

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK CORP., DISH NETWORK LLC, and
DISH NETWORK SERVICE LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

IPR2023-00391
Patent 7,130,576 C1

Before LYNNE H. BROWNE, PATRICK R. SCANLON, and
JON M. JURGOVAN, *Administrative Patent Judges*.

JURGOVAN, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

DISH Network Corp., DISH Network LLC, and Dish Network Service LLC (collectively “Petitioner”) filed a Petition (Paper 1, “Pet.”) to institute an *inter partes* review of claims 8–23 and 34–42 of U.S. Patent 7,130,576 B1 (Ex. 1001, “the ’576 patent”). Entropic Communications, LLC (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”).

We have jurisdiction under 35 U.S.C. § 314. Institution of an *inter partes* review is authorized when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Based on the current record, and for the reasons explained below, we determine that Petitioner has not established a reasonable likelihood that it would prevail with respect to at least one challenged claim. Accordingly, we decline to institute *inter partes* review.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner entities Dish Network Corp., Dish Network LLC, and Dish Network Service LLC identify themselves as real parties in interest. Pet. 3. Patent Owner identifies itself as the real party in interest. Paper 4, 1.

B. *Related Matters*

Petitioner and Patent Owner identify *Entropic Communications, LLC v. DISH Network Corp. et al.*, Case No. 2:22-cv-07959-JWH-JEM (C.D. Cal.) (transferred from No. 2:22-cv-75 (E.D. Tex.) on November 3, 2022) and *Entropic Communications, LLC v. DirecTV, LLC, AT&T, Inc., AT&T Services, Inc., and AT&T Communications, LLC*, Case No. 2:22-cv-07775-

JWH-JEM (C.D. Cal.). Pet. 3; Paper 4, 1. Petitioner and Patent Owner also identify IPR2023-00393 involving U.S. Patent No. 8,792,008; and IPR2023-00392 involving U.S. Patent No. 7,542,715. Pet. 3; Paper 4, 1.

C. The '576 Patent (Ex. 1001)

The '576 patent is titled “Signal Selector and Combiner for Broadband Content Distribution” and pertains to a satellite receiving system in which program channels are selected, combined, and transmitted over a single cable to a gateway, server, or set-top box. Ex. 1001, codes (54), (57).

Figure 2 of the '576 patent is shown below.

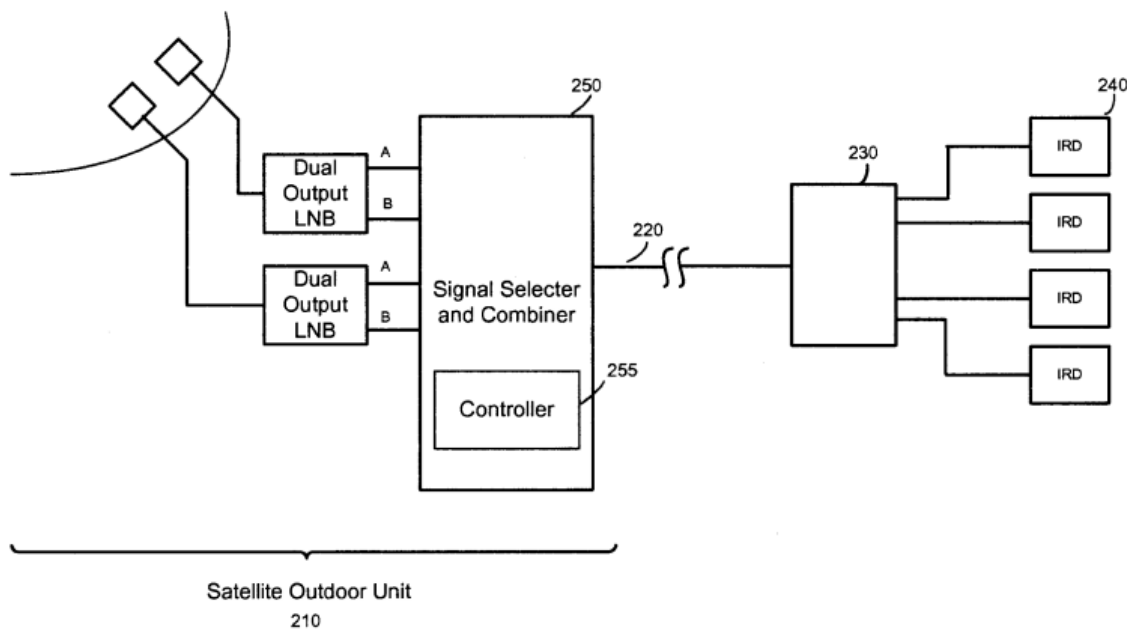


FIG. 2

In Figure 2 above, satellite outdoor unit (ODU) 210 includes a signal selector 250 that extracts needed transponder signals from each the low noise amplifiers and block down converters (LNBs) outputs and combines the channels into one composite signal transmitted on cable 220. *Id.* at

1:19–22, 4:28–33. Gateway 230 receives the signals and provides distribution to the IRD¹s located in a building. *Id.* at 4:34–35. Controller 255 tunes filters and local oscillators in the signal selector and maintains the channel map specifying the frequency slots for transponder channels, or alternatively, the channel map may be maintained by gateway 230. *Id.* at 4:37–41. Gateway 230 can be a power splitter/summer allowing IRDs to connect directly to the cable. *Id.* at 4:42–43. Gateway 230 may be located inside a home to provide connection to IRDs 240. *Id.* at 4:43–45. Gateway 230 passes signaling from IRDs 240 to ODU 210 that contains the channel selection information. *Id.* at 4:45–47.

Figure 3 of the '576 patent is reproduced below.

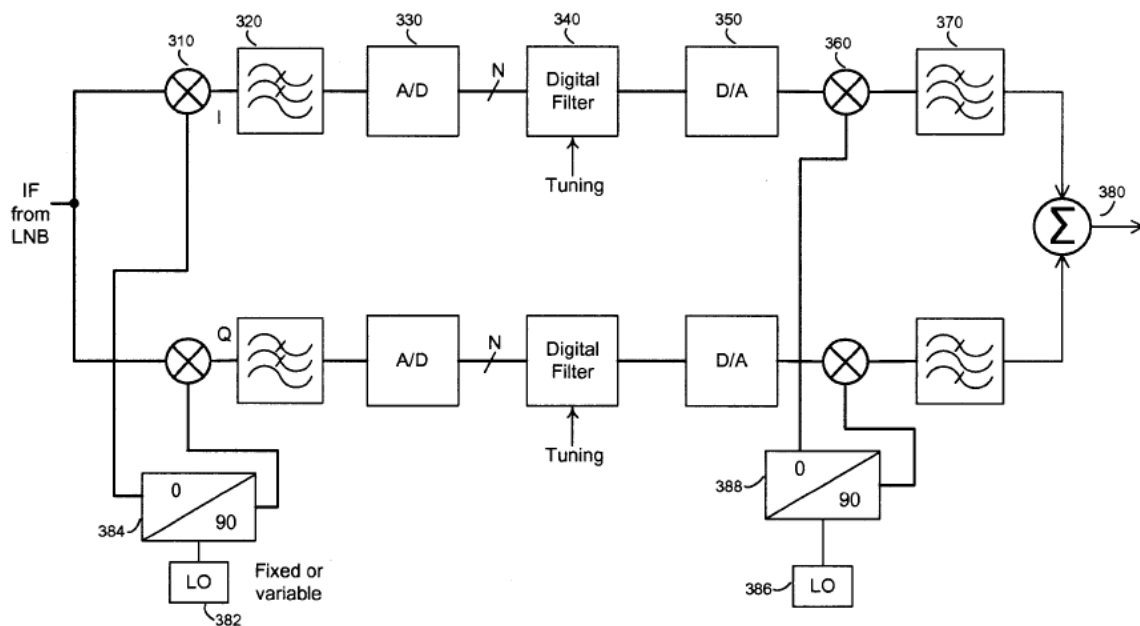


FIG. 3

Figure 3 above shows a quadrature down converter to produce I and Q analog signals. *Id.* at 4:51–53. The down converter has a local oscillator

¹ Acronym for Integrated Receiver Decoder. Ex. 1001, 1:30–31.

382, phase splitter 384 to produce an in-phase and quadrature-phase LO, two mixers 310, and two filters 320 to reject undesired mixing products. *Id.* at 4:52–56. The I and Q signals are sampled by high-speed analog-to-digital (A/D) converters 330 to create I and Q digital samples. *Id.* at 4:56–58.

Digital filtering 340 selects one or more transponder output signals. *Id.* at 5:13–14. The digital filter may operate by applying a bandpass filter transfer function to the broadband signal to isolate a single transponder channel. *Id.* at 5:15–16. The selected transponder channel is then frequency translated to a new carrier frequency. *Id.* at 5:30–31. The selected and frequency translated digital signal is converted to an analog signal using a D/A converter for the I and Q components. *Id.* at 5:32–33. Conversion from the digitally filtered signal to the analog domain may be performed using a digital-to-analog (D/A) converter 350, quadrature modulator with mixers 360, phase splitter 388, local oscillator (LO) 386, and summer 380. *Id.* at 5:34–37. Alternatively, digital mixing may be used where a rotating phasor is multiplied by the data samples to translate their frequency, then converting the frequency shifted digital signal to an analog signal with a D/A converter. *Id.* at 5:37–41.

D. Illustrative Claim

Of the challenged claims, independent claim 14 is representative. Claim 14 is shown below with Petitioner's identifiers in brackets.

14. [pre] A method of communicating a plurality of transponder signals from a satellite outdoor unit (ODU) that receives a plurality of satellite broadband signals to an integrated receiver decoder (IRD) over a single cable connected to the ODU, the method comprising the steps of:

[a] communicating a transponder request to the ODU from the IRD;

[b] [1] in the ODU, digitizing the plurality of satellite broadband signals, [2] selecting and extracting a plurality of transponder signals from the received digitized satellite broadband signals, [3] wherein the selecting is responsive to the transponder request signals;

[c] combining extracted selected transponder signals into a composite signal;

[d] transmitting the composite signal over the single cable from the ODU to the IRDs, wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

Ex. 1001, 2:7–24 (reexamination certificate) (indications of insertions and deletions as a result of reexamination are omitted).

E. Examination

During prosecution of the '576 patent, claim 14 was rejected as anticipated by Williams (U.S. Patent No. 6,493,873, issued December 10, 2002). Ex. 1006, 70. Williams is the same patent relied on in the Petition. Claim 14 was amended to overcome Williams by specifying that “the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.” *Id.* at 83, 88.

The Examiner rejected claim 14 as anticipated by Shah (U.S. Patent No. 6,441,797, issued August 27, 2002), and claim 14 was amended to overcome Shah by clarifying that the steps of digitizing, selecting, and extracting the satellite broadband signals are performed in the ODU. *Id.* at 99, 111, 116–17. The Examiner then combined Shah and Williams to reject claim 14 as obvious. *Id.* at 127–129. The Examiner admitted that Shah did

not perform the process of generating a composite signal to be transmitted over a cable to an IRD and therefore relied on Williams for this feature. Patent Owner distinguished claim 14 over the asserted combination without amendment, stating there was no motivation to combine Williams and Shah. *Id.* at 146. The Examiner then allowed the claims without amendment. *Id.* at 146, 154.

F. Reexamination

During *ex parte* reexamination of the '576 patent, claim 14 was initially rejected as anticipated by the Eutelsat Installer Guide reference (Eutelsat) (Ex. 2001), which discloses an ODU performing processing similar to that of Williams. Ex. 2001, 526–29. Like Williams, Eutelsat outputs a composite signal on a single cable to the IRD. *Id.* Patent Owner amended claim 14 to overcome Eutelsat by reciting “in the ODU, digitizing the plurality of satellite broadband signals, selecting and extracting a plurality of transponder signals from the received digitized satellite transponder signals.” *Id.* at 548, 557–58. Patent Owner explained that Eutelsat teaches performing channel selection and combining in the RF and/or IF domains, but does “not teach or suggest broadband digitization of the incoming signal with channel selection from that digitized signal in the digital domain.” *Id.* The Reexamination Unit indicated that claim 14 as amended distinguished over Eutelsat because the amended claim language “requires that the signals from the ODU to the IRD include digitizing satellite broadband signals and extracting transponder signals from the received digitized satellite broadband signals.” *Id.* at 591.

Dependent claim 3 recites that “the selector comprises an analog to digital converter and digital filter.” *Id.* at 25. The Reexamination Unit

initially rejected claim 3 as obvious by incorporating Kelley’s analog-to-digital converter (ADC) into Eutelsat’s ODU to digitize the signals in the ODU. *Id.* at 534. However, the Reexamination Unit ultimately withdrew its rejection modifying Eutelsat’s ODU with Kelley’s ADC. *Id.* at 591.

G. Prior Art and Asserted Challenge to Patentability

Petitioner asserts that claims 8–23 and 34–42 of the ’576 patent are unpatentable on the following challenge (Pet. 1, 4–5):

Claim(s) Challenged	35 U.S.C. §²	Basis/Reference(s)
8–23, 34–42	103(a)	Williams ³ , Pugel ⁴

In support of its proposed challenge, Petitioner relies on the Declaration of Dan Schonfeld, Ph.D. *See* Ex. 1002.

Patent Owner disclaimed claims 8–13, thus narrowing Petitioner’s challenged to independent claim 14 and its dependent claims 15–23 and 34–42. Prelim. Resp. 1, n.1; Ex. 2002.

² Because the ’576 patent issued from a patent application that was filed before March 16, 2013, patentability is governed by the version of 35 U.S.C. § 103 preceding the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011).

³ Williams, U.S. Patent No. 6,493,873 B1, issued December 10, 2002 (Ex. 1003). Petitioner contends that Williams is prior art at least under pre-AIA § 102(e). Pet. 5.

⁴ Pugel, U.S. Patent Publication No. 2003/0165200 A1, published September 4, 2003 (Ex. 1004). Petitioner contends that Pugel is prior art under pre-AIA § 102(e). Pet. 5.

III. ANALYSIS

A. *Legal Standards*

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations.⁵ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

An obviousness determination requires finding “both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted); *see KSR*, 550 U.S. at 418. Further, an assertion of obviousness “cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418; *In re NuVasive, Inc.*, 842 F.3d 1376,

⁵ Neither Petitioner nor Patent Owner have presented any objective evidence of obviousness or nonobviousness in the record.

1383 (Fed. Cir. 2016) (a finding of a motivation to combine “must be supported by a ‘reasoned explanation’”).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3)); *see also Intelligent Bio-Sys.*, 821 F.3d at 1369. Therefore, to prevail in an *inter partes* review, Petitioner must explain how the proposed combinations of prior art would have rendered the challenged claims unpatentable. We determine whether the information presented in the Petition shows there is a reasonable likelihood that Petitioner would prevail in establishing that at least one of the challenged claims would have been obvious over the proposed combinations of prior art.

B. Level of Ordinary Skill in the Art

The person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citing *Custom Accessories, Inc. v. Jeffrey–Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). In determining the skill level, the Board may consider various factors including “the type of problems encountered in the prior art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *Id.* In a given case, every factor may not be present, and one or more factors may predominate. *Id.*

Petitioner asserts that

a [person of ordinary skill in the art] is a person having at least: i) a bachelor-level degree in electrical engineering, computer engineering, or a related field, and three or more years of experience working in television signal processing and satellite communications; ii) a Master's-level degree in electrical engineering, computer engineering, or a related field, and at least one year of experience in the television signal processing and satellite communications; or iii) a Ph.D.-level degree in electrical engineering, computer engineering, or a related field, and at least some experience in television signal processing and satellite communications. Additional education may substitute for professional experience, and significant work experience may substitute for formal education.

Pet. 19 (citing Ex. 1002 ¶¶ 33-34.)

Patent Owner does not dispute Petitioner's definition of the level of ordinary skill in the art.

Neither Petitioner nor Patent Owner contends that the outcome of this proceeding is determined by the level of ordinary skill in the art. We apply Petitioner's definition of the level of ordinary skill in the art except that we delete the qualifier "at least" which renders the level of skill ambiguous and may encompass levels of skill beyond ordinary. We consider Petitioner's proposed level of skill to be consistent with the problems and solutions identified in the '576 patent and the prior art. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). We also consider the proposed level of skill to be reflective of the education and experience a person of ordinary skill would have had.

C. Claim Construction

Petitioner contends that the claim terms should be interpreted according to their plain and ordinary meanings as understood by a person of

ordinary skill in the art at the time of the invention in view of the specification and the prosecution history. Pet. 18–19.

Patent Owner does not address claim construction in its Preliminary Response.

Given that no claim terms are in controversy, we determine that no express claim construction is necessary. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). Accordingly, we construe the claims in accordance with the ordinary and customary meaning of the claims as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b).

D. Alleged Obviousness Over Williams and Pugel

Petitioner contends that claims 14–23 and 34–42 of the ’576 patent would have been obvious over the combination of Williams and Pugel. Pet. 24–65. As explained, Patent Owner disclaimed claims 8–13, so we do not address these claims further. Ex. 2002.

1. Williams (Ex. 1003)

Williams is titled “Transmodulator with Dynamically Selectable Channels.” Ex. 1003, code (54). Williams relates to distribution of satellite, terrestrial, and cable signals to receivers in multiple dwelling units. *Id.* at 1:13–18.

Figure 1 of Williams is reproduced below.

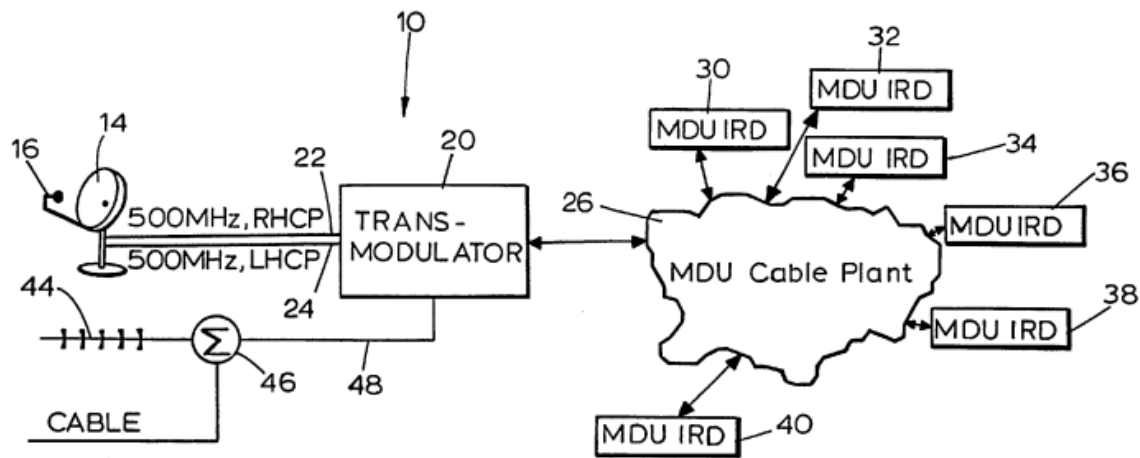


FIG. 1

In Figure 1 above, Williams's signal distribution system 10 is shown. *Id.* at 5:45–48. The system 10 includes dish antenna 14 and LNB 16, which receives the modulated satellite signals reflected from dish antenna 14. *Id.* at 5:66–6:1. System 10 includes a transmodulator 20 that remodulates or transmodulates a subset of the signals received from LNB 16 using an output modulation technique that reduces the bandwidth of the signals from LNB 16 to produce a composite signal. *Id.* at 6:12–21. Transmodulator 20 provides the composite signal on a cable plant or network 26 within an MDU for distribution to IRDs 30, 32, 34, 36, 38, 40 associated with individual receiver units spread throughout the MDU. *Id.* at 6:21–27.

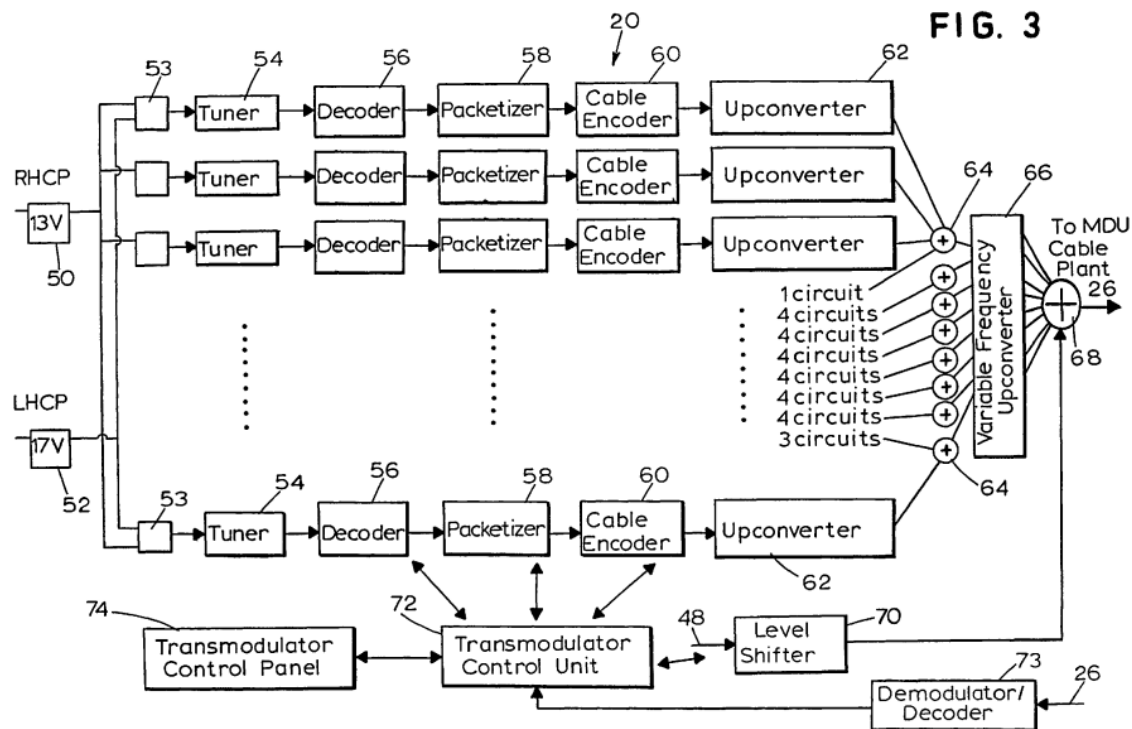
Transmodulator 20 receives and decodes requests for particular channels or satellite signals from each of the IRDs 30–40 that are active, determines from these requests which of the set of satellite or transponder signals to transmodulate and then tunes to and transmodulates only the selected satellite and transponder signals. *Id.* at 6:35–42.

Transmodulator 20 may transmodulate selected signals within QPSK⁶-modulated downlink signals into 128-QAM⁷-modulated signals. *Id.* at 7:4–13. Alternatively, transmodulator 20 may use any other desired modulation technique to remodulate selected ones of the received satellite signals. *Id.* at 7:13–15. Williams further states

in some cases in which only a few of the selected signals are being distributed, the transmodulator may not need to remodulate the selected signals but may, instead, send these signals over the cable network 26 at the received modulation scheme.

Id. at 7:16–20.

Figure 3 of Williams is shown below.



⁶ Acronym for Quadrature Phase Shift-Keying.

⁷ Acronym for Quadrature Amplitude Modulation.

In Figure 3, transmodulator 20 includes bias tees 50, 52 that receive RHCP⁸ and LHCP⁹ QPSK-modulated satellite signals from LNB 16. *Id.* at 8:59–62. Switches 53 receive the RHCP and LHCP signals for each transponder channel of transmodulator 20. *Id.* at 9:7–9. Each transmodulator channel has a switch 53, tuner 54, satellite decoder 56, packetizer 58, cable encoder 60, and upconverter 62. *Id.* at 9:28–35. Tuner 54 tunes to one of the transponder signals in the RHCP or LHCP signals and filters out remaining signals in the band. *Id.* at 9:40–47. Satellite decoder 56 decodes the QPSK-modulated transponder signal to produce a stream of data packets of programmed-multiplexed data. *Id.* at 9:49–52. Packetizer 58 repacketizes the data into a chosen standard. *Id.* at 9:59–61. Cable encoder 60 modulates the received stream of data packets, preferably using QAM modulation. *Id.* at 10:10–16. Upconverter 62 shifts the transmodulated signal to an intermediate frequency (IF). *Id.* at 10:17–19. Each summer 64 combines four transmodulated signals. *Id.* at 10:27–30. Variable frequency upconverter 66 upconverts eight groups of four signals from the summers 64 to a different carrier frequency band. *Id.* at 10:31–34. Summer 68 combines transmodulated signals for propagation over cable network 26 (*see* Fig. 1). *Id.* at 10:34–39. Level shifter 70 receives signals from an off-air antenna, cable provider or other source and passes them to the summer 68 at their current frequency or a shifted frequency. *Id.* at 10:40–52. Transmodulator control unit 72 controls switches 53, tuners 54, decoders 56, packetizers 58, encoders 60, upconverters 62, variable frequency upconverter 66, and level shifter 70. *Id.* at 10:53–59. Control unit 72 receives satellite signal requests

⁸ Acronym for Right-Hand Circular Polarization. Ex. 1003, 1:60–61.

⁹ Acronym for Left-Hand Circular Polarization. Ex. 1003, 1:61–62.

transmitted from IRDs 30–40 decoded by demodulator/decoder 73. *Id.* at 10:59–62. Control unit 72 controls tuners 54 to tune to the signal channels selected by the IRDs 30–40. *Id.* at 11:6–15.

2. *Pugel (Ex. 1004)*

Pugel is titled “Method and Apparatus for Simultaneously Retrieving Portions of a Data Stream from Different Channels.” Ex. 1004, code (54). *Pugel* discloses simultaneously processing carrier signals with modulated data by extracting portions of at least two modulated signals and combining the extracted portions. *Id.* code (57). Each of the portions of the complete data stream comprises packets with stream identification and sequence codes to identify where the associated packets should be inserted in the complete bit stream. *Id.*

Figure 1 of *Pugel* is reproduced below.

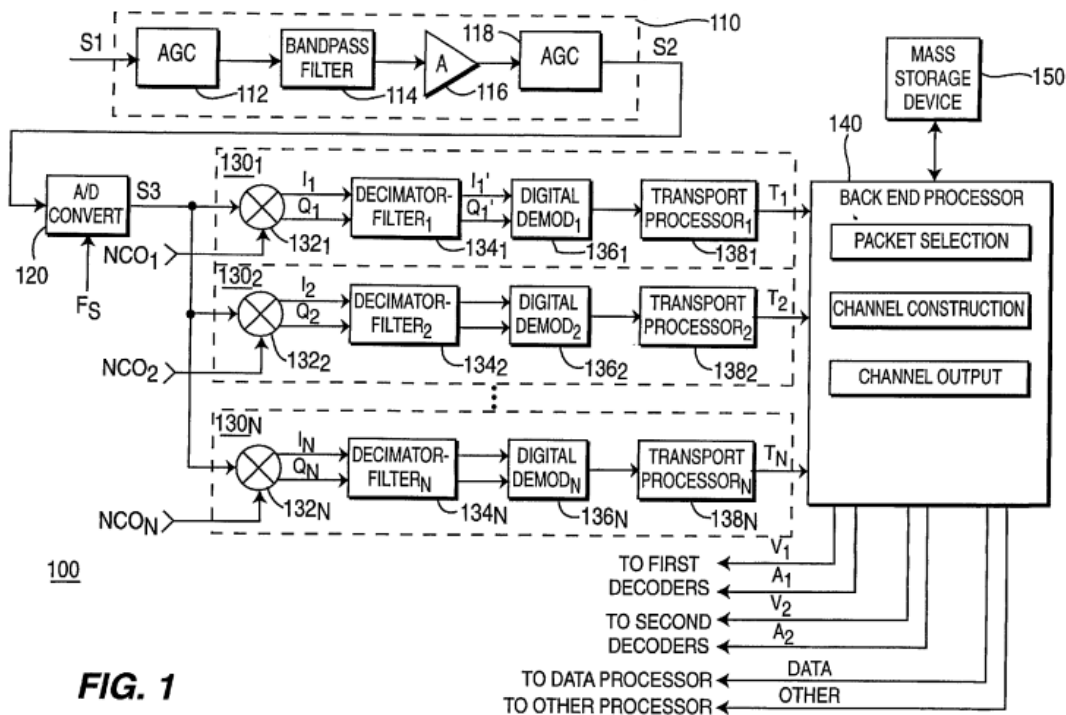


Figure 1 shows a direct broadcast satellite (DBS) receiver 100 with an analog processing section 110, analog-to-digital (A/D) converter 120, channel processors 130₁–130_n, back end processor 140, and mass storage device 150. *Id.* ¶ 15. Analog processor 110 receives analog input signal S1 and performs a signal conditioning function to produce an output signal S2 suitable for processing by A/D converter 120. *Id.* ¶ 16. Analog processing section 110 comprises the series combination of an optional analog gain control (AGC) function block 112, bandpass filter 114, amplifier 116, and a second AGC 118. *Id.* ¶ 17. First AGC 112 amplifies signal S1 as needed, bandpass filter 114 rejects out-of-band frequency components, amplifier 116 boosts the passband limited signal to a level appropriate for processing by the A/D converter 120, and AGC 118 operates to insure that the amplified signal remains consistent over a large range of input signals available from the outdoor portion (i.e. satellite dish and associated circuitry) of a satellite signal. *Id.*

A/D converter 120 receives 16 channels simultaneously and produces at its output digital bit stream S3 representative of the channels. *Id.* ¶ 18. A/D converter 120 comprises a high-speed analog-to-digital converter operating at a sampling rate FS. *Id.* ¶ 19.

Channel processors 130 each comprise a mixer 132, decimator/filter 134, digital demodulator 136, and transport processor 138. *Id.* ¶ 21. Each mixer 132 mixes digital signal S3 with respective numerically controlled oscillator (NCO) signal to produce in-phase I and quadrature Q signal components which are coupled to respective decimator/filters 134. *Id.* ¶ 22. Decimator/filter 134 receives the respective in-phase I and quadrature Q components and processes them to extract the desired signal. *Id.* ¶ 23.

Demodulator 136 demodulates the signal and retrieves the original data stream modulated thereon. *Id.* ¶ 24. Each transport processor 138 provides baseband video and audio stream portions to back-end processor 140. *Id.* ¶ 26. Back-end processor 140 receives the transport streams and recombines them using stream identification and sequence codes. *Id.* ¶¶ 40, 42, Fig. 5, step 545.

3. *Motivation to Combine*

Petitioner contends that a person of ordinary skill in the art would have combined Williams and Pugel with a reasonable expectation of success in arriving at the invention claimed in the '576 patent. Pet. 25–29. Patent Owner contends that the Petition fails to provide a sufficient reason to combine Williams and Pugel. Prelim. Resp. 46–66. We address Petitioner's and Patent Owner's contentions below.

a) *Petitioner's Contentions*

Petitioner contends that Williams and Pugel are directed to the same problem—how to optimally process and distribute received signals in view of user needs at a given point in time. Pet. 25 (citing Ex. 1003, code (57); Ex. 1004 ¶¶ 3–4). Petitioner contends that both references describe receiving, selecting, combining, and distributing satellite signals, and that a person of ordinary skill in the art would look to these similar and related references to efficiently process and distribute received satellite television channels to multiple users. *Id.* (citing Ex. 1002 ¶ 112).

Petitioner contends that Pugel suggests to move the point of digitization earlier in Williams's distribution system so the digitization would occur prior to channel selection and after an LNB has down-converted received satellite signals so that at least signal selection and subsequent

processing is done in the digital domain. *Id.* at 26 (citing Ex. 1002 ¶¶ 114–117). According to Petitioner, moving the point of digitization would obtain the benefits that Pugel teaches regarding processing in the digital domain. *Id.* at 27 (citing Ex. 1002 ¶¶ 116–119). As advantages and efficiencies, Petitioner mentions avoiding high cost for analog tuning and processing arrangements as the number of channel selectors increases. *Id.* at 28 (citing Ex. 1004 ¶¶ 52; Ex. 1002 ¶ 119).

Specifically, Petitioner contends that because all of the down-converted channels are included within a digital bit stream, it can be processed digitally to recover in parallel any of the original transponder channels. *Id.* (citing Ex. 1004 ¶ 52). In contrast, Petitioner argues, Pugel teaches analog tuners that cannot be split and would need to be ganged together. *Id.* Petitioner contends this disclosure would lead one of ordinary skill in the art to implement in the digital domain the functionality of Williams’s analog switches 53, tuners 54, and variable frequency upconverter 66 because “the digital equivalent of each were generally more efficient, reliable, flexible, and less expensive than their analog counterparts, as taught in Pugel.” *Id.* (citing Ex. 1002 ¶¶ 120–122).

Petitioner contends that digitizing before signal selection and performing signal selection and translation functions in the digital domain were within the general knowledge of a person of ordinary skill in the art and would have been implemented with a reasonable expectation of success using known components to make Williams’s system more economical. *Id.* at 28–29 (citing Ex. 1002 ¶ 122). Petitioner further contends that, during reexamination, the Office found that using an analog-to-digital converter would have been part of the ordinary capabilities of a skilled artisan and that

there would have been a reasonable expectation of success based on similar uses of analog-to-digital converters in the same technological area. *Id.* at 29 (citing Ex. 1007, 297; Ex. 1002 ¶ 122).

b) Patent Owner's Contentions

Patent Owner argues that Pugel is redundant to Kelley and that the idea of incorporating Kelley's ADC for digital processing into the outdoor unit of a satellite receiver system was specifically considered and rejected during reexamination of the '576 patent. Prelim. Resp. 47. Patent Owner contends that the Reexamination Unit understood that while it may have been conceivable to modify the teachings of Eutelsat with Kelley's ADC in a manner similar to Petitioner's proposal of modifying Williams with Pugel's ADC, the Reexamination Unit determined it was not obvious to do so. *Id.* (citing *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020)).

Patent Owner further argues that Pugel is silent on digitizing received satellite broadband signals at an ODU, which is a fundamentally different device from the indoor unit described in Pugel. *Id.* Patent Owner contends that the Petition relies solely on an expert's impermissible hindsight-based analysis that modifying an ODU using indoor digitization circuitry is obvious. *Id.* at 48. Patent Owner contends that the heart of Petitioner's argument is that changing analog components to digital ones to facilitate an earlier digitization point is a simple change. *Id.* Patent Owner argues that Petitioner's argument assumes, without showing, that digital components were ubiquitous at the time of the invention of the '576 patent. *Id.*

Patent Owner also contends that Petitioner incorrectly asserted that "the front portion of Williams-873's system, including the tuning

(*i.e.*, channel selection), frequency translating, and signal combining, are not conducted in the digital domain.” *Id.* at 49 (citing Pet. 26; Ex. 1002 ¶¶ 114–117). Patent Owner argues the front section of Williams’s Figure 3 does not include frequency translating and signal combining performed by upconverter 62, summers 64, variable frequency upconverter 66, and summer 68, which are instead located at the end portion after transmodulator 20. *Id.* Patent Owner asserts Petitioner’s expert “got this important fact wrong,” and that what the Petition proposes is not merely a simple substitution of analog components for digital ones, but rather a “wholesale rearchitecting of Williams” that “requires further downstream changes to Williams that are not disclosed in either Williams or Pugel.” *Id.* at 50. Petitioner contends this is impermissible hindsight reasoning not based on any knowledge available at the time the invention was made. *Id.* at 50–51.

Patent Owner further argues that inserting Pugel’s ADC 120 after bias tees 50, 52 and before switches 53 in Williams’s ODU (*see* Ex. 1003, Fig. 3) would require significant effort that would outweigh any alleged benefits that would motivate one of ordinary skill in the art to combine the references. *Id.* at 51. Patent Owner alleges that Pugel’s ADC 120 would require an analog pre-processing section in order to process the broadband signal. *Id.* at 51–52 (citing Ex. 1004 ¶ 17, Fig. 1). Pugel’s pre-processing section 110 includes an analog gain control 112, bandpass filter 114, amplifier 116, and second analog gain control 118 to produce an output S2 that is ready to be digitized. *Id.* at 51–52. Patent Owner contends that a person of ordinary skill in the art would know that Pugel’s pre-processing section is required because Kelley also requires a pre-processing section including RF amplifier 100, RF anti-aliasing filter 102, and gain controlled

amplifier 104 with feedback from digital automatic gain control 108. *Id.* at 52 (citing Ex. 1005, 5:35–6:6, Fig. 8).

Patent Owner argues that using Pugel’s or Kelley’s ADC without pre-processing causes problems, since noise normally stripped out by these analog pre-processing components may unacceptably degrade the digital signal output by the ADC. *Id.* Patent Owner contends that “adding these necessary analog components rated for full broadband signals runs contrary to the Petition’s purported motivation to combine—avoiding “high cost” analog hardware components.” *Id.* (citing Pet. 27–28). Patent Owner contends that the additional effort and cost of components, and the minimal gains in efficiency Pugel’s ADC would offer, would cause the person of ordinary skill in the art to “lose all motivation to undertake the significant effort to combine the references.” *Id.* at 53–54. Patent Owner further contends that the Petition does not explain why one of ordinary skill in the art would have been motivated to move signal processing circuitry out of the home and into the ODU. *Id.* at 54 (citing Ex. 2001, 554–558, 590–591).

In addition, Patent Owner argues that Williams and Pugel are directed to solving different problems, so one of ordinary skill in the art would not have been led to combine them. *Id.* at 55–56. Patent Owner contends that Williams addresses the problem of having too many channels to fit on the available bandwidth of a single cable connecting a satellite receiver system to an MDU, whereas Pugel addresses how to digitize and digitally decode data received from an ODU. *Id.* at 55. Patent Owner contends that neither of these references relate to processing and distributing the signals in view of user needs at a given point in time. *Id.*

Patent Owner further argues that “the mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art.” *Id.* at 56 (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007)). Patent Owner argues that Petitioner fails to articulate any reasoning why a person of ordinary skill in the art would have considered the combination of Williams and Pugel predictable given they are “vastly different systems.” *Id.*

Patent Owner notes that “rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.* (citing *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988, (Fed. Cir. 2006))). Patent Owner contends that the Petitioner merely provides a conclusory statement devoid of any rational underpinning to support the legal conclusion of obviousness. *Id.* at 56–57.

Patent Owner also argues that Petitioner assumes that a person of ordinary skill in the art would have known of a digital variable frequency upconverter 66 and digital summer 68, which are not disclosed by Williams or Pugel. *Id.* at 59–61. Patent Owner further argues that in Petitioner’s combination, tuner 54 generates a digital output that cannot be processed by upconverter 62, so that the combination is inoperative for its intended purpose. *Id.* at 61–62.

Patent Owner further contends that the Petition asserts that a person of ordinary skill in the art would use one of two options to generate a composite signal: (1) converting each selected and extracted transponder signal from digital to analog prior to summing; or (2) using a digital

combiner and converting the output to analog. *Id.* at 62. Patent Owner contends that option (1) fails because claim 14 requires digitally combining digital signals, and because Petitioner has not shown that one of ordinary skill in the art would have added multiple digital-to-analog converters prior to summing transponder signals. *Id.* at 62–64. Patent Owner contends that option (2) fails because Pugel does not disclose a digital combiner. *Id.* at 64.

In addition, Patent Owner contends that claim 14 recites “selecting and extracting a plurality of transponder signals from the received digitized satellite broadband signals” and “combining extracted selected transponder signals into a composite signal.” *Id.* at 63. Patent Owner contends claim 14 thus recites digitally combining digital signals, and argues that analog summing of analog signals does not teach this, as found during reexamination. *Id.* Accordingly, Patent Owner contends there is no motivation to combine Williams and Pugel as the Petitioner relies on inoperable combinations and/or combinations based solely on impermissible hindsight reconstruction. *Id.* at 66.

c) Analysis

We agree with Patent Owner that the Petition does not sufficiently explain why one of ordinary skill in the art would have been motivated to combine Williams and Pugel to obtain the claimed invention.

Petitioner contends that Pugel teaches to move the point of digitization earlier in Williams’s system by locating an ADC at its front end. However, as Pugel shows, it is not simply a matter of moving an ADC earlier in the processing, because the ADC requires Pugel’s analog processing section 110 including AGC 112 (optional), bandpass filter 114, amplifier 116, and AGC 118. Ex. 1004 ¶¶ 16–18. Petitioner does not

adequately address the fact that the ADC requires this pre-processing section to filter out noise over the entire broadband signal, which adds complexity and expense to the system, in determining whether one of ordinary skill in the art would have combined the references at the time of the invention. *See Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) (“a reasonable fact finder could have found these tradeoffs to yield an unappetizing combination”); *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 796 (Fed. Cir. 2021) (Board weighed competing evidence regarding the relevant tradeoffs and concluded that the combination would negate a key benefit of one of the references which would have outweighed any reason to combine).

We also agree with Patent Owner that substituting digital components for analog ones is not as straightforward as Petitioner alleges. Prelim. Resp. 48; Pet. 41. According to Petitioner, Williams performs the tuning (i.e., channel selection), frequency translating, and signal combining in the analog domain. Petitioner contends that tuning and frequency translating could be performed in the digital domain using digital equivalents of Williams’s analog components. Pet. 27 (citing Ex. 1002 ¶¶ 116–119). However, Petitioner does not identify adequately what these digital equivalents are and whether they were available at the time of the ’576 patent.

Petitioner further contends that signal combining could be accomplished by converting signals to analog before summing at Williams’s summer 68, or by summing the signals in the digital domain and converting the output of summer 68 to analog. Pet. 41. Petitioner does not address the complexity or costs associated with additional DACs or a digital combiner in its proposed combination and whether one of ordinary skill in the art would

have been motivated to combine the references in light of these disadvantages. And Patent Owner rightly notes that Pugel does not disclose a digital combiner.

In addition, we agree with Patent Owner that Pugel implies that analog processing section 110, or at least AGC 118 and components downstream from it, is part of an indoor unit that is distinct from the outdoor portion including the satellite disk and associated circuitry of a satellite system. Specifically, Pugel states

The AGC 118 operates to insure that the amplified signal remains consistent over a relatively large range of input signals, such as is available from the “outdoor” portion (i.e., satellite disk and associated circuitry) of a satellite system.

Ex. 1004 ¶ 17. That the input signals to AGC 118 are coming from the “outdoor” portion of the system suggests that analog processing section 110 is in the “indoor” portion of the system. Moving Pugel’s analog-to-digital converter and associated circuitry from the indoor to outdoor portion of the system would require ensuring that that circuitry is appropriately rated and protected for outdoor use. Petitioner does not address these considerations in connection with the motivation to combine the references.

Although Williams and Pugel have some similarities as both are directed to satellite communications systems with channel processing, as Patent Owner recognizes, Williams and Pugel do not relate to the same problem. Prelim. Resp. 55–56. Williams seeks to put more channels on a single cable using transmodulation, whereas Pugel assigns stream identification and sequence codes so that a data stream can be reconstructed. Ex. 1003, code (57); Ex. 1004, code (57). Based on the problems addressed,

one of ordinary skill in the art would not have been led to combine the references.

We also note that Petitioner's expert states that prior to the '576 patent, the design trend was to digitize later in processing using analog filters to decompose wideband analog signals into multiple narrowband digital signals. Ex. 1002 ¶ 117. As samplers improved, digital designers transitioned to moving digitization into the earliest possible stage of electronic systems. *Id.* Petitioner's expert does not indicate when the design trend reversed, but states that digitization technology that could accommodate broadband signals existed by November 2001. *Id.* There is, however, no showing that this technology existed when Williams and Pugel were filed. The '576 patent was filed in February 2002, thus only three months after sufficiently capable samplers were available.

This tends to show that the combination of Williams and Pugel was not capable of processing broadband signals at least as proposed in the combination. Hence, one of ordinary skill in the art would not have been motivated to combine Williams and Pugel to process broadband signals, nor would such person have had a reasonable expectation of success in arriving at the claimed invention.

4. Summary

We determine that Petitioner has not demonstrated a reasonable likelihood that one of ordinary skill in the art would have combined Williams and Pugel to arrive at the claimed invention. Thus, Petitioner has not shown that at least one claim is unpatentable under 35 U.S.C. § 103(a) over the combination of Williams and Pugel.

E. Remaining Matter

As we determine that the Petition does not show sufficient motivation to combine Williams and Pugel, we do not reach the issue of whether the same or substantially the same prior art or arguments were previously presented to the Office under 35 U.S.C. § 325(d).

IV. CONCLUSION

After considering the evidence and arguments presented in the Petition, we determine Petitioner has not established a reasonable likelihood of prevailing on its assertion that at least one claim of the '576 patent is unpatentable. Accordingly, we do not institute an *inter partes* review.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied as to all challenged claims of the '576 patent and no trial is instituted.

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