

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SILICON LABORATORIES, INC.
Petitioner

v.

CRESTA TECHNOLOGY CORPORATION
Patent Owner

Case IPR2014-00728
Patent 7,075,585 B2

PATENT OWNER'S NOTICE OF APPEAL

Patent Owner Cresta Technology Corporation hereby gives notice pursuant to 35 U.S.C. § 142 and 37 C.F.R. 90.2(a) that it appeals to the United States Court of Appeals for the Federal Circuit from the Board's Final Written Decision in IPR2014-00728, entered on October 21, 2015 (Paper No. 53), and from all orders, decisions, rulings, and opinions underlying the Final Written Decision. A copy of the Final Written Decision is attached to this Notice.

In accordance with 37 C.F.R. 90.2(a)(3)(ii), Patent Owner further notes that the issues on appeal will likely include, but are not limited to:

- 1) Whether the Board erred in construing the term "input RF signals" and "tuner for receiving input RF signals" as "signals that are input having a frequency between 10 kHz and 100 GHz" and "a tuner that receives signals that are input having a frequency between 10 kHz and 100 GHz," respectively.
- 2) Whether the Board erred in finding that publication EP 0 696 854 A1 ("Thompson") disclosed the limitations of claim 1 of U.S. Patent No. 7,075,585 (the "585 Patent"), including the limitation "a plurality of demodulators, each coupled to receive output signals from said signal processor, each of said demodulators for demodulating said digital output signals according to one of said formats of said input RF standard, each

of said demodulators generating video and audio baseband signals corresponding to said format of said input RF signal.”

- 3) Whether the Board erred in any finding or determination supporting or relating to the above-referenced issues and any other issues decided adversely to Patent Owner in any orders, decisions, ruling, or opinions of the Board.

Copies of this Notice of Appeal are being filed simultaneously with the Patent Trial and Appeal Board, the Director of the United States Patent and Trademark Office, and with the Clerk of the United States Court of Appeals for the Federal Circuit.

Dated: December 18, 2015

Respectfully submitted,

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Certificate of Filing in Compliance with 37 C.F.R. § 90.2(a)(1)

I hereby certify that, in addition to being filed electronically through the Board's PRPS System, the original version of this PATENT OWNER'S NOTICE OF APPEAL was filed by hand on December 18, 2015, with the Director of the United States Patent and Trademark Office, at the following address:

Director of the United States Patent and Trademark Office
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Certificate of Filing in Compliance with 37 C.F.R. § 90.2(a)(2)

I hereby certify that on December 18, 2015, the foregoing, PATENT OWNER'S NOTICE OF APPEAL, was filed with the Clerk's Office of the United States Court of Appeals for the Federal Circuit, using the Court's CM/ECF system.

Certificate of Service in Compliance with 37 CFR § 42.6(e)(4)

The undersigned certifies that a complete copy of this PATENT OWNER'S NOTICE OF APPEAL was served by email and overnight mail on December 18, 2015 to the Petitioner's lead and back-up counsel, as list below:

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SILICON LABORATORIES, INC.,
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v.

CRESTA TECHNOLOGY CORPORATION,
Patent Owner.

Case IPR2015-00728
Patent 7,075,585 B2

Before PHILLIP J. KAUFFMAN, GREGG I. ANDERSON, and
PATRICK M. BOUCHER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background*

Silicon Laboratories, Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–3, 5, 10, 13, 14, and 16–19 of U.S. Patent No. 7,075,585 (“the ’585 patent”). After consideration of a Preliminary Response (Paper 8) filed by Cresta Technology Corporation (“Patent Owner”), the Board instituted trial on October 24, 2014. Paper 9 (“Dec.”).

During the trial, Patent Owner timely filed a Patent Owner Response (Paper 30, “PO Resp.”), and Petitioner timely filed a Reply to the Patent Owner Response (Paper 37, “Reply”). An oral hearing was held on July 7, 2015 (Paper 50, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 5, 10, and 16–19 are unpatentable.

B. *Related Proceedings*

Patent Owner has asserted the ’585 patent against Petitioner in the following two actions: *Cresta Technology Corp. v. MaxLinear, Inc.*, 1:14-cv-00079-RGA (D. Del.); and *Certain Television Sets, Television Receivers*,

Television Tuners, and Components Thereof, Investigation No. 337-TA-910 (USITC). Pet. 1.

C. The '585 Patent

The '585 patent “relates to a broadband television signal receiver for receiving multi-standard analog television signals, digital television signals and data channels.” Ex. 1101, col. 1, ll. 16–19. Figure 2 of the '585 patent is reproduced below.

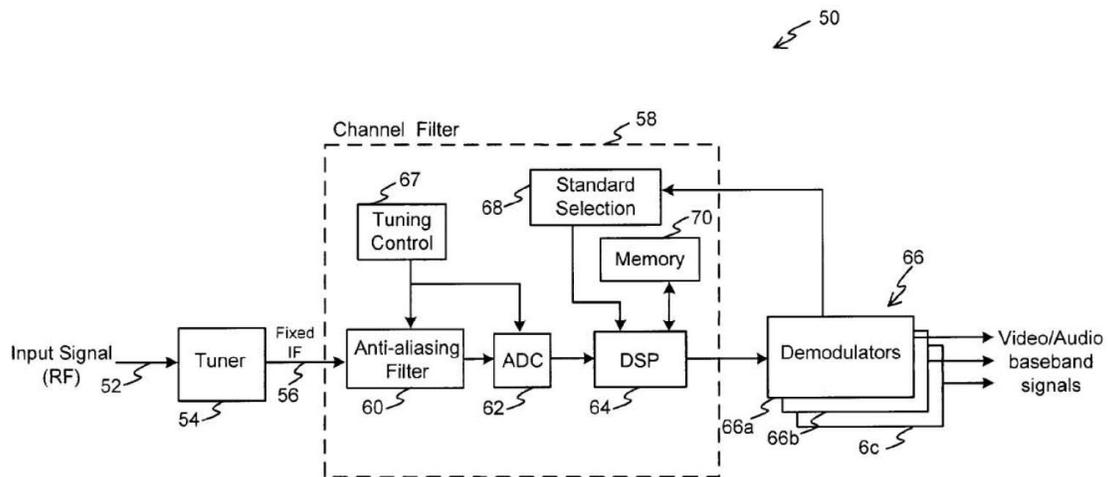


Figure 2 provides a block diagram of television receiver 50 that receives input radio frequency (RF) signals at input terminal 52. *Id.* at col. 1, l. 52; col. 3, ll. 44–48. Tuner 54 converts an input RF signal to an intermediate-frequency signal that is filtered and processed by anti-aliasing filter 60. *Id.* at col. 3, ll. 48–51; col. 4, ll. 3–7. The center frequency of anti-aliasing filter 60 is selected based on the intermediate frequency of the intermediate signal. *Id.* at col. 4, ll. 31–33. After filtering, the intermediate signal is sampled and

digitized by analog-digital converter 62. *Id.* at col. 4, ll. 17–20. The resulting digital representation is processed by digital signal processor 64 “according to the television standard to which the input RF signal is encoded.” *Id.* at col. 4, ll. 41–54. Specifically, the digital signal processor applies a filter function that depends on a manually or automatically established state of a standard selection circuit used to select among “the several analog television standards and the several digital television standards.” *Id.* at col. 4, ll. 55–64; col. 5, ll. 7–22. A bank of demodulators generates appropriate video and audio baseband signals from the digitally processed signals. *Id.* at col. 6, ll. 42–44.

D. Illustrative Claim

Claim 17 of the '585 patent is illustrative of the claims at issue:

17. A method for receiving input RF signal[s] comprising:
 - receiving said input RF signals encoding information in one of a plurality of formats;
 - converting said input RF signals to intermediate signals having an intermediate frequency;
 - applying a first filter function to said intermediate signals, said first filter function being an anti-aliasing filter and having a center frequency;
 - digitizing said filtered intermediate signals at a sampling frequency;
 - processing said digitized signals in accordance with said format of said input RF signals and generating digital output signals indicative of information encoded in said input RF signals; and

demodulating using a plurality of demodulators said processed digitized signals to generate baseband signals corresponding to said format of said input RF signals.

E. Grounds of Unpatentability

Petitioner relies on the following references to support the grounds on which we instituted review.

Thomson	EP 0696854 A1	Feb. 14, 1996	Ex. 1004
Kerth	US 6,804,497 B2	Oct. 12, 2004	Ex. 1011

Clay Olmstead and Mike Petrowski, *A Digital Tuner for Wideband Receivers*, DSP Applications Magazine (Sept. 1992) (Ex. 1005) (“Harris”)

Prior art shown in Figure 1 of the ’585 patent and related description (Ex. 1001).

We instituted this proceeding based on the following grounds.

Reference(s)	Basis	Claim(s) Challenged
Thomson	§ 102(b)	1, 2, 5, and 16–19
Thomson and Harris	§ 103(a)	1, 2, 5, 10, and 16
Thomson and Figure 1 of the ’585 patent	§ 103(a)	1, 2, 5, and 16
Thomson, Harris, and Figure 1 of the ’585 patent	§ 103(a)	1, 2, 5, 10, and 16
Thomson and Kerth	§ 103(a)	3
Thomson, Harris, and Kerth	§ 103(a)	3

II. ANALYSIS

A. Claim Construction

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, at 1277–79 (Fed. Cir. 2015); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).¹

1. “input RF signals” and “tuner for receiving input RF signals”

Independent claims 1 and 17 respectively recite “a tuner for receiving input RF signals” and “receiving said input RF signals.” In the Institution Decision, we adopted a preliminary construction of “RF signals” as signals having a frequency between 10 kHz and 100 GHz. Dec. 6 (citing Ex. 3001, *The Authoritative Dictionary of IEEE Standards Terms* (7th ed. 2000), 912, for a definition of “radio frequency”).

Patent Owner contends that that construction is inappropriate because “the Board is dissecting the claim term by not addressing that the complete claim limitation which is recited as ‘input RF signals.’” PO Resp. 10. Patent Owner proposes that the full term “input RF signal” be construed as

¹ Patent Owner argued in its Patent Owner Response that the standard for claim interpretation should be the judicial standard established by the Federal Circuit in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005), but withdrew that argument at the oral hearing after the Federal Circuit decided *Cuozzo*. PO Resp. 16–18, Tr. 70:12–22.

“a signal that is an incoming signal that comes out of the medium of propagation and is external to the tuner without any processing by the tuner.” *Id.* at 11. Patent Owner similarly proposes that “tuner for receiving input RF signals” be construed as a tuner that receives an incoming signal that comes out of the medium of propagation and is external to the tuner without any processing. *Id.* at 12. Patent Owner supports its proposed constructions by identifying disclosures in the ’585 patent that relate to the receipt and conversion of an input RF signal to an intermediate frequency signal. *Id.* at 10–11.

Petitioner responds that “[t]he word ‘input’ cannot bear the weight [Patent Owner] places upon it.” Reply 3. Petitioner supports its contention that “the terms ‘input’ and ‘input signals’ should be construed as signals that are input to a circuit or device” with testimony by Douglas Holberg, Ph.D. *Id.* (citing Ex. 1072 ¶ 9). Petitioner also observes that claim 16 recites specific sources for the input RF signals, “mak[ing] clear that neither the source nor the medium of the input RF signal is a limitation on the term.” *Id.* at 3–4 (citing *Trebro Mfg., Inc. v. Firefly Equipment, LLC*, 748 F.3d 1159, 1166 (Fed. Cir. 2014)).

Although Patent Owner’s proposed construction is not without appeal, we disagree that it corresponds to the broadest reasonable interpretation in light of the specification. Patent Owner’s implication that “input RF signal” can be considered only as an undivided expression is belied by references

within the '585 patent that parse the expression, such as in Figures 1 and 2, which identify an "Input Signal" with a parenthetical notation of frequency.²

We construe "input RF signals" as signals that are input having a frequency between 10 kHz and 100 GHz, and we construe "tuner for receiving input RF signals" as a tuner that receives signals that are input having a frequency between 10 kHz and 100 GHz.

2. *"said input RF signals encoding information in one of a plurality of formats"*

Independent claims 1 and 17 recite "said input RF signals encoding information in one of a plurality of formats." In the Institution Decision, we adopted a preliminary construction of "format" such that analog and digital signals are examples of distinct formats. Dec. 7. After considering the submissions of the parties during the trial, we see no compelling reason to alter that construction.

Patent Owner contends that the phrase "said input RF signals encoding information in one of a plurality of formats" requires "receiving one format RF signal at a time." PO Resp. 13. It is unclear what Patent Owner means by "format RF signal," which appears nowhere in the '585 patent, including its claims.

The claims unambiguously require receipt of a plural number of "input RF signals." In describing the function of standard selection circuit

² See also Ex. 1001, col. 1, l. 60 (referring to "the RF signal").

68, the specification of the '585 patent makes clear that different received input RF signals may encode information in different formats, but that each received input RF signal encodes information in exactly one format: “Each demodulator in bank **66** generates a signal which is fed back to standard selection circuit **68** indicating *which television standard the input signal is encoded.*” Ex. 1001, col. 5, ll. 18–20 (emphasis added). Thus, applying the broadest reasonable interpretation in light of the specification for purposes of this Decision, we construe “said input RF signals encoding information in one of a plurality of formats” as requiring that each received input RF signal encode information in exactly one format.

3. *“processing said digital representation of said intermediate signals in accordance with said format” and “processing said digitized signals in accordance with said format”*

Independent claim 1 recites “processing said digital representation of said intermediate signals in accordance with said format” and independent claim 17 recites “processing said digitized signals in accordance with said format.” Patent Owner contends that, under the broadest reasonable interpretation in light of the specification, the phrases exclude processing a plurality of formats in parallel. PO Resp. 13, 16. We agree, and, accordingly, construe the phrases to require processing in accordance with the exactly one format in which each received input RF signal is encoded.

4. “*signal processor*”

Independent claim 1 recites a “signal processor,” which we construed in the Institution Decision as “a digital module that processes signals in the digital domain.” Dec. 8–9. Patent Owner contends that “the signal processor processes only **one** format RF signal and does not process a plurality of formats in parallel.” PO Resp. 13. We address Patent Owner’s contention that “the signal processor processes only **one** format RF signal and does not process a plurality of formats in parallel” above. *See* PO Resp. 13. We otherwise see no compelling reason to modify that construction, and construe “signal processor” as a digital module that processes signals in the digital domain.

5. “*receiver*”

The preamble of independent claim 1 recites “A receiver comprising . . . ,” and each of challenged dependent claims 2, 3, 5, 10, 13, 14, and 16 refers back to “[t]he receiver.” No claim otherwise relies on the recitation of a “receiver” for antecedent basis.

Patent Owner proposes that “receiver” be construed as “an apparatus that first converts the incoming radio frequency (RF) signals to intermediate frequency (IF) signals and then second, it converts the intermediate frequency (IF) signals to baseband signals.” *Id.* at 15. We disagree with Patent Owner’s proposed construction because, as Petitioner asserts, “[r]ather than ‘breathing life into the claims,’ the term ‘receiver’ merely

recites a purpose or intended use for the invention, and thus is not a claim limitation.” Reply 5 (citing *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). Petitioner’s position is supported by the testimony of Dr. Holberg, who states his opinion that “the term ‘receiver’ is not a necessary part of the claim” and that “the body of the claims recite a complete invention without reference to the word ‘receiver’ in the preamble.” Ex. 1072 ¶ 21.

Because recitation of the term “receiver” does not limit the claims, we do not construe it.

6. “*video and audio baseband signals*” and “*baseband signals*”

Independent claims 1 and 17 respectively recite “generating video and audio baseband signals corresponding to said format of said input RF signals” and “to generate baseband signals corresponding to said format of said input RF signals.” In the Institution Decision, we construed “baseband signal” as a signal without transmission modulation. Dec. 7–8.

Although Patent Owner asserts that it “provides and argues claim construction for . . . ‘each of said demodulators generating video and audio baseband signals,’” we do not discern any specific claim construction proposed by Patent Owner in its Response. PO Resp. 8. Instead, as Petitioner observes, Patent Owner “did not provide an explicit definition of this term in its response, but its expert apparently disagrees with the Board’s construction of ‘baseband signals.’” Reply 6 (citing Ex. 2003 ¶ 59). Petitioner otherwise contends that a person of ordinary skill in the art

“would interpret ‘baseband signals’ consistent with the Board’s previous construction” but that “baseband signaling does not preclude some form of modulation.” *Id.* (citing Ex. 1072 ¶ 22; Ex. 1001, col. 5, ll. 59–65; Ex. 1020, col. 11, ll. 43–44).

We take this opportunity to clarify an aspect of our construction, noting that the plural language of the phrases in the claims is consistent with the plural recitation of “input RF signals” that are received. Consistent with the parallel pluralism of the claim language, we adopt a construction in which each “video and audio baseband signal” may correspond to a single signal that encodes both video and audio information without transmission modulation.

B. Patent Owner’s Motion to Exclude

Dr. Holberg’s support of the Petition appears in two declarations, filed as Exhibits 1009 and 1072. Patent Owner moves to exclude both declarations because Dr. Holberg’s “knowledge is below what one of ordinary skill in the relevant art would know, and would have to know to understand the relevance of the prior art and the invention” and because “his testimony clearly shows lack of credibility.” Paper 40, 1. Patent Owner clarified at the oral hearing that “credibility” does not refer to Dr. Holberg’s honesty, but to his ability to put support for his opinions on the record. Tr. 76:9–77:24. Petitioner opposes, contending that Dr. Holberg is qualified as an expert in the relevant field. Paper 46, 3–4.

The parties disagree in their characterization of the relevant field in evaluating whether Dr. Holberg is “qualified as an expert by knowledge, skill, experience, training, or education.” *See* Fed. R. Evid. 702. Patent Owner contends that a person of ordinary skill in the art at the time of the invention of the ’585 patent

would be familiar with: 1) fundamental RF circuit design concepts, e.g. heterodyne, superheterodyne, tuner, baseband, intermediate frequency, 2) fundamental RF television circuit design criteria, e.g. sensitivity, signal-to-noise ratio, linearity, 3) the required signal-to-noise ratio for an analog TV tuner, and 4) basic usage of the Cadence design platform (the most widespread RF integrated circuit design tool).

Paper 40, 3–4. We find Patent Owner’s characterization of the relevant field too narrow. The ’585 patent characterizes the field of the invention as follows, notably lacking the strong focus of Patent Owner’s characterization on RF circuit design:

The present invention relates to a television signal receiver, and in particular, the present invention relates to a broadband television signal receiver for receiving multi-standard analog television signals, digital television signals and data channels.

Ex. 1001, col. 1, ll. 15–19. As Petitioner observes, the only RF component of the claimed receiver is the “tuner for receiving input RF signals and for converting said input RF signals to intermediate signals having an intermediate frequency.” Paper 46, 2 (citing Ex. 1001, col. 6, ll. 52–55). The ’585 patent describes the tuner as “a commercially available discrete component” that “can perform a single or dual super-heterodyne

conversion.” Ex. 1001, col. 3, ll. 51–55. Patent Owner’s expert, Dr. Opris, further acknowledged that heterodyne and superheterodyne conversion has been known for about 100 years. Ex. 1056, 26:11–20. These factors weigh significantly against defining the field of *invention* as narrowly as Patent Owner proposes. Instead, we agree with Petitioner, and find that a person of ordinary skill in the art 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. Pet. 16–17.

Dr. Holberg’s education and experience exceed these qualifications. Ex. 1009 ¶ 3, App. A. We also have considered Patent Owner’s contention that Dr. Holberg’s cross-examination testimony shows that he lacks ordinary skill in the art of the invention, and have reviewed that testimony. We conclude that Dr. Holberg is an expert in the relevant field of the invention.

Accordingly, we deny Patent Owner’s Motion to Exclude.

C. Thomson

Thomson describes a broadcast receiver. Ex. 1004, col. 1, ll. 3–4. Figure 1 of Thomson is reproduced below.

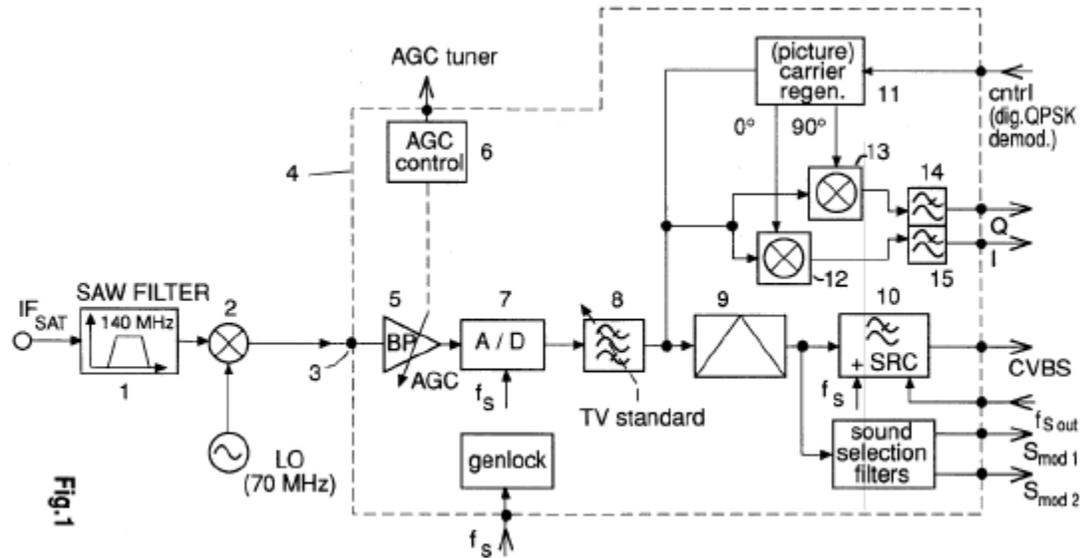


Figure 1 is a block diagram showing components of the broadcast receiver, which may receive incoming signal IF_{SAT} from an outdoor station. *Id.* at col. 2, ll. 30–31. Incoming signal IF_{SAT} results from the outdoor station supplying satellite channels already down-converted in a frequency band covering 950–1750 MHz. *Id.* at col. 1, l. 56–col. 2, l. 1. Incoming signal IF_{SAT} is, therefore, an “input RF signal” as we have construed the term. Thomson teaches that the “proposed architecture allows a digitising of the Sat-If signals no matter that they are analog or digital ones.” *Id.* at col. 1, ll. 42–43.

Incoming signal IF_{SAT} is down-converted by SAW filter 1 and mixer 2, which respectively suppress adjacent channel components and achieve a “frequency transposition into an IF signal of around 75 MHz.” *Id.* at col. 2, ll. 30–33; col. 2, ll. 47–57. AGC amplifier 5 includes “an internal bandpass limitation” (*id.* at col. 2, ll. 58–59) that prevents aliasing when A/D

converter 7 digitizes the IF signal at a sampling frequency. *Id.* at col. 3, ll. 1–14. Bandpass filter 8 applies “an adaptively controlled bandwidth [to] select[] the desired signal with a minimal remainder of the adjacent channel signals.” *Id.* at col. 3, ll. 16–19. FM demodulator 9 and low-pass filter 10 output a CVBS (“composite video baseband signal”), and synchronous demodulators 12 and 13 effect QPSK (“quadrature phase shift keying”) demodulation to provide quadrature (“Q”) and in-phase (“I”) signals. *Id.* at col. 2, ll. 37–44.

1. Anticipation of Claims 1, 2, 5, and 16–19 by Thomson

a. Claim 17

Petitioner contends that the broadcast receiver disclosed by Thomson performs all steps recited in independent claim 17. Pet. 21–27. We address each limitation of the claim as follows.

i. Preamble: “A method for receiving input RF signal[s]”

Petitioner contends that the preamble of “[a] method for receiving input RF signal[s]” is not limiting. Pet. 22. We agree and find that the body of the claim fully and intrinsically sets forth all limitations of the claimed invention. *See Pitney Bowes, Inc. v. Hewlett Packard Co.*, 182 F.3d 1293, 1305 (Fed. Cir. 1999). The preamble merely states the purpose of the claimed invention rather than any distinct definition of the invention’s limitations.

*ii. “receiving said input RF signals encoding information
in one of a plurality of formats”*

Petitioner contends that Thomson teaches “receiving said input RF signals encoding information in one of a plurality of formats” because the multi-standard tuner of Thomson can receive RF signals in a plurality of formats, including analog and digital. Pet. 22 (citing Ex. 1004, col. 1, ll. 42–43). Patent Owner contends that “Thomson does not teach a receiver for receiving input RF signals,” but instead “describes an apparatus that receives input *IF* signals.” PO Resp. 23. We agree with Petitioner.

Although Thomson labels the input signal as “ IF_{SAT} ” to reflect that satellite channels have already been down-converted when received by the broadcast receiver, IF_{SAT} is disclosed as having a radio frequency and is shown in Figure 1 of Thomson as input to SAW filter 1. Ex. 1004, col. 1, l. 56–col. 2, l. 1. As we note above, it is therefore an “input RF signal” as we have construed the term. *See In re Gleave*, 530 F.3d 1331, 1334 (Fed. Cir. 2009) (although a reference must disclose each and every limitation in a claim to anticipate the claim, the reference need not satisfy an *ipsissimis verbis* test).

iii. “converting said input RF signals to intermediate signals having an intermediate frequency”

Petitioner contends that Thomson discloses “converting said input RF signals to intermediate signals having an intermediate frequency” because the IF_{SAT} signal of Thomson is further downconverted by mixer stage 2 into “an IF signal of around 75 MHz.” Pet. 23 (citing Ex. 1004, col. 2, ll. 53–57). Patent Owner’s argument that the limitation is not taught by Thomson relies on its proposed construction of “input RF signal,” which we have not adopted. See PO Resp. 24–26. We agree with Petitioner and find that the limitation is taught by Thomson for the reasons Petitioner expresses.

iv. “applying a first filter function to said intermediate signals, said first filter function being an anti-aliasing filter and having a center frequency”

Petitioner contends that Thomson discloses “applying a first filter function to said intermediate signals” because the intermediate signal of Thomson is directed to AGC amplifier 5, which has an internal bandpass limitation. Pet. 23–34 (citing Ex. 1004, col. 2, l. 58–col. 3, l. 1). Petitioner further contends that Thomson discloses “said first filter function being an anti-aliasing filter and having a center frequency” because Thomson’s bandpass filter is designed to avoid aliasing and because a bandpass filter also inherently has a center frequency in the middle of the bandpass. *Id.* at 24 (citing Ex. 1004, col. 3, ll. 9–16). Petitioner supports its contentions with testimony by Dr. Holberg. Ex. 1009 ¶ 35.

Patent Owner responds that “it is uncertain . . . that Thomson discloses a bandpass filter as part of the amplifier.” PO Resp. 31. Patent Owner notes that “the sole allusion to a filtering function is the two letters ‘BP’ placed inside [the] amplifier symbol for element 5,” and cites Dr. Opris’s opinion that there is no indication in Thomson of any specific filtering being performed. *Id.* at 31–32 (citing Ex. 2003 ¶ 77). Although we do not discount Dr. Opris’s opinion, the “BP” indication on AGC amplifier 5 is at least suggestive, and we are persuaded by Petitioner that further indications in Thomson support its position. In particular, Figure 2 of Thomson shows frequency spectra for the conversion of the analog IF_{SAT} signal into a digital IF signal, and includes a dashed arrow that Dr. Holberg explains represents the “‘sum’ signal has been removed by the ‘internal bandlimiting function’ of the AGC.” Reply (citing Ex. 1072 ¶ 44). Furthermore, during the related ITC proceeding, Patent Owner’s witness, Dr. Caloyannides, testified that unless these spectra were removed, they would cause aliasing. *See* Ex. 1054, 30.

Weighing these various considerations, we conclude that Petitioner has established, by a preponderance of the evidence, that Thomson discloses the claim limitation. We further note our agreement with Petitioner that the bandpass filter disclosed by Thomson has a center frequency. In its Patent Owner Response, Patent Owner does not advocate for any construction of “center frequency” different than the plain and ordinary meaning of a

“frequency in the middle of the bandpass,” which the AGC amplifier necessarily has. *See* Pet. 24 (citing Ex. 1009 ¶ 35).

v. *“digitizing said filtered intermediate signals at a sampling frequency”*

Petitioner contends that Thomson discloses “digitizing said filtered intermediate signals at a sampling frequency” because the filtered output of the AGC amplifier is coupled to an analog-to-digital converter that performs the recited digitizing. Pet. 25 (citing Ex. 1004, col. 1, l. 47, Fig. 1). We agree with Petitioner’s contention.

vi. *“processing said digitized signals in accordance with said format of said input RF signals and generating digital output signals indicative of information encoded in said input RF signals”*

Petitioner contends that Thomson discloses “processing said digitized signals in accordance with said format of said input RF signals and generating digital output signals indicative of information encoded in said input RF signals” because adaptive filter 8 makes a selection of analog or digital formats based on a “TV standard” input to the filter. Pet. 25–26.

First, Patent Owner contends that “Thomson does not teach a signal processor that processes in accordance with **one** format instead of processing in accordance with a plurality of formats.” PO Resp. 36; *see id.* at 48. We are not persuaded by this contention because the argument is not commensurate with the claim construction we have adopted. Above, we express our agreement with Patent Owner that “processing said digitized

signals in accordance with said format” requires processing in accordance with the exactly one format in which each received input RF signal is encoded. But that construction does not require that processing of different RF signals all be performed in accordance with the same format. Indeed, an expressed objective of the ’585 patent is processing of television signals received “in a variety of television standards and formats.” Ex. 1001, col. 2, ll. 43–46.

Second, Patent Owner contends that “[n]othing in Thomson discloses that the Thomson bandpass filter 8 processes in accordance with the TV standard of the signal.” PO Resp. 37 (citing Ex. 2003 ¶ 86); *see id.* at 48. Petitioner’s and Patent Owner’s experts disagree whether processing in accordance with the “TV standard” is reasonably inferred from that designation at adaptive filter 8 in Figure 1 of Thomson. *Compare* Ex. 1009 ¶ 37 *with* Ex. 2003 ¶ 86. But Petitioner’s expert, Dr. Holberg, further observes that the output of adaptive filter 8 is fed to two modulators in parallel. Ex. 1072 ¶ 49. Dr. Holberg explains that the symbol used with the “TV standard” designation would be understood by one of skill in the art as representing “a tuning or control mechanism for the filter.” *Id.* ¶ 50. We give greater weight to the testimony of Dr. Holberg because Dr. Opris’s characterization of this aspect of Thomson provides insufficient explanation for the “TV standard designation” and would render that designation superfluous.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Thomson discloses the claim limitation.

vii. “demodulating using a plurality of demodulators said processed digitized signals to generate baseband signals corresponding to said format of said input RF signals”

Petitioner contends that Thomson discloses “demodulating using a plurality of demodulators said processed digitized signals” because digitized output signals of adaptive filter 8 are input to “an FM demodulator” and a “QPSK demodulator.” Pet. 26–27 (citing Ex. 1004, col. 4, ll. 10–11). Petitioner further contends that Thomson discloses “to generate baseband signals corresponding to said format of said input RF signals” because the FM demodulator demodulates digital signals broadcast in the analog TV format, and the QPSK demodulator demodulates digital signals broadcast in the digital TV format. *Id.* (citing Ex. 1004, col. 1, ll. 10–13, col. 1, l. 27–28, col. 3, l. 55). Petitioner contends that demodulated signals, namely CVBS (“composite video baseband signal”), $S_{\text{mod } 1}$, $S_{\text{mod } 2}$, and Q and I, are baseband signals. *Id.* Petitioner supports its analysis with testimony by Dr. Holberg. Ex. 1009 ¶¶ 38, 39.

Patent Owner contends that Petitioner has not established that the digital demodulator of Thomson outputs audio signals in addition to video signals. PO Resp. 41–42. We are not persuaded by this argument. As Dr. Holberg explains, one of skill in the art would understand from Thomson

that it describes a QPSK encoded MPEG signal that includes both video and audio information. Ex. 1072 ¶ 52, 53.

We also are not persuaded by Patent Owner’s contentions that I and Q “cannot be baseband signals” because they are not in the same QPSK format that they were before transmission. PO Resp. 43. The construction of “baseband signal” that we have adopted requires removal of the original transmission carrier, not all forms of modulation. As Petitioner notes, the ’585 patent expressly acknowledges that modulated signals can be baseband signals. Reply 12 (citing Ex. 1001, col. 5, ll. 59–62 (describing AM, FM, or intercarrier modulation)).

viii. Summary

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that claim 17 is anticipated by Thomson.

b. Claim 18

Claim 18 depends from claim 17 and recites that “said plurality of formats comprise an analog television format and a digital television format.” Petitioner identifies disclosure in Thomson of an architecture that allows digitizing both analog and digital television signals. Pet. 27–28. We note that the claim does not require both that signals encoding information in an analog format be received and that signals encoding information in a

digital format be received, only that the received input RF signals encode in formation in “one” of the formats identified by claim 18.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 18 is anticipated by Thomson.

c. Claim 19

Claim 19 recites that “said processing said digital signals is performed in response to a select signal indicative of said format of said RF signal.” Petitioner contends that this limitation is disclosed by Thomson’s bandpass filter 8, which has an adaptively controlled bandwidth and which “selects the desired signal with a minimal remainder of the adjacent channel signals.” Pet. 28 (citing Ex. 1004, col. 3, ll. 17–19). Petitioner identifies the “TV standard” signal shown in Figure 1, contending that “[t]he processing of the ‘desired signal’ is performed in response to the setting of the ‘TV standard’ signal provided to the bandpass filter 8.” Pet. 28. Petitioner supports its argument with declaration testimony of Dr. Holberg. Ex. 1009 ¶ 42.

Patent Owner responds that it is “far from clear or convincing” that the notation of “TV standard” on the drawing has the meaning that Petitioner and Dr. Holberg ascribe to it. PO Resp. 48–51. Patent Owner’s contentions parallel those that we address *supra* with respect to claim 17’s recitation of “processing said digitized signals in accordance with said format of said input RF signals and generating digital output signals indicative of

information encoded in said input RF signals.” For the reasons we express there, we are not persuaded by Patent Owner’s position.

Patent Owner also responds that Thomson’s bandpass filter “is not a signal processor because it cannot fulfill . . . the ‘adaptive’ function.” PO Resp. 47. Specifically, Patent Owner cites testimony by its expert, Dr. Opris, that a person of ordinary skill in the art “would have serious difficulties in implementing an undisclosed method for the adaptive filter 8 in Thomson because the only indication [in] Thomson about the adaptation is Figure 2 g) that shows that the bandpass filter can have a variable shape.” *Id.* (citing Ex. 2003 ¶ 100).

Petitioner’s expert, Dr. Holberg, disagrees that a person of ordinary skill in the art would have such difficulty, “given the vast body of work in that area.” Ex. 1072 ¶ 58. Petitioner cites the testimony of Dr. Holberg, which provides examples of implementations that would be within ordinary skill. Reply 13 (citing Ex. 1072 ¶ 52). We credit that testimony and conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claim 19 is anticipated by Thomson.

d. Claims 1, 2, 5, and 16

Both Petitioner and Patent Owner advance arguments directed at claims 1 and 2 that parallel those we address above for claims 17 and 18. *See* Pet. 28–33; PO Resp. 22–45. With respect to the recited “signal processor,” we are persuaded that the adaptive bandpass filter disclosed by

Thomson is a “signal processor” as we have construed the term because it is a digital module that processes signals in the digital domain. *See* Pet. 30.

For the reasons we express above, we disagree with Patent Owner’s contention that “bandpass filter 8 is not a signal processor because it cannot fulfill, as shown in Fig. 1, the ‘adaptive’ function.” PO Resp. 37.

Specifically, we credit Dr. Holberg’s testimony, which provides examples of such implementations within the skill of an ordinary artisan. With respect to other limitations of claims 1 and 2, we incorporate our analysis for claims 17 and 18. We conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1 and 2 are anticipated by Thomson.

Claim 5 recites that “said intermediate frequency comprises a frequency value other than those specified by one or more television standards.” Petitioner identifies the 75-MHz intermediate frequency disclosed by Thomson, observing that the intermediate frequency “specified for the United States is 41 to 47 MHz.” Pet. 34 (citing Ex. 1001, col. 1, l. 67). We conclude that Petitioner has demonstrated by a preponderance of the evidence that claim 5 is anticipated by Thomson.

Claim 16 recites that “said input RF signals comprise RF signals received from one of terrestrial broadcast, from satellite broadcast, and from cable transmission.” Petitioner identifies disclosure in Thomson of a “multi-standard” tuner capable of receiving satellite-broadcast, terrestrial, and cable transmissions. *Id.* at 34–35 (citing Ex. 1004, col. 1, l. 55–col. 2, l. 19). We

conclude that Petitioner has demonstrated by a preponderance of the evidence that claim 16 is anticipated by Thomson.

*2. Obviousness of Claims 1, 2, 5, 10, and 16
over Thomson and Harris*

Harris discloses a digital tuner that uses “standard off the shelf DSP [integrated circuits] as digital replacements for the analog intermediate frequency (IF) processing stage in wideband receivers.” Ex. 1005, 1. As illustrated in Figure 6 of Harris, such wideband channelized receivers use an analog-to-digital converter to convert an incoming RF signal to an IF signal, which subsequently is processed by a set of finite impulse response filters. *Id.* at 5–6. Harris further teaches that “[i]n systems where the second IF filter stage consists of a bank of filters to support various operational modes, cost and board space can be saved [by] reconfiguring a single DDF [digital decimation filter] to implement the filter required by each operational mode.” *Id.* at 5.

Petitioner contends that each of claims 1, 2, 5, 10, and 16 is unpatentable under 35 U.S.C. § 103(a) over Thomson and Harris, contending that it would have been obvious for one of ordinary skill in the art “use a single reprogrammable FIR filter, memory, and processor of Harris to implement the adaptive filter in [Thomson] because the adaptive filter is designed ‘to support various operational modes’ such as analog and digital TV formats.” Pet. 37 (citing Ex. 1009 ¶ 56). Patent Owner responds

that the combination would not teach all the limitations of the claims, and that Petitioner has not articulated a sufficient reason to make the combination. PO Resp. 51. We disagree with Patent Owner's first contention because we find that Thomson discloses all limitations of the claims for the reasons explained *supra*.

Patent Owner identifies four bases for its second contention: (1) the Harris DDF is a low-pass filter rather than a bandpass filter; (2) the Harris DDF is not an adaptive filter; (3) the Harris DDF cannot be made adaptive by the Harris microprocessor interface; and (4) substitution of Thomson's bandpass filter 8 with the Harris DDF would not have obtained predictable results. *Id.* at 52. We are not persuaded by these bases because "Petitioner is not relying on the specific Harris DDF component, but rather on Harris's overall teaching of programmable, digital FIR filters to implement a 'channelized receiver' in various communications applications." Reply 14 (citing Pet. 9–10). Petitioner articulates sufficient reasoning underpinned by the testimony of Dr. Holberg to support the legal conclusion of obviousness. *See* Ex. 1072 ¶¶ 59–64; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) ("the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ").

We conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, 5, 10, and 16 are unpatentable under 35 U.S.C. § 103(a) over Thomson and Harris.

*3. Obviousness of Claims 1, 2, 5, and 16
over Thomson and Figure 1 of the '585 Patent*

Petitioner challenges claims 1, 2, 5, and 16 as unpatentable under 35 U.S.C. § 103(a) over Thomson and Figure 1 of the '585 patent. Pet. 43–47. Specifically, Petitioner contends that Figure 1 of the '585 patent demonstrates that “it was well known in the art to use separate demodulators for each separate television format or standard,” and that the demodulators shown in the drawing “produced audio and video baseband signals . . . so that they could produce sound and video on the television receiver.” Pet. 44 (citing Ex. 1001, Fig. 1, col. 2, ll. 12–26; Ex. 1009 ¶ 66). We agree with Petitioner’s contention.

Patent Owner’s response relies on testimony by Dr. Opris that the demodulators in Figure 1 cannot be combined with the Thomson apparatus “because the description of Fig. 1 of the [']585 patent states that the IF is 41 to 47 MHz . . . and those IF values are clearly used only in cable or terrestrial TV and do not work in satellite TV.” PO Resp. 61 (citing Ex. 2003 ¶ 118). We are not persuaded by this response because “[t]he test for obviousness is not whether the features of a secondary reference may be

bodily incorporated into the structure of the primary reference.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

We conclude that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, and 16 are unpatentable under 35 U.S.C. § 103(a) over Thomson and Figure 1 of the '585 patent.

*4. Obviousness of Claims 1, 2, 5, 10, and 16
over Thomson, Harris, and Figure 1 of the '585 Patent*

Petitioner challenges claims 1, 2, 5, 10, and 16 as unpatentable under 35 U.S.C. § 103(a) over Thomson, Harris, and Figure 1 of the '585 patent. Pet. 43–47. Petitioner applies the same rationale for combining the teachings of Figure 1 of the '585 patent in this challenge as in its challenge of claims 1, 2, 5, and 16 over Thomson and Figure 1 of the '585 patent. *Id.* Patent Owner reiterates its previous responses regarding the teachings of Harris and of Figure 1 of the '585 patent. For the reasons expressed above, we are persuaded by Petitioner’s arguments.

We conclude that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 5, 10, and 16 are unpatentable under 35 U.S.C. § 103(a) over Thomson, Harris, and Figure 1 of the '585 patent.

5. *Obviousness of Claim 3 over Thomson and Kerth and over Thomson, Harris, and Kerth*

Claim 3 depends from independent claim 1 and recites “a digital-to-analog converter coupled between said signal processor and a first one of said plurality of demodulators, said digital-to-analog converter converting said digital output signals to an analog format.” Petitioner challenges claim 3 as unpatentable under 35 U.S.C. § 103(a) over Thomson and Kerth, and challenges claim 3 as unpatentable under 35 U.S.C. § 103(a) over Thomson, Harris, and Kerth. Pet. 46–47. Petitioner cites Kerth as disclosing a digital-to-analog converter (“DAC”) between a signal processor and baseband processor circuitry. Pet. 46 (citing Ex. 1011, col. 9, ll. 13–17, Fig. 4). Petitioner reasons that “one of ordinary skill in the art would be motivated to include a DAC between a signal processor and one or more demodulators in any system where an analog signal into a demodulator is desired or required.” *Id.* at 47.

In addition to reiterating its position that Thomson does not disclose all limitations of underlying independent claim 1, Patent Owner responds that “Petitioner has failed to point to substantial evidence that a [person of ordinary skill in the art] would have a reason to combine the teaching of Thomson and Kerth.” PO Resp. 62; *see id.* at 63–64. We disagree that Petitioner has identified insufficient evidence to support its position because Petitioner supplements its reasoning with evidence of the use of analog

demodulators in the prior art, as shown in Figure 1 of the '585 patent. Pet. 47.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 3 is unpatentable under 35 U.S.C. § 103(a) over Thomson and Kerth and that claim 3 is unpatentable under 35 U.S.C. § 103(a) over Thomson, Harris, and Kerth.

III. ORDER

In consideration of the foregoing, it is

ORDERED that based on a preponderance of the evidence, claims 1–3, 5, 10, and 16–19 of U.S. Patent No. 7,075,585 are held to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibits 1009 and 1072 is *denied*; and

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

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