hardware enclosed with chain lines 118)" ("*the electric power supplied from the power source unit is controlled so as to supply the electric power to the remote control signal receiving portion and the second controller including the decoder, under the second waiting condition*"), as shown in Figure 1:



EX1012, [0029-0031], FIG. 1 (annotated); EX1003, ¶¶321-23.

As shown above, **"remote control light receiving part 113"** (highlighted red), CPU 111 (highlighted blue), "**descrambling part 103," and "MPEG decoding part 104"** are not enclosed by chain lines 118, and thus **are supplied with power**. *Id*.

B. Claim 2

As with Grounds 1 and 2, the differences between Claims 1 and 2 are also immaterial with respect to Kitamura and Kim'616. EX1003, ¶324; *see supra* §VIII.C. Kitamura's CPU's are circuits. EX1003, ¶324; s*ee* EX1001, 6:6-8 (sub-CPU 60 is a "circuit"). Further, Kim'616's OS-based controller controls both processing of video and parts of a display. *See, e.g.*, EX1011, [0005], [0010-11], [0013], [0032], [0041-42]; EX1003, ¶324. Thus, for the same reasons discussed for Claim 1, Kitamura, in view of POSITA knowledge and/or Kim'616, discloses or at least renders obvious every element of the Claim 2.[40]

C. Claim 13

Kitamura in view of POSITA knowledge discloses or at least renders obvious, Claim 13. EX1003, ¶¶325-28.

[40] The same mapping of related support from Claim 1 to Claim 2 used in Grounds 1–2 applies here as well (*e.g.*, Limitation 2A corresponds to 1 Preamble, 2F corresponds to 1B, 2K corresponds to 1J, etc.). *See supra* §VIII.C

Kitamura discloses a state of "[television] receiver 101" where the "power supply [is fully] on." *See, e.g.*, EX1012, [0032]; EX1003, ¶¶325-28. In this "power supply on" state, "[broadcast] images and sounds can be immediately presented to the user." *See, e.g.*, EX1012, [0022], [0034]; [0038]; EX1003, ¶¶325-28. In such a state "power supply circuit 115" would supply power to the entire television, including "tuner 102" and "monitor 107," to receive and display such images ("*the sub-control circuit controls the electronic power source unit, so as to supply the electric power to the receiving portion and the display portion, so as to operate the display apparatus in a normal manner*"). *See, e.g.*, EX1012, [0027]; EX1003, ¶¶325-28

In addition, the "power supply on" state can be achieved from "full standby" and "false standby" ("*under the first waiting condition or the second waiting condition*"). *See, e.g.*, EX1012, [0034]; [0038]; EX1003, ¶¶325-28. Finally, Kitamura discloses the "sub-CPU 114 analyzes the remote control signals for controlling a power supply circuit 115" ("*when a power button of the display apparatus is turned ON ... the sub-control circuit controls the electronic power source unit*"). *See, e.g.*, EX1012, [0029-30]; EX1003, ¶¶325-28. Television remote controllers conventionally included a "power button." *Id*.

D. It would have been Obvious to a POSITA to Modify Kitamura with Kim'616 OS-Based CPU

With respect to Limitations 1B/2F, it would have been obvious to a POSITA use an OS-based CPU, such as disclosed by Kim'616, for Kitamura's CPU 111, with a reasonable expectation of success, for at least the reasons discussed in Limitation 1B above and Grounds 3-4. EX1003, ¶329.

XI. GROUND 6: KITAMURA, IN VIEW OF KIM'616, TICHELAAR AND POSITA KNOWLEDGE, RENDERS OBVIOUS CLAIM 8-10

This ground combines Tichelaar's "standby LED" with Ground 5. *See* section §VII.F, *supra*. As discussed for Ground 1, Tichelaar's "DμC," which similar to Kitamura's sub-CPU, controls the power supply to place a television into one or more "standby" modes. *See* section §VII.B.2 (Grounds 1-2, Limitation 1A), *supra*. Thus, Kitamura and Tichelaar are analogous art and directed to the same field of endeavor. EX1003, ¶¶330-31.

A POSITA would have found it obvious to combine Tichelaar's "standby LED" (*see* Ground 1) with Kitamura. EX1003, ¶¶330-31. Modifying Kitamura would have been the application of a known technique (*i.e.*, implementing a "standby LED" indicator in a television) to a known device (*i.e.*, Kitamura's television receiver 101, including its sub-CPU and related interface) ready for improvement (*i.e.*, a television indicating whether standby mode is active or not) to yield predictable results (*i.e.*, television with a standby LED indicator). *See*

EX1003, ¶¶330-31. In that regard, a port of sub-CPU 114 could be dedicated to controls one or more "standby LED[s]." *See* EX1003, ¶¶330-31; *see also* EX1018, [0059].

XII. THE BOARD SHOULD NOT DENY INSTITUTION

A. 35 U.S.C. §314

The Board should not deny institution of this Petition under 35 U.S.C. §314 on the basis of the co-pending Litigation. Under the June 21, 2022 *Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation* ("Interim Procedure"), there is no basis for discretionary denial. The Petition presents a "compelling, meritorious challenge[]" that the evidence presented, "if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence." Interim Procedure at 4. The strength of this Petition alone (*Fintiv* factor (6)) is therefore sufficient to foreclose a discretionary denial. *Id*., 4-5.

At least four of the six *Fintiv* factors (including (6), addressed above) weigh heavily against discretionary denial.

With respect to *Fintiv* factors (2) (proximity of the trial date to the Board's final written decision deadline) and (3) (investment by the parties and the Court in the Litigation), the Litigation is still in its very early stages. VIZIO filed a motion to dismiss, which was partially granted on March 9, 2022. Since then, limited

activity has taken place. The Court has not issued any subsequent substantive orders, Petitioner just recently served invalidity contentions on July 15, 2022, and the parties have not begun claim construction briefing.

The last date currently scheduled is the *Markman* hearing in December 2022. *See* EX1029. No trial date has been set and patent cases in this District currently average approximately 15 months between a *Markman* **order** (not hearing) and trial. *See* EX1028. Thus, the Litigation will likely have a trial date no earlier than the second quarter (April, May, June) of 2024. As the Board's final written decision would be expected in February 2024, trial in the Litigation will likely occur "after the projected statutory deadline for the PTAB's final written decision." Interim Procedure at 9.

Moreover, as to *Fintiv* factor (4) (overlap of issues between the Petition and Litigation), the Challenged Claims include claims 8 and 10, which have <u>not</u> been asserted in the Litigation.

These facts alone mitigate any concern that institution might be an inefficient use of the Board's resources.

The remaining *Fintiv* factors do not impact the analysis. Neither party has requested a stay, nor has the Court indicated it would grant one even if requested, and so factor (1) is neutral. *Lego Sys., Inc. v. MQ Gaming, LLC*, IPR2020-01445, Paper 12, at 7 (PTAB Feb. 16, 2021). And while Petitioner is a defendant in the

Litigation (factor (5)), this is extraordinarily common in IPRs and should not be accorded much weight.

B. 35 U.S.C. §325(d)

The Board should also not deny review under §325(d). *Advanced Bionics, LLC v. Med-El Elektromedizinische Gerate GmbH*, IPR2019-01469, Paper 6, 8 (PTAB. Feb. 13, 2020) (precedential); *Becton, Dickinson & Co v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8, 17-18 (PTAB Dec. 15, 2017).

None of the prior art asserted herein was before the Office during the '507 Patent prosecution. EX1003, ¶¶51-57. Accordingly, it was not evaluated during examination or formed the basis of any rejection. EX1003, ¶¶51-57.

Further, the prior art cited above is not cumulative of and is materially different from the prior art relied upon by the Examiner. EX1002, 58-59; EX1003, ¶¶51-57. For example, the foregoing prior art discloses the claimed "*first controller*"/"*sub-control circuit*" (*e.g.*, Tichelaar's "DμC" and Kitamura's "sub-CPU 114") that the Examiner found not disclosed in the prior art. EX1003, ¶¶51-57.

XIII. CONCLUSION

Petitioner respectfully requests that the Board institute IPR of the '507 Patent and cancel the Challenged Claims.

Date: August 29, 2022

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e), 42.8(b)(4), and 42.105, the undersigned certifies that that a copy of the foregoing Petition for *Inter Partes* Review and all supporting exhibits was served by filing this document through the End-to-End System on August 29, 2022, as well as delivering a copy via overnight mail on the correspondence address of record for the subject patent:

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24 *et seq*., the undersigned certifies that this document complies with the type-volume limitations. This document contains 13,996 words as calculated by the "Word Count" feature of Microsoft Word 2016, the word processing program used to create it.

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