

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC.,
Patent Owner.

Patent No. 11,399,206

Filing Date: January 28, 2022

Issue Date: July 26, 2022

Title: METHOD FOR RECEIVING A TELEVISION SIGNAL

Inter Partes Review No.: IPR2024-00440

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.***

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EXHIBITS

Ex. 1201:	U.S. Patent No. 11,399,206 (“the ’206 Patent”)
Ex. 1202:	Expert Declaration of David B. Lett
Ex. 1203:	Curriculum Vitae of David B. Lett
Ex. 1204:	Certified Prosecution History of the ’206 Patent
Ex. 1205:	Reserved
Ex. 1206:	Reserved
Ex. 1207:	Certified Prosecution History of U.S. Provisional App. No. 61/170,526 (“’526 provisional”)
Ex. 1208-13:	Reserved
Ex. 1214:	U.S. Patent No. 7,237,214 (“Pandey”)
Ex. 1215:	Excerpts of “IEEE Std 100-2000, The Authoritative Dictionary of IEEE Standards Terms, Seventh Edition” (IEEE Press. 2000) (“IEEE Std 100”)
Ex. 1216:	Excerpts of Jan M Rabaey, “Digital Integrated Circuits: A Design Perspective” (Pearson, 2nd ed. 2002) (“Rabaey”)
Ex. 1217:	A. P. Chandrakasan, “Ultra low power digital signal processing,” Proceedings of 9th International Conference on VLSI Design, Bangalore, India, 1996, pp. 352-357 (“Chandrakasan”)
Ex. 1218:	S. Mirabbasi and K. Martin, “Classical and Modern Receiver Architectures,” IEEE Communications Magazine, vol. 38, no. 11, pp. 132-139, November 2000 (“Mirabbasi”)
Ex. 1219:	U.S. Patent No. 6,061,406 (“Carson”)
Ex. 1220:	Reserved
Ex. 1221:	“Data-Over-Cable Service Interface Specifications: Radio Frequency Interface Specification CM-SP-RFiv2.0-I11-060602,” DOCSIS, June 2006

Ex. 1222-23:	Reserved
Ex. 1224:	International Pub. No. 2007/145,637 (“Pugel”)
Ex. 1225:	J. Crols and M. S. J. Steyaert, “Low-IF topologies for high-performance analog front ends of fully integrated receivers,” IEEE Transactions on Circuits and Systems II: Analog and Digital Signal Processing, vol. 45, no. 3, pp. 269-282, March 1998 (“Crols”)
Ex. 1226:	Reserved
Ex. 1227:	U.S. Patents and Patent Applications Family Tree for U.S. Pat. 11,399,206
Ex. 1228-29:	Reserved
Ex. 1230:	U.S. Pub. No. 2006/0029170 (“Jensen ’170”)
Ex. 1231-32:	Reserved
Ex. 1233:	Excerpts of W. Ciciora, J. Farmer, D. Large, and M. Adams, “Modern Cable Television Technology: Video, Voice, and Data Communications” (2 nd ed. 2004) (“Ciciora”)
Ex. 1234:	Excerpts of J. Crols and M. Steyaert, “CMOS Wireless Transceiver Design” (1997)
Ex. 1235:	U.S. Patent No. 7,340,230 (“Khoini-Poorfard”)
Ex. 1236:	U.S. Pub. No. 2003/0217362 (“Summers”)
Ex. 1237:	U.S. Pub. No. 2006/0256799 (“Eng”)
Ex. 1238:	U.S. Pub. No. 2006/008335 (“Seendripu”)
Ex. 1239:	Excerpts of Chris Bowick, “RF Circuit Design” (2 nd ed. 2008)
Ex. 1240:	Reserved
Ex. 1241:	Excerpts of Roland Priemer, “Introductory Signal Processing” (1991)
Ex. 1242:	U.S. Patent No. 7, 272, 375 (“Tuttle”)

Ex. 1243:	U.S. Patent No. 7,130,576 (“Gurantz”)
Ex. 1244:	U.S. Patent No. 5,278,837 (“Kelley”)
Ex. 1245:	Jeffrey Hugh Reed, “Software Radio: A Modern Approach to Radio Engineering” (2002)
Ex. 1246:	U.S. Patent No. 7,213,042 (“Cannon”)
Ex. 1247:	Reserved
Ex. 1248:	Excerpts of William Buchanan, “Computer Busses” (2000)
Ex. 1249:	U.S. Patent No. 7,079,528 (“Ziegler”)
Ex. 1250:	Excerpts of “Software Defined Radio: Enabling Technologies” (Walter H.W. Tuttlebee ed., 2003)
Ex. 1251:	U.S. Pub. No. 2005/0183015 (“Dunton”)
Ex. 1252:	U.S. Pub. No. 2003/0229900 (“Reisman”)
Ex. 1253-72:	Reserved
Ex. 1273:	Expert Declaration of Dr. Sylvia Hall-Ellis
Ex. 1274:	U.S. Pub. No. 2008/0120667 (“Zaltsman”)
Ex. 1275:	U.S. Patent No. 6,791,995 (“Azenkot”)
Ex. 1276:	U.S. Patent No. 6,542,203 (“Shadwell”)

I. MANDATORY NOTICES

A. Real Parties in Interest (37 C.F.R. § 42.8(b)(1))

The real parties-in-interest for this petition are (i) Comcast Corporation, (ii) Comcast Cable Communications, LLC, and (iii) Comcast Cable Communications Management, LLC. No unnamed entity is funding, controlling, or directing this Petition for *inter partes* review (IPR) of U.S. Patent No. 11,399,206 (“the ’206 Patent”), or otherwise has an opportunity to control or direct this Petition or Petitioner’s participation in any resulting IPR.

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

Office Proceedings

This is the third of three petitions for *inter partes* review filed by Petitioner against the ’206 Patent. Petitioner is also filing petitions for *inter partes* review against related U.S. Patent Nos. 11,381,866 and 9,210,362.

No other Office proceedings (e.g., *inter partes* review, post-grant review, or covered business method) have been filed against the ’206 Patent.

Litigation matters

The ’206 Patent has been asserted in *Entropic Communications, LLC v. Comcast Corporation*, No. 2:23-cv-01050 (C.D. Cal. filed Feb. 10, 2023) and *Entropic Communications, LLC v. Cox Communications, Inc.*, No. 2-23-cv-01049 (C.D. Cal. filed Feb. 10, 2023) (collectively, “CA litigation”). These cases have been consolidated and remain pending. The ’206 Patent was also asserted in *Entropic*

Communications, LLC v. Charter Communications, Inc., No. 2:22-cv-00052-JRG (E.D. Tex. filed April 27, 2022) (“TX litigation”), which case was dismissed on December 10, 2023.

Continuity

According to Office records, the ’206 Patent is a continuation of U.S. Pat. App. No. 17/217,244, filed March 30, 2021 (abandoned), which is a continuation of U.S. Pat. App. No. 16/430,506, filed June 4, 2019 (issued as U.S. Pat. No. 10,972,781), which is a continuation of U.S. Pat. App. No. 15/792,318, filed October 24, 2017 (issued as U.S. Pat. No. 10,313,733), which is a continuation of U.S. Pat. App. No. 14/948,881, filed November 23, 2015 (issued as U.S. Pat. No. 9,819,992), which is a continuation of U.S. Pat. App. No. 14/617,973, filed February 10, 2015 (issued as U.S. Pat. No. 9,210,363), which is a continuation of U.S. Pat. App. No. 13/962,871, filed August 8, 2013 (issued as U.S. Pat. No. 9,100,622), which is a continuation of U.S. Pat. App. No. 12/762,900, filed April 19, 2010 (issued as U.S. Pat. No. 8,526,898), which claims the benefit of U.S. Provisional App. No. 61/170,526, filed April 17, 2009. The ’206 Patent is part of a family that includes thirteen additional patents or applications that purport to claim priority, via a chain of continuation applications, from App. No. 12/762,900. A family tree is included as Ex. 1227.

C. Lead and Back-Up Counsel (37 C.F.R. § 42.8(b)(3))

Petitioner designates counsel listed below. A power of attorney for counsel is being concurrently filed.

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A declaration of David B. Lett in support of this petition includes, e.g., a discussion of Mr. Lett's background, the '206 Patent, and the prior art, as well as his opinions and an explanation of the bases for those opinions. Ex. 1202, ¶¶ 1-253. As

set forth in his attached declaration, David B. Lett at least meets the level of skill of a POSITA. *Id.* ¶¶ 4-16.

II. INTRODUCTION

Comcast Cable Communications, LLC (“Petitioner”) petitions for *inter partes* review and cancellation of claims 1-76 of U.S. Patent No. 11,399,206 (“the ’206 Patent”) (Ex. 1201).

III. SUMMARY OF ARGUMENT

The ’206 patent generally claims a method for receiving a television signal that comprises digitizing, via a “wideband analog-to-digital converter (ADC),” “all received channels” in the input signal, with those channels comprising “a plurality of desired channels and a plurality of undesired channels.”

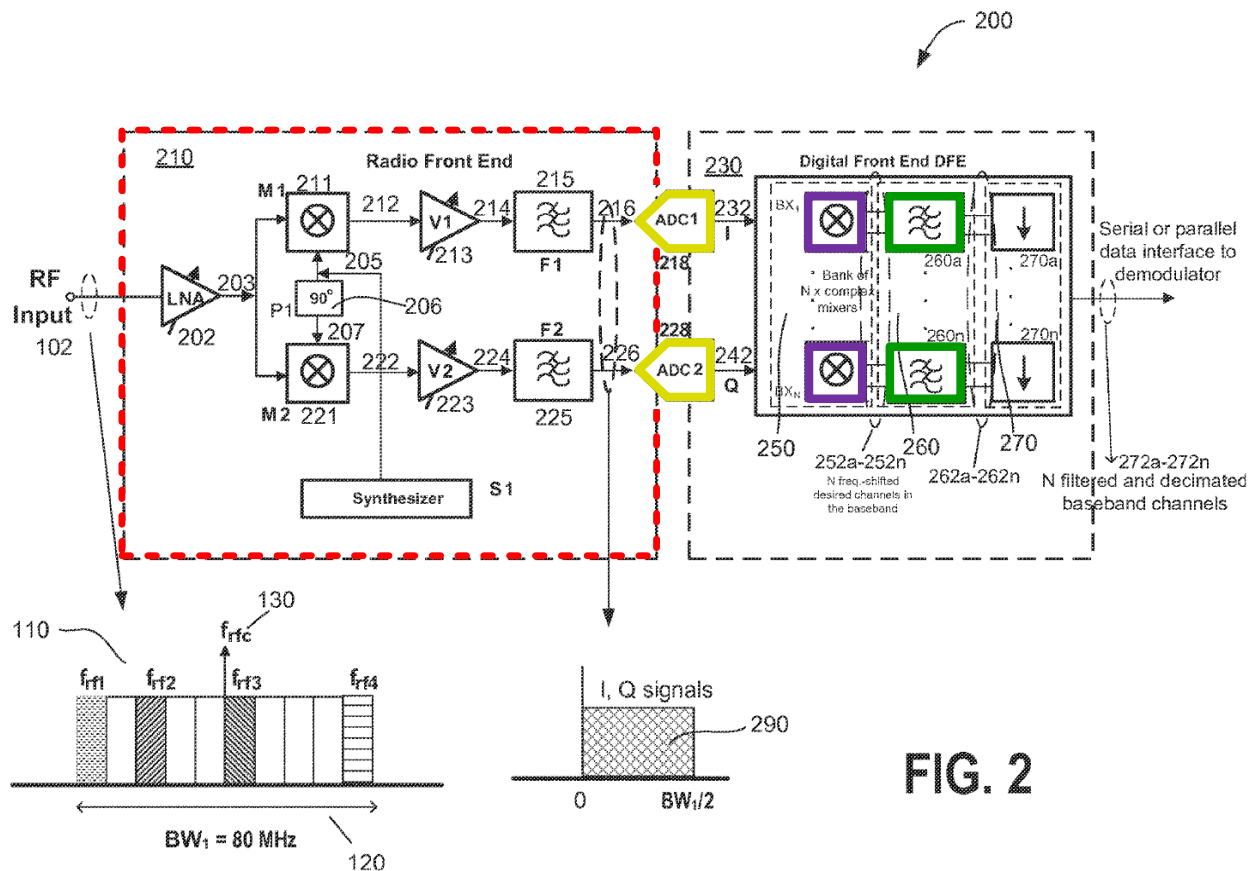
The ’206 Patent admits that an ADC module and other elements of its wideband receiver system “is similar to conventional tuners.” Ex. 1207, p. 5; Ex. 1201, 1:6-23. But the alleged inventive concept—combining conventional tuner features with selection of desired channels from digitized frequencies and output of the selected channels as a digital data stream—was well known. These features, and additional features of the ’206 Patent claims, are disclosed or rendered obvious by the prior art, e.g., Pugel, Crols, and other references relied on herein.

Accordingly, as set forth below, claims 1-76 of the ’206 Patent are unpatentable and should be canceled.

IV. OVERVIEW OF THE '206 PATENT

A. Brief Description

The '206 Patent describes a wideband receiver system 200 illustrated below “capable of receiving multiple radio frequency channels located in a broad radio frequency spectrum.” Ex. 1201, 1:28-30, 4:35-37; Ex. 1202, ¶ 36. A receiver is “wideband” if it is “designed to concurrently receive several TV channels.” Ex. 1201, 1:36-39; Ex. 1202, ¶ 36.



Ex. 1201, Fig. 2 (annotated)

The system 200 receives television channels as frequencies dispersed within a frequency bandwidth BW_1 . Ex. 1201, 4:38-51. A radio frontend 210 (red)

downconverts the bandwidth as in-phase and quadrature signals 212 and 222 at an intermediate frequency (IF), which are then digitized by wideband analog-to-digital converters ADC1/ADC2 (**gold**). *Id.*, 2:59-65, 4:61-5:7, 5:20-24, 5:48-51. U.S. Provisional App. No. 61/170,526 (“’526 provisional”), incorporated by reference, admits that the left side of Figure 2 (up to and including ADC1/ADC2) “is similar to conventional tuners.” *Id.*, 1:6-22; Ex. 1207, p. 5.

The digital I and Q signals 232 and 242 from ADC1/ADC2 are input to a bank of N complex mixers 250 (**purple**) in a digital front end 230. Ex. 1201, 5:51-55. “Each of the N complex mixers ... extract[s] a different one of the desired channels” from the I and Q signals and “frequency-shifts the extracted signals to the baseband frequency.” *Id.*, 6:2-8. Filters 260a-260n (**green**) filter each frequency-shifted desired channel to remove undesired channels. Ex. 1201, 6:6-8. The filtered baseband channels are then “sent as a serial or parallel digital data stream to a demodulator using a serial or parallel data interface according to commonly known methods.” *Id.*, 7:10-14; Ex. 1202, ¶ 38.

B. Prosecution History

U.S. Application No. 17/587,462 (“the ’462 application”), which became the ’206 patent, was filed with a preliminary amendment that canceled claims 1-18 and added claims 19-48. Ex. 1104, pp. 2-9. The Office rejected claims 19-48 for non-statutory double patenting over claims 1-27 U.S. Patent No. 9,100,622, and rejected

claims 19-27, 29-30, 33-42, 44-45, and 48 as obvious over U.S. Patent No. 6,760,342 (Skones et al.) in view of International Publication No. WO 02/087230 (Uskali et al.), but indicated allowable subject matter in claims 28 and 43 (reciting “a serial interface”), claims 31 and 46 (reciting “a device comprising a digital video recorder (DVR)”), and claims 32 and 47 (reciting “a picture-in-picture display”). Ex. 1204, pp. 119-133.

Applicant filed a terminal disclaimer and amended to add the limitations of claim 28 to claim 19, add the limitations of claim 43 to claim 34, add independent claim 49 based on original claims 19 and 31, add independent claim 63 based on original claims 34 and 46, add independent claim 77 based on original claims 19 and 32, add independent claim 91 based on original claims 34 and 47, and add sets of dependent claims that paralleled existing dependent claims. Ex. 1204, pp. 220-242.

Applicant subsequently amended claims 19, 49, and 77 ('206 patent claims 1, 25, and 51, respectively) to add “receiving an input signal from a cable network,” amended the “digitizing” step: “... wherein the contiguous band of frequencies comprises all received channels that exist in the input signal and the received channels comprise[[s]] a plurality of desired channels and a plurality of undesired channels” and made comparable changes to claims 34, 63, and 91 ('206 patent claims 13, 38, and 64, respectively) Ex. 1204, pp. 259-272; Ex. 1202, ¶¶ 39-42.

C. Earliest Priority Date for the Claims

The earliest possible priority date for claims 1-9 and 13-21 of the '206 Patent is April 17, 2009, the filing date of the '526 provisional. Each reference relied on herein is prior art to that date. The earliest possible priority date for the remaining claims is the April 19, 2010, the filing date of Application No. 12/762,900; the '526 provisional is silent regarding a “channel delivered via ... DOCSIS[] protocol,” “DVR,” or “picture-in-picture display.” Ex. 1207, pp. 3-7; Ex. 1202, ¶ 43.

V. OVERVIEW OF PRIOR ART

A. Pugel

Pugel (Ex. 1224) is a PCT Application published on December 21, 2007. Ex. 1224, p. 1. As the publication date is more than a year prior to the earliest filing date of the '206 Patent, Pugel is prior art under pre-AIA 35 U.S.C. § 102(b). Ex. 1202, ¶ 74. Pugel was not considered during the prosecution of the '206 Patent. Ex. 1201, pp. 1-2; Ex. 1202, ¶ 74.

Pugel describes a “digital television receiver capable of simultaneously receiving a plurality of channels ... suitable for use with conventional cable television delivery systems.” Ex. 1224, [0008]; Ex. 1202, ¶ 75. Pugel's Figure 1 shows a multichannel receiver circuit 100 annotated with colors referenced in the description below. Ex. 1224, [0022]-[0028], Fig. 1; Ex. 1202, ¶ 75.

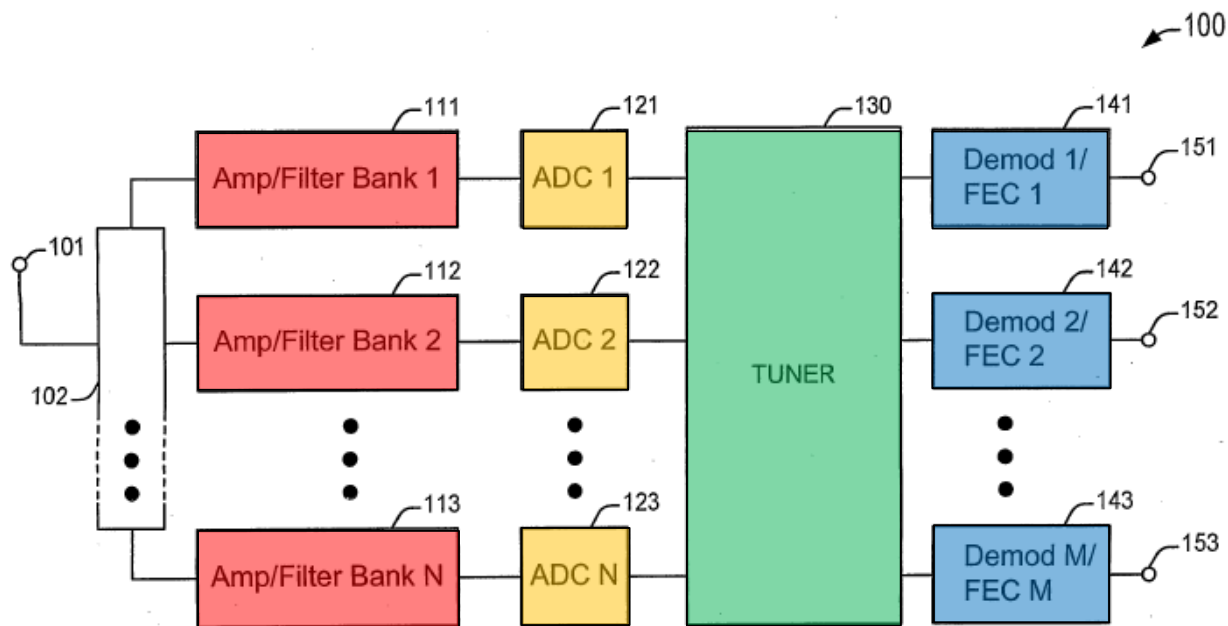


FIG. 1

Ex. 1224, Fig. 1 (annotated)

The receiver circuit 100 receives a multichannel analog RF input signal, such as a signal used in a conventional cable television delivery system, received at input coupler 101. Ex. 1224, [0008], [0024]; Ex. 1202, ¶ 76. That signal is wideband, as it may comprise multiple channels. Ex. 1224, [0009], [0020]-[0023]; Ex. 1202, ¶ 76. The signal can be optionally split. Ex. 1224, [0024]-[0025]; Ex. 1202, ¶ 76. The receiver circuit comprises “a plurality of amplifier-filter banks or circuits 111, 112, 113, a plurality of analog-to-digital converters 121, 122, 123, a digital tuner 130, and a plurality of demodulator circuits 141, 142, 143.” Ex. 1224, [0023]; Ex. 1202, ¶ 76.

The amplifier-filter banks 111-113 (**red**) “segregate[] the multichannel analog input signal into a plurality of separate analog signals of differing frequency ranges.” Ex. 1224, [0024], [0028]-[0032], [0043]; Ex. 1202, ¶ 77. The plurality of separate signals are undersampled, such that the sampling frequency range of any downstream analog-to-digital converters (ADCs) is reduced. Ex. 1224, [0033]-[0034]; Ex. 1202, ¶ 77. Undersampling, as described in Pugel, is more economical because it reduces the need to supply ADCs supporting high-frequency sampling. Ex. 1224, [0034]; Ex. 1202, ¶ 77.

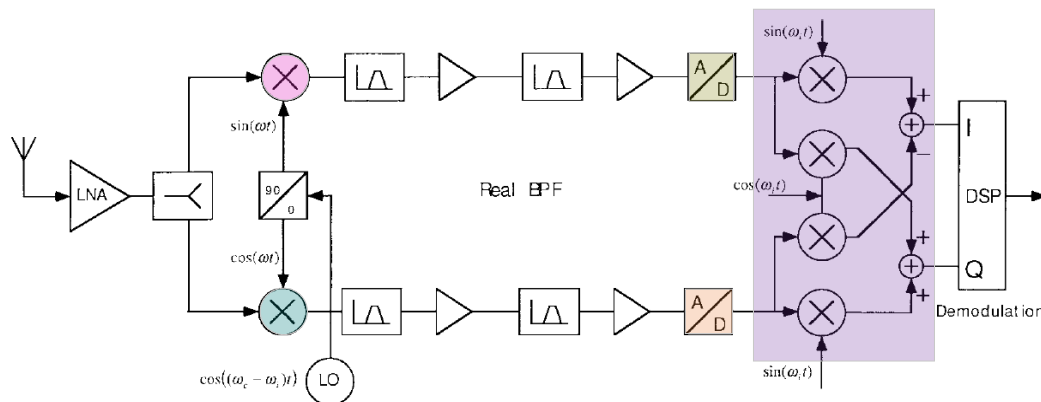
The undersampled signals are then converted to digital form in analog-to-digital converters 121-123 (**gold**) Ex. 1224, [0036], [0033]-[0037], [0044]-[0045]; Ex. 1202, ¶ 78. The digital signals are received by a digital tuner (**green**) such that “a selected set of digital cable television channels” may be demultiplexed from the digital signals. Ex. 1224, [0038], [0037]-[0039], [0045]; Ex. 1202, ¶ 78. Those demultiplexed channels may then be outputted to one or more demodulator circuits 141-143 (**blue**). Ex. 1224, [0039]-[0040], [0046]; Ex. 1202, ¶ 78.

Pugel is in the same field of endeavor as the '206 Patent, and thus is analogous art. Like the '206 Patent, Pugel relates to a system and method for receiving a wideband radio frequency signal comprising multiple channels. Ex. 1201, 1:26-30; Ex. 1224, Abstract, [0008]-[0013], [0023]-[0024]; Ex. 1202, ¶ 79. Pugel is also reasonably pertinent to problems with which the '206 Patent is concerned, and is

also analogous art on that basis. Ex. 1202, ¶ 79. For example, Pugel describes filtering signals for input to an ADC in the same way as is described by the '206 Patent. *Compare* Ex. 1201, 4:35-6:15, Fig. 3 *with* Ex. 1224, [0029]-[0032], [0042]-[0043], Fig. 2; Ex. 1202, ¶ 79.

B. Crols

Crols (Ex. 1225) is a Non-Patent Literature published in March 1998. Crols was publicly available as of April 3, 1998. Ex. 1273, pp. 44-50, 52; Ex. 1202, ¶ 80. Thus, Crols is prior art under pre-AIA 35 U.S.C. § 102(b). Ex. 1202, ¶ 80. Crols was not considered during the prosecution of the '206 Patent. Ex. 1201, pp. 1-2; Ex. 1202, ¶ 80.

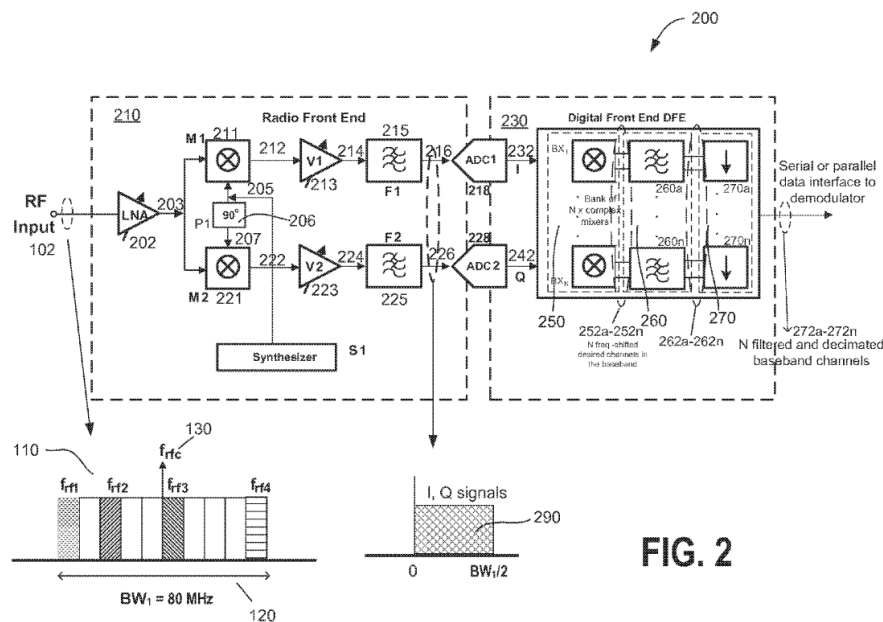


Ex. 1225, Fig. 22 (annotated)

Crols discusses how RF receivers can avoid the mirror frequency problem during the downconversion of analog RF signals to an intermediate frequency by downconverting the signals once with a first mixer (**pink**) using a sine signal and again with a second mixer (**teal**) using a cosine signal as an input. Ex. 1225, p. 271-

272; Ex. 1202, ¶ 82. Figure 22 of Crols (reproduced above) shows such an example RF receiver architecture. Ex. 1225, p. 281; Ex. 1202, ¶ 82. The outputs of the two mixers are digitized separately by two analog-to-digital converters (**olive** and **orange**). Ex. 1225, pp. 280-281; Ex. 1202, ¶ 82. The digitized signals can be further downconverted to baseband frequency by a complex mixing circuit (**purple**) with four mixers and two adders before forwarding the components to the digital signal processor (DSP) for demodulation. Ex. 1225, pp. 280-281; Ex. 1202, ¶ 82.

Crols is reasonably pertinent to problems with which the '206 Patent is concerned, and is analogous art to the '206 Patent on at least that basis. Ex. 1202, ¶ 83. For example, the '206 Patent indicates a circuit wherein an RF signal is amplified, and the downconverted I and Q signals are generated, prior to digitization by an ADC. Ex. 1201, 4:35-6:15, Fig. 2; Ex. 1202, ¶ 83.



Ex. 1201, Fig. 2

Similarly, Crols presents circuit diagrams depicting complex bandpass filters consistent with the '206 Patent's analog circuit topologies:

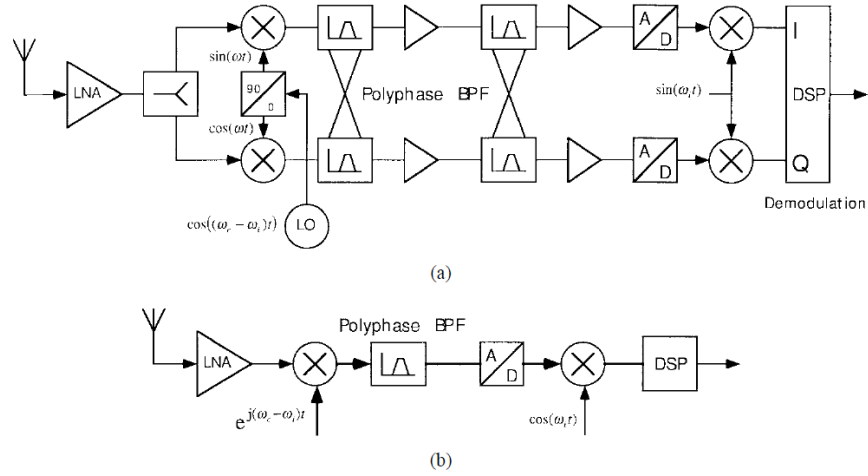


Fig. 21. The topology of a low-IF receiver which uses a complex bandpass filter in the LF part. (a) Full notation and (b) compact notation.

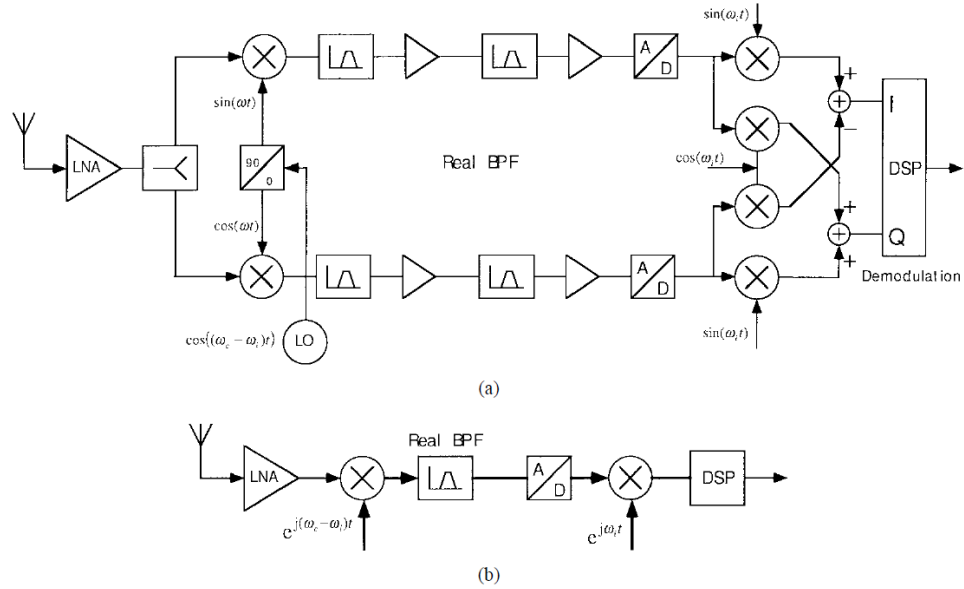


Fig. 22. The topology of a low-IF receiver which uses real filters in the LF part. (a) Full notation and (b) compact notation.

Ex. 1225, Figs. 21-22

Both techniques show ways to suppress unwanted signals as part of downconversion to a baseband prior to digital processing, providing example implementations for a

POSITA looking to build systems in real-world applications. Ex. 1225, pp. 279-280; Ex. 1201, 5:17-5:32; Ex. 1202, ¶ 84.

C. Chandrakasan

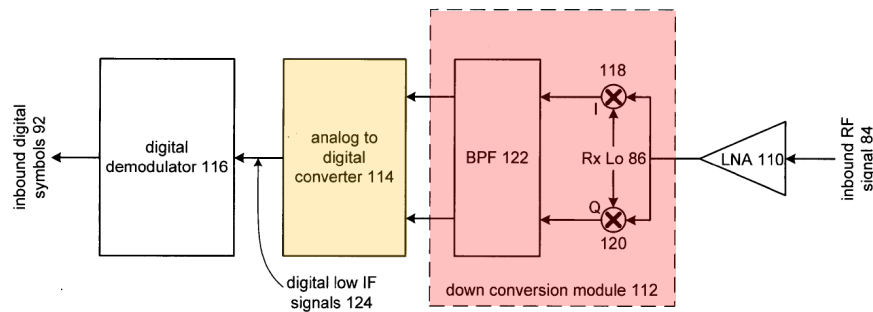
Chandrakasan (Ex. 1217) is a Non-Patent Literature published in January 1996. Ex. 1202, ¶ 85. Chandrakasan was publicly available as of April 23, 1996. Ex. 1273, pp. 35-39, 52; Ex. 1202, ¶ 85. Thus, Chandrakasan is prior art under pre-AIA 35 U.S.C. § 102(b). Ex. 1202, ¶ 85. Chandrakasan was not considered during the prosecution of the '206 Patent. Ex. 1201, pp. 1-2; Ex. 1202, ¶ 85. Chandrakasan describes the trade-offs between selecting serial time-multiplex architecture and parallel architecture to implement digital signal processing functions. Ex. 1217, pp. 354-356; Ex. 1202, ¶ 85. Parallel architectures comprise “one to one correspondence between the operations on the signal flow graph” and “require[] a small or no controller.” Ex. 1217, pp. 354-355; Ex. 1202, ¶ 85. However, when there is a constraint in the circuit area, serial time-multiplexed architectures may be preferred where “multiple operations on a signal flowgraph can be mapped onto the same functional hardware unit.” Ex. 1217, pp. 355; Ex. 1202, ¶ 85.

Chandrakasan is reasonably pertinent to problems with which the '206 Patent is concerned, and is analogous art to the '206 Patent on at least that basis. Ex. 1202, ¶ 86. Both techniques represent well-known approaches to signal transmissions in digital systems, providing example implementations for a POSITA looking to build

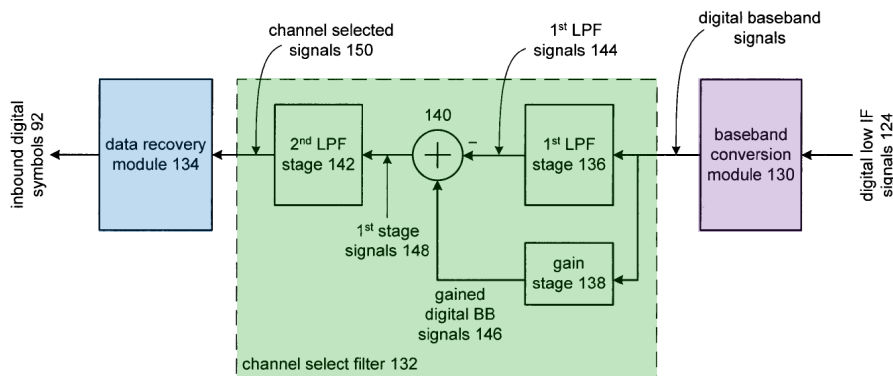
systems in real-world applications. Ex. 1217, p. 352; Ex. 1201, 7:10-19; Ex. 1202, ¶ 86.

D. Jensen '170

Jensen '170 (Ex. 1230) is a U.S. Published Application published on February 9, 2006, and is prior art under pre-AIA 35 U.S.C. § 102(b). Ex. 1202, ¶ 87. Jensen '170 was not considered during the prosecution of the '206 Patent. Ex. 1201, pp. 1-2; Ex. 1202, ¶ 87.

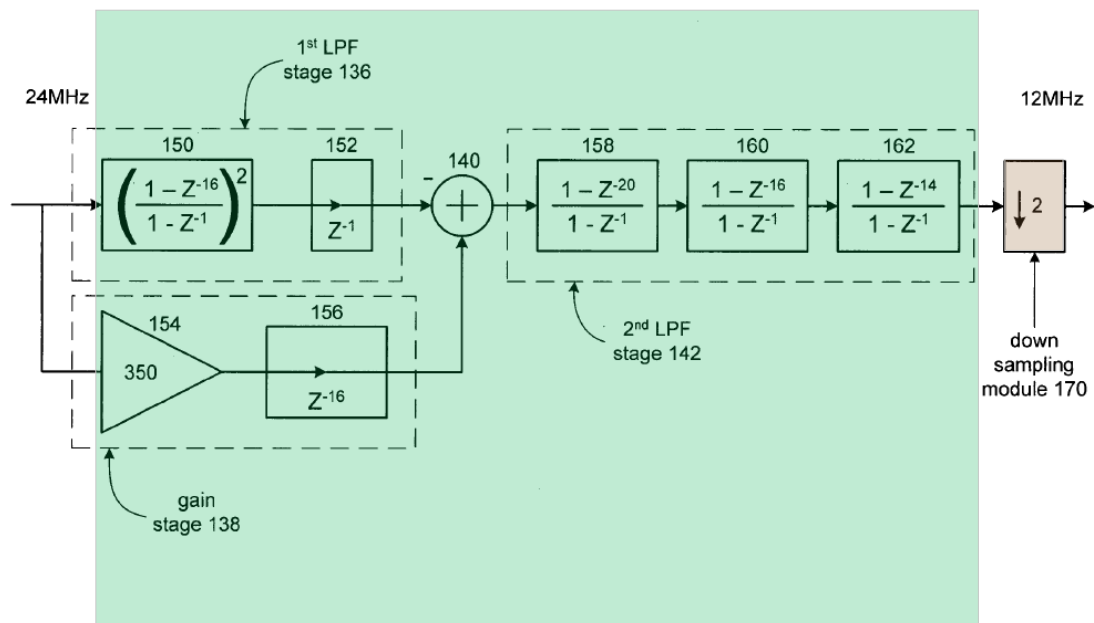


Ex. 1230, Fig. 8 (annotated)



Ex. 1230, Fig. 9 (annotated)

Jensen '170 describes a radio receiver (illustrated above) that comprises a down-conversion module 112 (red), an analog to digital converter 114 (gold), a baseband conversion module 130 (purple), a channel select filter 132 (green), and a data recovery module 134 (blue). Ex. 1230, [0060]-[0068], Figs. 8, 9; Ex. 1202, ¶ 88. The down-conversion module 112 includes mixers 118 and 120. Ex. 1230, [0060]-[0061]; Ex. 1202, ¶ 88. The low pass filter stages 136 and 138 are implemented with finite impulse filters. Ex. 1230, [0010], [0071]-[0073]; Ex. 1202, ¶ 88. Jensen '170 further describes a down-sampling module 170 (brown) for reducing the sampling rate of the signals. Ex. 1230, [0074]-[0075]; Ex. 1202, ¶ 89.



Ex. 1230, Fig. 15 (annotated)

Jensen '170 is reasonably pertinent to problems with which the '206 Patent is concerned, and is analogous art to the '206 Patent on at least that basis. Ex. 1202, ¶

90. Jensen '170 presents known systems for implementing demodulators and decimators for digital channel selection, similar to the '206 Patent, and a POSITA would turn to Jensen '170 when looking to build systems in real-world applications. Ex. 1230, [0060]-[0075], [0087]-[0090]; Ex. 1201, 7:20-8:34, 9:35-11:7; Ex. 1202, ¶ 90.

E. Zaltsman

Zaltsman (Ex. 1274) is a U.S. Patent Application Publication published on May 22, 2008. Ex. 1202, ¶ 91. As the publication date is more than a year prior to the earliest priority date of the '206 Patent claims against which it is asserted herein, Zaltsman is prior art under pre-AIA 35 U.S.C. § 102(b). Ex. 1202, ¶ 91. Further, in view of its October 29, 2007, priority date, Zaltsman is prior art under pre-AIA 35 U.S.C. § 102(e) as to all claims. Zaltsman was not considered during the prosecution of the '206 Patent. Ex. 1201, pp. 1-2; Ex. 1202, ¶ 91.

Zaltsman discloses a cable gateway system and architecture incorporating a hybrid digital video transceiver. Ex. 1274, Abstract, [0003]-[0023]; Ex. 1202, ¶ 92. Zaltsman provides a detailed background section discussing known technology as of 2007, particularly regarding the use of digital television standards including DOCSIS in wideband television transmission to a set-top receiver. Ex. 1274, [0003]-[0023]; Ex. 1202, ¶ 92. In particular, Zaltsman states that, in the latest DOCSIS

standard of the day, multiple television channels were bonded together, typically using a 6 MHz frequency band. Ex. 1274, [0012]-[0013]; Ex. 1202, ¶ 92.

Zaltsman is reasonably pertinent to problems with which the '206 Patent is concerned, and is analogous art to the '206 Patent on at least that basis. Ex. 1202, ¶ 93. Zaltsman describes cable systems for transmitting digital data signals using RF signals and QAM, similar to the '206 Patent, and a POSITA would turn to Zaltsman when looking for technical details known in the art for such systems. Ex. 1274, Abstract, [0003]-[0023]; Ex. 1201, 1:26-57, 2:45-3:67, 8:54-9:8; Ex. 1202, ¶ 93.

VI. IDENTIFICATION OF CHALLENGE PURSUANT TO 37 C.F.R. § 42.104(b)

A. Claims for Which Review is Requested and Grounds on Which Challenge Is Based

Petitioner requests review of claims 1-76 on the following pre-AIA 35 U.S.C. §§ 102 and 103 grounds (independent claims in **bold**).

Ground	References	Basis	Claims Challenged
A0/A1	Pugel	§102/§103	25 , 26, 31, 35, 37, 51 , 52, 57, 61, 63
B	Pugel-Crols	§103	27-28, 30, 38 , 39-41, 43-44, 48, 50, 53-54, 56, 64 , 65-67, 69-70, 74, 76

C	Pugel-Chandrakasan	§103	1, 2, 7-9, 11-12, 32-34, 58-60
D	Pugel-Crols-Chandrakasan	§103	3, 4, 6, 13 , 14-16, 18-21, 23-24, 45-47, 71-73
E	Pugel-Zaltsman	§103	36, 62
F	Pugel-Crols-Zaltsman	§103	49, 75
G	Pugel-Chandrakasan-Zaltsman	§103	10
H	Pugel-Crols-Chandrakasan-Zaltsman	§103	22
I	Pugel-Crols-Zaltsman-Jensen '170	§103	29, 42, 55, 68
J	Pugel-Crols-Chandrakasan-Zaltsman-Jensen '170	§103	5, 17

None of the prior art listed above was before the examiner during the prosecution of the '206 Patent.

A declaration of David B. Lett in support of this petition includes, e.g., a discussion of Mr. Lett's background, the '206 Patent, and the prior art, as well his

opinions and an explanation of the bases for those opinions. Ex. 1202, ¶¶ 1-253. As set forth in his attached declaration, David B. Lett at least meets the level of skill of a POSITA. Ex. 1202, ¶¶ 4-16.

B. Summary of Grounds and Comparison of Claim Limitations

The '206 Patent has 6 independent claims (1, 13, 25, 38, 51, and 64), with 11-12 dependent claims each, for a total of 76 claims. Claims 1, 25, and 51 are nearly identical, with each reciting “receiving an input signal from a cable network,” “digitizing ... via a wideband analog-to-digital converter ... all received channels that exist in the input signal,” “selecting ... desired channels from the input signal without selecting ... undesired channels,” and “providing the plurality of desired channels.” Claims 1, 25, and 51 only differ based on choice of a single, well-known ancillary feature: “a serial interface” (claim 1), “a digital video recorder” (claim 25), or “a picture-in-picture” display (claim 51).

Claims 13, 38, and 64 are also nearly identical, with each reciting “receiving an input signal from a cable network,” “digitizing all received channels in the input signal via a wideband analog-to-digital converter,” and “digitally down converting each desired channel ... to generate a plurality of digital channel outputs.” Claims 13, 38, and 64 only differ based on the same well-known ancillary features: “a serial interface” (claim 13), “a digital video recorder” (claim 38), or “a picture-in-picture” display (claim 64).

Each of the six dependent claim sets corresponding to one of claims 1, 13, 25, 38, 51, and 64 includes claims directed to a common group of well-known features, such as “communicating ... via at least one of an analog amplifier and an analog filter” (claims 2, 14, 26, 39, 52, 65), generating complex signals having I and Q components (claims 3, 15, 27, 40, 53, 66), baseband I and Q complex signal components (claims 4, 16, 28, 41, 54, 67), filtering complex signals (claims 5, 17, 29, 42, 55, 68), demodulating complex signals/desired channels (claims 6/7, 18/19, 30/31, 43/44, 56/57, 69/70), output via a parallel interface (claims 8, 20, 32, 46, 59, 71), a cable broadcast channel (claims 9, 21, 35, 48, 61, 74), and a DOCSIS channel (claims 10, 22, 36, 49, 62, 75).

Pugel, the primary reference, discloses every feature of independent claims 25 and 51, and thus anticipates these claims as well as multiple dependent claims (ground A0). To the extent Patent Owner argues that Pugel does not expressly disclose certain features, Pugel also renders them obvious (ground A1).

Additional grounds add Crols (Ground B) for teaching certain analog components and features of a complex mixer, Chandrakasan (Ground C) for teaching serial and parallel interfaces, and Zaltsman (Ground E) for teaching standard cable television transmission techniques and standards. The remaining grounds represent permutations of the above, wherein various sub-features are independently stacked onto one another without otherwise adding additional technical complexity.

C. 314(a) Discretion Does Not Apply

The *Fintiv* factors as set forth in the Director's June 21, 2022, Guidance Memorandum do not warrant discretionary denial.

Factor one appears neutral. Petitioner has filed IPR petitions challenging all eight patents asserted in the District Court. If trial is instituted, and the case is not dismissed, then Petitioner expects to request a stay, as decisions in Petitioner's favor would resolve the dispute in its entirety.

Factor two favors institution. Petitioner has filed a Motion to Dismiss, Patent Owner has filed an Amended Complaint, and Petitioner will renew its Motion to Dismiss the operative complaint. No schedule beyond claim construction has been entered, and no trial date set.

Factor three favors institution. To date, the investment by the District Court has been limited to considering motions to dismiss on the pleadings.

Factor four strongly favors institution. The petition challenges all claims in the '206 Patent while only claims 13-14, 19, 21, 23, 25-26, 31, 34, 35, 38-39, 44, and 47-48 are asserted in the District Court.

Factor five does not warrant denial as Petitioner is a defendant in the District Court case.

Factor six favors institution. Petitioner presents compelling unpatentability challenges that merit institution.

D. 325(d) Discretion Does Not Apply

Considering the two-part framework discussed in *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper 6 at 8-9 (PTAB Feb. 13, 2020), the Board should not exercise its §325(d) discretion to deny institution. The grounds raised by this Petition are not the same or substantially the same as the art and arguments raised during prosecution, and to the extent that they are, the Examiner erred in a manner material to the patentability of the challenged claims by failing to find and consider all of the relevant prior art, including Pugel.

E. Level of Ordinary Skill

A person of ordinary skill in the art (a “POSITA”) at the time of the alleged invention would have had a degree in electrical engineering, or a similar discipline, along with three-to-four years of experience with digital signal processing (DSP) and RF tuning systems for satellite and/or cable communications. Additional education may substitute for professional experience, and significant work experience may substitute for formal education. Ex. 1202, ¶¶ 30-32.

F. Claim Construction

All claim terms herein should be given their ordinary and customary meaning to a POSITA, consistent with the prosecution history, as they would be given in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b). Petitioner does not contend that the claims include any means-plus-function limitations.

The claims use the term “wideband.” The ’206 Patent implicitly defines “wideband” as a band that carries multiple channels. For example, the ’206 Patent states that a receiver is “wideband” if it is “designed to concurrently receive several TV channels.” Ex. 1201, 1:36-39. This is consistent with the ordinary and customary meaning of “wideband.” Ex. 1202, ¶ 35.¹

VII. SPECIFIC GROUNDS FOR UNPATENTABILITY

A. Ground A0 and A1: Pugel

Pugel anticipates (ground A0) and renders obvious (ground A1) claims 25, 26, 31, 35, 37, 51, 52, 57, 61, and 63. Ex. 1202, ¶¶ 94-144.

1. Independent Claim 25

Elements [25A]-[25E] are anticipated (ground A0) and rendered obvious (ground A1) by Pugel. Ex. 1202, ¶¶ 94-122.

¹ The ’206 patent also states that “the invention relates to wideband receiver systems that are capable of receiving multiple desired television channels that extend over multiple non-contiguous portions of the broad frequency spectrum.” Ex. 1201, 1:30-34. This does not change the ordinary meaning above for “wideband,” and in any event the claims only recite a “wideband analog-to-digital converter,” not a “wideband receiver system.”

a. [25A] “A method for receiving a television (TV) signal comprising:”

While the preamble [25A]² is not limiting, Pugel teaches it. Ex. 1202, ¶¶ 96-98. Pugel teaches a multichannel receiver circuit for processing multiple digital television channels, such that devices such as “television receivers, PVR’s, or other devices” may receive those signals. Ex. 1224, [0001]-[0013], [0048]-[0049]; Ex. 1202, ¶ 97.

b. [25B] “receiving an input signal from a cable network;”

Pugel discloses “a cable network connector” comprising an input coupler 101, and optionally a splitter 102, for receiving a multichannel analog RF input signal from a cable network, wherein the signal is then sent to a plurality of amplifier-filter circuits (**red**), which in turn sends the input signal to a plurality of ADCs (**gold**). Ex. 1224, [0025]-[0026], [0042]-[0044], Figs. 1-2; Ex. 1202, ¶¶ 99-101. Thus, Pugel discloses [25B]. Ex. 1202, ¶ 102.

² The limitations of the claims appear and are labelled in the Claims Listing Appendix.

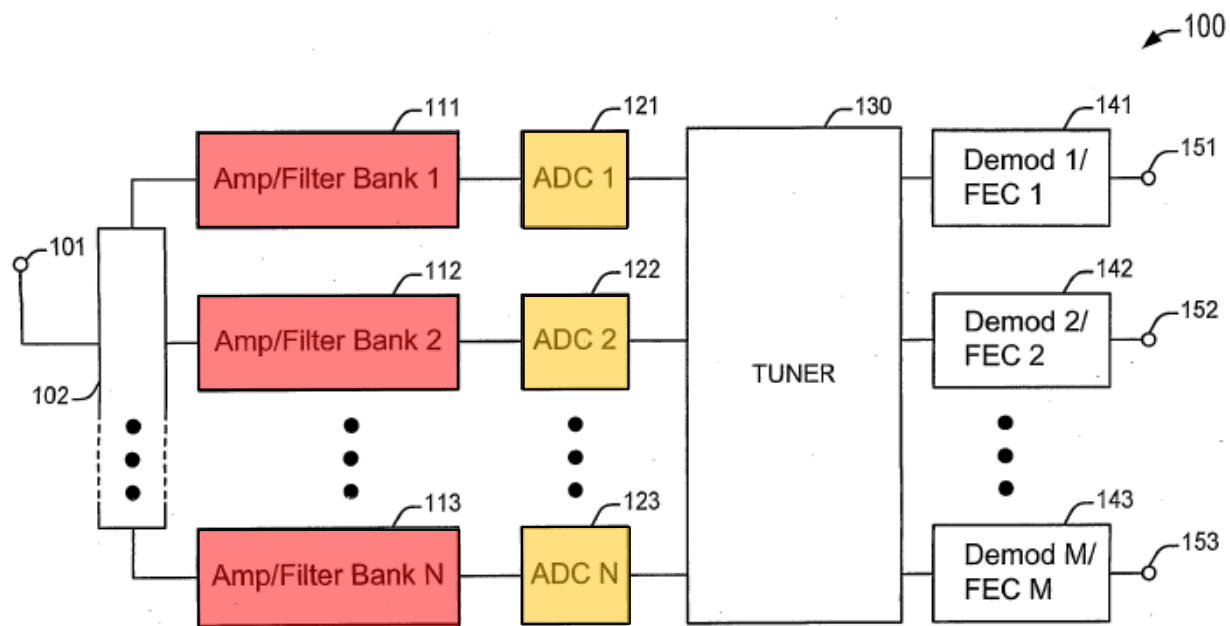


FIG. 1

Ex. 1224, Fig. 1 (annotated)

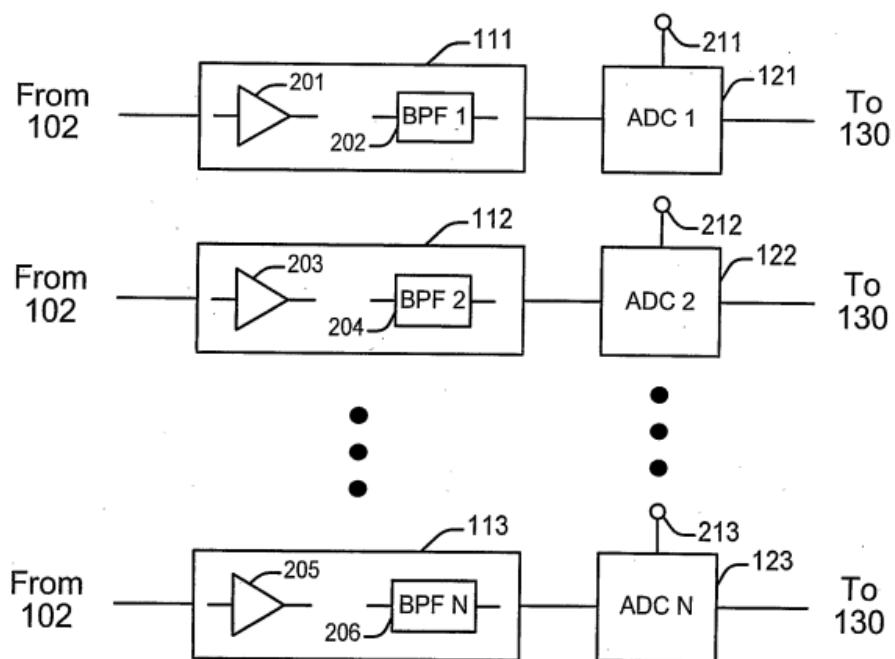


FIG. 2

Ex. 1224, Fig. 2

- c. [25C] “digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal and the received channels comprise a plurality of desired channels and a plurality of undesired channels;”

Pugel’s receiver circuit includes analog-to-digital converters 121-123 (the claimed “wideband ... ADC”, gold) “sufficient for satisfactorily processing digital television signals and associated signals intended for end users in a conventional cable television broadcast system.” Ex. 1224, [0036], [0033]-[0037], [0044]-[0045], Fig. 1; Ex. 1202, ¶¶ 103-105.

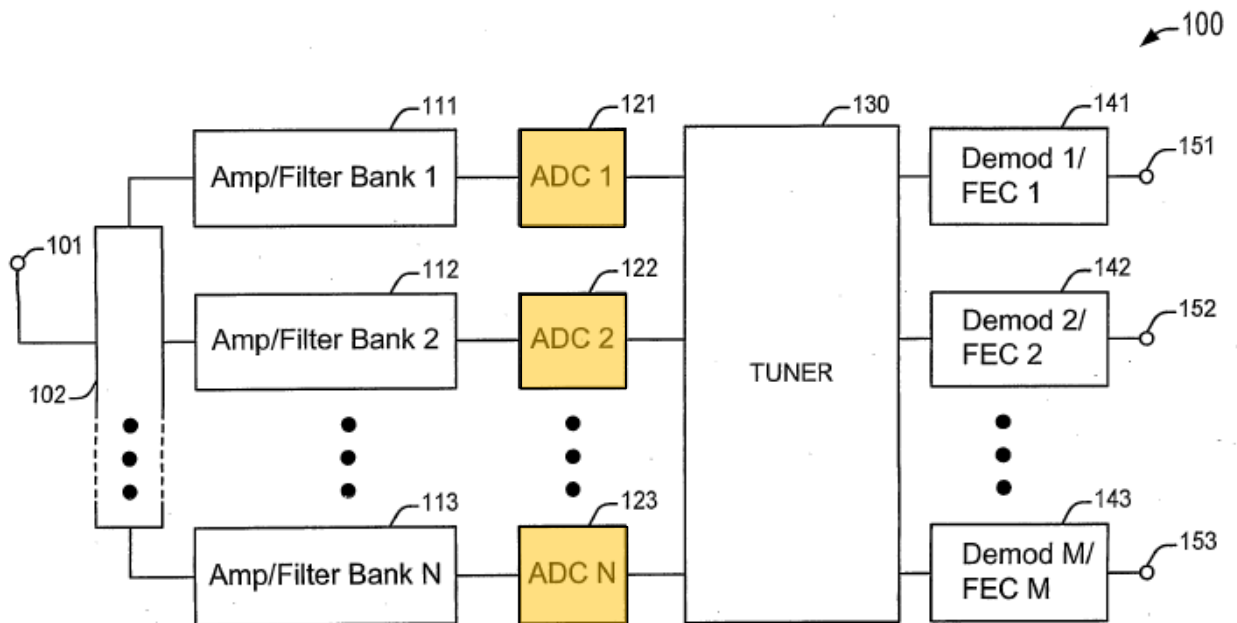


FIG. 1

Ex. 1224, Fig. 1 (annotated)

Pugel teaches amplifier-filter circuits that generate analog signals within a particular, segregated pass-band. Ex. 1224, Abstract, [0001], [0008]-[0009], [0011], [0022], [0028], [0036]-[0044], [0048]-[0049]; Ex. 1202, ¶ 106. The bands correspond to the claimed “all received television channels,” including “desired” and “undesired” television channels. Ex. 1224, Abstract, [0001], [0008]-[0009], [0011], [0022], [0028], [0036]-[0044], [0048]-[0049]; Ex. 1202, ¶¶ 104, 106. A channel to be selected by the digital tuner is desired, and a channel to go unselected by the digital tuner is undesired. Ex. 1202, ¶ 104. This is consistent with the use of “desired” and “undesired” in the ’206 Patent. Ex. 1201, Abstract, 1:40-45, 3:25-56, 4:38-53, 5:56-65, 6:3-15, 6:53-63, 7:10-19; Ex. 1202, ¶ 104.

The pass-bands from the amplifier-filter circuits are received by a given ADC for digitization of the pass-band of frequencies, wherein each ADC may comprise a frequency selector “for setting the sampling frequency and/or input frequency corresponding to the desired band.” Ex. 1224, [0035], [0024], [0034]; Ex. 1202, ¶ 106. Pugel’s ADC is “wideband” because it digitizes a “contiguous” frequency band (e.g., a 300MHz band) that a POSITA would have understood to comprise several channels within the frequency block concurrently. *Compare* Ex. 1224, [0035]-[0036] *with* Ex. 1201, 1:35-38; Ex. 1202, ¶¶ 106-108. Pugel discloses that the bands of frequencies may be contiguous or non-contiguous. Ex. 1224, [0043]; Ex. 1202, ¶ 108. Pugel’s ADCs are structurally equivalent to, and perform the same

function as, the structure described by the '206 Patent for performing the function recited in limitation [25C] (e.g., ADC1 218 and ADC2 228). Ex. 1201, 5:48-51; Ex. 1202, ¶ 108. Each contiguous frequency band processed by each ADC corresponds to a particular set of television channels, including a plurality of desired and undesired television channels as will be selected downstream by the digital tuner. Ex. 1224, [0026]-[0028], [0038]-[0040]; Ex. 1202, ¶ 107.

Thus, Pugel discloses [25C]. Ex. 1202, ¶ 109.

d. [25D] “concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels; and”

Pugel’s receiver circuit comprises a digital tuner (**green**) that is “capable of generating a plurality of digital channels” and integrates a channel selector 315 such that “a selected set of digital channels may be communicated.” Ex. 1224, [0037]-[0038]; Ex. 1202, ¶ 111. The digital tuner concurrently selects a plurality of desired television channels from the plurality of frequencies that were digitized by the ADCs, and then, based on the selections, provides each of the plurality of desired channels without providing any of the plurality of undesired channels. Ex. 1224, [0038], [0037]-[0039], [0045], Fig. 1; Ex. 1202, ¶¶ 110-111. The digital tuner 130 may include digital multiplexers, demultiplexers, or “a multitude of components configured as is well known in the art to recover a plurality of digital channel signals.” Ex. 1224, [0037]; Ex. 1202, ¶ 111.

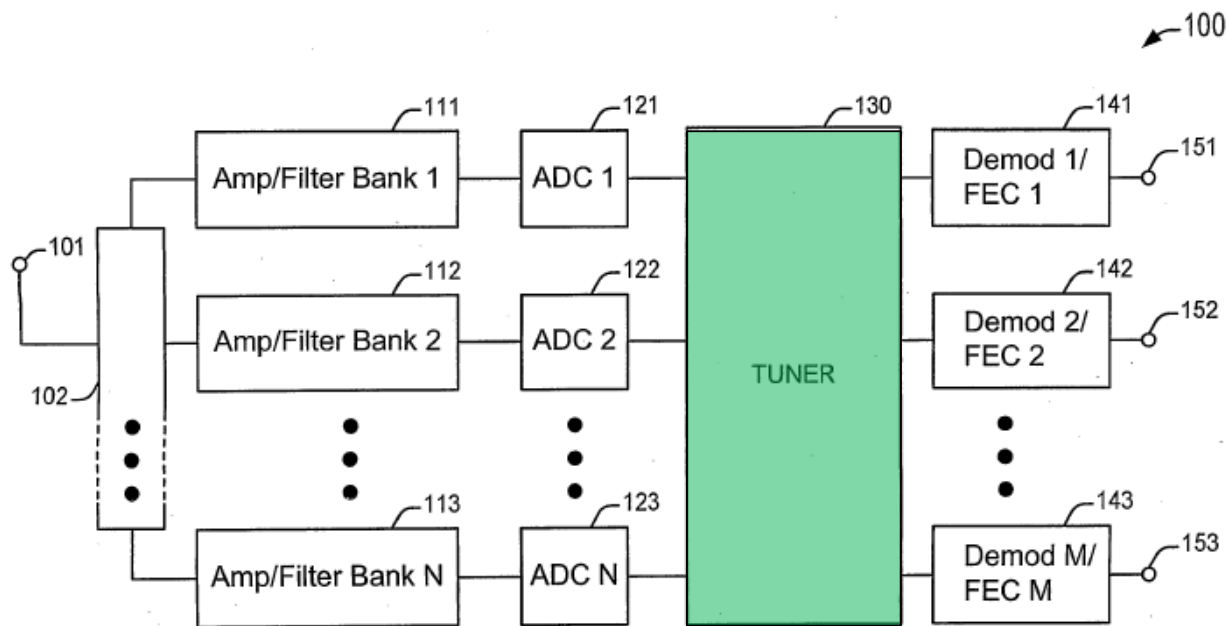


FIG. 1

Ex. 1224, Fig. 1 (annotated)

For example, Pugel teaches that the digital tuner may select and only demultiplex digital channels corresponding to certain pay-per-view selections, or may demultiplex all channels. Ex. 1224, [0038]; Ex. 1202, ¶ 112. In such an example, the selected digital channels are the claimed “desired channels.” Ex. 1202, ¶ 112. The digital tuner may also perform a variety of other functions, including “coding, decoding, scrambling, descrambling, rotating, and/or derotating operations prior to passing the digital channel signals to demodulation circuits.” Ex. 1224, [0039]; Ex. 1202, ¶ 112.

Thus, Pugel discloses [25D]. Ex. 1202, ¶ 113.

e. [25E] “providing the plurality of desired channels.”

As discussed in Section VII.A.1.d, the digital tuner is configured to concurrently select a plurality of desired television channels from the plurality of frequencies that were digitized by the ADCs and provide them to demodulators. Ex. 1224, [0038], [0037]-[0039], [0045], Fig. 1; Ex. 1202, ¶¶ 114-115. Pugel’s teaching, for example, that the digital tuner 130 “may perform coding, decoding, scrambling, descrambling, rotating, and/or derotating operations prior to passing the digital channel signals to demodulation circuits 141, 142, 143” thus discloses “providing the plurality of desired channels.” Ex. 1224, [0039]; Ex. 1202, ¶¶ 115-116.

f. [25F] “wherein the method is performed by a device comprising a digital video recorder (DVR).”

Pugel teaches that its system may comprise “a PVR device” for receiving the digital video signals. Ex. 1224, [0048]-[0049]; Ex. 1202, ¶¶ 118-119. This refers to a personal video recorder, which a POSITA would have understood to be another term for a DVR. Ex. 1224, [0005]; Ex. 1202, ¶ 119. Thus, Pugel discloses the method of claim 25 is performed by a device comprising a DVR. Ex. 1202, ¶ 119.

To any extent it is asserted that Pugel does not explicitly disclose that Pugel’s device for performing the claimed method may comprise both the multichannel receiver circuit such as described above and a DVR, it would have been obvious to modify Pugel to co-locate the television receiver circuit and a DVR into the same device because it would allow for a more feature-filled device and would be more

cost-efficient. Ex. 1202, ¶ 120. Pugel provides an express teaching that “[m]any PVR's include the ability to tune one or more channels for viewing, while simultaneously tuning one or more additional channels for recording to a recording medium.” Ex. 1224, [0005]; Ex. 1202, ¶ 121. It would have been obvious to a POSITA that a DVR for tuning and recording multiple channels, as taught by Pugel, could be implemented using the multichannel receiver circuit, including a tuner as also taught by Pugel. Ex. 1202, ¶ 121. Nothing in Pugel forecloses that a DVR and receiver circuit could be co-located. Ex. 1202, ¶¶ 120-121. And co-locating the bundled receiver circuit/DVR device would still be consistent with Pugel’s other teachings, as the device could then send additional tuned signals to other devices (e.g., receivers or other DVRs) throughout the home. See Ex. 1224, [0049]; Ex. 1202, ¶¶ 120-121. This would have the benefit of being more cost-efficient for the consumer, as the consumer could buy a bundled receiver circuit/DVR device to start, and they may purchase further devices in their home compatible with the receiver circuit later. Ex. 1202, ¶¶ 120-122.

This would be nothing more than applying a known technique (incorporating a tuner into a DVR, as taught by Pugel) to a known device (Pugel’s receiver circuit) ready for improvement to yield predictable results (a single device with DVR and multichannel tuning functionality, as taught by Pugel). Ex. 1202, ¶ 121. A POSITA would have a reasonable expectation of success, as Pugel expressly teaches DVRs

incorporating tuners, and co-locating both elements into a single device would have been well within the skill of a POSITA. Ex. 1202, ¶¶ 120-121.

Thus, claim 25 is anticipated and rendered obvious by Pugel. Ex. 1202, ¶¶ 95-122.

2. Independent Claim 51

Elements [51A]-[51F] are anticipated or rendered obvious by Pugel. Ex. 1202, ¶¶ 123-127.

a. [51A]-[51E]

Elements [51A]-[51E] are identical to Elements [25A]-[25E]. Ex. 1202, ¶ 124. Elements [51A]-[51E] are thus disclosed and/or taught as obvious by Pugel for the same reasons discussed above with respect to Elements [25A]-[25E]. *See* Section VII.A.1.a-e, *supra*; Ex. 1202, ¶ 124.

b. [51F] “configuring at least some of the plurality of desired channels as an output for a picture-in-picture display.”

Pugel discloses that its system is designed to support a television displaying multiple channels on the same television using a picture-in-picture (PiP) display. Ex. 1224, [0005], [0048]-[0049]; Ex. 1202, ¶ 125. Pugel teaches that PiP utilizes support for the simultaneous reception of multiple television channels. *Id.* And a POSITA would have understood that an advantage of Pugel’s multichannel receiver is that it supports the output of multiple television channels to support such a PiP system when “traditional solutions lack the flexibility required.” Ex. 1224, [0005]; Ex. 1202,

¶ 125. Thus, Pugel discloses configuring desired channels as an output for a PiP display. Ex. 1202, ¶ 125.

To any extent it is asserted that Pugel does not explicitly disclose Element [51F], it would have been obvious to modify Pugel in view of Pugel's express teachings that a device, such as Pugel's multichannel receiver circuit, would be configured to output a plurality of desired channels for use in a PiP display in the home. Ex. 1202, ¶ 126. A POSITA would understand the benefits of such a configuration because it would support the display of PiP material from the tuner, as taught by Pugel. Ex. 1202, ¶ 126. This would have been nothing more than applying a known technique (generation of multiple data streams for PiP display) to a known device (Pugel's receiver circuit) ready for improvement to yield predictable results (the output of the receiver circuit could be used for PiP display). Ex. 1202, ¶ 126. A POSITA would have a reasonable expectation of success, as Pugel's multichannel receiver circuit is designed to output a plurality of desired channels, and any necessary modification would have been well within the skill of a POSITA. Ex. 1202, ¶ 126.

Thus, claim 51 is anticipated and rendered obvious by Pugel. Ex. 1202, ¶¶ 125-127.

3. Dependent Claims 26, 52

[26/52] "The method of claim [25/51], wherein the method comprises: communicating the input signal from a cable network connector to

the wideband ADC via at least one of an analog amplifier and an analog filter.”

Pugel teaches “a cable network connector” comprising an input coupler 101 for a multichannel analog RF input signal, and optionally a splitter 102, that connects the input signal to a plurality of amplifier-filter circuits (**red**), which in turn connect to a plurality of ADCs (**gold**). Ex. 1224, [0025]-[0026], [0042]-[0044], Figs. 1-2; Ex. 1202, ¶ 130. The amplifier-filter circuits comprise at least one “analog amplifier” (e.g., amplifier 201) and at least one “analog filter” (e.g., bandpass filter 202). *Id.* The contents of Pugel’s Amp/Filter Bank in Figure 1 are shown in Pugel’s Figure 2. Ex. 1202, ¶ 130.

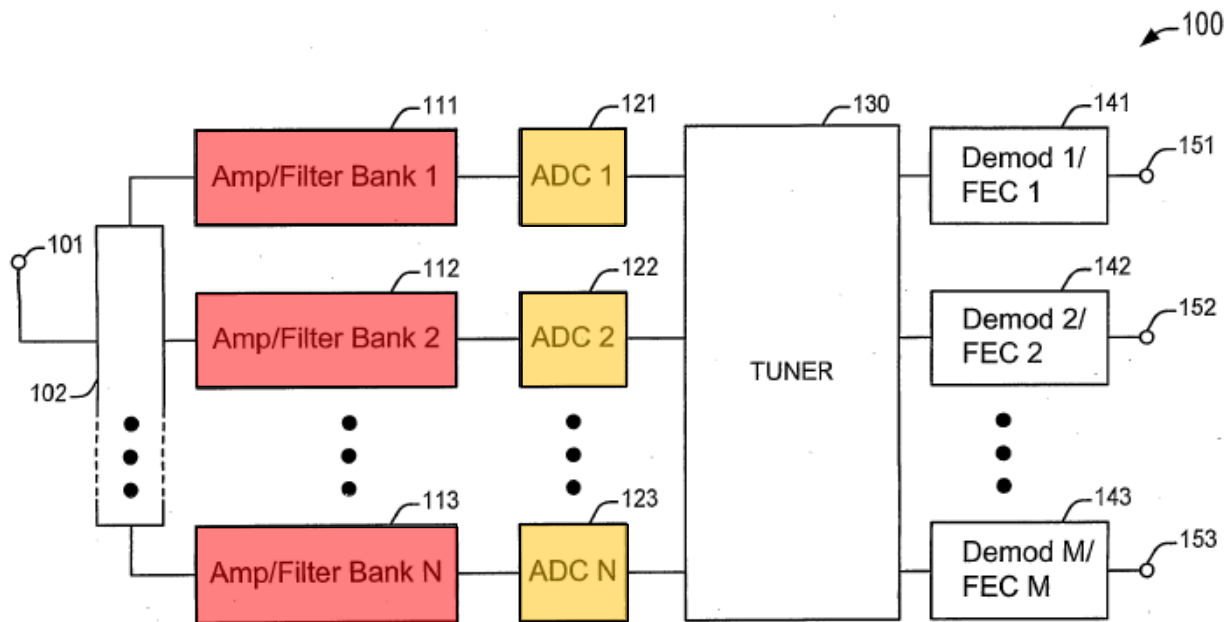


FIG. 1

Ex. 1224, Fig. 1 (annotated)

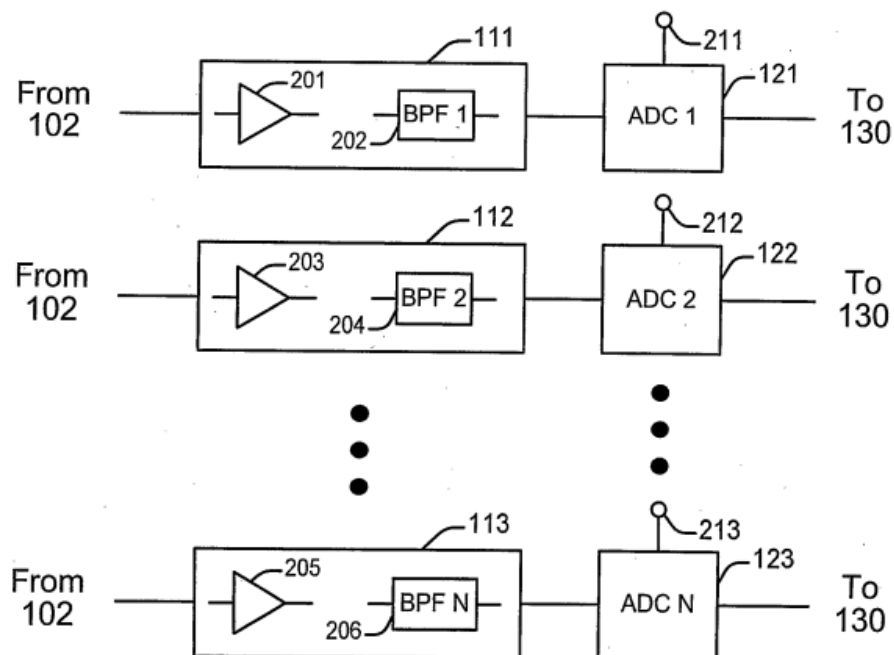


FIG. 2

Ex. 1224, Fig. 2.

4. Dependent Claims 31, 57

[31/57] “The method of claim [25/51], wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, a desired channel, of the plurality of desired channels.”

Pugel discloses these additional features. The input to Pugel’s multichannel receiver circuit corresponds to all received television channels, including desired and undesired television channels. Ex. 1224, Abstract, [0001], [0008]-[0009], [0011], [0022], [0028], [0036]-[0044], [0048]-[0049], Fig. 3; Ex. 1202, ¶ 133. Pugel teaches the digital tuner 130 comprising a channel selector 315 for selecting channels to be demultiplexed, wherein a channel selected by the digital tuner is desired, and a channel unselected by the digital tuner is undesired. *Id.* This is consistent with the

use of “desired” and “undesired” in the ’206 Patent. Ex. 1201, Abstract, 1:40-45, 3:25-56, 4:38-53, 5:56-65, 6:3-15, 6:53-63, 7:10-19; Ex. 1202, ¶ 133.

Pugel teaches that the selected, demultiplexed channels output from digital tuner 130 are then received by one or more demodulators 141-143 (blue), which demodulates each selected (“desired”) channel of the selected channels (“the plurality of desired channels”) using a variety of demodulation techniques including quadrature amplitude modulation (QAM) or quadrature phase shift keying demodulation (QPSK). Ex. 1224, [0027], [0039]-[0040], [0046], Figs. 1, 3, 4; Ex. 1202, ¶¶ 134-135. For example, “a first demodulator 301 may be configured to perform [QAM] demodulation of digital cable television signals.” Ex. 1224, [0040]; Ex. 1202, ¶ 135.

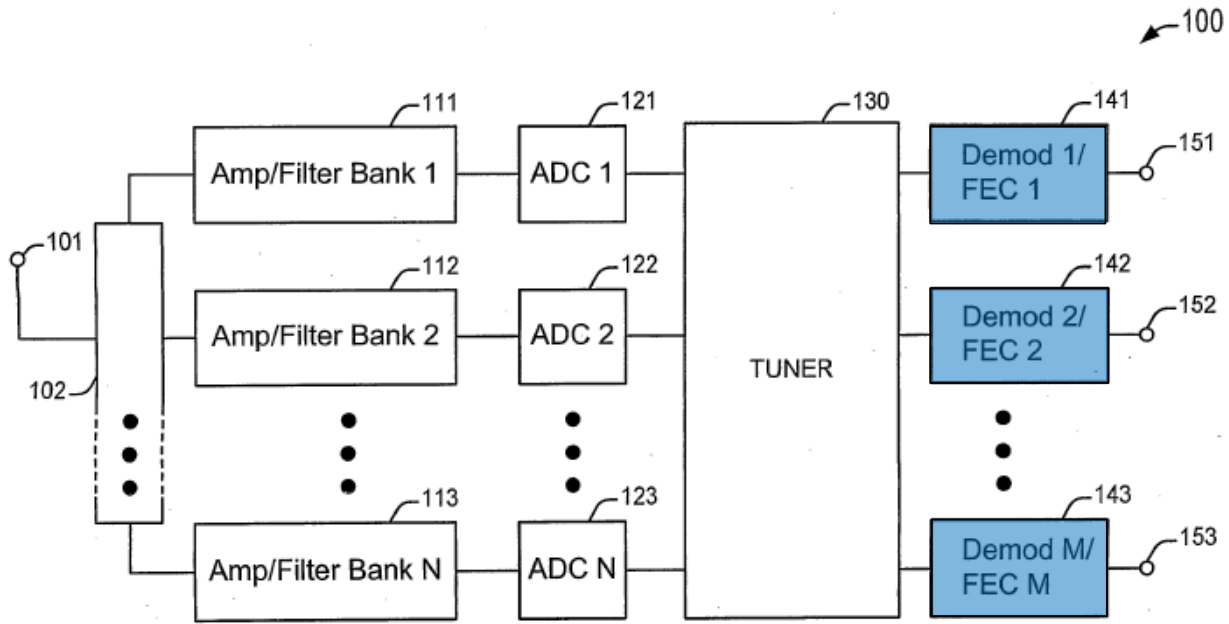


FIG. 1

Ex. 1224, Fig. 1 (annotated)

Pugel teaches that the digital tuner 130 “may perform coding, decoding, scrambling, descrambling, rotating, and/or derotating operations prior to passing the digital channel signals to demodulation circuits 141, 142, 143.” Ex. 1224, [0039]; Ex. 1202, ¶ 136. Thus, the digital tuner outputs desired digital channel signals to one or more demodulators operable to demodulate the desired channels. Ex. 1202, ¶ 136. The demodulated signal is then provided as a digital channel output at one or more output couplers 151-153. Ex. 1224, [0010]-[0012], [0027] [0039]-[0041], [0046], Figs. 3-4; Ex. 1202, ¶ 136.

Regarding the number of demodulators, while Figure 1 shows multiple demodulators, Pugel expressly teaches that “the present invention is not so limited and any number of ... demodulator circuits may be used in accordance with the present invention.” Ex. 1224, [0023]; Ex. 1202, ¶ 137. Moreover, Pugel expressly teaches that “the number (1 . . . M) of demodulator circuits provided is not necessarily related to the number (1 . . . N) of amplifier-filter circuits and/or analog-to-digital converters provided.” Ex. 1224, [0023], [0027], [0040]; Ex. 1202, ¶¶ 137-138.

5. Dependent Claims 35, 61

[35/61] “The method of claim [25/51], wherein: the plurality of desired channels comprises at least one cable broadcast channel.”

Pugel discloses these additional features. Ex. 1202, ¶¶ 139-140. Pugel’s system is “sufficient for satisfactorily processing digital television signals and associated signals intended for end users in a conventional cable television broadcast system.” Ex. 1224, [0036], [0033]-[0037], [0044]-[0045]; Ex. 1202, ¶ 140. This includes tuning desired channels comprising at least one cable broadcast channel. Ex. 1224, [0037]-[0039], [0045]; Ex. 1202, ¶ 140.

6. Dependent Claim 37

[37] “The method of claim 25, wherein the method comprises: configuring at least some of the plurality of desired channels as an output for a picture-in-picture display.”

Claim 37 recites the identical limitation as in Elements [51F], and thus, this claim is anticipated and rendered obvious by Pugel (grounds A0 and A1) for the same reasons discussed above with respect to its base claim 25, and for Pugel’s additional teaching of picture-in-picture feature as described above with respect to Element [51F]. *See* Sections VII.A.1-2, *supra*; Ex. 1202, ¶¶ 141-142.

7. Dependent Claim 63

[63] “The method of claim 51, wherein: the method is performed by a device comprising a digital video recorder (DVR).”

Claim 63 recites the identical limitation as Element [25F], and thus, this claim is disclosed and rendered obvious by Pugel (grounds A0 and A1) for the same reasons discussed above with respect to its base claim 51, and for Pugel’s additional teaching of a DVR as described above with respect to Element [25F]. *See* Sections VII.A.1-2, *supra*; Ex. 1202, ¶¶ 143-144.

B. Ground B: Pugel-Crols

Pugel in view of Crols renders obvious claims 27-28, 30, 38, 39-41, 43-44, 48, 50, 53-54, 56, 64, 65-67, 69-70, 74, and 76. Ex. 1202, ¶¶ 145-186.

1. Independent Claim 38

Elements [38A]-[38E] are rendered obvious by Pugel in view of Crols. Ex. 1202, ¶¶ 146-160.

a. [38A] “A method comprising:”

Element [38A] is similar to Element [25A], and is disclosed by Pugel for the same reasons discussed above with respect to Element [25A]. *See* Section VII.A.1.a, *supra*; Ex. 1202, ¶ 147.

b. [38B] “receiving an input signal from a cable network;”

Element [38B] is identical to Element [25B], and thus disclosed by Pugel for the same reasons discussed above with respect to Element [25B]. *See* Section VII.A.1.b, *supra*; Ex. 1202, ¶ 148.

c. [38C] “digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels;”

Element [38C] is substantially similar to Element [25C], differing only in that Element [38C] lacks a requirement for “all received channels [that exist] in the input signal” to be comprised in “a contiguous band of frequencies.” Ex. 1202, ¶¶ 149-150. Pugel thus discloses Element [38C] for the same reasons discussed above with respect to Element [25C]. *See* Section VII.A.1.c, *supra*; Ex. 1202, ¶¶ 149-151.

d. [38D] “digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs,”

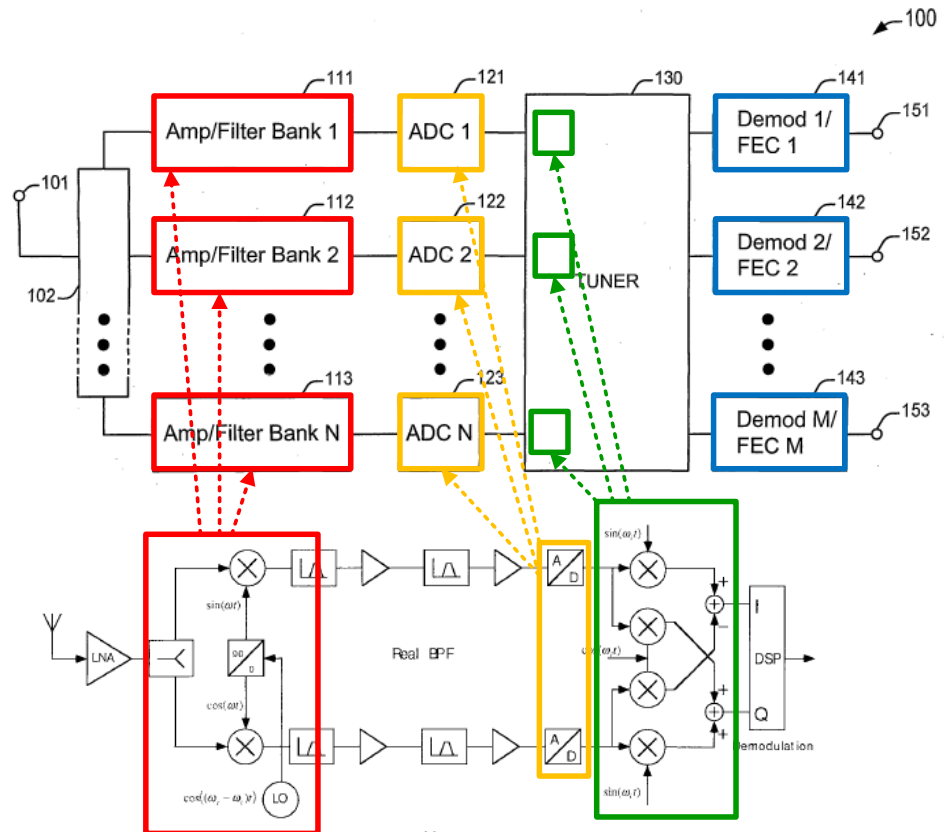
As explained in Section VII.A.1.d for limitation [25D], Pugel discloses a digital tuner 130 for selecting digital channels. Ex. 1202, ¶ 153. Pugel also teaches that the DFE or digital down converter comprises one or more demodulators. *Id.* ¶

155; *see also* Section VII.A.4, *supra*. The digital tuner 130 or demodulators may comprise “circuitry for providing additional functions, for example adaptive filters for removing multi-path propagation effects.” Ex. 1224, [0041]. Pugel teaches that the additional functions include “coding, decoding, scrambling, descrambling, rotating, and/or derotating operations prior to passing the digital channel signals to demodulation circuits.” Ex. 1224, [0039]. A POSITA would have understood this to provide an express teaching of modifying Pugel to perform digital downconversion as claimed, because the claims of Pugel provide an express teaching that the digital tuner 130 may itself perform downconverting of digital signals to generate a plurality of digital channel outputs. Ex. 1224, claims 14-15, 18, 20-21; Ex. 1202, ¶ 154.

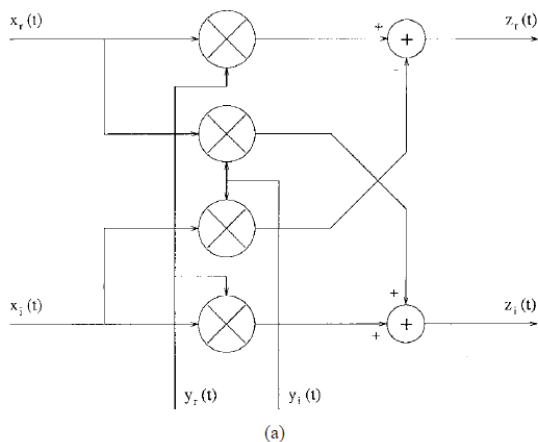
To any extent it is asserted that Pugel does not teach or suggest implementation details regarding using a complex mixer to perform downconverting at the digital tuner to generate a plurality of digital channel outputs, this would have been obvious to a POSITA in view of Crols. Ex. 1202, ¶¶ 155-157. Crols discloses a complex mixer for processing digital signals output by the ADC. The figures of Pugel and Crols relate as follows, with the corresponding mixer in **green**:

Ex. 1224, FIG. 1
(annotated)

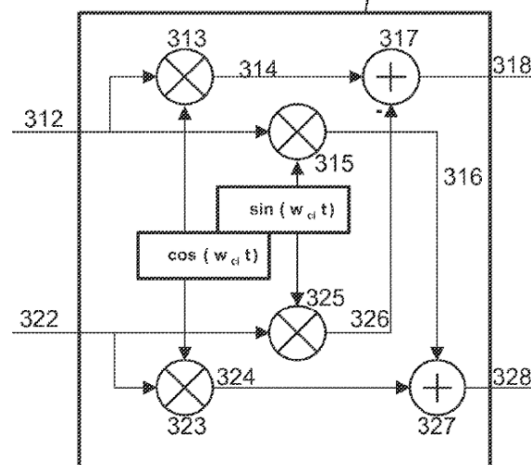
Ex. 1225, FIG. 22
(annotated)



Ex. 1202, ¶ 157. As Crols explains and illustrates, the circuitry outlined in green is a “complex mixer” that is utilized to perform downconversion of the selected (e.g., “desired”) channels received by the digital tuner 130. Ex. 1225, pp. 273-274, 279-280, Figs. 8(a), 21-22; Ex. 1234, pp. 46-47, 75, Fig. 3.3; Ex. 1202, ¶ 157. Crols’s complex mixer has the identical structure and performs the identical downconversion (i.e., shifting the frequency of in-phase and quadrature components of the digital complex input signal) as mixer 300 shown in Figure 3 of the ’206 Patent. *Compare* Ex. 1225, pp. 273-274, 279-280, Figs. 8(a), 21-22, *with* Ex. 1201, 6:28-46, 9:42-47, Fig. 3; *see also* Ex. 1234, p. 63; Ex. 1202, ¶ 158.



Ex. 1225, Fig. 8(a)



Ex. 1201, Fig. 3 (excerpted)

It would have been obvious to a POSITA that Pugel's digital tuner 130 would incorporate a complex mixer for downconversion as taught by Crols in view of Pugel's express teachings that its digital tuner 130 employs downconversion. Ex. 1224, [0039], claims 14-15, 18, 20-21; Ex. 1202, ¶ 159. A POSITA looking to implement downconversion would have turned to techniques known to the art, such as taught by Crols. Ex. 1202, ¶ 159. Even if not expressly taught, such an implementation would have been obvious to try, as Crols's complex mixer topology is one of a finite number of identified, predictable solutions to implement downconversion in digital circuitry, such as a digital tuner. *Id.* A POSITA would have had a reasonable expectation of success given the express teachings in Pugel to turn to other systems, Crols's detailed descriptions of the operational effectiveness

of its topologies, and the POSITA's own familiarity with known receiver circuit topologies in the art. *Id.*

Thus, Pugel in view of Crols teaches [38D]. Ex. 1202, ¶¶ 152-159.

e. [38E] “wherein the method is performed by a device comprising a digital video recorder (DVR).”

Element [38E] is identical to Element [25F], and thus disclosed by Pugel for the same reasons discussed above with respect to Element [25F]. *See* Section VII.A.1.b, *supra*; Ex. 1202, ¶ 160.

Accordingly, claim 38 is rendered obvious by Pugel in view of Crols. Ex. 1202, ¶¶ 146-160.

2. Independent Claim 64

Elements [64A]-[64E] are rendered obvious by Pugel in view of Crols. Ex. 1202, ¶¶ 161-163.

a. [64A]-[64D]

Elements [64A]-[64D] are identical to Elements [38A]-[38D], and thus elements [64A]-[64D] are disclosed by Pugel, or taught by Pugel in view of Crols, for the same reasons discussed above with respect to Elements [38A]-[38D]. *See* Sections VII.B.1.a-d, VII.A.1.a-d, *supra*; Ex. 1202, ¶ 162.

b. [64E]

Element [64E] is identical to Element [51F], and thus disclosed or taught by Pugel for the same reasons as discussed above with respect to Element [51F]. *See* Section VII.A.2.b, *supra*; Ex. 1202, ¶ 163.

Accordingly, claim 64 is rendered obvious by Pugel in view of Crols. Ex. 1202, ¶¶ 162-163.

3. Dependent Claims 39, 65

[39/65] “The method of claim [38/64], wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.”

Claims 39 and 65 recite identical additional limitations as those in claims 26 and 52, and thus, Pugel teaches the additional limitations of claims 39 and 65 for the same reasons discussed above. *See* Section VII.A.3, *supra*; Ex. 1202, ¶ 164.

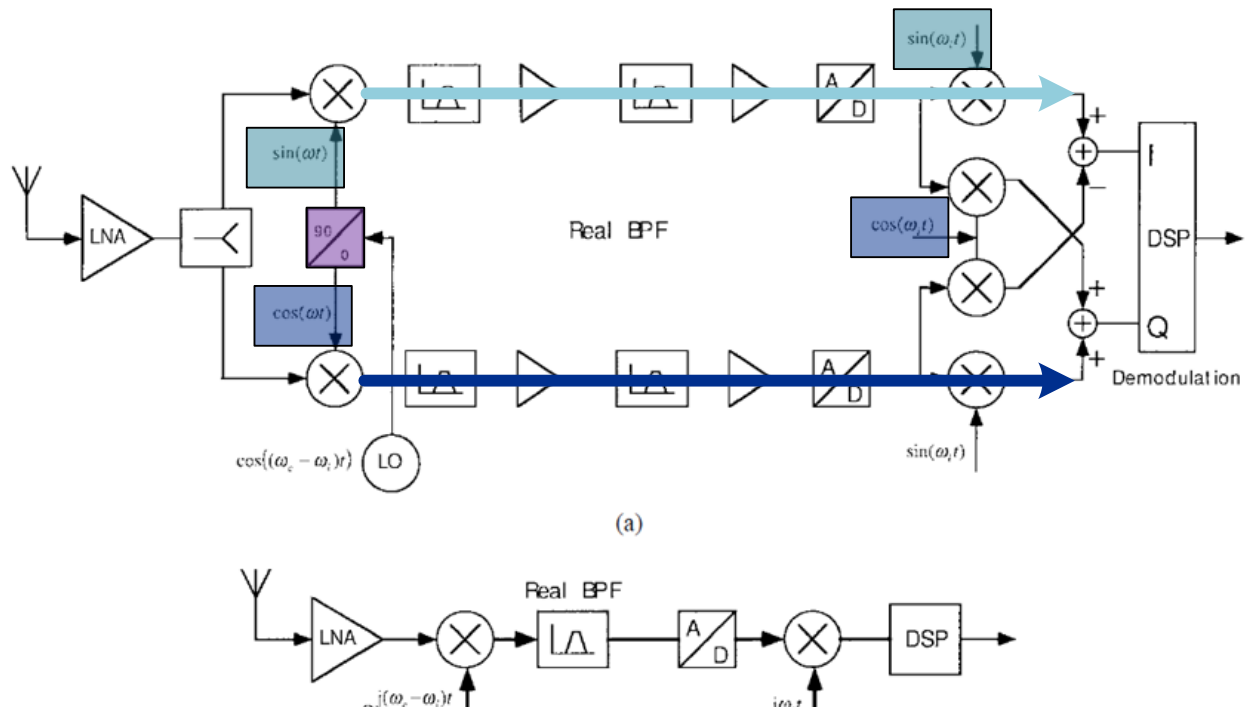
4. Dependent Claims 27, 40, 53, 66

[27/53] “The method of claim [25/51], wherein the method comprises: generating, via each mixer of a plurality of mixers, a complex signal corresponding to each of the plurality of desired channels, and wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.”

[40/66] “The method of claim [38/64], wherein: digitally down converting comprises generating a corresponding complex signal for each of the plurality of desired channels, and wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.”

Pugel-Crols teaches a digital tuner comprising a plurality of mixers for the reasons discussed above in Section VII.B.1.c. Ex. 1202, ¶ 166. Further, Pugel-Crols

teaches that the resultant complex mixers generate complex signals comprising in-phase and quadrature signals. Ex. 1202, ¶ 166. Crols teaches the generation of a “complex signal” for each channel (the claimed “each of the plurality of desired channels”) comprising an in-phase signal (shown as “0” in the mixed signal below, **purple**, or as the “cos” component of the signal, **dark blue**) and a quadrature signal (shown as “90” in the mixed signal below, **purple**, or as the “sin” component of the signal, **light blue**). Ex. 1225, pp. 277 (“Quadrature oscillators often use an *RC-CR* circuit to obtain the 90° phase shift. The phase shift is a result of comparing the phase shift of a pole and a zero.”), 279, 281-282; *see* Ex. 1234, pp. 42-43, 65-67; Ex. 1202, ¶ 166.



Ex. 1225, Fig. 22 (annotated)

As stated above, it would have been obvious to a POSITA to modify Pugel's receiver circuit to implement mixers, such as taught by Crols. *See* Section VII.B.1.d, *supra*. Further, in doing so, a POSITA would have understood that Pugel teaches the use of QAM or QPSK demodulation, and that in-phase and quadrature signals are used in those modulation schemes. Ex. 1202, ¶ 167; Ex. 1224, [0040]. Thus, applying Crols's topologies comprising mixer modules to Pugel's receiver circuits would have been nothing more than applying a known technique (generating in-phase and quadrature signals) to improve a known device (Pugel's receiver which performs QAM or QPSK demodulation) ready for improvement to yield predictable results (the resulting implementation of Pugel-Crols would be capable of performing

QAM or QPSK modulation as taught by Pugel). Ex. 1202, ¶ 167. A POSITA would have had a reasonable expectation of success given the express teachings in Pugel to turn to other systems, Crols's detailed descriptions of the operational effectiveness of its topologies, and the POSITA's own familiarity with known receiver circuit topologies in the art. Ex. 1202, ¶ 159, 167.

Thus, the combination of Pugel and Pugel-Crols teach claims 27, 40, 53, and 66 for the same reasons discussed above with respect to their base claims 25, 38, 51, and 64, and further based on the additional teachings of Crols as discussed above. See Sections VII.A.1-2, VII.B.1-2, *supra*; Ex. 1202, ¶¶ 165-168.

5. Dependent Claims 28, 41, 54, 67

[28/41/54/67] “The method of claim [27/40/53/66], wherein: the I and Q components of each corresponding complex signal are at baseband.”

Pugel in view of Crols teaches generating a corresponding complex signal comprising an I component and a Q component for the reasons discussed above in Section VII.B.4. Ex. 1202, ¶ 170. Crols further teaches that the resulting I and Q components of Pugel-Crols are at baseband. Ex. 1225, pp. 269, 279-280; Ex. 1202, ¶ 170. Crols states that “[i]t will be presumed that the demodulation is preferably done with a DSP at baseband.” Ex. 1225, p. 269. For example, concerning Crols's Figures 21-22, Crols teaches that “[t]he final downconversion of the wanted signal to the baseband can then be done by multiplication with a sine.” Ex. 1225, p. 279.

To any extent it is asserted that Pugel in view of Crols does not explicitly disclose I and Q components of each complex signal at baseband, it would have been obvious to implement Pugel-Crols's system to support a DSP demodulating at baseband based on Crols's express teachings. Ex. 1202, ¶ 171. Specifically, downconverting a signal to baseband would be obvious to a POSITA because of the express teachings in Pugel-Crols, including recitations of downconversion in the claims of Pugel, and Crols's disclosure of converting to baseband. Ex. 1202, ¶¶ 171-172; Ex. 1224, claims 14-15, 18, 20-21; Ex. 1225, pp. 269, 279-280. It would have been obvious from Pugel's and Crols's express teachings (regarding downconversion in Pugel, and that signals should be at baseband for demodulation in Crols) to use well-known techniques of downconversion to baseband to implement the system of Pugel-Crols. Ex. 1202, ¶¶ 171-172. At most, this would have been nothing more than applying a known technique (downconversion to baseband as taught by Pugel and Crols) to a known device (Pugel's multichannel receiver circuit) ready for improvement to yield predictable results (a signal at baseband as taught by Crols). Ex. 1202, ¶ 172. A POSITA would have had a reasonable expectation of success, as downconversion was well-known in the art as evidenced by Pugel and Crols. *Id.*

Thus, the combination of Pugel-Crols teaches claims 28, 41, 54, and 67 for the same reasons discussed above with respect to their base claims 27, 40, 53, and

66, and further based on the additional teachings of Crols as discussed above. *See* Section VII.B.4, *supra*; Ex. 1202, ¶¶ 169-173.

6. Dependent Claims 44, 70

[44/70] “The method of claim [38/64], wherein the method comprises: demodulating each digitally down converted, desired channel to generate a plurality of demodulated channels.”

Pugel teaches demodulating desired channels for the reasons discussed above in Section VII.A.4. Ex. 1202, ¶¶ 132-138, 174-178. Pugel-Crols further teaches that the demodulated signals are further digitally down converted for the reasons discussed above in Sections VII.B.1-2. Ex. 1202, ¶¶ 175-177. Pugel-Crols thus teaches the additional limitations of claims 44 and 70. Ex. 1202, ¶¶ 174-178.

7. Dependent Claim 30, 43, 56, 69

[30/56] “The method of claim [27/53], wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, the corresponding complex signal to generate a demodulated signal as a desired channel output.”

[43/69] “The method of claim [40/66], wherein the method comprises: demodulating the corresponding complex signal to provide a demodulated channel as a digital channel output.”

Claims 30, 43, 56, and 69 recite identical limitations to claims 31, 44, 57, and 70, respectively, except that “a desired channel, of the plurality of desired channels” in claims 31 and 57 and “each digitally down converted, desired channel to generate a plurality of demodulated channels” in claims 44 and 70 are replaced in claims 30,

43, 56, and 69 with “the corresponding complex signal to [generate/provide] a demodulated [signal/channel] as a [desired/digital] channel output.” Ex. 1202, ¶ 180.

As discussed above with respect to claims 31, 44, 57, and 70, Pugel and Pugel-Crols disclose or teach the claimed “demodulating” and “plurality of demodulators.” *See* Sections VII.A.4, VII.B.6, *supra*; Ex. 1202, ¶ 180. Moreover, as discussed above with respect to claims 27-28, 40-41, 53-54, and 66-67, a POSITA would have understood that the complex mixer of Pugel-Crols outputs a complex signal, which Pugel’s demodulators 141-143 would receive. *See* Sections VII.B.4-5, *supra*; Ex. 1202, ¶ 180.

A POSITA would have understood that Pugel’s demodulators would have been designed to demodulate such signals. Ex. 1202, ¶¶ 44, 55, 180. For example, Pugel discloses that the demodulators may perform QAM demodulation of digital cable television signals, and QAM demodulation utilizes complex signals comprising in-phase and quadrature components. Ex. 1224, [0040]; Ex. 1202, ¶¶ 44, 55, 180. To any extent this is not explicitly disclosed, it would have been obvious to implement Pugel’s demodulators to receive a complex signal to enable the performance of QAM demodulation based on Pugel’s express teachings. Ex. 1202, ¶¶ 44, 55, 180.

Applying Crols’s topologies comprising complex signals to Pugel’s receiver circuits would have been nothing more than applying a known technique (generating

in-phase and quadrature signals) to improve a known device (Pugel's receiver which performs QAM or QPSK demodulation) ready for improvement to yield predictable results (the resulting implementation of Pugel-Crols would be capable of performing QAM or QPSK modulation as taught by Pugel). Ex. 1202, ¶ 180.

Thus, the combination of Pugel-Crols teaches claims 30, 43, 56, and 69 for the same reasons discussed above with respect to their base claims 27, 40, 53, and 66, and further based on the additional teachings of Crols as discussed above. *See* Section VII.B.4, *supra*; Ex. 1202, ¶¶ 179-181.

8. Dependent Claims 48, 74, 76

Claims 48, 74, and 76 recite identical additional limitations as those in claims 35, 61, and 63, respectively, and thus Pugel teaches the additional limitations of claims 48, 74, and 76 for the same reasons discussed above in Sections VII.A.5 and VII.A.7. Ex. 1202, ¶¶ 182-184.

9. Dependent Claim 50

[50] “The method of claim 38, wherein the method comprises: providing a picture-in-picture display signal according to the plurality of digital channel outputs.”

As discussed above regarding Element [51F], Pugel discloses providing display signals for use in a picture-in-picture display. *See* Section VII.A.2.b, *supra*. Thus, claim 50 is rendered obvious by Pugel in view of Crols for the same reasons discussed above with respect to its base claim 38, and for Pugel's additional teaching of providing a digital signal for use in a picture-in-picture display as described above

with respect to Element [51F]. *See* Sections VII.A.2.b, VII.B.1, *supra*; Ex. 1202, ¶¶ 185-186.

C. Ground C: Pugel-Chandrakasan

Pugel in view of Crols renders obvious claims 1, 2, 7-9, 11-12, 32-34, 58-60. Ex. 1202, ¶¶ 187-214.

1. Independent Claim 1

Elements [1A]-[1E] are rendered obvious by Pugel in view of Chandrakasan. Ex. 1202, ¶ 188.

a. [1A]-[1D]

Elements [1A]-[1D] are identical to Elements [25A]-[25D], and thus are disclosed by Pugel for the same reasons discussed above with respect to Elements [25A]-[25D]. *See* Sections VII.A.1.a-d, *supra*. Ex. 1202, ¶ 189.

b. [1E] “providing the plurality of desired channels via a serial interface.”

Element [1E] differs from Element [25E], in that it additionally recites “via a serial interface.” *See* Section VII.A.1.e, *supra*; Ex. 1202, ¶ 190. Except for that element, [1E] is thus disclosed by Pugel for the same reasons discussed above with respect to Element [25E]. *See* Section VII.A.1.e, *supra*; Ex. 1202, ¶ 190. As explained above, Pugel teaches a digital tuner 130 in communication with one or more modulators 141-143. *See* Sections VII.A.1.d-e, VII.A.4, *supra*. But Pugel is silent with regard to how its selected channels may be output from the digital tuner

130 to the demodulators (e.g., such as by using a commonly-known serial interface or parallel interface). Ex. 1202, ¶ 190.

However, as the '206 Patent concedes, outputting a digital data stream via serial and parallel interfaces were “commonly known methods,” i.e., Applicant Admitted Prior Art (AAPA). Ex. 1201, 7:10-14; Ex. 1202, ¶ 191. Indeed, as explained in dictionaries, basic text books and technical papers on digital integrated circuit design at the time, a POSITA would have understood that using these two interfaces were common options for outputting data in standard integrated circuits. Ex. 1202, ¶¶ 191-194.

At the most fundamental level, a digital integrated circuit represents data as binary units (referred to as “bits”) in the form of electrical signals on wires (e.g., high and low voltages for binary values “1” and “0” respectively). Ex. 1202, ¶ 195; Ex. 1216, pp. 23-24, 27-29, 31-34, 48-51. Pugel teaches that its ADCs output digital signals at varying resolutions with differing numbers of bits. Ex. 1224, [0036]; Ex. 1202, ¶ 195. To output multiple bits (e.g., as a “digital datastream”), the circuit can either transmit the bits over multiple separate wires, one wire for each bit, which was known as a “parallel interface,” or the circuit can transmit the set of bits one at a time as sequential pulses over a single wire, according to a fixed sequence, which was known as a “serial interface.” Ex. 1202, ¶ 195; Ex. 1215, pp. 5-6, 8; Ex. 1216, pp. 79-80, Fig. 6-25.

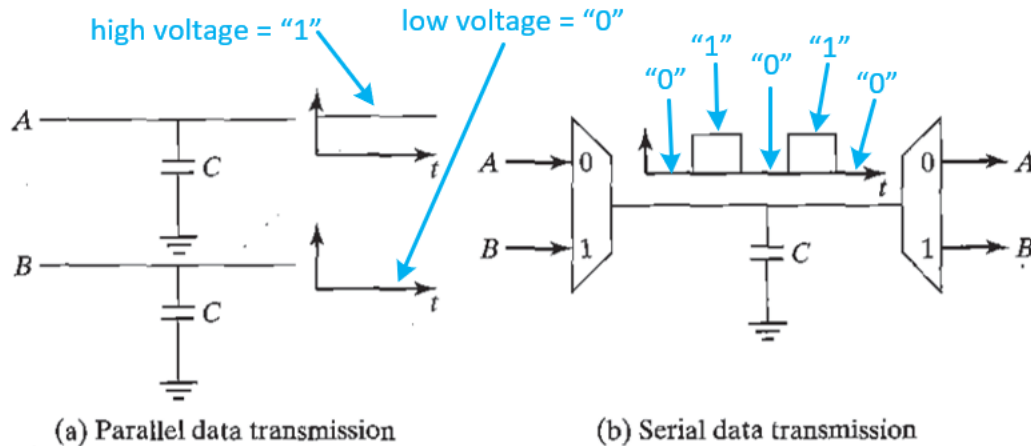


Figure 6-25 Parallel versus time-multiplexed data busses.

Ex. 1216, p. 80 (Fig. 6-25) (annotated)

Implementing Pugel's data interface as an output from a demodulator using either option would have been obvious as design choices, because both were "commonly known methods" as Applicant admits and as shown in the background art that demonstrates such interfaces where known and used by POSITAs in integrated circuit designs at the time. Ex. 1202, ¶ 196; Ex. 1214, 30:31-42, 31:15-22; Ex. 1215, pp. 5-6, 8; Ex. 1216, pp. 79-80; Ex. 1217, pp. 354-355. For the same reasons, implementing serial and parallel interfaces would have been well within the POSITA's skillset, and thus, a POSITA which would have had a high expectation of success leading to a predictable result. Ex. 1202, ¶ 196.

In addition to the AAPA acknowledging that serial and parallel interfaces were commonly known, each of the background references cited above is prior art and teaches why a POSITA would apply parallel and serial interfaces to Pugel's

digital design. Ex. 1202, ¶ 196; Ex. 1214, 30:31-42, 31:15-22; Ex. 1216, pp. 79-80; Ex. 1217, pp. 354-355.

For example, Chandrakasan, an article on “Ultra Low Power Digital Signal Processing,” teaches that both serial (referred to in Chandrakasan as “time-multiplexed”) and parallel interfaces such as those illustrated in Figure 6-25 above were used in integrated circuits. Ex. 1217, p. 355; Ex. 1216, pp. 79-80; Ex. 1202, ¶ 197. Specifically, Chandrakasan teaches that time-multiplexing (e.g., a serial interface) is often used “due to area constraints or if very high-throughput is not the goal,” but that “[g]iven that there is a choice between time-multiplexed and fully-parallel architectures ... an important question which arises is what architecture will result in the lowest switching activity.” Ex. 1217, p. 355; Ex. 1202, ¶ 197. Minimizing circuit area minimizes the cost of the integrated circuit, while minimizing the switching activity minimizes the power consumed by the integrated circuit. Ex. 1217, pp. 355-357. Thus, Chandrakasan teaches selecting between serial and parallel interfaces for transmitting digital data between two points, both of which have advantages over each other, depending upon area and power constraints and the temporal correlation between the signals. Ex. 1202, ¶ 197.

It would thus have been obvious to apply either of parallel data or serial data communication as taught by Chandrakasan to the interconnection between Pugel’s digital tuner 130 and demodulators 141-143 because a known, useful interface would

facilitate better and more reliable data transmission. Ex. 1202, ¶ 198. Pugel teaches sending a digital RF signal, and the use of parallel or serial data interfaces as taught in Chandrakasan would have enabled such transmission. Ex. 1224, [0038]-[0041], [0045]-[0046]; Ex. 1217, pp. 354-356; Ex. 1202, ¶ 198.

As such, the modification of Pugel with Chandrakasan that results in a serial interface as an output from digital tuner 130 to demodulators 141-143 is nothing more than choosing from a finite number of identified, predictable solutions (using serial or parallel communications as taught by Chandrakasan and known in the art) with a reasonable expectation of success (resulting in Pugel's system implemented with either serial or parallel communication). Ex. 1202, ¶ 199.

The resultant combinations of Pugel and Chandrakasan are predictable, and a POSITA would have had a reasonable expectation of success, because Chandrakasan teaches basic techniques used by POSITAs to design integrated circuits, and because those techniques are specifically directed to overcoming specific issues, such as meeting area and power constraints, that are often necessary for a successful design. Ex. 1217, pp. 355-357; Ex. 1202, ¶ 199.

Thus, Pugel in view of Chandrakasan teaches [1E], and renders claim 1 obvious. Ex. 1202, ¶ 200.

2. Dependent Claim 2

Claim 2 recites identical additional limitations as those in claims 26 and 52, and thus, Pugel discloses the additional limitations of claim 2 for the same reasons discussed above in Section VII.A.3. Ex. 1202, ¶ 201.

3. Dependent Claim 7

Claim 7 recites identical additional limitations as those in claims 31 and 57, and thus, Pugel discloses the additional limitations of claim 7 for the same reasons discussed above in Section VII.A.4. Ex. 1202, ¶ 202.

4. Dependent Claims 8, 32, 58

[8/32/58] “The method of claim [7/31/57], wherein the method comprises: providing a plurality of demodulated channels via a parallel interface.”³

As explained above, Pugel teaches a digital tuner 130 in communication with one or more demodulators 141-143. *See* Sections VII.A.1.d, VII.A.4, *supra*; Ex. 1202, ¶ 204. And as further discussed above with respect to Element [1E], Pugel in view of Chandrakasan teaches that it would have been obvious to provide the plurality of channels as an *input* to demodulators 141-143 via a parallel or serial interface. *See* Section VII.C.1.b, *supra*; Ex. 1202, ¶ 204. Based on a similar rationale,

³ Petitioner does not concede that these limitations meet the requirements of 35 U.S.C. § 112.

it would have been obvious that the *output* of the demodulators 141-143 would be provided via a parallel interface. Ex. 1202, ¶ 204.

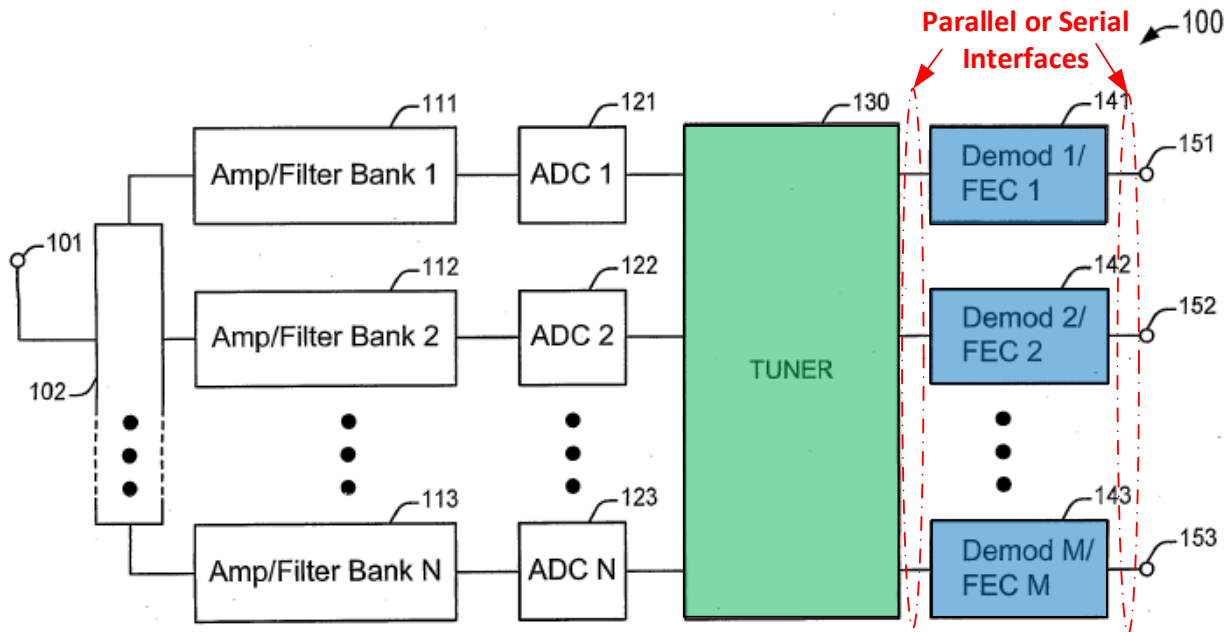


FIG. 1

Ex. 1224, Fig. 1 (annotated)

Implementing Pugel’s data interface as an output from a demodulator using either option would have been obvious as design choices, because both were “commonly known methods” as Applicant admits and as shown in the background art that demonstrates such interfaces where known and used by POSITAs in integrated circuit designs at time. Ex. 1202, ¶ 205; Ex. 1214, 30:31-42, 31:15-22; Ex. 1215, pp. 5-6, 8; Ex. 1216, pp. 79-80, Fig. 6-25; Ex. 1217, pp. 354-355; Section VII.C.1.b, *supra*. For the same reasons, implementing serial and parallel interfaces

would have been well within the POSITA's skillset, and thus, a POSITA would have had a high expectation of success leading to a predictable result. Ex. 1202, ¶ 205.

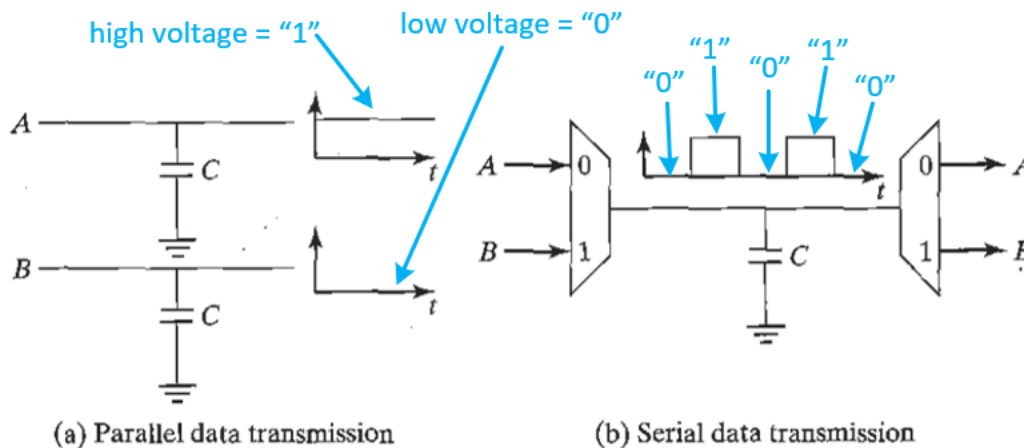


Figure 6-25 Parallel versus time-multiplexed data busses.

Ex. 1216, p. 80 (Fig. 6-25) (annotated)

Further, Chandrakasan teaches that both serial (referred to in Chandrakasan as “time-multiplexed”) and parallel interfaces such as those illustrated in Figure 6-25 above were used in integrated circuits. Ex. 1217, p. 355; Ex. 1216, pp. 79-80; Ex. 1202, ¶ 206.

It would thus have been obvious to apply either of parallel data or serial data communication as taught by Chandrakasan to the output from Pugel's demodulators 141-143 because a known, useful interface would facilitate better and more reliable data transmission. Ex. 1202, ¶ 207. Pugel teaches sending a digital RF signal, and the use of parallel or serial data interfaces as taught in Chandrakasan would have enabled such transmission. Ex. 1224, [0038]-[0041], [0045]-[0046]; Ex. 1217, pp. 354-356; Ex. 1202, ¶ 207.

As such, the modification of Pugel with Chandrakasan that results in a parallel interface as an output from demodulators 141-143 is nothing more than choosing from a finite number of identified, predictable solutions (using serial or parallel communications as taught by Chandrakasan and known in the art) with a reasonable expectation of success (resulting in Pugel's system implemented with either serial or parallel communication). Ex. 1202, ¶ 207.

The resultant combinations of Pugel and Chandrakasan are predictable, and a POSITA would have had a reasonable expectation of success, because Chandrakasan teaches basic techniques used by POSITAs to design integrated circuits, and because those techniques are specifically directed to overcoming specific issues, such as meeting area and power constraints, that are often necessary for a successful design. Ex. 1217, pp. 355-357; Ex. 1202, ¶ 207

Thus, the combination of Pugel and Chandrakasan teaches claims 8, 32, and 58 for the same reasons discussed above with respect to their base claims 7, 31, and 57, and further based on the additional teachings of Chandrakasan as discussed above. *See* Sections VII.A.4, VII.C.3, *supra*; Ex. 1202, ¶ 208.

5. Dependent Claims 9, 11, 12

Claims 9, 11, and 12 recite identical additional limitations as those in claims 35, 63, and 37, respectively, and thus Pugel discloses the additional limitations of

claims 9, 11, and 12 for the same reasons discussed above in Sections VII.A.5-7. Ex. 1202, ¶ 209.

6. Dependent Claims 33, 59

[33/59] “The method of claim [25/51], wherein the method comprises: providing the plurality of desired channels via a parallel interface.”

Claims 33 and 59 recite the same limitations as Element [1E], except that they recite a “parallel interface” rather than a “serial interface.” Ex. 1202, ¶ 210. As discussed above with respect to Element [1E], Pugel in view of Chandrakasan teaches providing the plurality of desired channels via a serial or parallel interface. Section VII.C.1.b, *supra*. It would thus have been obvious to apply either of parallel data or serial data communication as taught by Chandrakasan to the interconnection between Pugel’s digital tuner 130 and demodulators 141-143. Section VII.C.1.b, *supra*; Ex. 1202, ¶ 210. Pugel teaches sending a digital RF signal, and the use of parallel or serial data interfaces as taught in Chandrakasan would have enabled such transmission. Ex. 1224, [0038]-[0041], [0045]-[0046]; Ex. 1217, pp. 354-356; Ex. 1202, ¶ 210.

As such, the modification of Pugel with Chandrakasan that results in a parallel interface as an output from digital tuner 130 to demodulators 141-143 is nothing more than choosing from a finite number of identified, predictable solutions (using serial or parallel communications as taught by Chandrakasan and known in the art)

with a reasonable expectation of success (resulting in Pugel's system implemented with either serial or parallel communication). Ex. 1202, ¶ 211.

The resultant combinations of Pugel and Chandrakasan are predictable, and a POSITA would have had a reasonable expectation of success, because Chandrakasan teaches basic techniques used by POSITAs to design integrated circuits, and because those techniques are specifically directed to overcoming specific issues, such as meeting area and power constraints, that are often necessary for a successful design. Ex. 1217, pp. 355-357; Ex. 1202, ¶ 212.

Thus, the combination of Pugel and Chandrakasan teaches claims 33 and 59 for the same reasons discussed above with respect to their base claims 25 and 51, and further based on the additional teachings of Chandrakasan as discussed above. *See* Sections VII.A.1-2, *supra*; Ex. 1202, ¶ 213.

7. Dependent Claims 34, 60

[34/60] “The method of claim [25/51], wherein the method comprises: providing the plurality of desired channels via a serial interface.”

Claims 34 and 60 recite additional limitations identical to Element [1E], and thus Pugel in view of Chandrakasan teaches the additional limitations of claims 34 and 36 for the same reasons discussed above in Section VII.C.1.b. Ex. 1202, ¶ 214.

D. Ground D: Pugel/Crols/Chandrakasan

Pugel in view of Crols and further in view of Chandrakasan renders obvious claims 3-4, 6, 13-16, 18-21, 23-24, 45-47, and 71-73. Ex. 1202, ¶¶ 215-227.

1. Independent Claim 13

a. [13A]-[13D]

Elements [13A]-[13D] are identical to Elements [38A]-[38D], and thus are disclosed by Pugel or taught by Pugel in view of Crols for the same reasons discussed above with respect to Elements [38A]-[38D]. *See* Section VII.B.1.a-d, *supra*; Ex. 1202, ¶ 217.

b. [13E] “providing the plurality of desired channels via a serial interface.”

Element [13E] is identical to Element [1E], and Pugel in view of Chandrakasan teaches the additional limitations for the same reasons discussed above with respect to Element [1E]. *See* Section VII.C.1.b, *supra*; Ex. 1202, ¶ 218. Modifying Pugel in view of Crols further in view of Chandrakasan would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.B.1.a-d, VII.C.1.b, *supra*; Ex. 1202, ¶ 218.

Accordingly, claim 13 is rendered obvious by Pugel-Crols-Chandrakasan.

2. Dependent Claim 14

Claim 14 recites identical additional limitations as those in claims 26 and 52, and thus, Pugel discloses the additional limitations of claim 14 for the same reasons discussed above in Section VII.A.3. Ex. 1202, ¶ 219.

3. Dependent Claims 3, 15

Claims 3 and 15 recite identical additional limitations as those in claims 27 and 40, respectively, and thus Pugel in view of Crols teaches the additional limitations of claims 3 and 15 for the same reasons discussed above in Section VII.B.4. Ex. 1202, ¶¶ 220-221. Modifying Pugel in view of Crols further in view of Chandrakasan would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.B.4, VII.B.1.a-d, VII.C.1.b, *supra*; Ex. 1202, ¶¶ 220-221.

4. Dependent Claims 4, 6, 16, 18-19

Claims 4, 6, 16, and 18-19 recite identical additional limitations as those in claims 28, 30, 41, and 43-44, respectively, and thus Pugel in view of Crols teaches the additional limitations of claims 4, 6, 16, and 18-19 for the same reasons discussed above in Sections VII.B.5-7. Ex. 1202, ¶ 222. Modifying Pugel in view of Crols further in view of Chandrakasan would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.B.5-7, VII.B.1.a-d, VII.C.1.b, *supra*; Ex. 1202, ¶ 222.

5. Dependent Claims 20, 45, 71

[20/45/71] “The method of claim [19/44/70], wherein the method comprises: providing the plurality of demodulated channels via a parallel interface.”⁴

Claims 20, 45, and 71 recite identical additional limitations as those in claims 8, 32, and 58, except that “a plurality of demodulated desired channels” in claims 20, 45, and 71 is replaced with “the plurality of demodulated channels.” Pugel in view of Chandrakasan teaches the additional limitations of claims 20, 45, and 71 for the same reasons discussed above in Section VII.C.4. Ex. 1202, ¶ 223. Modifying Pugel in view of Chandrakasan further in view of Crols would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.C.4, VII.B.1.a-d, VII.C.1.b, *supra*; Ex. 1202, ¶ 223.

6. Dependent Claims 46, 72

[46/72] “The method of claim [38/64], wherein the method comprises: providing the plurality of digital channel outputs via a parallel interface.”

Claims 46 and 72 recite identical additional limitations as those in claims 33 and 59, except that “desired channels” in claims 33 and 59 are replaced with “digital

⁴ Petitioner does not concede that these limitations meet the requirements of 35 U.S.C. § 112.

channel outputs.” Pugel in view of Chandrakasan teaches the additional limitations of claims 46 and 72 for the same reasons discussed above in Section VII.C.6. Ex. 1202, ¶ 224. Modifying Pugel in view of Chandrakasan further in view of Crols would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.C.6, VII.B.1.a-d, VII.C.1.b, *supra*; Ex. 1202, ¶ 224.

7. Dependent Claims 47, 73

[47/73] “The method of claim [38/64], wherein the method comprises: providing the plurality of digital channel outputs via a serial interface.”

Claims 47 and 73 recite identical additional limitations as those in claims 34 and 60, except that “desired channels” in claims 34 and 60 are replaced with “digital channel outputs.” Pugel in view of Chandrakasan teaches the additional limitations of claims 47 and 73 for the same reasons discussed above in Section VII.C.7. Ex. 1202, ¶ 225. Modifying Pugel in view of Chandrakasan further in view of Crols would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.C.7, VII.B.1.a-d, VII.C.1.b, *supra*; Ex. 1202, ¶ 225.

8. Dependent Claims 21, 23

Claims 21 and 23 recite identical additional limitations as those in claims 35 and 63, respectively, and thus Pugel discloses the additional limitations of claims 21 and 23 for the same reasons discussed above in Sections VII.A.5 and VII.A.7. Ex. 1202, ¶ 226.

9. Dependent Claim 24

Claim 24 recites identical additional limitations as those in claim 50, and thus Pugel discloses the additional limitations of claim 24 for the same reasons discussed above in Sections VII.A.6 and VII.B.9. Ex. 1202, ¶ 227.

E. Ground E: Pugel/Zaltsman

Pugel in view of Zaltsman renders obvious claims 36 and 62. Ex. 1202, ¶¶ 228-231.

1. Dependent Claims 36, 62

[36/62] “The method of claim [25/51], wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.”

Pugel teaches transmission of digital cable television signals using well-known methods, including transmission using QAM, QPSK, VSB, and/or HDTV signals. Ex. 1224, [0040]; Ex. 1202, ¶ 230. DOCSIS was the predominant standard at the time of the alleged invention for sending digital cable transmissions, and it would have been obvious to any POSITA to have turned to the standard to deliver cable television channels as taught by Pugel. Ex. 1202, ¶ 230.

To any extent that Pugel does not explicitly teach the DOCSIS protocol, the use of the protocol would have been obvious in view of Zaltsman because it would support transmission in consumer networks using the most common standard of the day. Ex. 1202, ¶ 231. Zaltsman provides a detailed background section discussing known technology as of 2007, particularly regarding the use of digital television standards including DOCSIS in wideband television transmission to a set-top receiver. Ex. 1274, [0003]-[0023]; Ex. 1202, ¶ 231. In particular, Zaltsman states that, in the latest DOCSIS standard of the day, multiple television channels were bonded together, typically using a 6 MHz frequency band. Ex. 1274, [0012]-[0013]. Modifying Pugel to use the DOCSIS standard as taught by Zaltsman would have been nothing more than applying a known technique (DOCSIS standardized transmission) to a known device (Pugel's receiver circuit for digital cable television transmission) ready for improvement to yield a predictable result (signals from Pugel's receiver circuit are transmitted according to the known DOCSIS standard). Ex. 1202, ¶ 231. A POSITA would have had a reasonable expectation of success, as the standard was well-documented and implementing it was well within the skill of the art. Ex. 1202, ¶ 231; *see* Ex. 1221.

Thus, the combination of Pugel and Zaltsman teaches claims 36 and 62 for the same reasons discussed above with respect to their base claims 25 and 51, and

further based on the additional teachings of Zaltsman as discussed above. Ex. 1202, ¶¶ 229-231.

F. Ground F: Pugel/Crols/Zaltsman

Pugel in view of Crols and further in view of Zaltsman renders obvious claims 49 and 75. Ex. 1202, ¶¶ 232-233.

1. Dependent Claims 49, 75

Claims 49 and 75 recite identical additional limitations as those in claims 36 and 62, and thus Pugel in view of Zaltsman teaches the additional limitations of claims 49 and 75 for the same reasons discussed above in Section VII.E.1. Ex. 1202, ¶ 233. Modifying Pugel in view of Crols further in view of Zaltsman would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.E.1, VII.B.1-2, *supra*; Ex. 1202, ¶ 233.

G. Ground G: Pugel/Chandrakasan/Zaltsman

Pugel in view of Chandrakasan and further in view of Zaltsman renders obvious claim 10. Ex. 1202, ¶¶ 234-235.

1. Dependent Claim 10

Claim 10 recites identical additional limitations as those in claims 36 and 62, and thus Pugel in view of Zaltsman teaches the additional limitations of claim 10 for the same reasons discussed above in Section VII.E.1. Ex. 1202, ¶ 235. Modifying Pugel in view of Chandrakasan further in view of Zaltsman would have been obvious

for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.E.1, VII.C.1, *supra*; Ex. 1202, ¶ 235.

H. Ground H: Pugel/Crols/Chandrakasan/Zaltsman

Pugel in view of Crols and Chandrakasan further in view of Zaltsman renders obvious claim 22. Ex. 1202, ¶¶ 236-237.

1. Dependent Claim 22

Claim 22 recites identical additional limitations as those in claims 36 and 62, and thus Pugel in view of Zaltsman teaches the additional limitations of claim 22 for the same reasons discussed above in Section VII.E.1. Ex. 1202, ¶ 237. Modifying Pugel in view of Crols and Chandrakasan further in view of Zaltsman would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.E.1, VII.B.1, VII.C.1, VII.D.1, *supra*; Ex. 1202, ¶ 237.

I. Ground I: Pugel/Crols/Zaltsman/Jensen '170

Pugel in view of Crols and further in view of Zaltsman and Jensen '170 renders obvious claims 29, 42, 55, and 68. Ex. 1202, ¶¶ 238-250.

1. Dependent Claim 29, 42, 55, 68

[29/55] “The method of claim [27/53], wherein the method comprises: filtering, via each filter of a plurality of filters, the corresponding complex signal, and wherein each corresponding complex signal comprises a 6 MHz channel.”

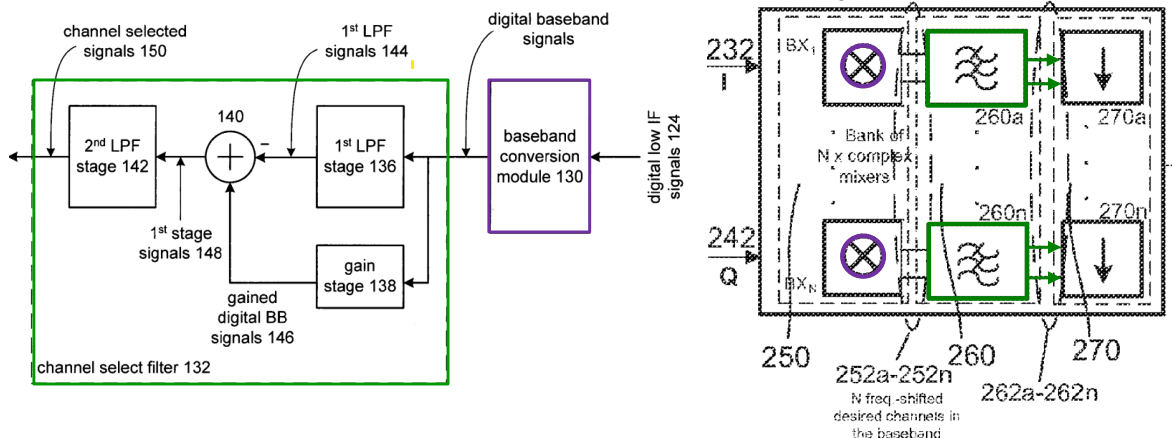
[42/68] “The method of claim [40/66], wherein the method comprises: a filtering the corresponding complex signal, wherein a bandwidth of the complex signal is 6 MHz.”

As discussed above, Pugel’s digital tuner 130 is configured to select signals of “one or more particular digital channels desired to be recovered” from “digital signals converted by the plurality of analog-to-digital converters 121, 122, 123” and output the selected digital channels to demodulation circuits 141, 142, 143. Ex. 1224, [0037]-[0039]; Ex. 1202, ¶ 240; *see* Section VII.A.1.d, *supra*. Before the selection process, the digital signals are downconverted by the digital tuner 130. Ex. 1224, [0037], claims 14-15, 18, 20-21; Ex. 1202, ¶ 241; *see* Section VII.B.1, *supra*. The selection is performed by the digital tuner 130 by “demultiplex[ing] only the digital channel signals corresponding to those digital cable television channels” selected via the channel selector 315. Ex. 1224, [0038]; Ex. 1202, ¶ 240. While Pugel does not expressly disclose in detail the components inside the digital tuner 130 that perform the downconversion and the selection, Pugel suggests that the digital tuner may include “a multitude of components configured as is well known in the art to recover a plurality of digital channel signals substantially simultaneously using a plurality of separate digital processors or a single digital processor.” Ex. 1224, [0037]; Ex. 1202, ¶ 242.

Jensen ’170 teaches “filtering, via each filter of a plurality of filters, the corresponding complex signal,” as claimed. Ex. 1230, [0010], [0064]-[0066],

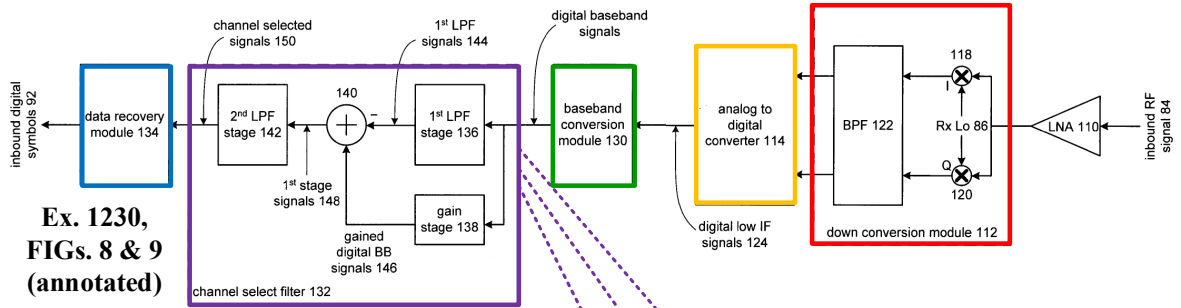
[0071]-[0073]; Ex. 1202, ¶ 243. Jensen '170 further describes using a baseband conversion module 130 to downconvert digital signals and low pass filters (LFPs) to build a “channel select” filter 132 that, like the filters 260 in the '206 Patent, perform the claimed selection by allowing only selected signals to pass through the filters and blocking the undesired signals. *Compare* Ex. 1230, Fig. 9 (channel select filter 132), [0007], [0009], [0016]-[0017], [0064]-[0067] *with* Ex. 1201, Fig. 2 (filters 260), 6:3-12, 6:64-7:9; Ex. 1202, ¶ 243-244.

Specifically, a portion of Jensen '170's digital demodulator 116 (below left), which is the same as each of the I path 232 and Q path 243 of the '206 Patent's digital front end 230 (below right), includes a baseband conversion module 130 (**purple**) followed by a channel select filter 132 (**green**). Ex. 1230, [0064]-[0066], Fig. 9; Ex. 1202, ¶¶ 240-241, 245. The channel-select filter 132 includes a first low pass filter stage 136 and a second low pass filter stage 142, which are implemented with finite impulse response (FIR) filters. Ex. 1230, [0010], [0064]-[0066], [0071]-[0073]; Ex. 1202, ¶ 245.

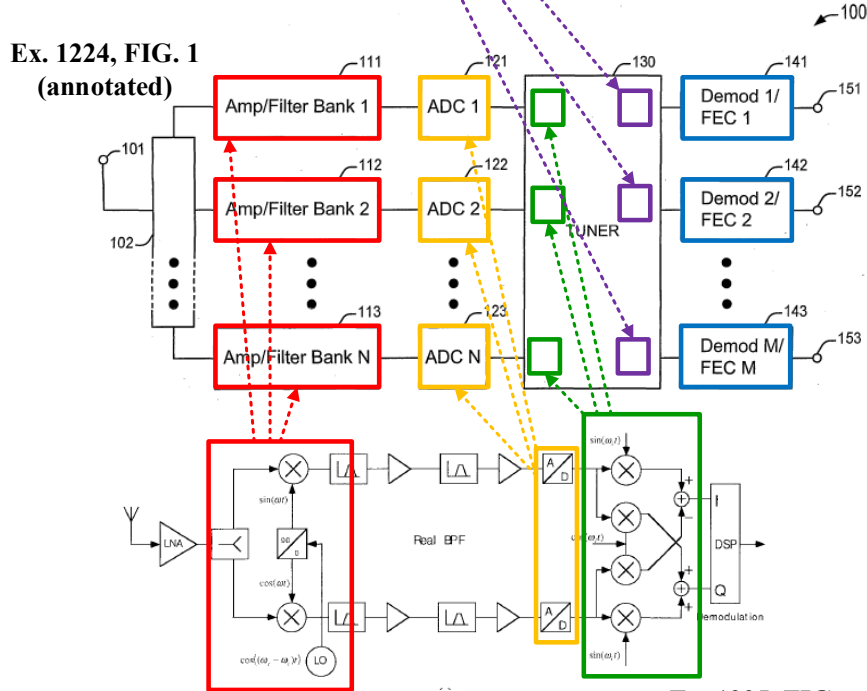


Ex. 1230, Fig. 9 (annotated, excerpted); Ex. 1201, Fig. 2 (annotated, excerpted)

Digital low IF signals enter the baseband conversion module 130 in Jensen '170, where the baseband conversion module 130 shifts the frequency of the desired channel to baseband. Ex. 1230, [0064]-[0065]; Ex. 1202, ¶ 246. The channel select filter 132 then selects the desired channels, while filtering out the remaining channels. Ex. 1230, [0007], [0009]-[0012], [0067]-[0068]; Ex. 1202, ¶ 246. Pugel in view of Crols and further in view of Jensen '170 thus teach claims 29, 42, 55 and 68. Ex. 1202, ¶ 246.



**Ex. 1230,
FIGS. 8 & 9
(annotated)**



**Ex. 1224, FIG. 1
(annotated)**

**Ex. 1225, FIG.
22(a) (annotated)**

It would have been obvious to a POSITA to modify Pugel's digital tuner 130 (see above) to include circuit topologies of the channel select filter 132 as taught by Jensen '170, because a POSITA would have been motivated to implement Pugel's digital tuner 130 with known solutions, in view of Pugel's express teaching that digital tuner 130 could be implemented with "a multitude of components configured as is well known in the art to recover a plurality of digital channel signals." Ex. 1224, [0037]; Ex. 1202, ¶ 247.

Applying Jensen '170's channel select filter 132 comprising FIR-based low pass filters to Pugel's digital tuner 130 would have been nothing more than applying a known technique (using channel select filters to filter signals of desired channels as taught by Jensen '170) to improve a known device (Pugel's digital tuner 130) to yield predictable results (Pugel's digital tuner 130 filtering signals of desired television channels using Jensen '170's channel select filters). Ex. 1202, ¶ 248. A POSITA would have had a reasonable expectation of success given the express teachings in Pugel to turn to other systems, such as Jensen '170's detailed descriptions of using channel select filters implemented using FIR architecture, and the POSITA's own familiarity with known receiver circuit topologies in the art. Ex. 1202, ¶ 248.

And, as further described in Section VII.E.1, it would have been obvious to modify Pugel in view of Zaltsman to use the DOCSIS standard, which specifies that the signal for each television channel (the claimed "complex signal") is a channel with a 6 MHz bandwidth. Ex. 1274, [0012]-[0013]; Ex. 1202, ¶ 249. Modifying Pugel in view of Crols and Jensen '170 would have been obvious for the same rationale, and the additional references would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.E.1, VII.B.1-2, *supra*; Ex. 1202, ¶ 249.

Thus, the combination of Pugel, Crols, Zaltsman, and Jensen '170 teaches claims 29, 42, 55, and 68 for the same reasons discussed above with respect to their base claims 27, 40, 53, and 66, and further based on the additional teachings of Zaltsman and Jensen '170 as discussed above. Ex. 1202, ¶ 250.

J. Ground J: Pugel/Crols/Chandrakasan/Zaltsman/Jensen '170

Pugel in view of Crols and Chandrakasan further in view of Zaltsman and Jensen '170 renders obvious claims 5 and 17. Ex. 1202, ¶¶ 251-252.

1. Dependent Claims 5, 17

Claims 5 and 17 recite identical additional limitations as those in claims 29 and 42, respectively, and thus Pugel in view of Jensen '170 and Zaltsman teaches the additional limitations of claims 5 and 17 for the same reasons discussed above in Section VII.I.1. Ex. 1202, ¶ 252. Modifying Pugel in view of Crols and Chandrakasan further in view of Zaltsman and Jensen '170 would have been obvious for the same rationales as discussed above, and the additional reference would have presented no additional difficulties for the combination to a POSITA. *See* Sections VII.I.1, VII.E.1, VII.B.1-2, VII.C.1, *supra*; Ex. 1202, ¶ 252.

VIII. GROUNDS FOR STANDING & FEE PAYMENT

Petitioner hereby certifies that the '206 Patent is available for, and Petitioner is not barred or estopped from requesting, *inter partes* review challenging claims 1-76.

Pursuant to 37 C.F.R. § 42.103, the undersigned authorizes the charge of any required fees to Deposit Account No. 19-0733.

IX. CONCLUSION

Inter partes review should be instituted, and claims 1-76 canceled.

Dated: February 16, 2024

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for Inter Partes Review totals 13,941, which is less than the 14,000 allowed under 37 CFR § 42.24(a)(1)(i). This total includes 13,884 words as counted by the Word Count feature of Microsoft Word and 57 words used in annotations.

Pursuant to 37 C.F.R. § 42.24(a)(1), this count does not include the table of contents, the table of authorities, mandatory notices under § 42.8, the certificate of service, this certification of word count, the claims listing appendix, or appendix of exhibits.

BANNER & WITCOFF, LTD

Dated: February 16, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.105, I hereby certify that I caused a true and correct copy of this Petition for *Inter Partes* Review in connection with U.S. Patent No. 11,399,206 and supporting evidence to be served via FedEx Priority Overnight on February 16, 2024, on the following:

23446 - MCANDREWS HELD & MALLOY, LTD
500 WEST MADISON STREET
SUITE 3400
CHICAGO, IL 60661
UNITED STATES

Dated: February 16, 2024

By: /Frederic M. Meeker/

Frederic M. Meeker
Reg. No. 35,282

CLAIM LISTING APPENDIX
U.S. Pat. No. 11,399,206

Designation	Claim Language
Claim 1	
[1A]	A method for receiving a television (TV) signal comprising:
[1B]	receiving an input signal from a cable network;
[1C]	digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal and the received channels comprise a plurality of desired channels and a plurality of undesired channels;
[1D]	concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels; and
[1E]	providing the plurality of desired channels via a serial interface.
Claim 2	
2	The method of claim 1, wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.
Claim 3	
[3A]	The method of claim 1, wherein the method comprises: generating, via each mixer of a plurality of mixers, a complex signal corresponding to each of the plurality of desired channels, and
[3B]	wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.
Claim 4	
4	The method of claim 3, wherein: the I and Q components of each corresponding complex signal are at baseband.
Claim 5	
5	The method of claim 3, wherein the method comprises: filtering, via each filter of a plurality of filters, the corresponding complex signal, and wherein each corresponding complex signal comprises a 6 MHz channel.

Designation	Claim Language
Claim 6	
6	The method of claim 3, wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, the corresponding complex signal to generate a demodulated signal as a desired channel output.
Claim 7	
7	The method of claim 1, wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, a desired channel, of the plurality of desired channels.
Claim 8	
8	The method of claim 7, wherein the method comprises: providing a plurality of demodulated desired channels via a parallel interface.
Claim 9	
9	The method of claim 1, wherein: the plurality of desired channels comprises at least one cable broadcast channel.
Claim 10	
10	The method of claim 1, wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.
Claim 11	
11	The method of claim 1, wherein: the method is performed by a device comprising a digital video recorder (DVR).
Claim 12	
12	The method of claim 1, wherein the method comprises: configuring at least some of the plurality of desired channels as an output for a picture-in-picture display.
Claim 13	
[13A]	A method comprising:
[13B]	receiving an input signal from a cable network;
[13C]	digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels;

Designation	Claim Language
[13D]	digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs; and
[13E]	providing the plurality of digital channel outputs via a serial interface.
Claim 14	
14	The method of claim 13, wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.
Claim 15	
[15A]	The method of claim 13, wherein: digitally down converting comprises generating a corresponding complex signal for each of the plurality of desired channels, and
[15B]	wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.
Claim 16	
16	The method of claim 15, wherein: the I and Q components of each corresponding complex signal are at baseband.
Claim 17	
17	The method of claim 15, wherein the method comprises: a filtering the corresponding complex signal, wherein a bandwidth of the complex signal is 6 MHz.
Claim 18	
18	The method of claim 15, wherein the method comprises: demodulating the corresponding complex signal to provide a demodulated channel as a digital channel output.
Claim 19	
19	The method of claim 13, wherein the method comprises: demodulating each digitally down converted, desired channel to generate a plurality of demodulated channels.
Claim 20	
20	The method of claim 19, wherein the method comprises: providing the plurality of demodulated channels via a parallel interface.
Claim 21	

Designation	Claim Language
21	The method of claim 13, wherein: the plurality of desired channels comprises at least one cable broadcast channel.
Claim 22	
22	The method of claim 13, wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.
Claim 23	
23	The method of claim 13, wherein: the method is performed by a device comprising a digital video recorder (DVR).
Claim 24	
24	The method of claim 13, wherein the method comprises: providing a picture-in-picture display signal according to the plurality of digital channel outputs.
Claim 25	
[25A]	A method for receiving a television (TV) signal comprising:
[25B]	receiving an input signal from a cable network;
[25C]	digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal and the received channels comprise a plurality of desired channels and a plurality of undesired channels;
[25D]	concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels; and
[25E]	providing the plurality of desired channels,
[25F]	wherein the method is performed by a device comprising a digital video recorder (DVR).
Claim 26	
26	The method of claim 25, wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.
Claim 27	
[27A]	The method of claim 25, wherein the method comprises:

Designation	Claim Language
	generating, via each mixer of a plurality of mixers, a complex signal corresponding to each of the plurality of desired channels, and
[27B]	wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.
Claim 28	
28	The method of claim 27, wherein: the I and Q components of each corresponding complex signal are at baseband.
Claim 29	
29	The method of claim 27, wherein the method comprises: filtering, via each filter of a plurality of filters, the corresponding complex signal, and wherein each corresponding complex signal comprises a 6 MHz channel.
Claim 30	
30	The method of claim 27, wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, the corresponding complex signal to generate a demodulated signal as a desired channel output.
Claim 31	
31	The method of claim 25, wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, a desired channel, of the plurality of desired channels.
Claim 32	
32	The method of claim 31, wherein the method comprises: providing a plurality of demodulated desired channels via a parallel interface.
Claim 33	
33	The method of claim 25, wherein the method comprises: providing the plurality of desired channels via a parallel interface.
Claim 34	
34	The method of claim 25, wherein the method comprises: providing the plurality of desired channels via a serial interface.
Claim 35	
35	The method of claim 25, wherein:

Designation	Claim Language
	the plurality of desired channels comprises at least one cable broadcast channel.
Claim 36	
36	The method of claim 25, wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.
Claim 37	
37	The method of claim 25, wherein the method comprises: configuring at least some of the plurality of desired channels as an output for a picture-in-picture display.
Claim 38	
[38A]	A method comprising:
[38B]	receiving an input signal from a cable network;
[38C]	digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels; and
[38D]	digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs,
[38E]	wherein the method is performed by a device comprising a digital video recorder (DVR).
Claim 39	
39	The method of claim 38, wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.
Claim 40	
[40A]	The method of claim 38, wherein: digitally down converting comprises generating a corresponding complex signal for each of the plurality of desired channels, and
[40B]	wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.
Claim 41	
41	The method of claim 40, wherein:

Designation	Claim Language
	the I and Q components of each corresponding complex signal are at baseband.
Claim 42	
42	The method of claim 40, wherein the method comprises: a filtering the corresponding complex signal, wherein a bandwidth of the complex signal is 6 MHz.
Claim 43	
43	The method of claim 40, wherein the method comprises: demodulating the corresponding complex signal to provide a demodulated channel as a digital channel output.
Claim 44	
44	The method of claim 38, wherein the method comprises: demodulating each digitally down converted, desired channel to generate a plurality of demodulated channels.
Claim 45	
45	The method of claim 44, wherein the method comprises: providing the plurality of demodulated channels via a parallel interface.
Claim 46	
46	The method of claim 38, wherein the method comprises: providing the plurality of digital channel outputs via a parallel interface.
Claim 47	
47	The method of claim 38, wherein the method comprises: providing the plurality of digital channel outputs via a serial interface.
Claim 48	
48	The method of claim 38, wherein: the plurality of desired channels comprises at least one cable broadcast channel.
Claim 49	
49	The method of claim 38, wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.
Claim 50	
50	The method of claim 38, wherein the method comprises:

Designation	Claim Language
	providing a picture-in-picture display signal according to the plurality of digital channel outputs.
Claim 51	
[51A]	A method for receiving a television (TV) signal comprising:
[51B]	receiving an input signal from a cable network;
[51C]	digitizing a contiguous band of frequencies in the input signal via a wideband analog-to-digital converter (ADC), wherein the contiguous band of frequencies comprises all received channels that exist in the input signal and the received channels comprise a plurality of desired channels and a plurality of undesired channels;
[51D]	concurrently selecting each of the plurality of desired channels from the input signal without selecting any of the plurality of undesired channels;
[51E]	providing the plurality of desired channels; and
[51F]	configuring at least some of the plurality of desired channels as an output for a picture-in-picture display.
Claim 52	
52	The method of claim 51, wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.
Claim 53	
[53A]	The method of claim 51, wherein the method comprises: generating, via each mixer of a plurality of mixers, a complex signal corresponding to each of the plurality of desired channels, and
[53B]	wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.
Claim 54	
54	The method of claim 53, wherein: the I and Q components of each corresponding complex signal are at baseband.
Claim 55	
55	The method of claim 53, wherein the method comprises: filtering, via each filter of a plurality of filters, the corresponding complex signal, and wherein each corresponding complex signal comprises a 6 MHz channel.

Designation	Claim Language
Claim 56	
56	The method of claim 53, wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, the corresponding complex signal to generate a demodulated signal as a desired channel output.
Claim 57	
57	The method of claim 51, wherein the method comprises: demodulating, via each demodulator of a plurality of demodulators, a desired channel, of the plurality of desired channels.
Claim 58	
58	The method of claim 57, wherein the method comprises: providing a plurality of demodulated desired channels via a parallel interface.
Claim 59	
59	The method of claim 51, wherein the method comprises: providing the plurality of desired channels via a parallel interface.
Claim 60	
60	The method of claim 51, wherein the method comprises: providing the plurality of desired channels via a serial interface.
Claim 61	
61	The method of claim 51, wherein: the plurality of desired channels comprises at least one cable broadcast channel.
Claim 62	
62	The method of claim 51, wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.
Claim 63	
63	The method of claim 51, wherein: the method is performed by a device comprising a digital video recorder (DVR).
Claim 64	
[64A]	A method comprising:
[64B]	receiving an input signal from a cable network;

Designation	Claim Language
[64C]	digitizing all received channels in the input signal via a wideband analog-to-digital converter (ADC), wherein the received channels comprise a plurality of desired channels and a plurality of undesired channels;
[64D]	digitally down converting each desired channel, of the plurality of desired channels, to generate a plurality of digital channel outputs; and
[64E]	configuring at least some of the plurality of desired channels as an output for a picture-in-picture display.
Claim 65	
65	The method of claim 64, wherein the method comprises: communicating the input signal from a cable network connector to the wideband ADC via at least one of an analog amplifier and an analog filter.
Claim 66	
[66A]	The method of claim 64, wherein: digitally down converting comprises generating a corresponding complex signal for each of the plurality of desired channels, and
[66B]	wherein each corresponding complex signal comprises an in-phase (I) component and a quadrature (Q) component.
Claim 67	
67	The method of claim 66, wherein: the I and Q components of each corresponding complex signal are at baseband.
Claim 68	
68	The method of claim 66, wherein the method comprises: a filtering the corresponding complex signal, wherein a bandwidth of the complex signal is 6 MHz.
Claim 69	
69	The method of claim 66, wherein the method comprises: demodulating the corresponding complex signal to provide a demodulated channel as a digital channel output.
Claim 70	
70	The method of claim 64, wherein the method comprises: demodulating each digitally down converted, desired channel to generate a plurality of demodulated channels.
Claim 71	

Designation	Claim Language
71	The method of claim 70, wherein the method comprises: providing the plurality of demodulated channels via a parallel interface.
Claim 72	
72	The method of claim 64, wherein the method comprises: providing the plurality of digital channel outputs via a parallel interface.
Claim 73	
73	The method of claim 64, wherein the method comprises: providing the plurality of digital channel outputs via a serial interface.
Claim 74	
74	The method of claim 64, wherein: the plurality of desired channels comprises at least one cable broadcast channel.
Claim 75	
75	The method of claim 64, wherein: the plurality of desired channels comprises at least one channel delivered via a Data Over Cable Service Interface Specification (DOCSIS) protocol.
Claim 76	
76	The method of claim 64, wherein: the method is performed by a device comprising a digital video recorder (DVR).