

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SILICON LABORATORIES, INC.
Petitioner

v.

CRESTA TECHNOLOGY CORPORATION
Patent Owner

Case IPR Unassigned
Patent 7,265,792 B2

Title: Television Receiver for Digital and Analog Television Signals

**PETITION FOR INTER PARTES REVIEW OF
U.S. PATENT NO. 7,265,792
UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104**

Mail Stop PATENT BOARD
U.S. Patent Trial & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

TABLE OF CONTENTS

I.	Compliance with Formal Requirements.....	1
A.	Grounds for Standing (37 C.F.R. § 42.104(a))	1
B.	Real Parties-In-Interest (37 C.F.R. § 42.8(b)(1)).....	1
C.	Related Matters (37 C.F.R. § 42.8(b)(2)).....	1
D.	Counsel and Service Information (37 C.F.R. § 42.8(b)(3)–(4))	4
E.	Fee	4
F.	Statement of Precise Relief Requested	4
II.	Reasonable Likelihood to Prevail.....	5
III.	Identification of Challenge	5
A.	Prior Art Publications.....	5
B.	Brief Statement of Grounds for Challenge.....	7
C.	Timeliness of Petition.....	8
IV.	Invalidity of the '792 Patent.....	12
A.	Introduction	12
B.	Prosecution History of the '792 Patent	17
C.	Person of Ordinary Skill in the Art	18
D.	Claim Construction	18
V.	Detailed Explanations of the Challenges.....	25
A.	Foundational Claim	25
B.	Ground 1: Claim 29 is obvious over Thomson in view of Harris.....	35
C.	Ground 2: Claim 24 is obvious over Thomson and Harris in view of Grumman.....	35

D.	Ground 2: Claim 25 is obvious over Thomson and Harris in view of Grumman.....	39
E.	Ground 3: Claim 26 is obvious over Thomson and Harris in view of Zenith.....	42
F.	Ground 3: Claim 28 is obvious over Thomson and Harris in view of Zenith.....	47
G.	Ground 4: Claim 27 is obvious over Thomson and Harris in view of Zenith and Birleson.	49
H.	Ground 5: Claim 18 is obvious over Thomson and Harris in further view of Oku, Ericsson, and Nguyen.....	51
I.	Ground 5: Claim 19 is obvious over Thomson and Harris in further view of Oku, Ericsson, and Nguyen.....	59
VI.	Conclusion	60

EXHIBIT LIST

- Exhibit 1001 U.S. Patent No. 7,265,792, titled “Television Receiver for Digital and Analog Signals,” to Favrat et al. (“the ‘792 patent”).
- Exhibit 1002 Return of Service in *Cresta Technology Corporation v. Silicon Laboratories, Inc. et al.*, Case No. 1:14-cv-00078 before the United States District Court for the District of Delaware (January 28, 2014) (“Return of Service”).
- Exhibit 1003 Complaint in ITC Investigation No. 377-TA-910 (January 28, 2014) (“ITC Complaint”).
- Exhibit 1004 European Patent Application No. EP 0696854, titled “Broadcast Receiver Adapted for Analog and Digital Signals,” assigned to Thomson Multimedia S.A. (“*Thomson*”).
- Exhibit 1005 Clay Olmstead & Mike Petrowski of Harris Semiconductor, A *Digital Tuner for Wideband Receivers*, DSP Applications Magazine, Sep. 1992 (“Harris”).
- Exhibit 1006 Al Lovrich & Ray Simar, Jr., “Implementation of FIR/IIR Filters with the TMS32010/TMS32020,” Application Report: SPRA003A (Texas Instruments 1989) (“TI App Note”).
- Exhibit 1007 U.S. Patent Application No. 2004/0061804, titled “Broadband Receiver Having a Multistandard Channel Filter,” to Favrat et al. (“the ‘585 application”).
- Exhibit 1008 U.S. Patent 5,381,357, titled “Complex Adaptive FIR Filter,” to Wedgwood et al. (“Grumman”).
- Exhibit 1009 Declaration of Douglas Holberg (“Holberg Dec.”).
- Exhibit 1010 Excerpts of the prosecution file history of the ‘792 patent.
- Exhibit 1011 U.S. Patent 6,377,316, titled “Tuner with Switched Analog and Digital Modulators,” to Mycynek et al. (“Zenith”).

Exhibit 1012	U.S. Patent 5,999,567, titled “Method for Recovering a Source Signal from a Composite Signal and Apparatus Therefor,” to Torkkola. (“Torkkola”).
Exhibit 1013	U.S. Patent 6,263,222, titled “Signal Processing Apparatus,” to Diab et al. (“Diab”).
Exhibit 1014	Order No. 50 in ITC Investigation No. 337-TA-910, “Initial Determination Granting Cresta Technology Corporation’s Corrected Motion to Partially Terminate Investigation as to U.S. Patent No. 7,251,466 and Certain Claims of U.S. Patent Nos. 7,075,585 and 7,265,792” (November 12, 2014).
Exhibit 1015	U.S. Patent 6,725,463, titled “Dual Mode Tuner for Co-Existing Digital and Analog Television Signals,” to Birleson. (“Birleson”).
Exhibit 1016	Advanced Television Systems Committee, “ATSC Digital Television Standard” (September 16, 1995).
Exhibit 1017	U.S. Patent 5,796,442, titled “Multi-Format Television Receiver,” to Gove et al. (“Gove”).
Exhibit 1018	U.S. Patent Application No. 2002/0057366, titled “Decoder Device and Receiver Using the Same,” to Oku et al. (“Oku”).
Exhibit 1019	U.S. Patent No. 4,872,054, titled “Video Interface for Capturing an Incoming Video Signal and Reformatting the Video Signal,” to Gray et al. (“Gray”).
Exhibit 1020	U.S. Patent No. 6,600,747, titled “Video Monitor Multiplexing Circuit,” to Sauber (“Sauber”).
Exhibit 1021	U.S. Patent No. 6,804,497, titled “Partitioned Radio-Frequency Apparatus and Associated Methods,” to Kerth et al. (“Kerth”).
Exhibit 1022	European Patent Application No. EP 94300649.4, titled “Digital Filtering, Data Rate Conversion and Modem

Design,” filed January 28, 1994, to Terrell (“Terrell”).

- Exhibit 1023 U.S. Patent No. 6,124,898, titled “Digital Television Receiver with Equalization Performed on Digital Intermediate-Frequency Signals,” to Patel et al. (“Patel”).
- Exhibit 1024 U.S. Patent No. 6,411,136, titled “Differential Line Driver,” to Nianxiong et al. (“Ericsson”).
- Exhibit 1025 U.S. Patent No. 7,394,857, titled “Flexible Versatile Low-Cost Wireline Transmit Driver,” to Maulik et al. (“Maulik”).
- Exhibit 1026 U.S. Patent No. 4,595,910, titled “Digital-to-Analog Converter Useful in a Television Receiver,” to Wine (“Wine”).
- Exhibit 1027 U.S. Patent No. 4,292,597, titled “Circuit for Converting Single-Ended Input Signals to a Pair of Differential Output Signals,” to Niimura et al. (“Niimura”).
- Exhibit 1028 The Authoritative Dictionary of IEEE Standards Terms, pp. 87, 912, IEEE Press (2000).
- Exhibit 1029 U.S. Patent No. 6,332,028, titled “Dual-Processing Interference Cancelling System and Method,” to Marash (“Marash”).
- Exhibit 1030 U.S. Patent No. 6,142,942, titled “Ultrasound Imaging System and Method Employing an Adaptive Filter,” to Clark (“Clark”).
- Exhibit 1031 U.S. Patent No. 6,400,598, titled “Programmable Circuit Devices with Low Voltage Differential Signaling Capabilities,” to Nguyen et al. (“Nguyen”).
- Exhibit 1032 Microsoft Computer Dictionary, pp. 269, 270, Microsoft Press (5th ed. 2002).
- Exhibit 1033 James Karki, “Fully-Differential Amplifiers,” Application Report: SLOA054D (Texas Instruments 2002) (“Karki”).

- Exhibit 1034 Stephen Kempainen, “Low-Voltage Differential Signaling (LVDS),” Application Note 1382-6 (Agilent Technologies May 20, 2002) (“Kempainen”).
- Exhibit 1035 “High-Bandwidth LVDS Support in APEX Devices,” M-SS-APEXLVDS-02 (Altera Corporation 2000) (“Altera”).
- Exhibit 1036 “LVDS Owner’s Manual: Low-Voltage Differential Signaling,” 3d Ed., 550062-003 (National Semiconductor January 2004) (“National Semiconductor”).
- Exhibit 1037 “Product Specification for TDA10021HT DVB-C channel receiver,” (Philips Semiconductors, October 1, 2001) (“TDA10021HT”).
- Exhibit 1038 “TDA10046HT Single-Chip DVB-T channel decoder,” Docment order No. 9397 750 0922 (Philips Semiconductors, May 2002) (“TDA10046HT”).
- Exhibit 1039 “Pre-Trial Brief of the Office of Unfair Import Investigations” in ITC Investigation No. 337-TA-910 (Redacted) (November 10, 2014).
- Exhibit 1040 Excerpts of “Hearing, Vol. 5” in ITC Investigation No. 337-TA-910 (December 5, 2014) (cross-examination of Dr. Caloyannides).

Petitioner hereby requests that the United States Patent and Trademark Office institute an *inter partes* review of claims 18, 19, and 24–29 of U.S. Patent No. 7,265,792 (“the ’792 patent”) (Ex. 1001).

I. COMPLIANCE WITH FORMAL REQUIREMENTS

A. Grounds for Standing (37 C.F.R. § 42.104(a))

In accordance with 37 C.F.R. § 42.104(a), Petitioner certifies that the ’792 patent is available for *inter partes* review. Petitioner further certifies that Petitioner is not barred or estopped from requesting an *inter partes* review challenging the ’792 patent on the grounds identified in this Petition.

B. Real Parties-In-Interest (37 C.F.R. § 42.8(b)(1))

To the best of Petitioner’s knowledge, Silicon Laboratories, Inc. (“Petitioner”) and Cresta Technology Corporation (“Patent Owner”) are the real parties-in-interest in this matter.

C. Related Matters (37 C.F.R. § 42.8(b)(2))

Petitioner is a defendant in two infringement actions filed by Patent Owner: Investigation No. 337-TA-910, filed on January 28, 2014, in the International Trade Commission (“ITC”) (ITC Complaint, Ex. 1003); and *Cresta Technology Corporation v. Silicon Laboratories, Inc. et al.*, Case No. 1:14-cv-00078-RGA, served on January 28, 2014 in the United States District Court for the District of Delaware (Return of Service, Ex. 1002). In both cases, Patent Owner has accused Petitioner (as well as its customers) of infringing three patents: U.S. Patent No.

7,075,585 (“the ’585 patent”); U.S. Patent No. 7,265,792 (“the ’792 patent”); and U.S. Patent No. 7,251,466 B2 (“the ’466 patent”).

In the ITC, Patent Owner accused Petitioner of infringing claims 1–3, 5, 10, 13, 14, and 16–19 of the ’585 patent. (Ex. 1003). On May 5, 2014, Petitioner filed a Petition for *inter partes* review of only the claims asserted against it in the ITC, *i.e.*, claims 1–3, 5, 10, 13, 14, and 16–19 of the ’585 patent. *See* IPR2014-00728, Paper No. 1 (May 5, 2014); *see also* Ex. 1014 (dismissing certain claims of the ’585 patent asserted in the ITC action)). The Board instituted *inter partes* review of claims 1–3, 5, 10, and 16–19 on the basis of that petition. (*See* IPR2014-00728, Paper No. 9 at 23–24 (October 24, 2014)).

A few weeks later, Petitioner also filed a Petition for *inter partes* review challenging only those claims the ’792 patent asserted against it in the ITC, *i.e.*, 1–17, 26, and 27. (*See* IPR2014-00809, Paper No. 1 (May 23, 2014); *see also* Ex. 1014 (dismissing certain claims of the ’792 patent asserted in the ITC action)). In response to that Petition, the Board instituted *inter partes* review on claims 1–17. IPR2014-00728, Paper No. 10 at 30; and Paper No. 28 at 8 (October 24, 2014).

Finally, on June 4, 2014, Petitioner filed IPR2014-00881 challenging claims 1, 2, 5, 8, 9, 11–13, 16, 20–22, 24–26, 29, 31, 32, 35–37, and 39 of U.S. Patent No. 7,251,466 B2 (“the ’466 patent”), which Patent Owner accused Petitioner of infringing in the ITC. (*See* IPR2014-00881, Paper No. 1 (June 4, 2014); Ex. 1014

(dismissing all asserted claims of the '466 patent originally asserted in the ITC action)). The Board instituted *inter partes* review of claims 1, 2, 5, 8, 11–13, 20, 21, 24–26, 32, 32, 35, 36, and 39 of the '466 patent on the basis of that petition. IPR2014-00881, Paper No. 9 at 28 (October 24, 2014).

The ITC trial has since been concluded and the Parties are currently awaiting the Administrative Law Judge's (ALJ) decision on the '585 and '792 patents—the Patent Owner having voluntarily dropped the '466 patent from the case from the proceedings. (*See* Ex. 1014). The district court case has been stayed during the pendency of the ITC proceeding, as required by statute. Even though Petitioner expects to be completely vindicated in the ITC, unfortunately, Petitioner anticipates that Patent Owner may then seek to lift the stay in the district court and assert additional claims that were held in reserve. To avoid enduring yet another round of expensive infringement litigation, Petitioner files this Petition to challenge the remaining claims that the Patent Owner could potentially assert in the district court case before Petitioner is barred from doing so. *See* 35 U.S.C. § 315(b).¹ This Petition aligns with the statutory goal of the America Invents Act (AIA) to provide lower-cost alternatives to costly patent litigation.

¹ On January 23, 2013, Petitioner filed a Petition to challenge the residual claims of the '585 Patent. Petitioner is not filing a Petition challenging any of the '466 claims, however, because Patent Owner has conceded that it does not have a

D. Counsel and Service Information (37 C.F.R. § 42.8(b)(3)–(4))

Lead Counsel	Backup Counsel
Peter J. Ayers LEE & HAYES, PLLC 11501 Alterra Parkway, Suite 450 Austin, Texas 78758 Telephone: 512-605-0252 Facsimile: 512-605-0252 Email: peter@leehayes.com	John Shumaker LEE & HAYES, PLLC 11501 Alterra Parkway, Suite 450 Austin, Texas 78758 Telephone: 512-605-0260 Facsimile: 512-605-0260 Email: jshumaker@leehayes.com Brian Mangum LEE & HAYES, PLLC 11501 Alterra Parkway, Suite 450 Austin, Texas 78758 Telephone: 512-605-0257 Facsimile: 512-605-0257 Email: brianm@leehayes.com

E. Fee

Petitioner authorizes the Director to charge the fee specified by 37 C.F.R. § 42.15(a) and any additional fees associated with this Petition to Deposit Account No. 12-0769.

F. Statement of Precise Relief Requested

In accordance with 37 C.F.R. § 42.22, Petitioner respectfully requests cancellation of claims 18, 19, and 24–29 of the '792 patent.

non-frivolous argument for continued assertion of that patent in district court. (See Ex. 1014).

II. REASONABLE LIKELIHOOD TO PREVAIL

This Petition, in accordance with 35 U.S.C. § 314(a), establishes a reasonable likelihood that Petitioner will prevail with respect to at least one of the claims challenged in this petition because the Petition provides evidence and supporting reasoning showing that all of the elements of each of claims 18, 19, and 24–29 of the '792 patent are unpatentable over the prior art.

III. IDENTIFICATION OF CHALLENGE

A. Prior Art Publications

Petitioner relies on the following prior art publications to support its grounds of challenge to claims of the '792 patent in this Petition:

1. European Patent Application No. EP 0696854, titled “Broadcast Receiver Adapted for Analog and Digital Signals,” filed July 29, 1995, published February 14, 1996 (Exhibit 1004), and assigned to Thomson Multimedia S.A. (“Thomson”). Thomson is prior art at least under 35 U.S.C. § 102(b) (pre-AIA).
2. Clay Olmstead & Mike Petrowski of Harris Semiconductor, “A Digital Tuner for Wideband Receivers,” DSP Applications Magazine, Sep. 1992 (Exhibit 1005) (“Harris”). Harris is prior art at least under 35 U.S.C. § 102(b) (pre-AIA).
3. Wedgwood et al., U.S. Patent 5,381,357, titled “Complex Adaptive FIR Filter,” filed May 28, 1993 and issued on January 10, 1995 (Exhibit 1008) (“Grumman”). Grumman is prior art under 35 U.S.C. § 102(b) (pre-AIA).

4. Mycynek et al., U.S. Patent 6,377,316, titled “Tuner with Switched Analog and Digital Modulators,” filed September 14, 1998 and issued on April 23, 2002 (Exhibit 1011) (“Zenith”). Zenith is prior art under 35 U.S.C. § 102(b) (pre-AIA).

5. Birleson, U.S. Patent 6,725,463, titled “Dual Mode Tuner for Co-Existing Digital and Analog Television Signals,” filed Aug. 1, 1997 and issued on April 20, 2004. (Exhibit 1015) (“Birleson”). Birleson is prior art at least under 35 U.S.C. § 102(e) (pre-AIA).

6. Oku, U.S. Patent Application No. 2002/0057366, titled “Decoder Device and Receiver Using the Same,” vclaims priority to U.S Patent Application No. 09/241,614 filed February 2, 1999 and patented October 11, 2001. (Exhibit 1018) (“Oku”). Oku is prior art at least under 35 U.S.C. § 102(b) (pre-AIA).

7. Nianxiong *et al.*, U.S. Patent 6,411,136 B1, titled “Differential Line Driver,” filed March 1, 1999 and patented June 25, 2002. (Exhibit 1024) (“Ericsson”). This patent is prior art at least under 35 U.S.C. § 102(b) (pre-AIA).

8. Nguyen, U.S. Patent 6,400,598 B1, titled “Programmable Logic Integrated Circuit Devices with Low Voltage Differential Signaling Capabilities,” filed April 25, 2001 and patented June 4, 2002. (Exhibit 1031) (“Nguyen”). Nguyen is prior art at least under 35 U.S.C. § 102(b) (pre-AIA).

B. Brief Statement of Grounds for Challenge

Petitioner challenges claims 18, 19, and 24–29 (“the challenged claims”) of the ’792 patent on the following grounds:

Ground 1: Claim 29 is invalid under 35 U.S.C. § 103 as obvious over Thomson in view of Harris.

Ground 2: Claims 24 and 25 are invalid under 35 U.S.C. § 103 as obvious over Thomson and Harris in view of Grumman.

Ground 3: Claims 26 and 28 are invalid under 35 U.S.C. § 103 as obvious over Thomson and Harris in view of Zenith.

Ground 4: Claim 27 is invalid under 35 U.S.C. § 103 as obvious over Thomson and Harris in view of Zenith and Birleson.

Ground 5: Claims 18 and 19 are invalid under 35 U.S.C. § 103 as obvious over Thomson and Harris in further view of Oku, Ericsson, and Nguyen.

None of these grounds is redundant. The challenged claim or claims of each ground is not challenged by any other ground in this Petition. Further, these grounds are not redundant of previous Petitions filed, as discussed further below.

This Petition, supported by the Declaration of Douglas Holberg (“Holberg Dec.”) (Ex. 1009) filed with this Petition, demonstrates that there is a reasonable likelihood that Petitioner will prevail with respect to at least one of the challenged

claims and that each of the challenged claims is unpatentable for the reasons cited in this petition. See 35 U.S.C. § 314(a).

C. Timeliness of Petition

This Petition is timely filed. A complaint alleging infringement of the '792 patent by Petitioner was first served on Petitioner on January 28, 2014. (Ex. 1002). Because this Petition is filed within one year from when Petitioner was first served with a complaint alleging infringement of the '792 patent, it is timely. See 35 U.S.C. § 315(b).

Petitioner's previous Petition for *inter partes* review of certain claims of the '792 patent should not bar this Petition. As explained above, Petitioner previously challenged *only* those claims asserted against in the ITC litigation. At that time, the district court case had been stayed and Patent Owner had not yet served any infringement contentions in that case asserting any additional claims. Petitioner therefore challenged all of the claims that were asserted against it at that time. Practically speaking, that was all of the claims Petitioner could challenge in a single, 60-page petition. See IPR2014-00809, Paper No. 1 (spanning pages 1–59).

At that time, Petitioner was confident that the ITC proceeding would finally resolve all of Patent Owner's claims against it. As that case has progressed, however, Petitioner's optimism has waned. After several unsuccessful settlement discussions, that case was tried before the ALJ on December 1–5, 2014. The

parties are currently awaiting a Preliminary Determination. While Petitioner expects to prevail, it is not optimistic that even an adverse decision by the ITC will persuade the Patent Owner to drop its fight in the district court. Petitioner is now forced to file a second Petition to challenge those residual claims that could possibly be asserted against it in the district court once the stay is lifted.

Challenged claims 18, 19, 24, 25, 28, and 29 of the '792 patent were not previously challenged by Petitioner in IPR2014-00809. Challenged claims 26 and 27 were previously challenged in IPR2014-00809 but the Board declined to institute *inter partes* review of those claims based on Petitioner's inherency argument. IPR2014-00809, Paper No. 10 at 25–27; *see also* Paper No. 19 at 7 (denying request for rehearing). Petitioner respectfully requests that the Board exercise its discretion and consider Petitioner's new grounds of invalidity, which clearly demonstrate a highly likelihood that these two claims are unpatentable. As discussed below, because Petitioner, in the instant Petition, provides prior art and arguments that substantially differ from those previously presented to the Board in IPR2014-00809, the Board should institute *inter partes* review of these claims along with newly challenged claims 18, 19, 24, 25, 28, and 29. *Cf.* 35 U.S.C. § 325(d) (“the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.”).

The Board previously declined to institute *inter partes* review of claims 26 and 27 (claim 27 depends from claim 26) based on a combination of Thomson and Harris, and alternatively on a combination of Thomson, Harris, and Balaban. (IPR2014-00809, Paper No. 10). Specifically, Petitioners argued that Thomson inherently disclosed a standard selection circuit as recited in claim 26. (IPR2014-00809, Pet. at 26). The Board rejected Petitioner's obvious arguments based on inherency of the selection circuit in Thomson as conclusory. Paper 10 at 26. Although Petitioner disagrees with that conclusion, it has nonetheless come forward with additional prior art (Zenith, Ex. 1011) that clearly discloses the standard selection circuit limitation of claim 26 and 27 that the Board previously found missing from Thomson.

As discussed in further detail herein, Zenith discloses a standard selection circuit that generates a select signal to couple an intermediate signal to the appropriate analog or digital demodulator for appropriate signal processing. (Ex. 1011, 2:39–45). The select signal is generated in accordance with the format of the incoming signal (analog or digital). (Ex. 1011, 3:13–15). Figure 8 of Thomson (Ex. 1004), in contrast, merely identifies a TV standard input to adaptive filter 8 without disclosing the circuit details that generated the TV standard input. While Zenith and Thomson both pertain to the field of television receivers, the disclosure of the actual details of the standard selection circuit in Zenith (*i.e.*, microprocessor

22) distinguishes the disclosure of Zenith from Thomson such that Thomson and Zenith are not the same or similar prior art. *See Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, IPR2013-00324, Paper No. 19 at 6 (“IBS does not distinguish any teaching present in Odedra that is lacking from Ju, Tsien, or any of the other references cited in the 128 Petition.”). Because Zenith explicitly discloses the standard selection circuit – whereas Thomson does not – Petitioner is not presenting the same or similar arguments to the Board in the instant petition as it did in IPR2014-00809. The present Petition stands in sharp contrast to *Conopco, Inc. dba Unilever v. The Procter & Gamble Co.*, IPR2014-00628, Paper No. 21, where the Board declined to institute *inter partes* review. In *Unilever*, the Board rejected an earlier filed petition finding a prior art reference disclosing a material only by its trade name did not inherently disclose the claimed “molecular weight and charge densities” limitation. (*Id.* at 7). A subsequent petition was filed identifying additional prior art disclosing “cationic polymers defined by broad molecular weight and charge density ranges that subsume or overlap the ranges specified in the challenged claims.” (*Id.* at 8). In each petition, the petitioner argued that the cited references met the disputed claim limitation despite identifying “‘no disclosure of particular materials that actually meet’ the molecular weight and charge density limitations recited in the challenged claims.” (*Id.* at 9 (citing Preliminary Response at 7–8)). As discussed in more detail below,

Petitioner identifies specific embodiments in Zenith disclosing the standard selection circuit limitation the Board previously found missing. Accordingly, the instant petition does not present the same or similar arguments regarding claims 26 and 27 as IPR2014-00809. As such, the Board should exercise its discretion and take up claims 26 and 27 along with newly presented claims 18, 19, 24, 25, 28, and 29.

IV. INVALIDITY OF THE '792 PATENT

A. Introduction

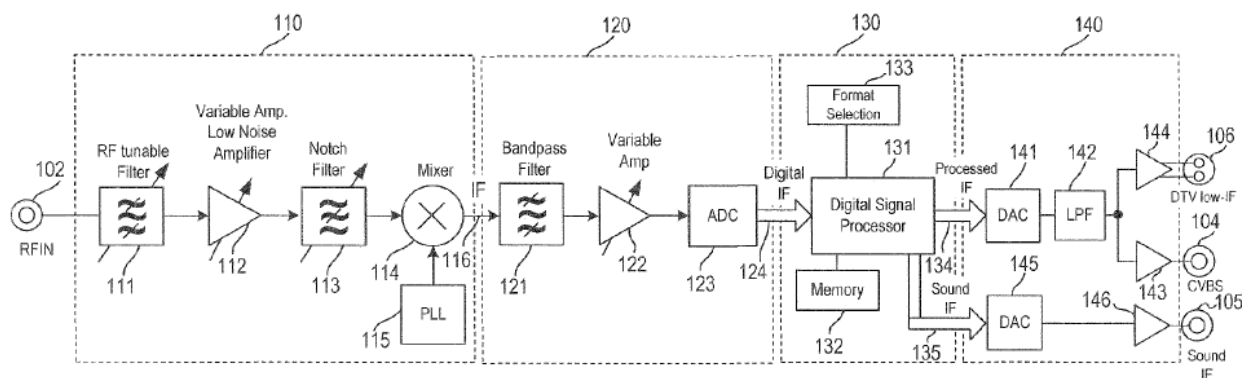
The '792 patent, titled "Television Receiver for Digital and Analog Television Signals," was filed July 1, 2004 and originally assigned to Xceive Corp. (Ex. 1001). After Xceive's business faltered, Cresta Technology Corp. ("Patent Owner") purchased certain of Xceive's assets including the '792 patent on October 10, 2011. (Ex. 1003, p.4). In January 2014, Patent Owner sued Petitioner and several of its customers for infringing three of the patents it acquired from Xceive. (*Id.*).

The '792 patent builds on the earlier '585 patent (Ex. 1007). Both are directed towards a television signal receiver and, in particular, "a broadband television signal receiver for receiving multi-standard analog television and digital television signals." (*Compare* Ex. 1001, 1:6–10 *with* Ex. 1007 at [0002]). In fact, as described further below, the Examiner rejected many of the original '792 patent

claims as “being anticipated” by the published ’585 patent application. (Ex. 1010 at 75 (citing “Favrat et al.,” US2004/0061804 A1, published April 1, 2004)).

As described in IPR2014-00728 and IPR2014-00809, Thomson Multimedia anticipated the move to DSP-based, multi-format television signal receivers long before Xceive filed the application that resulted in its ’585 patent. (See Ex. 1004). By the time Xceive filed its ’792 application, it conceded that the industry had already addressed this perceived need. (Ex. 1001, 2:4–5 (“Television receivers for receiving both analog and digital television signals are being developed.”)). In particular, Xceive acknowledged that U.S. Pat. No. 6,369,857 to Balaban described “digitizing the intermediate frequency signal and processing the digitized signal using two separate processing circuitry—one for the analog television signal and one for digital television signal.” (*Id.* at 2:15–20).

As a result, the ’792 application pivoted to focus on the output circuitry. Specifically, the ’792 application describes several iterations of a “signal output circuit,” labeled “140” in Fig. 1 (below). (Ex. 1001, 6:49–51).



“[R]eceiver 100 can provide output signals in either analog or digital format on one or more output terminals.” (*Id.* at 4:20–22). This output circuit at issue in the ’792 patent merely converts the “processed IF signals” into “the desired output signals.” (*Id.* at 6:49–51). Figure 2 illustrates several other “desired output signals” including analog v. digital, single-ended v. differential, or serial v. parallel. (*Id.* at Fig. 2, 7:34–35 (“Turning now to FIG. 2 where alternate embodiments of the signal output circuit are shown.”)).

Challenged claim 18, for example, recites several of these “desired output signals.” (*See* Ex. 1001, claim 18). This claim is drawn toward outputting either a digital or analog television signal on two output terminals. To do so, claim 18 recites coupling two output terminals to either a differential digital television signal or a single-ended analog television signal. (*Id.*). Because a television will either be analog or digital at a given time, claim 18 reduces the number of pins for an output circuit that drives either an analog or digital television monitor. (Exhibit 1009, ¶ 12).

Outputting either a differential signal or single-ended signal on the same set of pins to drive either an analog or digital monitor has been known well before July 1, 2004, the date the ’792 patent was filed. At least by 1998, connecting a computer system to both digital and analog monitors was “disadvantageous because the system 100 will have two sets of signal lines from the video controller

and two connectors.” (Sauber, Ex. 1020, 3:39–42). Sauber recognized that either a differential digital signal or an analog signal could be coupled to either an analog or digital monitor “using one set of lines between a computer system and either an analog monitor or a digital monitor.” (*Id.* at 1:8-12, 1:60–67). Thus, the use of the same pair of pins for coupling a differential signal to a digital monitor and a single-ended signal to an analog monitor was not novel when the ’792 patent was filed. (Ex. 1009, ¶ 13).

Furthermore, converting an output signal from one desired output form to another is not patentable. A person of ordinary skill in the art (“POSITA”) would know that a digital-to-analog converter (“DAC”) would be necessary if the desired output format was analog instead of digital. (Ex. 1009, ¶ 17 (citing Ex. 1026, “Digital-to-Analog Converter useful in a television receiver”)). Likewise, a POSITA would know that a single- to differential-ended converter was necessary to convert a signal ended output to a differential output, if a differential output was desired. (Ex. 1009, ¶ 17 (citing Ex. 1027, Abstract (“A circuit that is particularly adapted to convert a single-ended input signal to a pair of differential output signals,” which finds ready application in “a color saturation control circuit in a color television receiver.”); *see also* Ex. 1001, 4:3–7 (“When signal input terminal 102 is a differential terminal, receiver 100 further includes a balun transformer to convert the differential input signals into a single-ended signal, as is well

understood by one of ordinary skill in the art.”)). As the Federal Circuit explained in *Dystar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006), such use of known elements in such predictable ways is obvious. *See also KSR Intern. Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

In this case, the choice of the desired output signal format and the use of a common pair of pins for either analog or digital television is driven by the desire for a “cheaper,” “faster,” “smaller,” “or more efficient” television receiver, namely, commercial and marketing issues, as the ’792 patent concedes. (*Id.* at 2:22–24 (“It is further desired that such a dual-format television receiver be cost effective to manufacture and provides high quality video and audio performance.”); 6:51–56 (“A configuration for signal output circuit 140 can be selected based on factors such as the desired pin count for receiver 100 and the desired format for the output signals.”)). As the Supreme Court further explained in *KSR*, when, as here, “there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp.” 550 U.S. at 421. All of the claimed options are well within the grasp of a POSITA, as evidenced by the legions of prior art references

using these options. (Ex. 1009, ¶ 18). For the reasons described in detail below, the challenged claims should be cancelled.

B. Prosecution History of the '792 Patent

The '792 patent application was filed on July 1, 2004. In the first office action, claims 1–4, 11, 12, and 30–34 were rejected under 35 U.S.C. § 102(b) as anticipated by the published '585 patent application (Ex. 1007). Claims 5, 10, 13, and 14 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '585 application in view of Oku (Ex. 1018). Claims 16 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the '585 application in view of Oku, in further view of Gray (Ex. 1019). Claims 6–9, 15, and 18–29 were indicated to contain allegedly allowable subject matter. (Ex. 1010, pp. 75–77).

In response to the first office action, the applicant amended claim 1 to recite the limitations formerly of claim 24. (Ex. 1010, p. 84). The applicant also amended all of the other claims to depend from claim 1. Because the subject matter of claim 24 had been indicated as allowable, the applicant argued that independent claim 1 and all depending claims were therefore allowable. The applicant cancelled claim 24 as well as claims 31–34 and requested allowance of all remaining claims.

The Examiner then allowed all remaining claims in the application (Ex. 1010 at 99), despite the fact that the limitation added to claim 1 by amendment was

clearly taught in the '585 application. For example, claim 11 of the '585 application is virtually identical to the allegedly allowable subject matter. (See Ex. 1007 at claim 11 “wherein said signal processor applies one of a plurality of finite impulse response filters”). Clearly the Examiner should have maintained his rejection even in light of the amendment.

C. Person of Ordinary Skill in the Art

A person of ordinary skill in the art at the time of the alleged invention of the '792 patent (“POSITA”) would have held at least a Masters of Science or higher degree in electrical engineering, have at least four years of experience with mixed signal system design, including analog front ends and subsequent digital signal processing of various analog and digital signal formats of video and audio content. (Ex. 1009, ¶ 22).

D. Claim Construction

The claims in an *inter partes* review should be accorded the broadest reasonable construction, as commonly understood by those of ordinary skill in the art in view of the descriptions of the specification. See 37 C.F.R. § 42.100(b). Petitioner contends that all of the terms in the challenged claims should be given their plain and ordinary meaning.

Board's Previous Constructions

In the previously filed petition, the Board construed the following terms:

- RF Signals—“Signals having a frequency between 10 kHz and 100 GHz”;
- Format—“analog and digital signals are examples of distinct formats”;
- Baseband signal—“a signal without transmission modulation”; and
- Signal Processor—“a digital module that processes signals in the digital domain.”

IPR2014-00809, Paper 10 at 7–9. Petitioner adopts these constructions for the purposes of this Petition.

Additional Term

“Indexes”—The only other term that requires further explanation for purposes of this Petition is the “indexes” term as used in claim 24, namely “wherein the plurality of finite impulse response filters are stored in memory, and the signal processor indexes the memory to retrieve one of the plurality of finite impulse response filters.” (Ex. 1001, claim 24). As with the other terms in the ’792 patent, Petitioner believes that this term should also be given its plain and ordinary meaning.

As disclosed in the ’792 patent, the format/standard selection circuit, depending on its state, selects “between the several analog and digital television formats and standards.” (Ex. 1001, 6:21–23). Based on the standard selection

circuit, the DSP applies a filter function. The “coefficients of the filter functions are stored in a look-up table in a memory 132 in DSP circuit 130. DSP 131 retrieves the coefficients from memory 132 to be applied to the incoming digital signals.” (*Id.* at 5:60–63). The signal processor indexes or points to a block of memory when retrieving a set of coefficients. This usage of the term indexing is consistent with the plain and ordinary meaning of that term. (See Microsoft Computer Dictionary, Ex. 1032, pp. 269, 270 (defining the verb “index” as “1. In data storage and retrieval, to create and use a list or table that contains reference information, pointing to stored data. . . . 3. In indexed file storage, to find files stored on disk by using an index of file locations (addresses). 4. In programming and information processing, to locate information stored in a table by adding an offset amount, called the index, to the base address of the table.”); Ex 1009, ¶ 26). Accordingly, the broadest reasonable construction of the term “indexes” is its plain and ordinary meaning. (*Id.*).

Patent Owner’s Proposed Constructions

It its Patent Owner response in IPR2014-00809, Patent Owner offers constructions for six terms. As discussed below, Patent Owner attempts to limit those terms in a transparent attempt to distinguish the prior art. Patent Owner’s constructions do not reflect the broadest reasonable construction of those terms and should therefore be rejected.

“Input RF signal”—Patent Owner proposes to construe this term as “a signal that is an incoming signal that comes out of the medium of propagation and is external to the frequency conversion circuit without any processing by the frequency conversion circuit.” (IPR2014-00809, Paper No. 35 at 9–12). Patent owner’s proposed construction does not reflect the broadest reasonable construction of that term in light of the specification. Instead, this is simply another attempt by Patent Owner to read its strained construction of “RF signals” into the claim.

As a starting point, the specification uses the term “input signal” in a number of places. (*See, e.g.*, Ex. 1001, 4:3–7, 6:22–31, 14:44). In each case, the term is used in its plain and ordinary manner, *i.e.*, as a signal that is input to a circuit. (*See id.*). The specification refers in several places to an “input RF signals.” (*See, e.g.*, Ex. 1001 at Abstract, 1:43, 2:32–40, 4:53–56, 5:52). In each instance, this term is used simply to indicate that the signal that is input to the circuit is an RF signal. (Ex. 1009, ¶ 29). RF stands for “radio frequency,” as noted in the specification itself. (*Id.* (quoting Ex. 1001 at 1:36)). A POSITA understood that radio frequency or RF refers to “signals having a frequency between 10 kHz and 100 GHz.” (*Id.* (quoting “The Authoritative Dictionary of IEEE Standards Terms,” Ex. 1028, p. 912)). In no place does the specification equate “input RF signals” to the source of those signals or the medium over which the signal is propagated. (*Id.*)

In fact, the specification uses permissive language when it describes the source of those signals. (Ex. 1001 at 3:57–59 (“a dual-format television receiver 100 includes a signal input terminal 102 for receiving incoming RF signal”)). The patent specification does not require signal input terminal 102 only receive input RF signals directly “out of a medium of propagation external and is external to the tuner without any processing by the tuner,” as required by Patent Owner’s construction. (Ex. 1009 at ¶ 29).²

Patent Owner’s proposed construction should also be rejected as it has no support in the art. All television signals undergo multiple frequency conversions over multiple mediums between the data source and the claimed frequency conversion circuit, such that identifying any point before the input of the claimed frequency conversion circuit as the “medium of propagation” under Patent Owner’s proposed construction is vague, arbitrary, and ambiguous. (Ex. 1009, ¶ 30).

The claims use the term “input RF signals” in its plain and ordinary way. Claim 1 requires “receiving an input RF signal.” (Ex. 1001, claim 1). Claim 1

² Patent Owner’s proposed construction in this case is also inconsistent with the construction that it proposed in the ITC. (Ex. 1039, p. 15 (“input RF television signal(s)”). While improperly limited to “television,” Patent Owner concedes that the term should otherwise be given its plain and ordinary meaning.

makes no mention of the source of those input signals. The first element of the claim is the “frequency conversion circuit” that receives these signals. Claim 29 notes that “the input RF signal comprises an RF signal received from terrestrial broadcast, an RF signal received from satellite broadcast, and an RF signal received from cable transmission.” This makes clear that the source or the medium of the input RF signal is not a limitation on the claim. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc) (presence of limitation in dependent claim “strongly implies” that such a limitation is not “inherently” part of the term in the original claim); *see also Trebro Mfg, Inc. v. Firefly Equipment, LLC*, 748 F.3d 1159, 1166 (Fed. Cir. 2014).

“a frequency conversion circuit for receiving input RF signals and for converting said input RF signals to an intermediate frequency signal”—Patent Owner proposes that this term means “frequency conversion circuit that receives an incoming signal that comes out of the medium of propagation and is external to the tuner without any processing.” (IPR2014-00809, Paper No. 35 at 12–13). Patent Owner’s argument is based on its erroneous construction of the phrase “input RF signal.” As discussed above with respect to “input RF signals,” Patent Owner’s construction does not reflect the broadest reasonable construction of this term in light of the specification. Instead, the term should be given its plain and

ordinary meaning in light of the specification. (*See* 37 C.F.R. § 42.100(b); *see also* Ex. 1009 ¶ 33).

“the input RF signal encoding information in one of a plurality of television signal formats”—Patent Owner proposes that this term “requires receiving one television format RF signal at a time.” (IPR2014-00809, Paper No. 35 at 13). This proposed construction—which is unsupported in Patent Owner’s response—is erroneous. The ’792 patent provides no basis for construing the indefinite article “a” to mean “only one,” rather than its plain and ordinary meaning of “one or more.” Such a construction does not reflect the broadest reasonable construction of this term and should be rejected by the Board. (*See* 37 C.F.R. § 42.100(b); Ex. 1009, ¶ 34).

“a signal processor for processing . . . in accordance with the television signal format . . . the signal processor applies one of a plurality of finite impulse response filters . . . each of the plurality of finite impulse filters corresponding to a format”—Patent Owner proposes to construe these terms such that “the signal processor processes only one format and does not process a plurality of formats in parallel.” (IPR2014-00809, Paper No. 35 at 14). This proposed construction—which is unsupported in Patent Owner’s response—is also erroneous. The ’792 patent provides no basis for construing the indefinite article “a” to mean “only one,” rather than its plain and ordinary meaning of “one or

more.” It is axiomatic that “‘a’ or ‘an’ in patent parlance carries the meaning of ‘one or more’ in opened ended claims containing the transitional phrase ‘comprising.’” *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000). As a result, the Patent Owner’s proposed construction does not reflect the broadest reasonable construction of this term and should be rejected by the Board. (See 37 C.F.R. § 42.100(b); Ex. 1009 ¶ 35).

V. DETAILED EXPLANATIONS OF THE CHALLENGES

Independent claim 1 recites a television receiver. All of the challenged claims 18, 19, 24–29 depend from independent claim 1. A detailed explanation is provided below for each ground for each of the challenged claims.

A. Foundational Claim

Independent claim 1 is not challenged explicitly in this Petition, but Petitioner provides a discussion of the subject matter of claim 1 here because that claim is an antecedent of challenged claims 18, 19, and 24–29.

As the Board found in IPR2014-00809, independent claim 1 is obvious over Thomson in view of Harris. Paper No. 10 at 17, 30.

Claim 1 is obvious over Thomson in view of Harris.

1. Preamble

Under the broadest reasonable interpretation, Petitioner does not believe that the preamble of claim 1 is limiting. Even assuming it is, however, Thomson clearly describes the claimed “television receiver.” (Ex. 1004, 1:3–4 (“invention

relates to a broadcast receiver”)). Thomson describes a “multi-standard tuner” capable of receiving television signals transmitted in the form of a satellite broadcast, terrestrial, and cable transmissions in the range of “950-1750 MHz.” (*See id.* at 1:55–2:19). Thomson teaches this element. (Ex. 1009, ¶ 38).

2. “a frequency conversion circuit”

The first element of claim 1 recites “a frequency conversion circuit.” Thomson likewise describes a circuit that receives an incoming satellite signal “of about 2 GHz” and, via a multi-stage frequency down conversion process, converts that signal to a signal having a lower frequency. (Ex. 1004 at 1 “Gist of the Invention”, 2:30–33). For at least these reasons, Thomson teaches this element. (Ex. 1009, ¶ 39).

- a. “for receiving an input RF signal and for converting the input RF signal to an intermediate frequency signal having an intermediate frequency (IF)”

The Thomson “multi-standard tuner” receives the RF signal from an “outdoor” satellite unit, which “supplies the satellite channels already down-converted in a frequency band covering 950-1750 MHz.” (Ex. 1004, 1:55–60). Thus, Thomson teaches this element under the Board’s construction of “RF signals.” IPR2014-00809, Paper 10 at 7–9 (construing “RF signals” as “signals having a frequency between 10 kHz and 100 GHz”). As mentioned above, this RF signal is converted to a “140 MHz Sat-IF signal” that forms the “IF_{SAT}” input to the

circuit as shown above in Fig. 1. (Ex. 1004 at 2:17–19, Fig. 1). This signal then gets further “down-converted” by “mixer stage 2” into “an IF signal of around 75 MHz (see Figs. 2d and 2e).” (*Id.* at 2:53–57). Therefore, Thomson teaches this element under the Board’s construction. (Ex. 1009, ¶ 40).

Thomson discloses this limitation even under Patent Owner’s improperly narrow construction, in that Thomson discloses a signal (input to mixer 2) that is an incoming signal (with respect to mixer 2) that comes out of the medium of propagation (the signal line between SAW filter 1 and mixer 2) and is external to the frequency conversion circuit (mixer 2) without any processing by the frequency conversion circuit (mixer 2). (Ex. 1009, ¶ 41).

b. “the input RF signal encoding information in one of a plurality of television signal formats”

Thomson teaches that the “multi-standard tuner” can receive RF signals in a plurality of formats, including “analog or digital ones.” (*See, e.g.*, Ex. 1004, 1:42–43). The ’792 patent likewise identifies “analog or digital” as two different television signal “format[s].” (*Id.* at 1:30). For at least these reasons, Thomson teaches this element. (Ex. 1009, ¶ 42).

3. “an analog-to-digital converter for sampling the intermediate frequency signal and generating a digital representation thereof”

The filtered output of the AGC amplifier 5 in Thomson is coupled to an analog-to-digital converter (“A/D”) 7. (Ex. 1004, Fig. 1). The “A/D-converter [is] necessary for the digiti[z]ing” of the bandpass-filtered intermediate frequency signal output of AGC 5. (Ex. 1004, 1:47; *see also* Fig. 1). As the name implies, A/D 7 converts the filtered IF signal to, in the words of claim 1, “a digital representation thereof.” Fig. 1 shows that “A/D 7” has a sampling frequency of “ f_s .” Thomson further teaches that in one embodiment the “A/D converter (7) operates with a sampling frequency of about 100MHz.” (*Id.* at 4:14–16). For at least these reasons, Thomson teaches this element. (Ex. 1009, ¶ 43).

4. “a signal processor for”

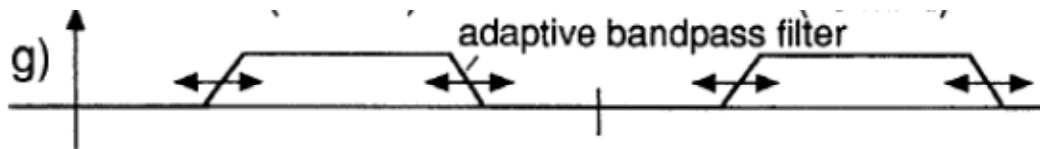
Thomson teaches this element under the Board’s construction of “signal processor”. As discussed below, Thomson discloses an adaptive bandpass filter that is a digital module that processes signals in the digital domain. (Ex. 1009, ¶ 44). Thomson describes a “bandpass filter 8” that has “an adaptively controlled bandwidth” that passes the analog TV encoded information in the case of analog formatted signal or the digital TV encoded information in the case of digital formatted signal. (Ex. 1004, 3:16–25). The adaptive filter 8 makes this selection based on the “TV standard” input to the filter. (*Id.* at Fig. 1; Ex. 1009, ¶ 44). By disclosing an adaptive bandpass filter that processes an input or output signal (*e.g.*, it filters an analog or digital TV signal), Thomson teaches a signal processor. (*Id.*).

The adaptive filter of Thomson satisfies the Board's construction of "signal processor." The Board construed "signal processor" to mean "a digital module that processes signals in the digital domain." IPR2014-00809, Paper 10 at 7–9. The Thomson bandpass filter is a digital module because it is a circuit that receives digital input signals that are output from the A/D 7. (Ex. 1009, ¶ 45). It processes those digital input signals in the digital domain (as opposed to the analog domain) to produce a bandlimited output signal. (*Id.*). Accordingly, Thomson satisfies the Board's definition for a "signal processor." (*Id.*).

5. "processing the digital representation of the intermediate frequency signal in accordance with the television signal format of the input RF signal, the signal processor generating digital output signals indicative of information encoded in the input RF signal, wherein the signal processor applies one of a plurality of finite impulse response filters to the digital representation of the intermediate frequency signal, each of the plurality of finite impulse response filters corresponding to a format of the input RF signal"

Thomson discloses a signal processor that implements an adaptive filter having varying bandpass frequencies. Harris discloses a signal processor that implements a finite impulse response (FIR) filter. As described further below, it would have been obvious to a POSITA to incorporate the FIR filter of Harris into the adaptive filter of Thomson. (Ex. 1009, ¶ 46).

The adaptive filter in Thomson processes intermediate frequencies according to the format of an input RF signal. An “adaptive filter is a filter which can change its characteristics by changing its filter coefficients.” (Ex. 1009, ¶ 47 (quoting Ex. 1029 and Ex. 1030, 2:19–23 (“Generally, an adaptive filter is a filter having a transfer function that can be adjusted, or changed, based on the sampled signal statistics, or signal features, associated with an input or output signal.”))). The transfer function of the Thomson adaptive filter is illustrated in the frequency map of Fig. 2(g) (reproduced below):

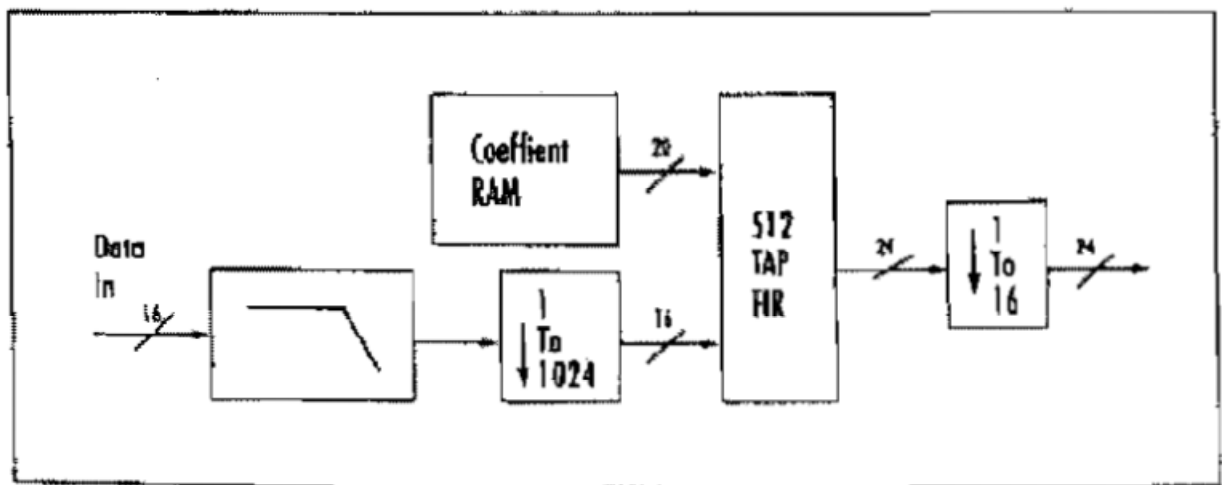


(Ex. 1004, Fig. 2). The upper and lower bounds of the Thomson filter vary or “adapt” according to the format of the input RF signal, as indicated by the “TV Standard” input to the filter. (Ex. 1009, ¶ 47; *see also* Ex. 1004 at 3:16–19 (“bandpass filter 8 (see Fig. 2g) with an adaptively controlled bandwidth selects the desired signal”), Fig. 1).

The status of the “TV standard” input determines the function of the bandpass filter: the filter executes one filter function if the RF input signal is an analog TV format, or another filter function if it is in a digital TV format. (Ex. 1009, ¶ 48; *see also* Ex. 1004 at Fig. 1 (“TV Standard” input to “filter 8”); *see also* (Ex. 1004 at 3:16–18 (“bandpass filter 8 (Fig. 2g) with an adaptively controlled

bandwidth selects the desired signal with a minimal remainder of adjacent channel signals.”)). Accordingly, the Thomson filter 8 is adapted to the particular TV format (e.g., analog or digital), receives the “digital representations of said intermediate signals” output by the A/D 7, processes those digital representations according to its transfer function “in accordance with said format of said input RF signal,” as indicated by the TV standard input, and “generat[es] digital output signals indicative of information encoded in said input RF signal.” (Ex. 1009, ¶ 48). While Thomson does not explicitly disclose the use of FIR filters, Harris does.

Harris describes a processor-based FIR filter that can function as an adaptive filter. For example, Harris discloses the following digital decimation filter (“DDF”) including a finite impulse response filter:



(Ex. 1005 at 4). The Harris digital decimation filter (“DDF”) includes a “512 TAP FIR” filter coupled to a “coefficient RAM” that stores the FIR filter coefficients.

(*Id.*). The DDF “can be rapidly reconfigured via a standard microprocessor interface.” (*Id.* at 5). In other words, this filter, combined with a microprocessor, can retrieve the FIR filter coefficients from memory and store those in the “coefficient RAM.” (Ex. 1009, ¶ 49) just like the ’792 Patent (Ex. 1001 at 5:59–63 (“In one embodiment, the coefficients of the filter functions are stored in a look-up table in memory 132 in DSP circuit 130. DSP 131 retrieves the coefficients from memory 132 to be applied to the incoming digital signals.”)). Harris further teaches that if this filter is used in “systems where the second IF filter state consists of a bank of filters to support various operational modes, cost and board space can be saved by [sic:by] *reconfiguring a single DDF to implement the filter required by each operational mode.*” (Ex. 1005 at 5 (emphasis added)).

It would have been obvious for one of ordinary skill in the art to incorporate the FIR filters of Harris into the Thomson adaptive filter and render this claim limitation obvious. (Ex. 1009, ¶ 50). Although both FIR and infinite impulse response (IIR) filters were well known in the art, (*See, e.g.*, Ex. 1006; Ex. 1009, ¶ 50), a POSITA would have been motivated to choose a FIR filter over an IIR filter for several reasons. A FIR filter produces “a linear phase, and only FIR filters can be designed to have linear phase,” which is a critical parameter in audio and video applications such as Thomson. (*Id.* (quoting TI App Note, Ex. 1006 at 21)). Moreover, the ’792 patent refers to a prior art ATSC A-53 specification teaching a

linear FIR filter, namely a “filter response . . . as a raised root cosine with 0.1152 roll-off.” (Ex. 1001, 6:39–41; *see also* Ex. 1016, Fig. 12, p. 58 (“linear phase raised cosine Nyquist filter” which would necessitate a FIR filter implementation)). FIR filters also are less sensitive to coefficient quantization and are thus generally more stable than IIR filters. (Ex. 1009, ¶ 50). The FIR implementation of Harris would be an obvious design choice in the Thomson application because both Harris and Thomson solve similar problems, namely tuning an adaptive filter to the input format or operational mode of the system. (*Id.*). Harris also explicitly teaches that the “declining cost of technology is making DSP a desirable alternative for an expanding spectrum of communication problems.” (Ex. 1005 at 7). A POSITA would have interpreted that suggestion to include digital television such as in Thomson. (Ex. 1009, ¶ 50). For these reasons, a POSITA would have been motivated to use the FIR filters of Harris to implement the plurality of filter functions for the adaptive filter of Thomson, thereby rendering this limitation obvious. (*Id.*). Because such a well-known combination would have had a reasonable expectation of success (*See* Ex. 1023, 6:1–5, 15:51–54 (implementing adaptive FIR filters using a “filter coefficient computation apparatus”)), a POSITA would be motivated to make such a combination. (Ex. 1009, ¶ 52).

6. “a signal output circuit for receiving the digital output signals from the signal processor and for providing one or more output signals corresponding to the digital output signals.”

Thomson discloses an output circuit including a plurality of demodulators, each coupled to receive output signals from said signal processor. (Ex. 1004, Fig. 1 showing FM-demodulator 9 and QPSK-demodulator (12, 13) connected in parallel to receive the output signals from the adaptive bandpass filter 8 (i.e. “said signal processor”)). Thomson discloses that the “FM-demodulator (9)” demodulates the digital signals encoding information in the analog TV format and the “QPSK-demodulator (12, 13)” demodulates the digital signals encoding information in the digital TV format. (Ex. 1004 at 4:10–11). Therefore Thomson discloses demodulators receiving output signals from the processor and outputting signals corresponding to received digital television signals. (Ex. 1009, ¶ 53).

Thomson discloses a TV receiver that receives TV signals having both audio and video components. “The FM demodulator 9 converts the IF signal into the CVBS signal and the subcarrier modulated sound signals.” (Thomson, Ex. 1004, 3:19–21). Thomson further discloses “synchronous demodulators 12, 13 for QPSK quadrature demodulation and low pass filters 14, 15 providing signal Q, I at outputs of circuit 4.” (*Id.* at 2:41–44). One of ordinary skill in the art would understand that the video and audio information of digital TV signals (*e.g.*, as MPEG) may be digitally encoded in a single signal (Ex. 1009, ¶ 54), and also that the Q and I baseband signal components must carry both the video and audio information for the TV signals of Thomson to serve the expressly disclosed

purpose of a digital TV receiver (*Id.*). For at least these reasons, Thomson teaches this element. (*Id.*). Accordingly, the combination of Thomson and Harris render claim 1 invalid.

B. Ground 1: Claim 29 is obvious over Thomson in view of Harris.

“29. The television receiver of claim 1, wherein the input RF signal comprises an RF signal received from terrestrial broadcast, an RF signal received from satellite broadcast, and an RF signal received from cable transmission.”

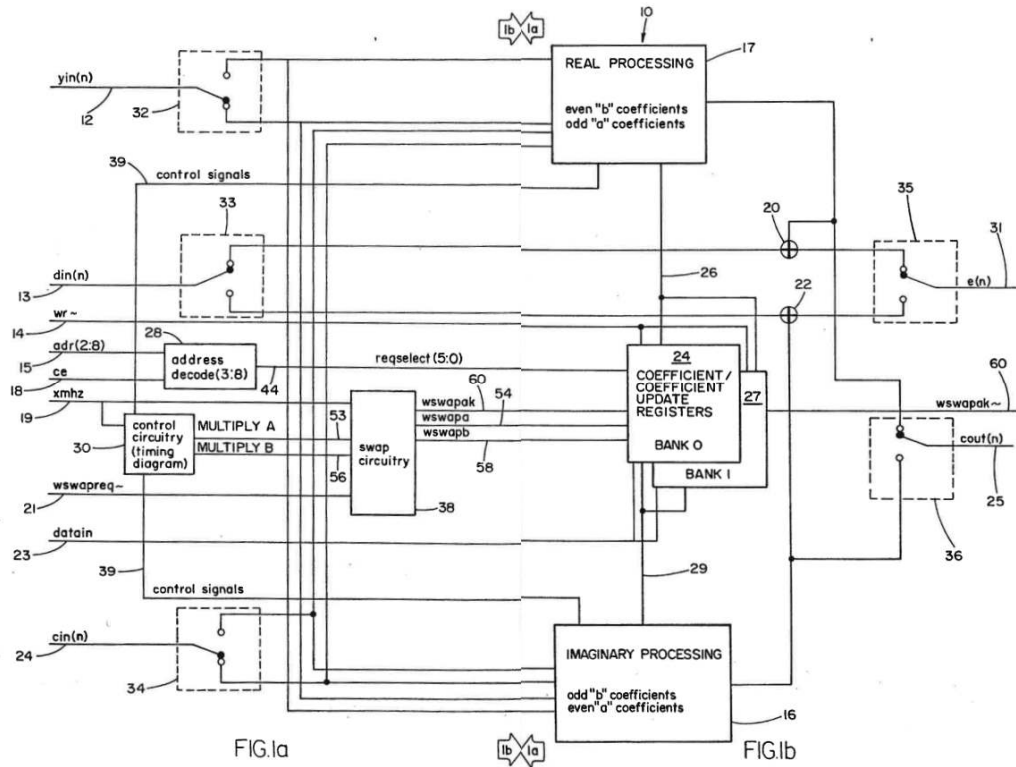
Thomson discloses that the multistandard receiver can receive satellite broadcast, terrestrial, and cable transmissions. (Ex. 1004, 1:55–2:3). Because Thomson discloses that the input RF signal can be received from a satellite broadcast, a terrestrial broadcast, and a cable broadcast, this claim is rendered obvious by Thomson in view of Harris. (Ex. 1009, ¶ 55).

C. Ground 2: Claim 24 is obvious over Thomson and Harris in view of Grumman.

1. “24. The television receiver of claim 1, wherein the plurality of finite impulse response filters are stored in a memory”

Claim 24 adds a well-known approach of implementing digital FIR filters, namely indexing a set of FIR filter coefficients stored in memory. Grumman describes the structure of “a complex Finite-Impulse-Response filter with adaptive weights for processing complex digital data having real and imaginary input data portions.” (Grumman, Ex. 1008, 3:31–34). The adaptive weights (coefficient data

values) of the FIR filters “are stored in two memory storage banks for access by the filter or host processor,” (*Id.* at 4:7–9), or are “stored in alternative memory storage banks.” (*Id.* at 4:9–14). Thus, Grumman discloses the storage of two sets of coefficients, each set corresponding to a separate FIR filter. (Ex. 1009, Dec. ¶ 56). This two bank architecture allows the filter to operate with data present in one memory bank while the other memory bank “is being updated with the new set of coefficients.” (Ex. 1008 at 11:25–29). Figs. 1a and 1b of Grumman are depicted below. The coefficients for the two FIR filters are stored in BANK 0 and BANK 1. The output of swap circuitry 38 controls access to BANK 0 or BANK 1. By outputting a “0,” swap circuitry selects BANK 0, else, by outputting a “1,” swap circuitry selects bank 1. (Ex. 1008 at Fig. 7c; Ex. 1009, ¶ 56).



(Ex. 1008 at Figs 1a and 1b). Because Grumman discloses storing coefficients for two FIR filters in memory, one set of coefficients for one FIR filter stored in BANK 0 and another set of coefficients for another FIR filter stored in bank 1, this limitation is met by Grumman. (See also *id.* at “BANK 0” and “BANK 1” in Fig. 1B; Ex. 1009 ¶ 56).

2. “the signal processor indexes the memory to retrieve one of the plurality of finite impulse response filters.”

Grumman discloses a signal processor that indexes memory to retrieve FIR filter coefficients via “weight swapping,” which results in changing access of the adaptive weight data from one memory bank 24 to the other memory bank. (Ex. 1008, 9:10–15). Weight swapping circuitry performs the weight swapping

function by providing “timing and control signals necessary to accomplish the weight swapping function in the real and imaginary coefficient/coefficient update memory banks 24 and 27.” (*Id.* at 9:63–67). Weight swapping with a two-bank architecture provides efficiency because it allows one FIR filter to retrieve and operate with data present in one coefficient memory bank, while the alternative memory bank is being updated with a new set of coefficients. (*Id.* at 10:67–11:10). Just as the ’792 patent indexes memory to retrieve a selected set of coefficients from one of a plurality of FIR filters, the signal processor of Grumman (*e.g.*, the real processing circuitry 17 and imaginary processing circuitry 16) indexes memory by swapping between BANK 0 and BANK 1 to retrieve a selected set of adaptive weights corresponding to a unique FIR filter. (*See id.* at 9:10–15, Fig. 7c; Ex. 1009, at ¶ 57). “It is a further objective to provide a complex adaptive FIR filter that is able to do complex adaptive digital filtering without having to interrupt or stop the filtering process when the weight coefficients are being updated.” (Ex. 1008 at 3:3–6). Thus, Grumman’s FIR filter architecture is very efficient, especially in the context of minimizing any delays caused by selecting a different set of FIR coefficients by indexing memory. (Ex. 1009, ¶ 57).

A person of ordinary skill in the art would have been motivated to implement the FIR filter of Harris using the Grumman architecture. Because digital FIR filter processing requires operating on coefficient weights, digital FIR

filter processing requires both processor and memory resources. A natural design choice for a person of ordinary skill in the art would have been to store the set of coefficients of a plurality of FIR filters in memory using an index for easy and efficient access by a processor as taught by Grumman. (Ex. 1009, ¶ 58). The Grumman FIR filters permit processing of “complex digital signals more quickly and efficiently” where speed requirements would otherwise prohibit “commercially available FIR filters.” (Ex. 1008 at 2:55–62). The Grumman FIR filter “architecture takes maximum advantage of the time available to do the required calculations.” (*Id.* at 2:68–3:2). In short, storing FIR filter coefficients in memory as does Grumman, yields a plurality of FIR filters that minimize delay when switching between different FIR filters. (Ex. 1009, ¶ 58). Accordingly, a POSITA would have been motivated to implement the adaptive filter of Thomson using the FIR filter disclosures of Harris and Grumman, especially in light of the ease and efficient approach of indexing memory storing a set of FIR filter coefficients. (*Id.*). For at least these reasons, the combination of Thomson, Harris, and Grumman renders this claim obvious.

D. Ground 2: Claim 25 is obvious over Thomson and Harris in view of Grumman.

1. “25. The television receiver of claim 1, wherein the signal processor comprises a first computing unit and a second computing unit,”

Claim 25 is drawn to a signal processor that processes the real and imaginary parts of the finite impulse response in parallel. Such a claim is not novel or unobvious in light of Grumman. Grumman discloses a “FIR filter having an internal processing architecture that features two parallel data paths, one which filters the real data stream of the complex signal and another which filters the complex data stream.” (Ex. 1008 at 2:63–3:2). “The first data path includes a first plurality of adaptive weight circuits for multiplying the real input data by predetermined coefficients to generate a set of multiplication results.” (*Id.* at 3:36–39). “The second path includes a second plurality of adaptive weight circuits for multiplying the imaginary input data by predetermined coefficients to generate a set of multiplication results.” (*Id.* at 3:41–44). Grumman further discloses in Fig. 2 “a 32 complex weight FIR filter 10 having a real processing circuit 17 and imaginary processing circuit 16.” (*Id.* at 7:32–35). Thus, Grumman discloses a first computing unit and a second computing unit (Ex. 1009 ¶ 59).

2. “the first computing unit processing a real part of the finite impulse response filter operation”

Grumman discloses “a complex adaptive FIR filter having an internal processing architecture that features two parallel data paths, one which filters the real data stream of the complex signal and another which filters the complex data stream.” (Ex. 1008 at 2:63–3:2). The first data path “filters the real data stream,” (*Id.* at 2:66), and “process[es] the real input data portion of the input complex data”

(*Id.* at 3:34–36). The real processing circuit 17 processes the real portion of the finite impulse response filter function. (*Id.* at 8:1–6, 6:64–7:10, Fig. 2, 5:44–56). Thus, Grumman discloses a first computing unit that processes the real part of the finite impulse response filter operation. (Ex. 1009, ¶ 60).

3. “while the second computing unit processing an imaginary part of the finite impulse response filter operation.”

Grumman discloses “a complex adaptive FIR filter having an internal processing architecture that features two parallel data paths, one which filters the real data stream of the complex signal and another which filters the complex data stream.” (Ex.1008 at 2:63–3:2). The second data path “filters the imaginary data stream,” (*Id.* at 5:7–11), and “process[es] the imaginary input data portion of the input complex data” (*Id.* at 3:39–41). The imaginary processing circuit 16 processes the imaginary portion of the finite impulse response function. (*Id.* at 8:6–8, 7:1–10, Fig. 2). Thus, Grumman discloses a second computing unit that processes the imaginary part of the finite impulse response filter operation. (Ex. 1009, ¶ 61).

A person of ordinary skill in the art would have been motivated to implement the adaptive filter in Thomson according to the highly efficient real and imaginary parallel implementation of Grumman. As discussed with respect to claim 24 a person of ordinary skill in the art would have been motivated to combine Thomson, Harris, and Grumman. Grumman’s adaptive FIR filter

architecture is very efficient, especially in the context of minimizing any delays caused by selecting a different set of FIR coefficients by indexing memory. (Ex. 1009, ¶ 62; *see also* Ex. 1008, claims 10, 11 (showing that a POSITA would have been motivated to combine Grumman with Thomson)). Grumman discloses “a complex adaptive FIR filter that is able to do complex adaptive digital filtering without having to interrupt or stop the filtering process when the weight coefficients are being updated.” (Ex. 1008 at 3:3–6). The Grumman FIR filters permit processing of “complex digital signals more quickly and efficiently” where speed requirements would otherwise prohibit “commercially available FIR filters.” (*Id.* at 2:55–62). The Grumman FIR filter “architecture takes maximum advantage of the time available to do the required calculations.” (Ex. 1008 at 2:68–3:2). Because of the computational efficiency of Grumman in implementing adaptive FIR filters, a POSITA would have been motivated to implement the adaptive filter of Thomson using the FIR filter disclosures of Harris and Grumman. (Ex. 1009, ¶ 62). For at least these reasons, the combination of Thomson, Harris, and Grumman renders this claim obvious.

E. Ground 3: Claim 26 is obvious over Thomson and Harris in view of Zenith.

1. “26. The television receiver of claim 1, further comprising a format/standard selection circuit coupled to the signal processor, the format/standard selection circuit generating a select signal indicative of a format of the input RF signal”

Thomson discloses a “signal processor” that has a “standard selection” input. This “standard selection” signal provides an explicit suggestion to a POSITA that a format/standard selection circuit should be used to generate this signal. (Ex. 1009, ¶ 63). Because the construction of such a circuit was well-known to those skilled in the art, however, Thomson did not explicitly teach how to construct that circuit. (*Id.*) Nonetheless, Zenith provides an exemplary embodiment of a “format/standard selection circuit” that a POSITA would have been motivated to use to generate the “select signal” in Thomson. (*Id.*).

Zenith “relates generally to television receivers and specifically to television receivers that are capable of receiving both analog and digital signals.”

(Ex. 1011, 1:7–10). The

output of the tuner is selectively coupled to either an analog demodulator or a digital demodulator. (*Id.* at Figs. 1–3). The selective coupling of the tuner to either the analog or digital demodulator is determined by the type of signal (analog or digital) received. (*Id.* at 3:13–15 (“As in Fig. 1 embodiment, microprocessor 22

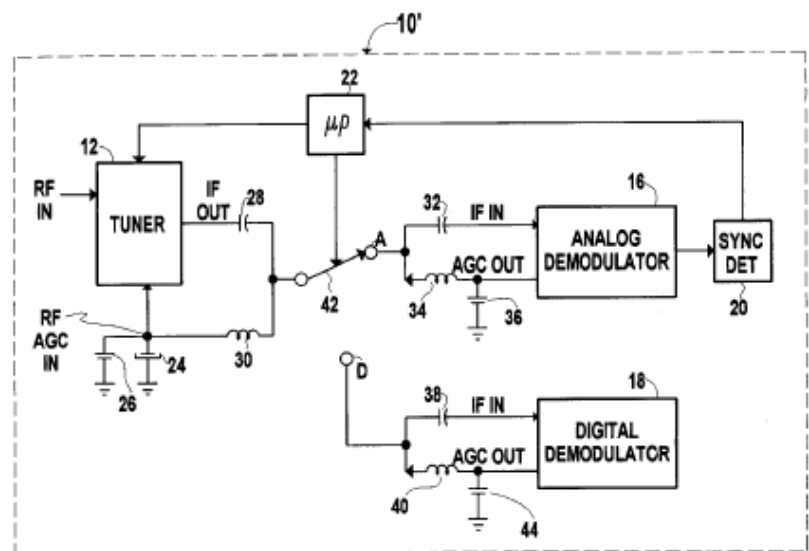


FIG. 2

controls the operation of switch 42 in accordance with the type of signal (analog or digital) that is received.”) Ex. 1009, ¶ 64).

Zenith discloses the actual details of a format/standard selection circuit for generating a select signal based on the format of the incoming RF signal as shown in Fig. 2. If “the presence of syncs corresponding to a demodulated analog type signal,” is detected by sync detector 20, “microprocessor 22 routes the IF signal from tuner 12 to analog demodulator 16.” (Ex. 1011, 2:38–41). Otherwise, “[i]n the absence of syncs corresponding to a demodulated analog type signal, microprocessor causes switch 14 . . . to couple the IF signal to digital demodulator 18.” (*Id.* at 2:42–45). Detecting syncs in the demodulated analog television signal would include detecting one or more of the horizontal or vertical sync signals. (Ex. 1009, ¶ 65). Since these sync signals are uniquely tied to a specific television standard, sync detection results in the identification of a specific television standard. (*Id.*). Accordingly, the Zenith microprocessor is a format/standard selection circuit that generates a select signal (output of microprocessor 22) that is indicative of the format (analog or digital) of the input RF signal and is coupled to the signal processor when combined with Thomson to generate the select signal in Thomson. (Ex. 1009, ¶ 66).

2. “the signal processor selecting a finite impulse response filter in response to the select signal.”

As previously described above, Thomson describes an adaptive bandpass filter that selects a particular filter in response to the “TV standard” input signal. (Ex. 1009, ¶ 67). Harris discloses a reconfigurable, reprogrammable signal processor that implements a plurality of FIR filters, each corresponding to a particular operating mode. (Ex. 1005, p. 6 (“the digital receiver structure also offers flexibilities like programmable filtering”)). Accordingly, Harris discloses a signal processor selecting a finite impulse response in response to the select signal of Thomson. (Ex. 1009, ¶ 67).

As discussed with respect to claim 1, a person of ordinary skill in the art would have been motivated to combine Thomson and Harris to implement the adaptive filter of Thomson with the well-known FIR filters of Harris. That discussion is incorporated by reference herein and will not be repeated. (*See also* Ex. 1009, ¶ 68). In that case, the bandpass filter in Thomson would select the particular FIR filter function that corresponds to the incoming RF signal format, as indicated by the “TV standard” input. (*Id.*).

A person of ordinary skill in the art would have been further motivated to combine Zenith with Harris and Thomson to implement a standard selection circuit as disclosed in Zenith to output the TV select signal of Thomson. Both Zenith and Thomson are directed toward a multistandard tuner capable of receiving both analog and digital television signals. (*See* Ex. 1011, 1:62–64 (an “object of the

invention is to provide an improved low cost method of processing digital and analog television signals using a single tuner”); Ex. 1004, 1:29–33 (“It is an object of the invention to provide a broadcast receiver of the kind described which is suited for digital and analog input signals and using a common A/D converter only for analog and digital transmission via satellite.”); Ex. 1009, ¶ 69). A receiver that can receive both analog and digital televisions signals must be able to identify the format or standard of the received signal for correct downstream processing. Ex. 1009, ¶ 69). Fig. 2 of Zenith illustrates that the input to the analog or digital demodulator is controlled by a microprocessor, based on the format of the received RF signal. (Ex. 1011, Fig. 2, 3:13–15). Fig. 1 of Thomson shows an adaptive filter 8 controlled by an input labeled “TV standard.” (Ex. 1004 at Fig. 1). Just as Thomson needs to be aware of the TV standard, and thus the format of the input RF signal, for correct processing of the signal through the signal processor (band pass filter 8) (Ex. 1004, Fig. 1 (TV standard input controls band pass filter 8), 3:16–19 (“The following bandpass filter 8 (see Fig. 2g) with an adaptively controlled bandwidth selects the desired signal with minimal remainder of the adjacent channel signals.”)), so does Zenith need to be aware of the standard and thus the format of the input RF signal (Ex. 1011, Fig. 2 (sync detector controlling microprocessor); 3:13–15 (“microprocessor 22 controls the operation of switch 42 in accordance with the type of signal (analog or digital) that is received”)).

Because Zenith and Thomson are directed to the same problem, a multistandard tuner capable of receiving and processing both digital and analog signals, each having different formats, a POSITA would naturally look to the selection circuit in Zenith to generate the select signal in Thomson in light of the explicit suggestion to use a standard selection circuit in Thomson. (Ex. 1009, ¶ 69).

Accordingly, Thomson, Zenith and Harris would have been an obvious combination to a POSITA. (Ex. 1009, ¶ 70). Such an obvious combination could have been fashioned without undue experimentation by a POSITA because both the microprocessor and the sync detect circuit in Zenith were well-known circuits at the time. (*Id.*). For at least these reasons, claim 26 is obvious over Thomson, Harris, and Zenith. (*Id.*).

F. Ground 3: Claim 28 is obvious over Thomson and Harris in view of Zenith.

“28. The television receiver of claim 26, wherein the format/standard selection circuit generates the select signal by detecting carrier signals identifying one of the formats of the input RF signals.”

The standard selection circuit in the '792 patent automatically provides “an auto-detection capability in receiver 100.” (Ex. 1001, 6:7–11). One disclosed embodiment of doing so is to detect “in the baseband signals, the presence or absence of carrier signals which uniquely identify the television standards.” (*Id.* at 6:11–15). The sync detector 20 and microprocessor 22 in Zenith perform this

function. In Zenith “the presence of syncs associated with a demodulated analog signal is communicated to the microprocessor.”) (Ex. 1011, 3:15–18). Just as in the ’792 patent, by identifying syncs in the demodulated analog signal, Zenith identifies carrier signals in the input RF signal. (*Id.*). Moreover, the detected carrier signals identify the incoming RF signal as either analog or digital television signals. (*Id.* at 3:12–15). Accordingly, the output select signal of microprocessor 22 is generated by detecting the syncs, which are carrier signals in the input RF signal identifying the type of format of the input RF signal. (Ex. 1009, ¶ 71) Thus, the select signal in Zenith (output of microprocessor 22) is generated by sync detect 20, which detects carrier signals in the input RF signal identifying said format of said input RF signal. (*Id.*).

As discussed above with respect to claim 26, a person of ordinary skill in the art would have been motivated to combine the carrier detection circuit of Zenith with Thomson and Harris to generate the select signal of Thomson. That discussion is incorporated by reference in its entirety and will not be duplicated herein. (Ex. 1009, ¶ 72). Thus, the combination of Thomson, Harris, and Zenith renders claims 28 invalid.

G. Ground 4: Claim 27 is obvious over Thomson and Harris in view of Zenith and Birleson.

“27. The television receiver of claim 26, wherein the format/standard selection circuit generates the select signal in response to an input signal from a user.”

User selection has long been the preferred method of controlling a television. From the earliest days of remote control, users have been providing an input signal to a circuit that generates a select signal that is used to control the configuration of a television. (Ex. 1009, ¶ 73). Due to the proliferative nature of user control of television channel viewing, user selection of a channel is the predominant factor determinative of the format of the incoming RF. (*Id.*).

Birleson (Ex. 1015) discloses an automatic carrier detect (ACD) circuit that “determines whether the signal being processed is in the digital or analog format.” (Ex. 1015 at 10:52–54). The signal is tested by the ACD when the channel is changed or alternatively the ACD testing can be initiated by a user, causing the selection circuit to generate the select signal: “ACD testing may be automatic or user-initiated. For example, a television system may provide a function on a remote control which allows the user to select the ‘test mode.’” (Ex. 1015, 11:27–31; *see also* Ex. 1017 at 4:19–20 (“In other cases, the input format will have to be manually selected by the viewer.”)). Birleson provides several examples a user-initiated generation of a standard select signal, for example, when the ACD is operating in “test mode,” it “either switches SIFFb 109 out or leaves it in the signal

path depending on whether an analog or digital signal is detected.” (Ex. 1015 at 11:24–26). Signal testing by automatic carrier detection (ACD) circuit in Birleson may be initiated by a channel change. (*Id.* at 11:20–26). The ACD circuit detects “whether the incoming channel is an analog signal or digital signal.” (Ex. 1015 at 10: 52–54). Besides changing the channel, a user could initiate signal testing by changing the input source. (Ex. 1015 at 11:29–30 (signal testing initiated in response to “an operator switching the input from an antenna or cable line to a videotape recorder or laser 25 disk player”)). Furthermore, the “television system may provide a function on a remote control which allows the user to select the ‘test mode’” (*Id.* at 11:34–37). In each of these examples in Birleson, the ACD circuit in test mode generates a select signal based on whether the input RF signal is an analog or digital signal. (*Id.* at 10:52–54 (“Fig. 3 shows automatic carrier detection (ACD) circuit 30. The function of ACD circuit is to detect whether the incoming channel is an analog signal or digital signal.”); Ex. 1009, ¶ 74). Thus, Birleson discloses a “format/standard selection circuit generates the select signal in response to an input signal from a user.” (Ex. 1009, ¶ 74).

An obvious design choice to a person of ordinary skill in the art would be to generate the select signal in Thomson in response to the most common type of input, namely user input, such as input from a remote television control. (Ex. 1009, ¶ 75). Moreover, responding to user input is an obvious design choice to try

because such input is one of a finite set of inputs to which Thomson could respond. (*Id.*). Thus, a POSITA would be motivated to combine the user input functionality from Birleson with the select circuit of Zenith, along with Thomson to generate a select signal in response to an input signal from a user. (*Id.*). Accordingly, the combination of Thomson in view of Zenith, and further in view of Birleson renders this claim obvious.

H. Ground 5: Claim 18 is obvious over Thomson and Harris in further view of Oku, Ericsson, and Nguyen.

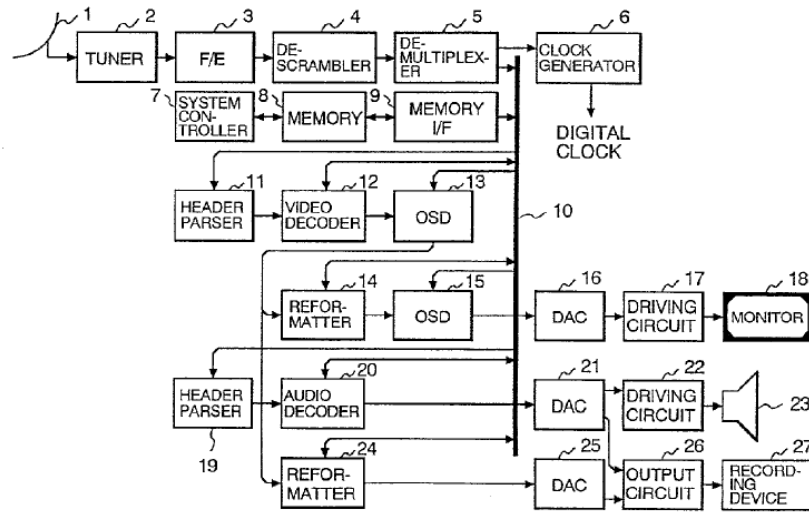
Claim 18 is drawn to well-known circuit designs using well-known circuit elements—digital-to-analog converters, driver circuits, and single-ended and differential signaling—for providing either a differential output for a digital television signal format or single-ended output for an analog television format. Such circuit elements and signaling have been used in digital television tuners well before the '792 patent. (Ex. 1009, ¶ 76). As shown below, the combination of claim elements of claim 18 are not novel or non-obvious, and thus claim 18 should be canceled as invalid.

1. “18. The television receiver of claim 1, wherein the signal output circuit comprises: a first digital-to-analog converter coupled to receive digital output signals from the signal processor and convert the digital output signals to analog output signals;”

As shown in Fig.

FIG. 4

4 (right) Oku discloses a television receiver including a first digital-to-analog converter (e.g., DAC 21 in Fig. 4) for receiving processed digital signals and



converting those digital signals to analog output signals. (Ex. 1018, ¶ [0046], Fig. 4; Ex. 1009, ¶ 77). Accordingly, Oku teaches this element. (Ex. 1009, ¶ 77).

2. “a first driver circuit for driving the analog output signals from the first digital-to-analog converter onto a first output terminal;”

The television receiver of Oku also includes a first driver circuit (e.g., driving circuit 22 in Fig. 4) for driving analog output signals from DAC 16 to an output terminal. (Ex. 1018 at ¶¶ [0046] and [0066]; Ex. 1009, ¶ 78). Accordingly, Oku teaches this element. (Ex. 1009, ¶ 78).

3. “a second driver circuit for driving the analog output signals from the first digital-to-analog converter, the second driver circuit comprising a differential output driver circuit having a first differential output terminal and a second differential output terminal, the first differential output terminal being coupled to

the first output terminal and the second differential output terminal being coupled to a second output terminal”;

Oku discloses a second driver circuit (output circuit 26 of Fig. 4) for driving the analog output signals from DAC 21. (Ex. 1018 at Fig. 4). Because digital television circuits frequently used differential inputs, a person of ordinary skill in the art would have been motivated to use differential signaling, a well-known design choice. (Ex. 1009, ¶ 79; (citing Kerth Ex. 1021, Fig. 4 (showing use of differential signaling))). Such a choice would provide numerous advantages, including reduced interference effects or noise within a circuit, increased output voltage swing, ideal for low-voltage systems, integrated circuit is easier to use, and reduced even-order harmonics. (See Ex. 1009, ¶ 79 (citing Ex. 1033, p. 3)).

One such differential driver is disclosed in Fig. 2 of Ericsson. (Ericsson, Ex. 1024 at Fig. 2). The differential line driver in Ericsson receives input from a digital-to-analog converter and outputs a pair of current outputs. (Ericsson, Ex. 1024, 2:23–24, 2:31–32; Ex. 1009, ¶ 80 and ¶ 81 (noting that Maulik, Ex. 1025 at 2:48–49 and Fig. 2 discloses a differential driver receiving input from a DAC)). Thus, the combination of Oku and Ericsson disclose this element. (Ex. 1009, ¶ 82).

4. “a second analog-to-digital converter coupled to receive digital output signals from the signal processor encoding audio

information and convert the digital output signals to analog output signals;”

Oku discloses a second digital-to-analog converter (DAC 16) which receives processed digital output signals from the signal processor. (Ex. 1018 at Fig. 4; Ex. 1009, ¶ 83). Although the output of DAC 16 is coupled to driving circuit 17 to drive a monitor, it would have been a mere design choice to input digital signals encoding audio information into a digital-to-analog converter when audio signals are desired. Accordingly, this element is met by Oku. (Ex. 1009, ¶ 83).

5. “a third driver circuit for driving the analog output signals from the second digital-to-analog converter onto the second output terminal,”

This element recites a third driver circuit whose output is connected to the second output terminal. This element, together with the preceding element, recites a structure in which the first and second output terminals are multiplexed or coupled to either (1) the first and third driver circuits or (2) the second differential driving circuit. (Ex. 1009, ¶ 84).

Oku discloses a third driver circuit (driving circuit 17 of Fig. 4) for driving the analog output signals from a second digital-to-analog converter (DAC 16) onto the second output terminal. (Ex. 1018 at Fig. 4). Oku discloses many different embodiments of output circuitry including multiple driver circuits. (*See e.g.*, Figs. 1, 5, 6, 7, 9–11). The specific configuration of output circuitry is dependent on the

desired design factors. In the case of claim 18, the receiver can be connected to a component that receives an analog signal corresponding to an input RF signal that has either of analog or digital television format, but not both (Ex. 1009, ¶ 85). A person of ordinary skill in the art would naturally choose to design a circuit that multiplexes the output lines connected to the differential and two single-ended drivers to reduce the pin count, as described further below. (*Id.*). Such a multiplexing architecture is shown in Nguyen, which discloses a driving circuit architecture that is selectively controlled by control logic so that two input/output (I/O) pins are coupled to either (1) a differential driver (element 600), or (2) two single-ended drivers (elements 60). (Ex. 1031, Fig. 7, 8:28-33). Thus, it would have been obvious to a POSITA to combine the analog differential driver as disclosed in Ericsson with the drivers disclosed in Oku using the multiplexing architecture of Nguyen. (Ex. 1009, ¶ 85).

6. “wherein the first and second output terminals provide differential output signals indicative of video and audio information encoded in the input RF signal when the input RF signal has a digital television signal format; and the first output terminal provides video information encoded in the input RF signal and the second output terminal provides signals indicative of audio information encoded in the input RF signal when the input RF signal has an analog television signal format.”

This element recites the multiplexing function, namely, (1) when the input RF signal has a digital television format, the signals on the first and second output terminals are indicative of video and audio information and (2) when the input RF signal has an analog television format, the signal on first output terminal provides video information and the signal on the second output terminal provides audio information. Such a multiplexing scheme would have been an obvious design choice to a POSITA because the outputs are normally mutually exclusive. (Ex. 1009, ¶ 86).

Thomson discloses a television receiver that outputs audio and video information in the form of I and Q signals when the input RF signal has a digital television format. (Ex. 1004, Fig. 1, 2:39–44; Ex. 1009, ¶ 87). Furthermore, when the input RF signal to the Thomson receiver has a digital television format, the input signal to the synchronous demodulators 12 and 13 (and also the output from bandpass filter 8) in Thomson is a digital IF signal that includes audio and video information that may be output. (Ex. 1004 at Fig. 1, 2:39–44; Ex. 1009, ¶ 87). Moreover, when the input RF signal has an analog television format, Thomson outputs video information (CVBS) and audio information (smod1 and smod2). (Ex. 1004 at Fig. 1; Ex. 1009, ¶ 87). A person of ordinary skill in the art would understand that these signals are logical candidates to multiplex on the same output terminals because they are mutually exclusive, *i.e.*, they do not exist

simultaneously. A POSITA would further understand that these signals could be multiplexed onto the same terminals based on whether the input RF signal is in analog or digital television format to reduce the pin count of the circuit. (Ex. 1009, ¶ 87). Accordingly, a POSITA having knowledge of the receiver teachings of Thomson and Harris would be familiar with the basic driver and D/A structures such as Oku and Ericsson, and the Nguyen multiplexing architecture. This fundamental knowledge of a POSITA renders the “wherein” claim element invalid. (*Id.*).

A person of ordinary skill in the art would be motivated to combine Harris, Thomson, Oku, Ericsson, and Nguyen. As discussed previously with respect to claim 1, a person of ordinary skill in the art would be motivated to implement the adaptive filter 7 of Thomson using the FIR filters of Harris. Moreover, claim 18 relates to outputting either a differential output or two single-ended signals on the first and second output terminals. Because the signals relating to analog or digital formats are mutually exclusive (*i.e.*, the receiver is only outputting either an analog or digital television signal) when two output terminals are shared for outputting the video and audio signals, signals would be present on the output terminals from only one of (1) the differential driver when the television signal corresponding to a digital format or (2) the two single-ended drivers when the television format corresponds to an analog format. (Ex. 1009, ¶ 88). To reduce the number of

input/output pins, a person of ordinary skill would be motivated to use the architecture of Nguyen to selectively couple either a differential driver or two single-ended drivers to two output lines to reduce the number of lines because it would result in a lower cost design. (*Id.*).

The details of the actual output circuit, including the digital-to-analog and driver circuits are mere design choices within the knowledge of a person of ordinary skill in the art. (Ex. 1009, ¶ 89). Oku discloses many different embodiments of output circuitry including multiple driver circuits, *e.g.*, in Figs. 1, 4, 6, 7, 9–11. The particular configuration of a digital-to-analog converter and driving circuit, as discussed above is a mere design choice, well within the knowledge of one of ordinary skill in the art. (Ex. 1009, ¶ 89). When the input RF signal has a digital television format, the output of the bandpass filter 8 of Thomson drives a first digital-to-analog converter (disclosed in Oku), which in turn, drives a differential driver (disclosed in Ericsson). (Ex. 1009, ¶ 89). Alternatively, when the input RF signal has an analog television format, the output of the analog demodulator 9 drives the first digital-to-analog converter, which in turn drives a first driver (disclosed in Oku (Ex. 1018)), and the output of smod1 or smod2 drives a second analog-to-digital converter (disclosed in Oku (Ex. 1018)), which in turn drives a second driver (disclosed in Oku (Ex. 1018)). (Ex. 1009, ¶ 89). The outputs of the differential and first and second drivers are multiplexed

together using the architecture disclosed in Nguyen (Ex. 1031). (Ex. 1009, ¶ 89). Accordingly, the combination of Thomson, Harris, Oku, Ericsson, and Nguyen, and render claim 18 invalid. (*Id.*).

I. Ground 5: Claim 19 is obvious over Thomson and Harris in further view of Oku, Ericsson, and Nguyen.

“19. The television receiver of claim 18, wherein the signal output circuit further comprises: a low pass filter coupled between the first digital-to-analog converter and the first and second driver circuits, the low pass filter providing low pass filtering function.”

Including a low pass filter at the output of a digital-to-analog converter is a mere design choice based on the properties of the DAC and downstream circuitry. (Ex. 1009, ¶ 90). A low-pass filter smoothes out waveforms and reduces or eliminates high-frequency noise which may be introduced by the electronic circuitry including the DAC. (*Id.*). Such high-frequency noise may result in unwanted EM radiation. Because EM radiation of consumer electronics is highly regulated, a POSITA would be motivated to use a low-pass filter at the output and reduce this possibility. This design choice is within the skill of a POSITA and would lead to predictable results, and therefore would be obvious to one of ordinary skill in the art to provide low-pass filtering of a baseband signal for attenuation of unwanted frequencies being output by baseband audio and video signal outputs. (*Id.*). Accordingly, Thomson, Harris, Oku, Ericsson, and Nguyen render claim 19 unpatentable. (*Id.*).

VI. CONCLUSION

For the reasons discussed in detail herein, the combination of Thomson and Harris renders Claim 29 obvious; the combination of Thomson, Harris, and Grumman render Claims 24 and 25 obvious; the combination of Thomson, Harris, and Zenith render Claims 26 and 28 obvious; the combination of Thomson, Harris, Zenith, and Birleson renders Claim 27 obvious; and the combination of Thomson, Harris, and Oku, Ericsson, and Nguyen render Claims 18 and 19 obvious. Petitioner therefore requests institution of an *inter partes* review and cancellation of claims 18, 19, and 24–29 of the ‘792 patent.

Dated: January 26, 2015

Respectfully submitted,

/s/ Peter J. Ayers

Peter J. Ayers

Registration No. 38,374

LEE & HAYES, PLLC

Customer No. 12-0769

Phone: (512) 605-0252

Facsimile: (509) 605-0252

Attorney Docket No.: S158-0006IPR

CERTIFICATE OF SERVICE

The undersigned certifies that on January 26, 2015, I caused a true and correct copy of the following materials:

1) PETITION FOR INTER PARTES REVIEW OF U.S. PATENT 7,265,792 UNDER 35 U.S.C. § 312 AND 37 C.F.R. § 42.104

2) EXHIBITS 1001–1040

3) TABLE OF EXHIBITS

4) FEE AUTHORIZATION

5) POWER OF ATTORNEY

to be served via Federal Express and electronically on the following attorney of record as listed on PAIR:

Name: Law Office of Andrei D. Popovici, P.C.

Attention: Andrei D. Popovici

Address: 4030 Moorpark Ave., Suite 108
San Jose, CA 95115

The identified documents were also served electronically to Patent Owner's Counsel of Record in IPR2014-00728, IRP2014-00809, and IPR2014-00881:

Michael R. Fleming
Lead Counsel for Patent Owner
Neifeld IP Law, PC
4813-B Eisenhower Avenue
Alexandria, VA 22304
mfleming@neifeld.com

Robert W. Hahl
Robert Mihail
Neifeld IP Law, PC
4813-B Eisenhower Avenue
Alexandria, VA 22304
rhahl@neifeld.com

/s/ Peter J. Ayers

Peter J. Ayers

Registration No. 38,374