

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK CORP.; DISH NETWORK LLC; AND DISH NETWORK
SERVICE LLC,

Petitioners

v.

ENTROPIC COMMUNICATIONS, LLC

Patent Owner.

PTAB Case No. IPR 2023-00391

Patent No. 7,130,576

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 7,130,576**

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EXHIBIT LIST

Ex.1001	U.S. Patent No. 7,130,576 (“’576 patent”)
Ex.1002	Declaration of Dr. Dan Schonfeld (“Schonfeld”) and Appendix A Thereto (CV)
Ex.1003	U.S. Patent No. 6,493,873 (“Williams-873”)
Ex.1004	U.S. Patent No. 2003/0165200 to Pugel (“Pugel”)
Ex.1005	U.S. Patent No. 5,278,837 (Kelley)
Ex.1006	File History - U.S. Patent No. 7,130,576 File History (family member of ’715 patent) (“’576 FH”)
Ex.1007	File History - U.S. Patent No. 7,130,576 Reexamination History (family member of ’715 patent) (“’576 Reexam”)
Ex.1008	U.S. Patent No. 5,959,592 to Petruzzelli (“AAPA-Petruzzelli”)
Ex.1009	U.S. Patent No. 6,134,419 to Williams (“AAPA-Williams-419”)
Ex.1010	Lewis, Communication Services Via Satellite, Butterworth-Heinemann Ltd (1992), excerpts
Ex.1011	U.S. Patent No. 5,073,930 (“Green”)
Ex.1012	Telstar, Wikipedia (2022), https://en.wikipedia.org/wiki/Telstar
Ex.1013	U.S. Patent No. 4,455,651 (“Baran”)
Ex.1014	Dan Logan, The Scoop on the Dish, Los Angeles Times (1996), https://www.latimes.com/archives/la-xpm-1996-09-07-hm-41715-story.html
Ex.1015	U.S. Patent No. 4,675,732 (“Oleson”)
Ex.1016	European Patent No. EP0740434B1 (“Carnero”) with Certified English Translation with Translator’s Affidavit
Ex.1017	Alan V. Oppenheim et al., Discrete-Time Signal Processing, Prentice Hall (1999), excerpts (“Oppenheim”)
Ex.1018	IEEE 802.11, Wikipedia (2022), https://en.wikipedia.org/wiki/IEEE_802.11
Ex.1019	Customer Experience, What is the Difference Between RG59 and RG6?, Sewell Direct (2019), https://sewelldirect.com/blogs/learning-center/what-is-the-difference-between-rg59-and-rg6

Ex.1020	Site Editor, RG6 vs RG59: Which Should You Buy?, Foshan New King Cable Industrial Co., Ltd. (2020), https://newkingcable.com/rg6-vs-rg59-which-one-to-choose.html
Ex.1021	U.S. Patent Application Publication No. 2002/0154055 (“Davis”)
Ex.1022	U.S. Provisional Patent Application No. 60/284,593 (“Davis Provis.”)
Ex.1023	U.S. Patent No. 6,697,603 (“Lovinggood”)
Ex.1024	Virtual Channel, Wikipedia (2022), https://en.wikipedia.org/wiki/Virtual_channel
Ex.1025	U.S. Patent No. 7,376,387 (“Eck”)
Ex.1026	Stephen P. Dulac & John P. Godwin, Satellite Direct-to-Home, 94 PROCS. OF THE IEEE 158, (Jan. 2006)
Ex.1027	U.S. Patent No. 6,441,797 (“Shah”)
Ex.1028	Tim Hentschel, et al., The Digital Front-End of Software Radio Terminals, IEEE PERS. COMMC’NS 6 (Aug. 1999)
Ex.1029	Reserved
Ex.1030	S.J. Crowley, “Capacity Trends in Direct Broadcast Satellite and Cable Television Services,” National Association of Broadcasters, National Religious Broadcasters, and National Black Religious Broadcasters (2013) https://www.nab.org/documents/newsroom/pdfs/100813_capacity_trends_in_dbs_and_cable_tv_services.pdf
Ex.1031	DVB-S, Wikipedia (2022), https://en.wikipedia.org/wiki/DVB-S
Ex.1032	B.R. Elbert, Introduction to Satellite Communication. Artech House, Third Edition, 2008
Ex.1033	Walt Kester (ed.), Ch. 1, Data Converter History, in ANALOG-DIGITAL CONVERSION, (2004)
Ex.1034	Rajendra Kumar et al., Signal Processing Techniques for Wideband Communication Systems, MILCOM 1999, IEEE MILITARY COMMS. CONF. PROCS. 452 (1999)
Ex.1035	<i>Entropic Communications v. DirectTV, LLC</i> , Case No. 2:22-cv-07775-JWH-JEM, C.D. Cal., Plaintiff’s Claim Construction Statement, December 1, 2022

Petitioners DISH Network Corp., DISH Network LLC, and Dish Network Service LLC (“DISH”) respectfully request *inter partes* review (“IPR”) of claims 8-23 and 34-42 of U.S. Patent No. 7,130,576 (“’576 patent”).

I. INTRODUCTION

The ’576 patent addresses an age-old problem within video distribution systems: how to efficiently deliver video signals to more than one integrated receiver decoder (“IRD” or “set-top box” (“STB”)) within a multiroom building such as a house or hotel. But as the ’576 patent expressly acknowledges, this problem was already solved by techniques for selecting and combining multiple signals into a single composite signal which enabled efficient transmission of video from an outdoor unit (ODU) to multiple IRDs—the exact same idea that Patent Owner Entropic Communications, Inc. (“Patent Owner” or “Entropic”) now boldly declares as its own. (Ex.1001-’576 patent, 2:8-48.)

To obtain its patent, Entropic mischaracterized U.S. Patent No. 6,493,873 (“Williams-873”)—an anticipatory reference relied on by the examiner as disclosing the composite signal—by amending its claims and arguing that Williams-873’s signal processing altered the signal’s modulation whereas “the applicant’s invention does not.” (Ex.1006-’576 FH, 83, 85.) But when read in full, it is abundantly clear that Williams-873 discloses an embodiment where the broadband signals are not altered. (Ex.1003-Williams-873, 4:57-60, 7:15-23, 15:15-27.) The Examiner erred

by not realizing the import of William-873's express disclosure and ultimately allowing the claims.

Almost immediately after issuance, an *ex parte* reexamination challenged the validity of the patent. Once again, the Patent Office determined that claims for creating a composite signal without altering the signal's modulation were anticipated, this time by the "*Eutelsat Installer Guide*." (Ex.1007-'576 Reexam, 276, 289-92.) Entropic responded by shape-shifting its claims yet again, amending them to require that the received broadband signals be "*digitized*" prior to signal selection and combination. (Ex.1007-'576 Reexam, 289-92.) But the '576 claims cannot be saved by merely replacing long-used analog signal processing applications with their known digital counterparts.

Entropic will undoubtedly claim that the '576 patent is "gold-plated" because it survived reexamination. But if there was ever a patent whose validity warrants scrutiny and a fully informed review, it's the '576 patent. Not only did the Entropic lead the examiner into material errors during the original prosecution, but the Patent Office also erred during reexamination when it failed to appreciate it was not novel to limit the claims to the digital domain. With the benefit of Dr. Schonfeld's testimony and the digital domain teachings of Pugel, neither of which were available to the examiner or Patent Office, there is no question that the '576 patent claims are invalid and must be canceled.

II. MANDATORY NOTICES

A. Real Party-in-Interest

DISH Network Corporation, and its subsidiaries, including DISH Network LLC and Dish Network Service LLC, are the real parties-in-interest for this Petition.

B. Related Matters

Patent Owner asserts that Petitioners infringe the '576 patent along with two others, U.S. Patent Nos. 7,542,715 ("715 patent") and 8,792,008 ("008 patent"), in a district court lawsuit captioned *Entropic Communications, LLC v. DISH Network Corp. et al*, No. 2:22-cv-07959-JWH-JEM (C.D. Cal.) (transferred from No. 2:22-cv-75 (E.D. Tex.) on November 3, 2022).

The current Petition seeks cancelation of claims 8-23 and 34-42 of the '576 patent. Petitioners are filing petitions for *inter partes* review challenging both the '008 and '715 patents in IPR 2023-00393 and IPR 2023-00392, respectively.

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III. REQUIREMENTS FOR *INTER PARTES* REVIEW

A. Grounds For Standing

Petitioners certify that the '576 patent is available for IPR and that Petitioners are not barred or estopped from requesting IPR challenging the claims of the '576 patent on the grounds presented here. This Petition is filed less than one year after Petitioners were served with a complaint alleging infringement.

B. Overview of Challenges and Requested Relief

Pursuant to Rules 42.22(a)(1) and 42.104(b)(1)-(2), Petitioners request cancelation of claims 8-23 and 34-42 of the '576 patent under pre-AIA 35 U.S.C. § 103.

1. Identification of prior art

In this Petition, Petitioners rely on the patents listed in the Table of the Exhibits, including:

Exhibit No.	Prior Art Basis
Ex. 1003: (Williams-873) U.S. Patent No. 6,493,873	Williams-873 was filed on January 20, 1998 and published upon issuance on December 10, 2002, and is prior art at least under pre-AIA 35 U.S.C. § 102(e).
Ex. 1004: (Pugel) U.S. Published Patent App. No. 2003/0165200	Pugel was filed on August 30, 2001 and published on September 4, 2003 and is prior art under pre-AIA 35 U.S.C. § 102(e).

2. Ground for Challenge

The table below summarizes the grounds challenging the independent and dependent claims:

Ground for Challenge		
Ground 1	Ind. Claims 8, 14 Dep. Claims 9-13, 15-23, 34-42	Obvious over Williams-873 in view of Pugel.

This Petition is supported by the declaration of Dr. Dan Schonfeld (“Schonfeld”) which is attached as Ex. 1002 and demonstrates a reasonable likelihood that Petitioners will prevail with respect to the cancelation of at least one challenged claim. *See* 35 U.S.C. § 314(a).

IV. STATE OF THE ART AND APPLICANT ADMITTED PRIOR ART (AAPA)

In the Background Section of the ’576 patent, the applicant described the state of the art and problems allegedly solved by referencing and incorporating two prior art patents—U.S. Patent Nos. 5,959,592 (“AAPA-Petruzzelli”) and 6,134,419

(“AAPA-Williams-419”)—and directed the reader to a “general” “descri[ption]” of “[s]atellite systems” in a textbook titled “Communication Services via Satellite” (collectively “AAPA”).¹ The AAPA establishes that the ’576 patent claims conventional components and functionality including at least ODU, STBs, LNBs, signal selectors and combiners, and frequency translators. (*See generally* Ex.1002-Schonfeld, ¶¶35-86.) Petitioners and Dr. Schonfeld rely on the AAPA throughout this Petition in accordance with the PTAB’s June 9, 2022 “Updated Guidance on the Treatment of Statements of the Applicant in the Challenged Patent in *Inter Partes* Review under Section 311” at least to establish background knowledge possessed

¹The Williams-873 patent used as the basis for Ground 1 in this Petition is a continuation-in-part (“CIP”) of AAPA-Williams-419 incorporated by reference in the ’576 patent. (Ex.1001-’576 patent, 2:8-33.) Importantly, as a CIP, Williams-873 contains additional disclosure—not found in Williams-419—of an alternative embodiment teaching a use case where transmodulation is not required and instead selected signals are “shift[ed] ... to different frequencies for transmission over the cable network 26.” (Ex.1003-Williams-873, 4:57-60, 7:15-23, 15:15-27.) Based in part on this additional disclosure, Williams-873 in view of Pugel render the claims obvious.

by a POSITA, to furnish a motivation to combine, to assess whether a patent's claims would have been obvious, and/or to supply a missing limitation. While Dr. Schonfeld provides a detailed description of the state of the art and AAPA in his Declaration, the chart below summarizes technology concepts that the '576 applicant admitted were prior art. (Ex.1002-Schonfeld, ¶¶87.)

Concepts Relevant to Challenged Claims	Disclosure of Concept in State of Art as Shown in AAPA and Prosecution History
Receiving and down-converting broadband satellite signals at an ODU.	Ex.1001-'576 patent, 1:19-555 (Background); Ex.1008-AAPA-Petruzzelli, 1:21-62, 2:11-21, 2:54-65, 4:23-45, 4:58-5:15, 5:1-15, 5:61-6:21; Ex.1009-AAPA-Williams-419, 2:11-40; Ex.1027-Shah, 1:64-3:6, Figs. 1, 4 (Ex.1006-'576 FH, 96); "Eutelsat Installers Guide," Figs. 8, 11 (Ex.1007-'576 Reexam, 276-77); Ex.1015-Oleson, 4:35-50.
Selecting transponder signals from broadband satellite signals based on request information.	Analog: "Eutelsat Installers Guide," 19, 26, Figs. 7, 11 (Ex.1007-'576 Reexam, 277-79). Digital: Ex.1023-Lovinggood, Figs. 2-3, 5:3-25; Ex.1004-Pugel, ¶¶6, 18.
Frequency translating selected transponder signals.	Analog: Ex.1008-AAPA Petruzzelli, Abstract, 5:45-6:50, 7:64-8:39; Ex.1027-Shah, 2:66-3:3, 4:61-67, Figs. 1, 4 (Ex.1006-'576 FH, 96); "Eutelsat Installers Guide," 15, 19, Figs. 7, 11 (Ex.1007-'576 Reexam, 281-82); Ex.1015-Oleson, 1:14-58, 7:21-35. Digital:

Concepts Relevant to Challenged Claims	Disclosure of Concept in State of Art as Shown in AAPA and Prosecution History
	Ex.1023-Lovinggood, Figs. 2-3, 5:3-25; Ex.1004-Pugel, ¶22.
Combining selected transponder signals for distribution.	Analog: Ex.1008-AAPA Petruzzelli, Abstract, 5:45-6:50, 7:64-8:39; Ex.1027-Shah, 3:55-4:38, Figs. 1, 4 (Ex.1006-'576 FH, 96-97); "Eutelsat Installers Guide," 15, 19, 27, Figs. 7, 11 (Ex.1007-'576 Reexam, 281-82, 284-85); Ex.1015-Oleson, 1:14-58, 7:21-35. Digital: Ex.1023-Lovinggood, 9:58-67; Ex.1004-Pugel, ¶26.
Distributing selected transponder signals in the same modulation as received in broadband satellite signals.	Ex.1008-AAPA Petruzzelli, Abstract, 5:45-6:50, 7:64-8:39; Ex.1015-Oleson, 1:14-58, 7:21-35; "Eutelsat Installers Guide," Fig. 7 (Ex.1007-'576 Reexam, 281-82).
Maintaining and distributing information about frequency locations for selected transponder signals.	Shah, 4:28-52 (Ex.1006-'576 FH, 98); "Eutelsat Installers Guide," 27 (Ex.1007-'576 Reexam, 287); Ex.1025-Eck, 1:21-35, 1:54-64, 2:10-25.

V. OVERVIEW OF THE '576 PATENT

A. The Alleged Invention

The '576 patent addresses how to efficiently deliver satellite video signals to more than one IRD within a multiroom building such as house or hotel. A conventional satellite video distribution system including an ODU and multiple IRDs is depicted below in Figure 1 of the '576 patent.

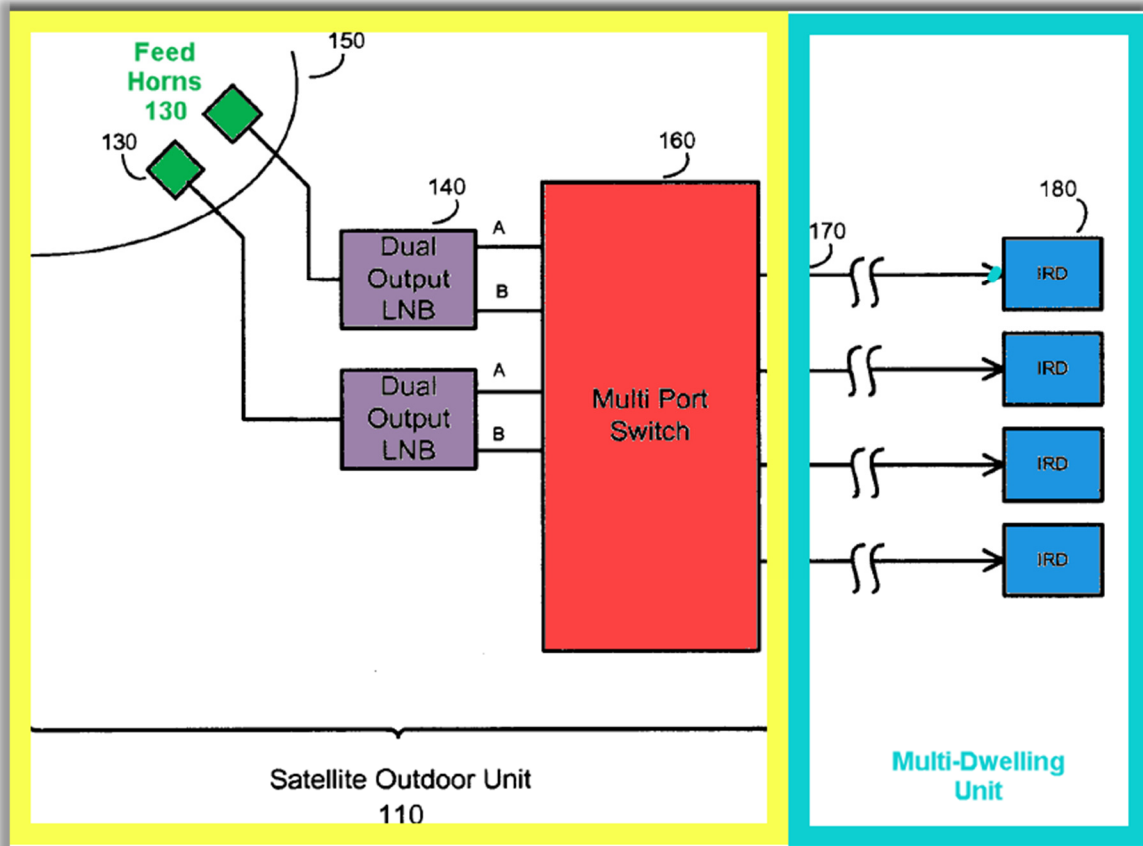


Figure 1 - Video Signal Distribution System (AAPA).

The '576 patent explains that under the “conventional” approach, requiring separate cables between the ODU and each IRD was inconvenient when adding additional IRDs to new locations within a building. (Ex.1001-'576 patent, 1:44-54.) As Dr. Schonfeld notes, the '576 patent’s purported solution draws on known techniques, including those summarized in the table above, to transmit desired channels as a combined signal that is outputted to all IRDs. Specifically, the '576 patent teaches “selecting” requested satellite signals (*e.g.*, selecting transponder signals from a broadband LNB output signal), “translating” those transponder

signals to various frequencies for transmission within an intermediate frequency (“IF”) signal, and “combining” the selected, translated transponder signals into a composite IF signal for output to all IRDs. (Ex.1001-’576 patent, 2:54-3:4; Ex.1002-Schonfeld, ¶¶89.)

The ’576 patent’s process for creating a “composite signal” is illustrated in Figure 5 below.

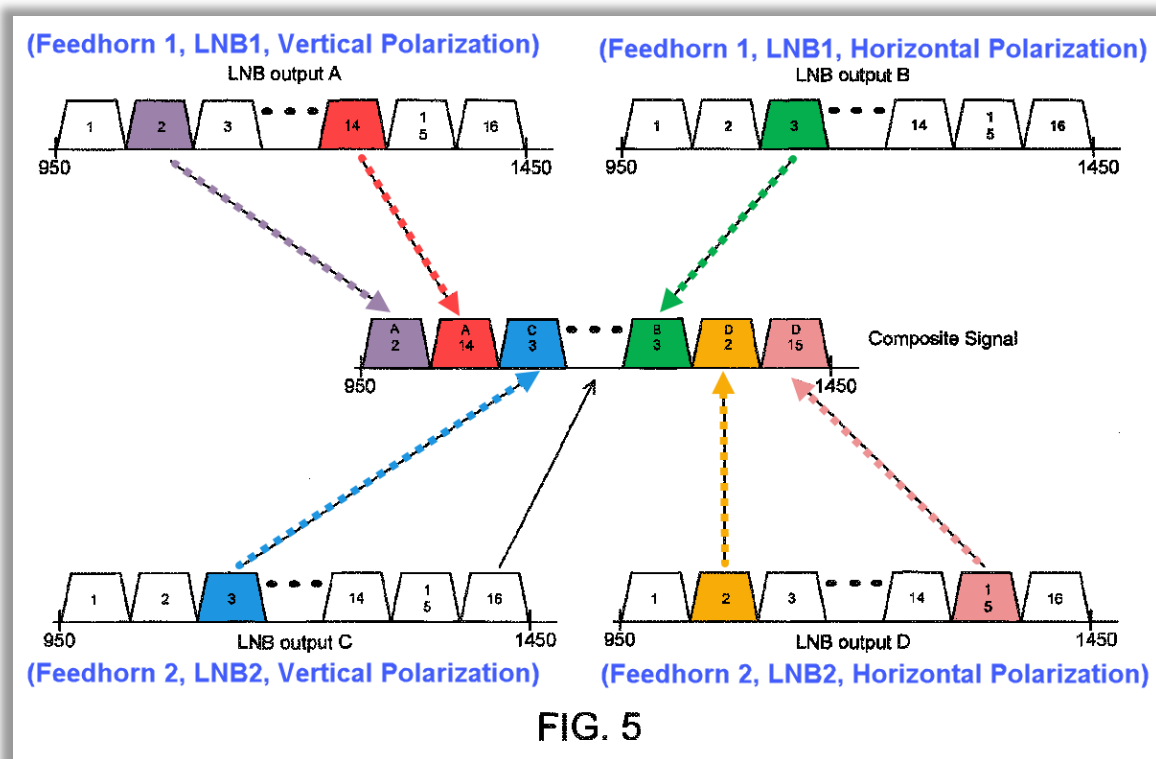


Figure 5 - The '576 Patent's Composite Signal

Here, each numbered frequency block represents a transponder channel having a transponder signal comprising one or more television channels. The transponder channels are grouped together into four satellite signals (*i.e.*, broadband

LNB outputs), labeled A-D, that correspond to the satellite hardware (*i.e.*, transponder) and signal polarization (*i.e.*, left- or right-polarity) of the satellite signals received by the feedhorns on the satellite antenna. (Ex.1002-Schonfeld, ¶91.) Upon receiving these four satellite signals, selected transponder channels from the broadband LNB output signals are combined into a “composite” IF signal having a frequency range of 950 to 1450 MHz. (Ex.1001-’576 patent, 7:32-39.) Figure 9 depicts system components for selection, translation, and combination to create the composite IF signal. (Ex.1002-Schonfeld, ¶91.)

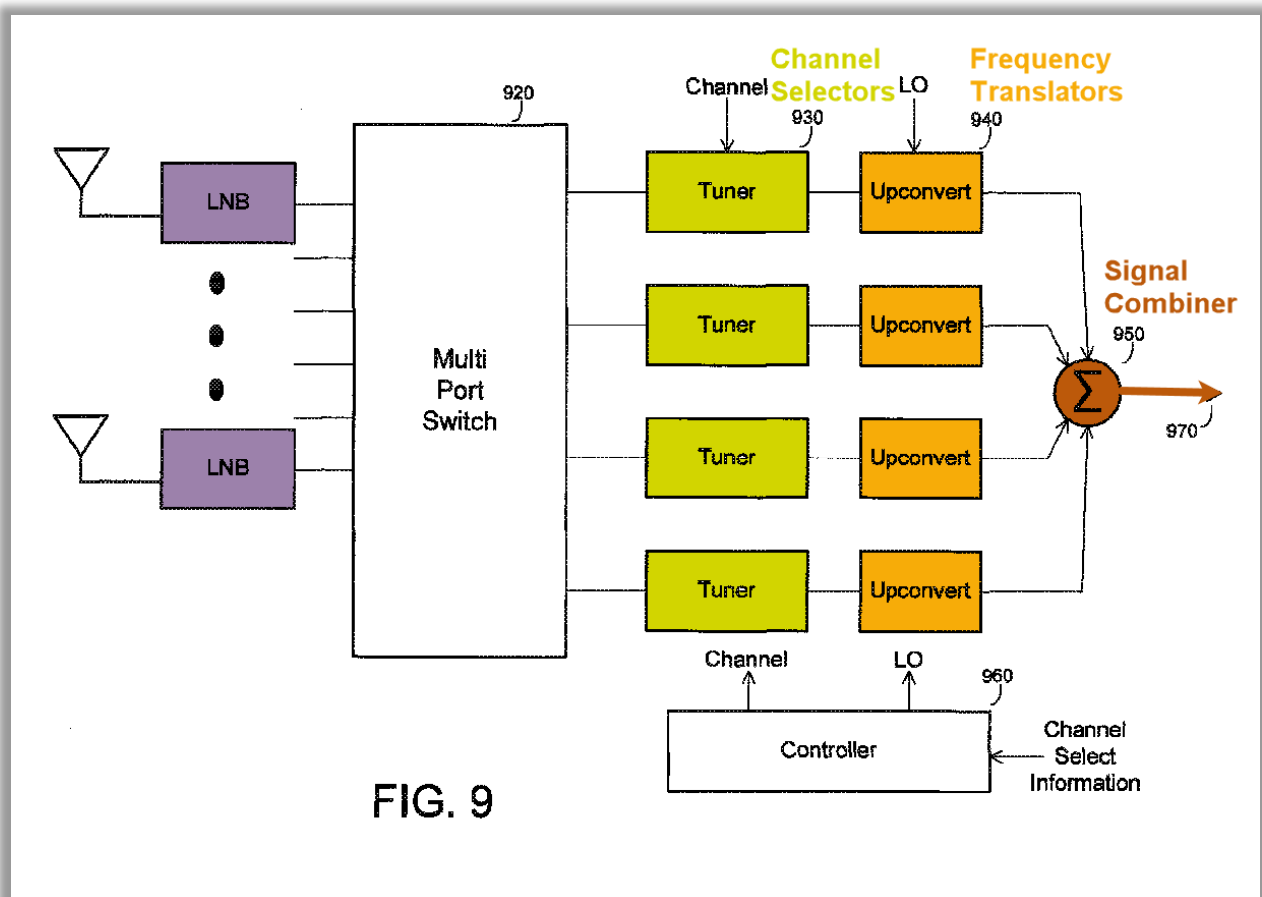


Figure 9 - Tuners and Upconverters Used to Select and Combine Channels.

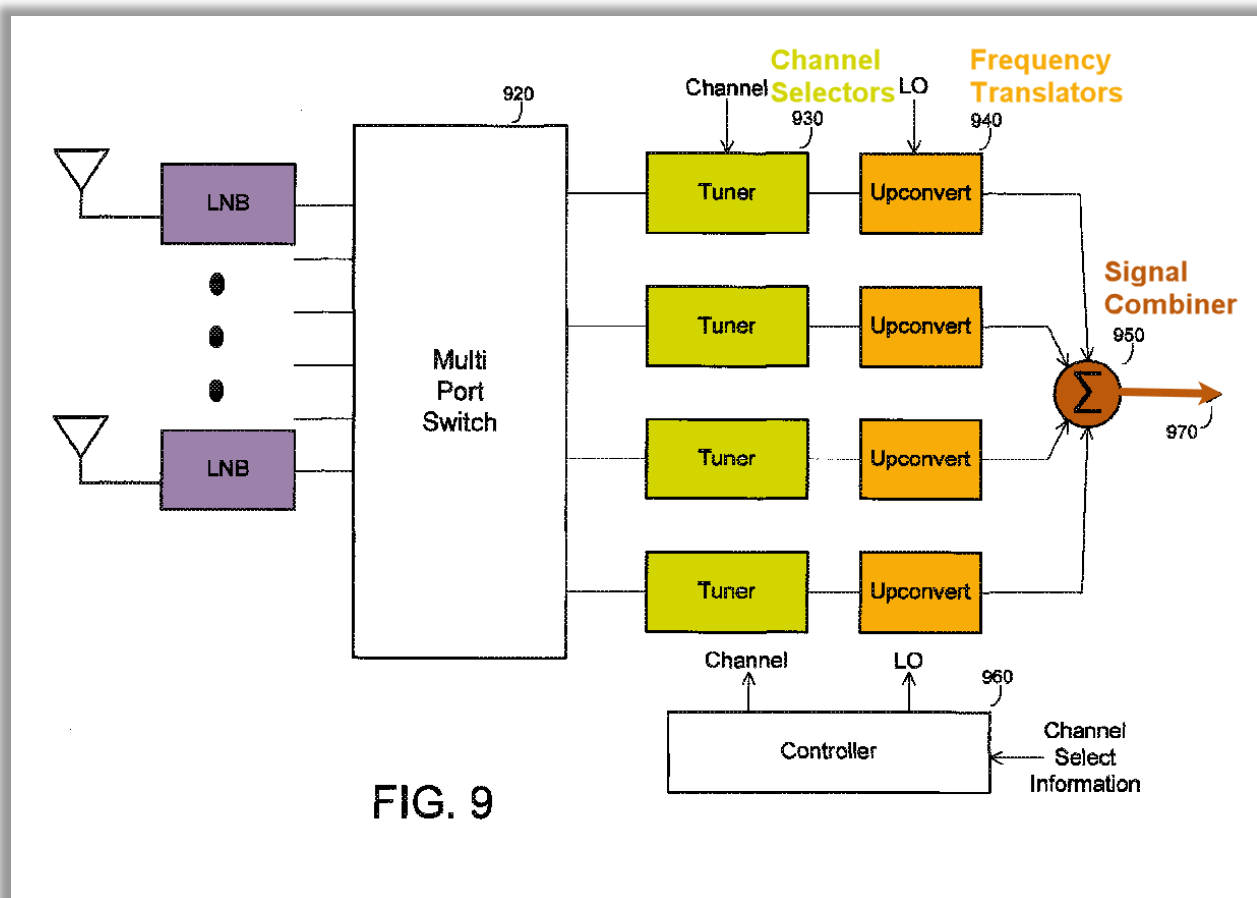
Figure 9 illustrates that each LNB output signal carries frequencies corresponding to particular satellite transponder channels that communicate video data. Desired transponder channels are selected by tuners 930. (Ex.1001-'576 patent, 8:65-9:25.) The frequency range for selected satellite transponder channels is shifted by up converters 940. (Ex.1001-'576 patent, 8:65-9:25.) Finally, all channels selected for distribution are combined into a composite signal for distribution over cable 970. (Ex.1001-'576 patent, 8:65-9:25.)

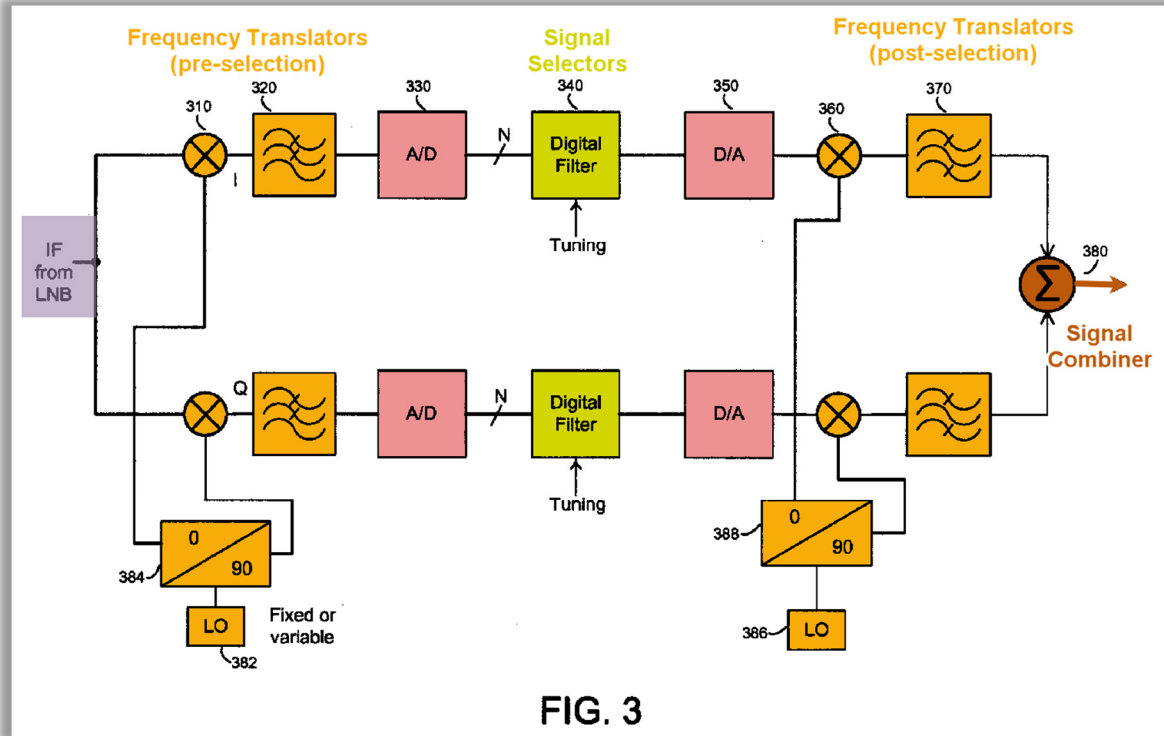
The '576 patent teaches that the tuning, upconverting, and combining depicted in Figure 9 is performed in the “digital domain”—that is, by a digital signal processor performing functions that are the digital equivalent of long-used analog signal processing techniques.² (Ex.1001-'576 patent, 10:60-63; Ex.1002-Schonfeld, ¶93.) However, nearly a decade before the '576 patent's 2001 priority date, the book “Communication Services Via Satellite” (1992)—part of the AAPA—touted the

² Importantly, the concept of selecting, extracting, and combining the broadband signal in the *digital domain* was not recited by the '576 application claims during prosecution. Instead, the claims were amended during reexamination to recite “*digitizing the plurality of satellite broadband signals*” to distinguish over prior art. (See §V.B.2, *infra*.)

“considerable advantages gained by changing to the digital concept,” including to increase bandwidth, minimize error, and optimize distribution. (Ex.1010, 104-05; Ex.1002-Schonfeld, ¶93.) Moreover, the ’576 patent expressly recognizes that conventional distribution system already operated in the digital domain. For example, QPSK—a digital signal modulation technique—was the “dominant modulation type in direct broadcast satellite systems” (Ex.1001-’576 patent, 1:54-57), and the received transponder channels carried multiplexed streams of video programs encoded using MPEG, a digital encoding method (Ex.1001-’576 patent, 9:26-33; Ex.1002-Schonfeld, ¶93.)

The ’576 patent purports to use what it expressly admits are known digital equivalents of analog signal processing, including digital filtering to select a signal instead of tuning (which the patent describes as “well known”), digital mixing to frequency shift a signal instead of analog mixing via an oscillator, and digitally combining to create a composite signal in lieu of an analog signal combiner such as a summer. (Ex.1001-’576 patent, 5:12-6:18; Ex.1002-Schonfeld, ¶94.) As Dr. Schonfeld explains, and as admitted by the ’576 applicant, each of these digital equivalents were known in the art and within the skill of a POSITA to incorporate into digital signal processing. (Ex.1002-Schonfeld, ¶94 & §§IV.E-F; *see* §IV, *supra*.)





Figures 3 and 9 - Signal Selection, Frequency Translation, and Signal Combination in the Analog (Fig. 9) and Digital (Fig. 3) Domains.

Because the transponder signals are received on an analog carrier, the digital signal processing embodiment requires the step of creating a digital representation of the analog signal. (Ex.1002-Schonfeld, ¶95.) And because the existing IRDs were configured to receive transponder signals in the format output by the LNB (*i.e.*, as an analog carrier signal typically modulated in QPSK), the digital signal processing further required converting the digital signal back to analog. (Ex.1002-Schonfeld, ¶95.) These steps are shown in Figure 3 by the “analog to digital” (“A/D”) and “digital to analog” (“D/A”) converters 330 and 350, respectively. (Ex. 1002-Schonfeld, ¶95.)

B. The Prosecution History

The '576 patent claims priority to multiple provisional patent applications, the earliest of which was filed November 7, 2001. (Ex.1001-'576 patent, Cover.)

1. Original Prosecution

The Examiner initially rejected all claims as anticipated by Williams-873, and/or rendered obvious by Williams-873 in combination with U.S. Patent No. 6,493,873 ("Seo"). (Ex.1006-'576 FH, 85.) The applicant distinguished over Williams-873 by arguing that "[a]n important distinction between applicant's invention and the Williams reference is that Williams uses transmodulation where the applicant's invention does not transmodulate." (Ex.1006-'576 FH, 85-86.) Applicant also distinguished over Williams-873 by amending the claims to require "wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting." (Ex.1006-'576 FH, 83, 85.)

Apparently persuaded by these arguments, the examiner dropped Williams-873 as a primary reference and rejected all claims as either anticipated by Shah (U.S. Patent No. 6,441,767), or obvious in view of Shah and other references, including Williams-873 for various dependent claims. (Ex.1006-'576 FH, 96-104.) Once again, applicant amended the claims to distinguish over the Shah-based rejections. In pertinent part, the claim amendments included "*in the ODU, selecting a plurality of transponder signals extracted from the received satellite broadband signals,*"

wherein the selecting is responsive to the transponder request signals.” (Ex.1006-’576 FH, 111.) An examiner interview occurred in June 2006 and the claims were subsequently allowed without any further explanation. (Ex.1006-’576 FH, 141-47, 154 (notice of allowance); *see also* Ex. 1002-Schonfeld, ¶¶97-99.)

2. Reexamination of the ’576 Patent

In 2007, RF Magic filed an *ex parte* reexamination challenging the validity of the ’576 patent. During reexamination, the Patent Office agreed that the “*Eutelsat Installer Guide*” anticipated the ’576 patent claims. (Ex.1007-’576 Reexam, 276, 289-92.) Unable to distinguish over *Eutelsat*, Patent Owner was forced to narrow its claims to avoid a finding of invalidity. (Ex.1007-’576 Reexam, 318 (admitting that “the Eutelsat references teach reception systems performing channel selection and combining” including via “reception architectures” that do not involve remodulation, such as “IF-IF conversion”); *see also id.*, 320-21.) This time, Patent Owner amended the claims to recite “digitizing the plurality of satellite broadband signals.” (Ex.1007-’576 Reexam, 311.) Patent Owner argued that *Eutelsat* did “not teach or suggest broadband digitization of the incoming signal combined with channel selection from that digitized signal in the digital domain,” including the step of “extracting selected channels from the digitized broadband signals in the digital domain.” (Ex.1007-’576 Reexam, 320-21.) Claims 1-23 were then found patentable as amended, and new claims 24-42 were added.

Had the Patent Office revisited Williams-873—prior art of record as anticipating the '576 patent claims—it was abundantly clear that Williams-873 disclosed a broadband signal distribution system embodiment that did not alter the modulation of the transponder signal. (Ex.1003-Williams-873, 4:57-60, 15:15-27; *See* Ex. 1002-Schonfeld, ¶¶148-52.) In light of the general knowledge of a POSITA and conventional techniques and applications of analog signal processing in the digital domain, the '576 patent claims should not have survived reexamination. (*See* Ex. 1002-Schonfeld, ¶¶70-84 and ¶¶100-102.)

C. The Alleged Priority Date

For the purposes of this proceeding only, Petitioners assume the '576 patent's priority date is November 7, 2001.

VI. CLAIM CONSTRUCTION

Except for the means-plus-function terms recited in claims 8-13 and addressed in Ground 1 below, Petitioners interpret the claims terms according to their plain and ordinary meanings as understood by a POSITA at the time of the invention in view of the specification and the prosecution history. 37 C.F.R. § 42.100 (b); *Phillips v. AWH Corp.*, 415 F.3d 1302, 1312-13 (Fed. Cir. 2005). In the district court litigation, Patent Owner proposed that all terms in asserted claims 14-19, 20-22, 34, and 36-42 be given their plain and ordinary meanings. (Ex.1035-Claim Construction Statement.) Petitioners reserve the right to respond if Patent Owner changes its

construction or otherwise defines the “plain and ordinary meaning” associated with a term.

VII. LEVEL OF ORDINARY SKILL

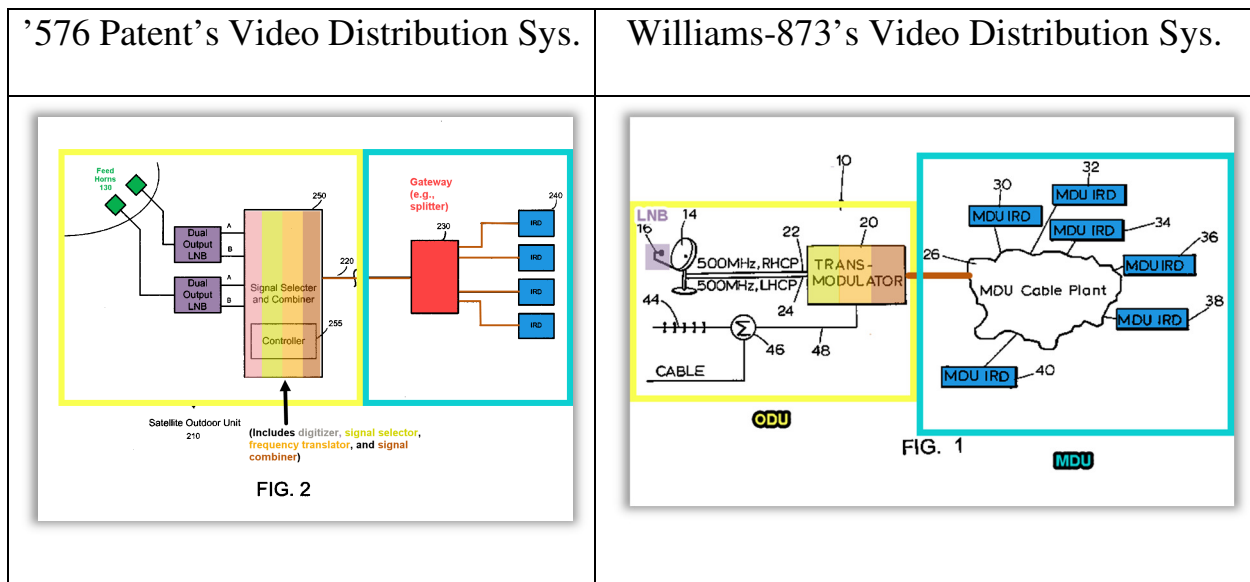
As of the alleged November 7, 2001 priority date, a POSITA is a person having at least: i) a bachelor-level degree in electrical engineering, computer engineering, or a related field, and three or more years of experience working in television signal processing and satellite communications; ii) a Master’s-level degree in electrical engineering, computer engineering, or a related field, and at least one year of experience in the television signal processing and satellite communications; or iii) a Ph.D.-level degree in electrical engineering, computer engineering, or a related field, and at least some experience in television signal processing and satellite communications. Additional education may substitute for professional experience, and significant work experience may substitute for formal education. (Ex.1002-Schonfeld, ¶¶33-34.)

VIII. DESCRIPTION OF THE PRIOR ART

A. Williams-873

Williams-873 describes and solves the same problem as the ’576 patent—how to deliver video signals to a plurality of IRDs using the same signal. (Ex.1003-Williams-873, Abstract, Fig. 1; Ex.1002-Schonfeld, ¶104.) Williams-873 sought to improve conventional limits on the bandwidth available for video transmission over

“typical cables” and the inability of the prior art to “broadcast a large number of transponder signals associated with one or more satellites over the same cable line.” (Ex.1003-Williams-873, 2:36-3:32; *compare with* Ex.1002-’576 patent, 1:55-62; Ex.1002-Schonfeld, ¶104.)



Williams-873's solution placed a transmodulator between two video sources—a satellite receiver and cable network receiver—that selected and combined signals into a composite signal for transmission over a single cable line for distribution via a cable network 26 within a multi-dwelling unit (“MDU”). (Ex.1002-Schonfeld, ¶105.)

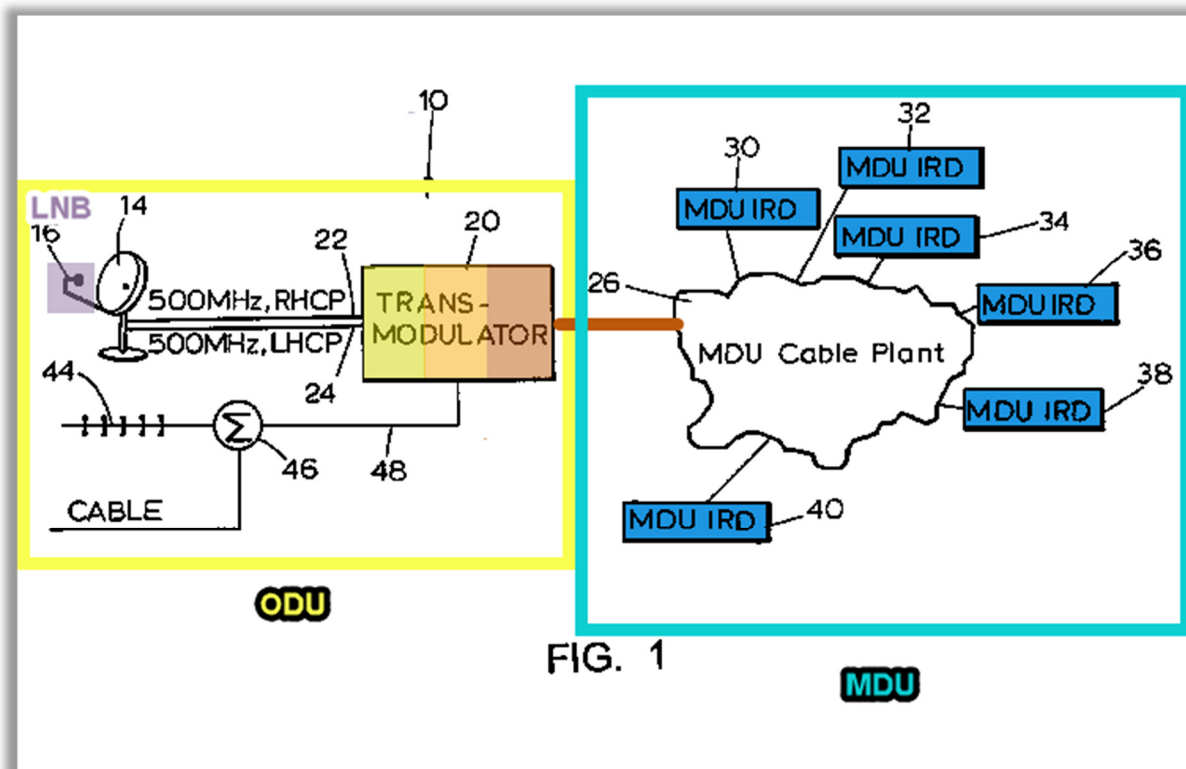


Figure 1 - Signal Distribution System of Williams-873.

In Williams-873, the transmodulator 20 receives input audio and video signals from a plurality of sources, including broadband satellite television signals 22 and 24 received by antenna 14 and down-converted by LNBs 16. (Ex.1003-Williams-873, 5:59-6:11; *compare with* Ex.1001-'576 patent, 4:28-50.) The transmodulator receives a plurality of transponder request signals from the IRDs located in within the MDU. (Ex.1003-Williams-873, 16:5-11; *compare with* Ex.1001-'576 patent, 3:10-19; Ex.1002-Schonfeld, ¶106.) Each requested transponder signal is selected in and processed by a transmodulator channel of the transmodulator 20. (Ex.1003-Williams-873, 4:16-39; *compare with* Ex.1001-'576 patent, 8:61-63, Fig. 8;

Ex.1002-Schonfeld, ¶[106.] An exemplary set of transmodulator channels having a tuner, decoder, packetizer, cable encoder, and upconverter are shown below in Figure 3.

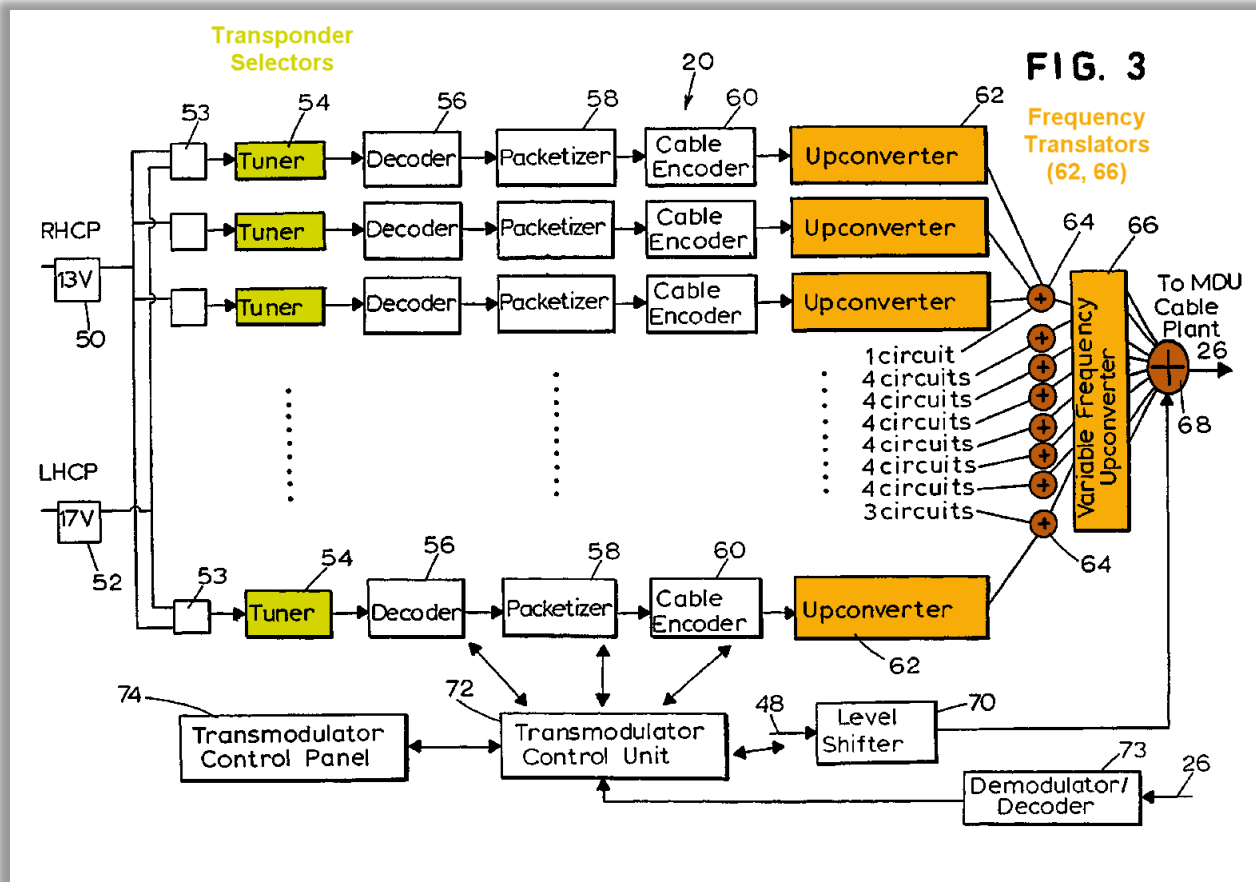


Figure 3 - Transmodulator 20 Contains a Plurality of Transmodulator Channels.

The output of each transmodulator channel is shifted to a distinct frequency before being summed by summer 68, and the resulting signal is distributed to the cable network of an MDU over a single cable. (Ex.1003-Williams-873, 10:34-39; compare with Ex.1001-'576 patent, 5:31-42, 5:55-6:19, Figs. 14-15; Ex.1002-

Schonfeld, ¶107.)

Importantly, although Williams-873 teaches exemplary transmodulator channels capable of changing the modulation of the selected signal, Williams-873's system does not require transmodulation. For example, Williams-873 explains that "in some cases in which only a few of the selected signals are being distributed, the transmodulator may not need to remodulate the selected signals but may, instead, send these signals over the cable network 26 at the received modulation scheme." (Ex.1003-Williams-873, 7:14-20.) The transmodulator 20 instead can "shift selected ones of the[] [received] signals to different frequencies for transmission over the cable network" without changing modulation. (Ex.1003-Williams-873, 15:15-27; Ex.1002-Schonfeld, ¶108.)

B. Pugel

Pugel discloses simultaneously processing a plurality of extracted satellite signals in a digital domain for distribution as a combined signal. (Ex.1004-Pugel, Abstract, ¶6; *compare with* Ex.1001-'576 patent, 4:51-6:19; Ex.1002-Schonfeld, ¶109.) Pugel's receiver 100 "comprises a direct broadcast satellite (DBS) receiver" including an analog processing section 110, for processing the received signal in the 950-1,450 MHz range. (Ex.1004-Pugel, ¶¶15-17; Ex.1002-Schonfeld, ¶109.) The output is then fed to an A/D converter 12 that "receives all ... 16 channels" of the received signal "simultaneously and produces at its output a digital bit stream S3

that is representative of the 16 channels in a digital format.” (Ex.1002-Pugel, ¶18; *compare with* Ex.1001-’576 patent, 4:51-64, 7:23-31; Ex.1002-Schonfeld, ¶109.) Channel processors 130 receive the digital signal and extract data associated with a particular one transponder channel (*i.e.*, extract a transponder signal). (Ex.1004-Pugel, ¶¶21-26; *compare with* Ex.1001-’576 patent, 5:12-30; Ex.1002-Schonfeld, ¶109.) Pugel teaches that all received transponder channels are processed by the channel processors 130 and combined in a manner for more efficient distribution (*i.e.*, through a network). Alternatively, a subset of received channels are processed by a smaller number of channel processors, the subset selected based on the needs of the system at the time. (Ex.1004-Pugel, ¶¶23, 37-39; *compare with* Ex.1001-’576 patent, 4:48-50, 5:31-42, 5:55-6:19, Figs. 14-15; Ex.1002-Schonfeld, ¶109.)

Pugel teaches several advantages to its digital channel processing receiver 100. For example, it removes the “typical analog conversion stage found in a direct conversion receiver,” and “[s]pecifically [avoids] analog mixers and oscillators.” (Ex.1004-Pugel, ¶51; Ex.1002-Schonfeld, ¶110.) It also advantageously avoids the “high-cost tuning and processing arrangement” associated with simultaneous channel processing in the analog domain. (Ex.1004-Pugel, ¶52; Ex.1002-Schonfeld, ¶110.)

IX. GROUND FOR CHALLENGE

Independent claims 8 and 14 are directed to a system and method for

distributing received satellite signals. Claims 9-13 depend from claim 8, and claims 15-23 and 34-42 depend from claim 14. Because claim 14 and most of its dependents are asserted by Patent Owner in the district court litigation, Petitioners present those claims first.

A. Ground 1: Claims 14-23, 34-42 and 8-13 are Obvious over Williams-873 in view of Pugel.

1. Motivation to Combine

A POSITA would have been motivated to combine the teachings of Williams-873 and Pugel. Both Williams-873 and Pugel are directed to satellite television signal distribution systems and address the same problem—how to optimally process and distribute received signals in view of user needs at a given point in time. (Ex.1003-Williams-873, Abstract; Ex.1004-Pugel, ¶¶3-4.) Moreover, both Williams-873 and Pugel describe receiving, selecting, combining, and distributing satellite signals. Thus, a POSITA would look to these similar and related references to efficiently process and distribute received satellite television channels to multiple users. (Ex.1002-Schonfeld, ¶112.)

Portions of Williams-873's signal distribution system are performed in the digital domain. Specifically, Williams-873 teaches decoding, packetizing, and cable encoding, performed on digital data in the "packet" form that is conventionally used to transmit data over a digital network. (Ex.1003-Williams-873, 9:39-10:39;

Ex.1002-Schonfeld, ¶113.) However, the front portion of Williams-873's system, including the tuning (*i.e.*, channel selection), frequency translating, and signal combining, are not conducted in the digital domain. (Ex.1002-Schonfeld, ¶¶113.)

Nevertheless, in view of Pugel, a POSITA would have been motivated to move the point of digitization earlier in Williams-873's distribution system so the digitization would occur prior to channel selection and after an LNB has down-converted received satellite signals so that at least signal selection (and subsequent processing) is performed in the digital domain. (Ex.1002-Schonfeld, ¶¶114-117.)

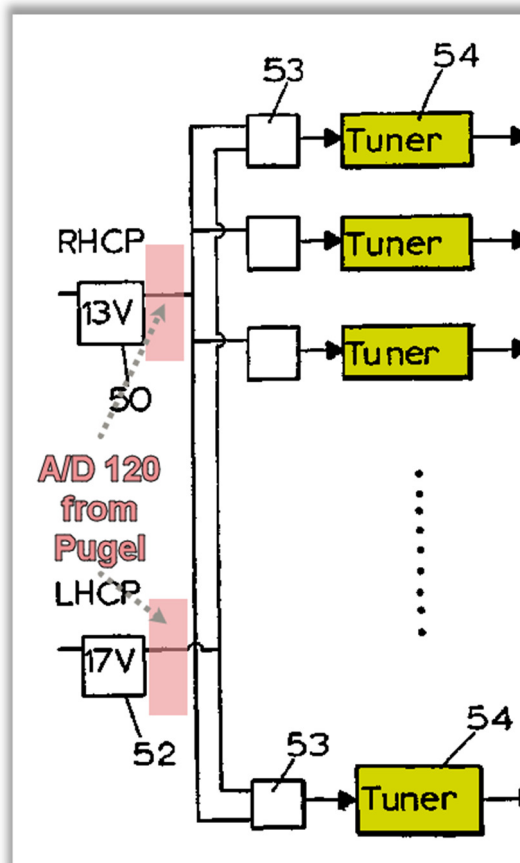


Figure 3 - Moving the Point of Digitization in Williams-873 Transmodulator 20 in View of Pugel 120

More particularly, a POSITA would have been motivated to use the A/D Converters 120 of Pugel—and apply them prior to Williams-873’s switches 53 and certainly before tuners 54 (collectively, “signal selection”). (Ex.1002-Schonfeld, ¶¶114-119.) A POSITA would have been further motivated to use known digital signal processing equivalents for the analog signal selection and frequency translation functions taught by Williams-873, including those taught in Pugel. (Ex.1002-Schonfeld, ¶120-21.)

Pugel teaches that the only processing performed prior to the use of A/D Converter 120 is by “analog processor 110” that “produce[s] an output signal S2 suitable for processing by the A/D converter 120.” (Ex.1004-Pugel, ¶16.) Therefore, a POSITA would have been motivated to use the teaching of Pugel to insert an analog-to-digital converter (such as A/D Converter 120) as early as possible in Williams-873’s signal distribution system, and to substitute in known digital equivalents to the switches 53 and tuners 54 in Williams-873 to obtain the benefits Pugel teaches regarding processing in the digital domain. (Ex.1002-Schonfeld, ¶¶116-19.) Modifying Williams-873 to include A/D converters after down-conversion (as shown above in Figure 3) would have been an obvious location to perform digitization while ensuring compatibility with commonly used satellite receiver/LNBs. (Ex.1002-Schonfeld, ¶¶118-19.)

Pugel teaches that digitizing a received satellite signal prior to channel

selection leads to advantages and efficiencies, including avoiding a “high cost” for analog “tuning and processing arrangement[s],” as the number of channel selectors (“transmodulator channels” in Williams-873) increase. (Ex.1004-Pugel, ¶52; Ex.1002-Schonfeld, ¶119.) Specifically, Pugel teaches that because “[a]ll of the N down-converted channels are included within a digital bit stream,” it can be “processed digitally to recover in parallel any of the N original transponder channels.” (Ex.1004-Pugel, ¶52.) In contrast to this efficient parallel processing in the digital domain, Pugel teaches that “[i]n an analog system,” such capability requires the use of N analog tuners “that cannot be split” and would need to be “ganged together.” (*Id.*) This disclosure in Pugel would further motivate a POSITA to implement in the digital domain the functionality of Williams-873 analog switches 53, tuners 54, and variable frequency upconverter 66, because such a skilled artisan would have known that the digital equivalent of each were generally more efficient, reliable, flexible, and less expensive than their analog counterparts, as taught in Pugel. (Ex.1002-Schonfeld, ¶¶120-22 (discussing undergraduate-level textbook authority from the 1990’s).)

Digitizing before signal selection and performing signal selection and translation functions in the digital domain were within the general knowledge of a POSITA and would have been implemented by a POSITA with a reasonable expectation of success using known components to make Williams-873’s system

more economical. (Ex.1002-Schonfeld, ¶122.) Indeed, during the *ex parte* reexamination, the Office found that “using a[n] ... analog to digital converter would have been part of the ordinary capabilities of a skilled artisan and there would have been a reasonable expectation of success based on similar uses of” analog to digital converters “in the same technological area.” (Ex.1007-’576 Reexam, 297; Ex.1002-Schonfeld, ¶122).)

2. Independent Claim 14

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

To the extent the preamble is limiting, Williams-873 teaches it.

Williams-873 discloses a *method of communicating a plurality of transponder signals from a satellite ODU that receives a plurality of satellite broadband signals*. (Ex.1002-Schonfeld, ¶124.) Williams-873 discloses that main signal receiver 14 and transmodulator device 20—collectively the *satellite ODU*—are responsible for receiving and processing a plurality of satellite signals 22/24 and then communicating a composite signal to an IRD in a multi-dwelling unit. (Ex.1003-Williams-873, Abstract (system includes “a main receiving antenna that receives a broadband video/audio/data signal having a number of individual program multiplex signals therein.”), 3:50-4:3 (“[A] receiving antenna receives a broadband signal

from, for example, a satellite ... [a] transmodulator ... transmits this transmodulated signal ... a communication channel, such as a cable”), 5:59-6:11 (“The signal distribution system 10 includes a main signal receiver 14 disposed on, for example, the roof of an MDU or any other location capable of receiving a signal transmitted by a satellite or other signal source.”), Fig. 1.)

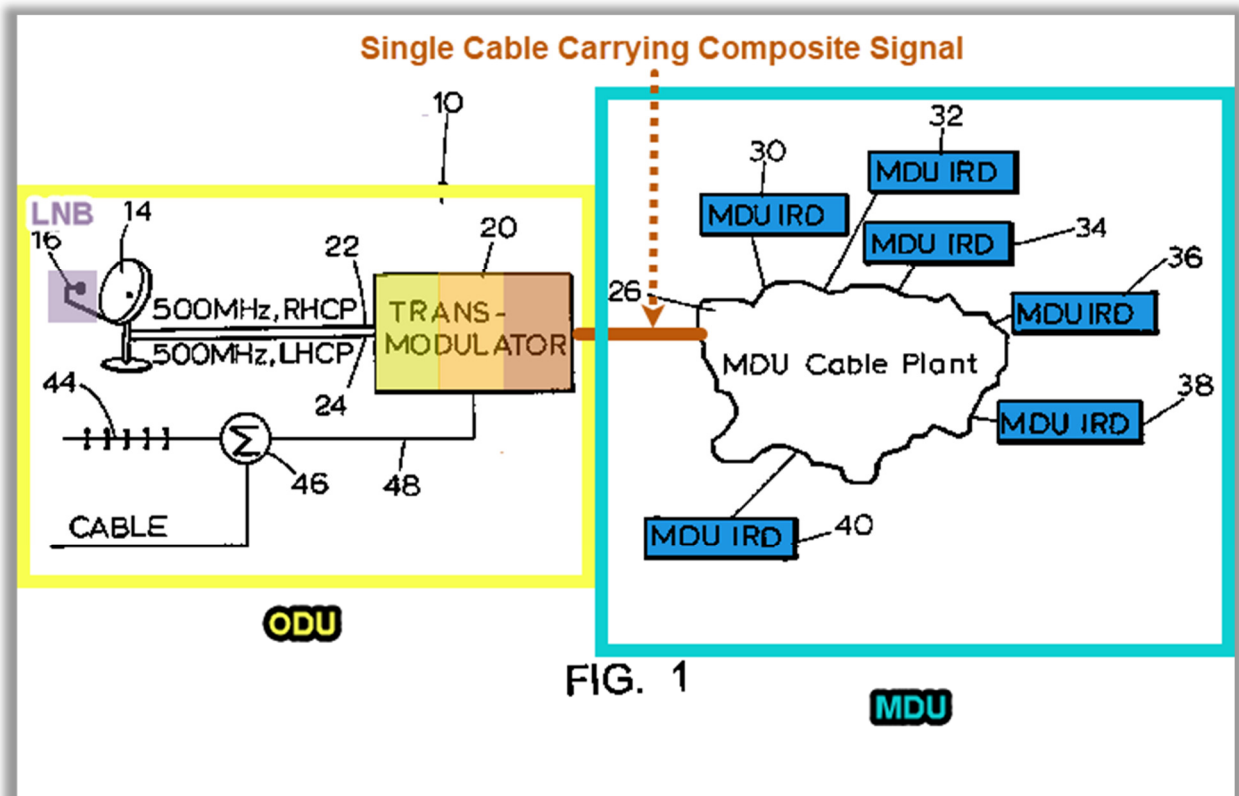


Figure 1 - Williams-873's Signal Distribution System.

Figure 1 of Williams-873 further illustrates that the *communicated transponder signals* are directed to *at least one IRD* (i.e., MDU IRDs 30, 32, 34, 36,

38 or 40) *over a single cable connected to the ODU.*³ (Ex.1002-Schonfeld, ¶125.) “The transmodulator 20” places “transponder signals on a cable plant or cable network 26 within an MDU for distribution to a number of IRDs.” (Ex.1003-Williams-873, 6:12-34, 10:24-39 (“A summer 68 then combines these upconverted transmodulated signals with each other ... for propagation over the cable network 26 of Fig. 1.”), claim 14 (“The signal distribution system of claim 9, wherein the main transmitter transmits the combined signal to the individual receivers over a cable ...”).)

Accordingly, Williams-873 discloses this limitation.

³ In its infringement contentions in co-pending district court litigation, Patent Owner appears to interpret “over a single cable to the ODU” to mean that the composite signal is first transmitted from the ODU into a house/MDU over a single cable before being “split” onto multiple other cables connecting each IRD to the ODU, meaning that in direct contrast to the express claim language—at least two cables are required. While DISH does not necessarily agree with this applied construction, DISH applies it for the purposes of this IPR, since the Williams-873 configuration mirrors it exactly.

14[a] “communicating a transponder request signal to the ODU from the IRD;”

Williams-873 discloses this limitation. (Ex.1002-Schonfeld, ¶127.) Williams-873’s IRDs “receive[] satellite signal requests from a user and then send[] requests to the transmodulator 20” of the ODU “to have the requested transponder signals ... transmitted to the IRD via cable network 26” (*i.e., communicate transponder request signals*). (Ex.1002-Williams-873, Figure 1 elements 30, 32, 34, 36, 38 or 40, 16:5-11, Abstract (“receiver units send requests for user-selected ones of the individual program multiplex signals to the transmodulator device”), 4:33-38 (“The signal distribution system also includes a request receiver that receives a request signal from each of the individual receivers, ...”).) Specifically, *the transponder request signals* are received by a transmodulator control unit 72 of *the ODU*, which may be a microprocessor that controls subsequent signal processing by the transmodulator 20. (Ex.1003-Williams-873, 10:53-11:21; Ex.1003-Schonfeld, ¶127.)

“in the ODU ...”

Each of limitations 14[b][1]-[3] is performed by Williams-873’s transmodulator 20 as modified in view of Pugel. Williams-873’s receiver 14 and transmodulator 20 are the claimed ODU, such that each of elements recited in limitation 14[b][1]-[3] are performed in the ODU. *See* limitation 14[pre], *supra*.

During prosecution of the ’576 patent, applicant attempted to distinguish

Williams-873 based on a narrow interpretation of the claimed *ODU*. (Ex.1006-'576 FH, 85-86; Ex.1002-Schonfeld, ¶¶129-30.) To the extent Patent Owner repeats that argument here, the combination of Williams-873 and Pugel would nonetheless render that interpretation obvious.

Specifically, Applicant stated that “[d]ue to the complexity, size, and power consumption of the Williams-873 approach, it is not suitable for installation in the outdoor unit (ODU), where applicant’s invention is installed in the outdoor unit”—apparently contending that the claimed ODU must be integrated in the signal receiver (*i.e.*, dish) to perform the claimed signal selection and combination. (Ex.1006-'576 FH, 85-86; Ex.1002-Schonfeld, ¶130.) Under this interpretation, it would have been obvious in the modified system of Williams-873 in view of Pugel to include the transmodulator within a single integrated receiver. (Ex.1002-Schonfeld, ¶130.) As Pugel recognizes, switching from analog tuners (taught in Williams) to digital tuners reduces complexity, prevents “high cost,” and thus avoids issues related to power necessary to amplify and split a signal between multiple analog tuners. (Ex.1004-Pugel, ¶52; Ex.1002-Schonfeld, ¶130.) Indeed, Pugel teaches that its entire signal processing system, including analog to digital converter, digital tuner, and digital frequency translator, is part of a single satellite receiver 100. (Ex.1004-Pugel, ¶15, Ex.1002-Schonfeld, ¶130.) A POSITA would have been motivated by Pugel to integrate the signal processing steps within a single receiver

to reduce components and potential fault points and would have had a reasonable expectation of success in doing so. (Ex.1002-Schonfeld, ¶130.) Accordingly, to the extent Williams-873 alone does not meet the narrower interpretation of an ODU, it would have been obvious based on the combination of Williams-873 and Pugel.

14[b][1] “digitizing the plurality of satellite broadband signals”

This limitation would have been obvious to a POSITA based on Williams-873 in view of Pugel. As discussed, Williams-873 does not expressly disclose digitizing the plurality of satellite broadband signals, but Williams-873’s system does operate in the digital domain when it decodes into digital data packets the signals selected by the analog tuner. (§IX.A.1, *supra*; Ex.1002-Schonfeld, ¶131.) Nevertheless, in view of Pugel, it would have been obvious to modify Williams-873 to *digitize the plurality of satellite broadband signals* (*i.e.*, all of the signal received by a satellite dish) before any signal processing, including signal selecting. (Ex.1002-Schonfeld, ¶131.)

Pugel teaches using analog to digital converters for “directly converting a plurality of carrier signals,” *satellite broadband signals*, “into a digital data stream.” (Ex.1004-Pugel, ¶6; Ex.1002-Schonfeld, ¶132.) Analog-to-digital converters (A/Ds) allow for conversion of all received signals for subsequent digital processing, which, as Pugel explains, provides cost and complexity advantages by allowing filtering for select signals in the digital domain, relative to a system using filtering select signals

in the analog selection like Williams-873. (Ex.1004-Pugel, ¶¶18, 52; Ex.1002-Schonfeld, ¶132.) It was generally known to a POSITA that performing signal processing in the digital domain would lead to well known advantages, including but not limited to (1) increased distribution bandwidth, (2) error minimization, and (3) optimized distribution. Indeed, the '576 patent admits that these digitization advantages were well within the knowledge of a POSITA and used in satellite distribution systems a decade before its priority date. (Ex.1009-AAPA-Communication Services Via Satellite, 104-05; Ex.1002-Schonfeld, ¶133.) Even during reexamination of the '576 patent, the Office recognized the benefits and predictable success of using analog-to-digital converters in the context of communications and signal processing. (Ex.1007-'576 Reexam, 297). Indeed, Williams-873 expressly teaches chips and integrated circuits capable of digitizing a received analog QPSK signal that are used in the transmodulator 20, but only after signal selection. (Ex.1003-Williams-873, 12:48-65; §IX.1.A, *supra*; Ex.1002-Schonfeld, ¶133.) Therefore, as Dr. Schonfeld opines, a POSITA would have had a reasonable expectation of success of digitizing the plurality of satellite broadband signals received by Williams-873's system before selecting, extracting and combining the selected transponder signals ultimately transmitted. (Ex.1002-Schonfeld, ¶133.)

Accordingly, *digitizing the plurality of satellite broadband signals* would

have been obvious to a POSITA based on the combination of Williams-873 and Pugel.

14[b][2] “selecting and extracting a plurality of transponder signals from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;”

Williams-873’s transmodulator includes a plurality of tuners 54 that are part of the “transmodulator channel” and responsible for *selecting and extracting a transponder signal from the received satellite broadband signals*. (Ex.1003-Williams-873, 4:16-39, 9:28:39.)

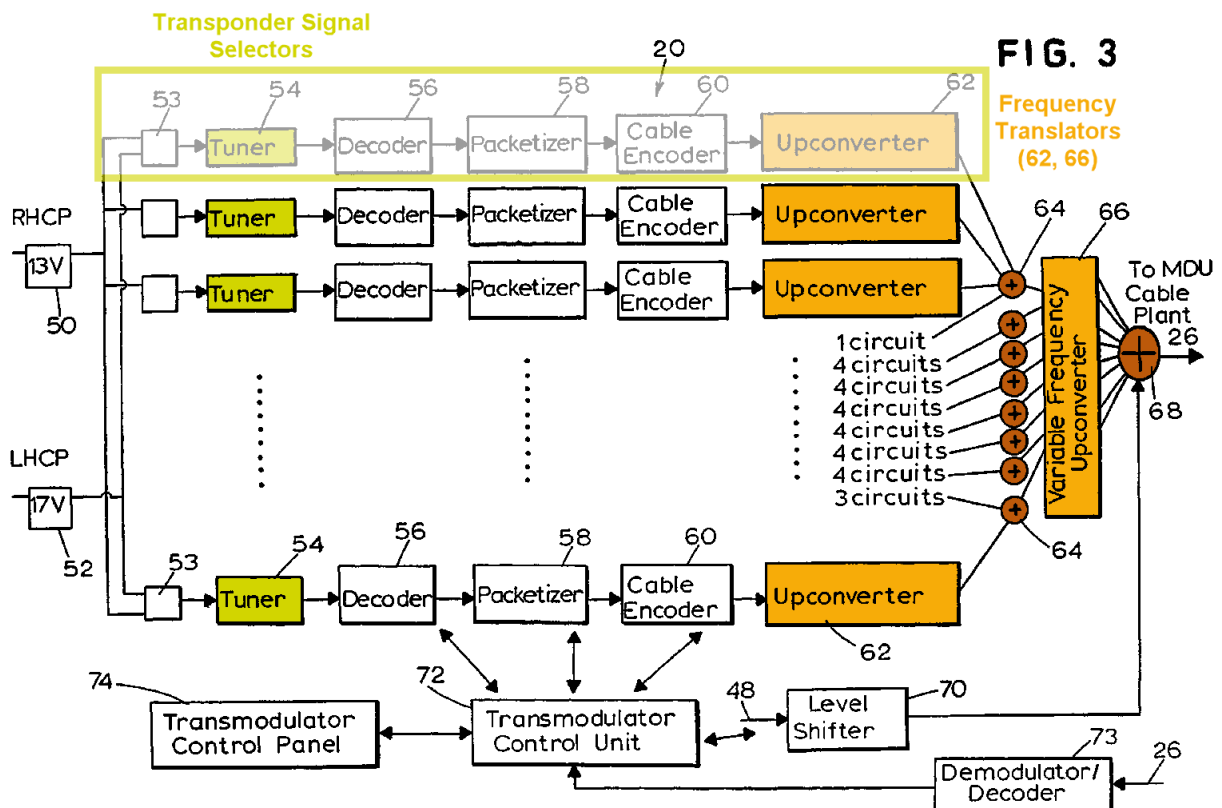


Figure 3 - Each Row of Processing is a Transmodulator Channel of Williams-873's Transmodulator 20.

In Williams-873's Figure 3, tuners 54 *select and extract* the transponder signals. Specifically, each tuner 54 "tunes to one of the transponder signals associated with" the received digital broadband satellite signals. (Ex.1003-Williams-873, 9:40-48.) Williams-873 described in detail that each tuner selects a transponder from either the RHCP 22 or LHCP 24 signal, each a *received satellite broadband signal*. (Ex.1003-Williams-873, 9:40-48; Ex.1002-Schonfeld, ¶136.) The tuner simultaneously "filter[s] out the other 15 transponder signals within that band, to produce a 24 MHz-wide, QPSK-modulated signal corresponding to a *selected one*" of the received *transponder signals*. (Ex.1003-Williams-873, 9:40-48 (emphasis added); Ex.1002-Schonfeld, ¶136.)

In the modified system of Williams-873 and Pugel, each of the *received satellite broadband signals* is digitized prior to tuning, and thus digital tuners (such as the mixer 132 and decimator/filter 134 taught in Pugel) are used in place of Williams-873's analog tuners 54. Both the digital mixer 132, which uses a numerically controlled oscillator (NCO) signal, and the digital decimator/filter 134, were known in the art for performing the digital equivalent of tuning/filtering functions even before they were disclosed in Pugel. (Ex.1002-Schonfeld, ¶137.)

As explained above and by Dr. Schonfeld, a POSITA would have been motivated to obtain the advantages of digital tuning and would have had a reasonable expectation of success incorporating the digital tuners into Williams-873's

distribution system. (§IX.A.1, limitation 14[b][1], *supra*; Ex.1002-Schonfeld, ¶138.) Indeed, Pugel expressly teaches using digital tuners to “extract from the digital data stream data carried by” a carrier signal (*i.e.*, from the digitized *satellite broadband signals*). (Ex.1004-Pugel, ¶¶5-6; Ex.1002-Schonfeld, ¶138.) This is the same purpose for *extracting* as described in the ’576 patent: taking digital data associated with a subset of a complete signal for further processing without the rest of the signal. (Ex.1001-’576 patent, 3:5-9 (“LNB outputs can be sampled by a broadband A/D converter and filtered with a digital filter to select a transponder channel. Alternatively, a tuner can select a transponder channel. The selecting process extracts from the wide band LNB output a narrow band transponder channel.”); Ex.1002-Schonfeld, ¶138.) And use of a digital tuner to select and extract transponder signals would not alter the modulation of the selected transponder signals, as is required in limitation 14[d]. (Ex.1002-Schonfeld, ¶138.)

Williams-873 further teaches that the transponder signal selection is *responsive to the transponder request signals*. (Ex.1002-Schonfeld, ¶139.) Williams-873’s transmodulator 20 and its control unit 72 “receive[] and decode[] requests for ... satellite signals” (*transponder request signals*) “from each of the IRDs 30-40 that are active.” (Ex.1003-Williams-873, 6:35-42.) Under the control of control unit 72, tuners 54 then “tune[] to ... only those selected satellite or transponder signals.” (Ex.1003-Williams-873, 6:35-42, 10:53-11:5 (“control unit 72

... preferably controls ... the tuners 54.”), 11:6-16 (“[T]he control unit 72 assimilates all of the satellite signal requests received from the IRDs 30-40, determines which of the satellite signals or transponder signals must be decoded to satisfy these requests and controls a different one of the transmodulator channels” which process the “so-determined transponder signals for transmission over the cable network 26.”.) As part of modifying Williams-873 to include a digital tuner (as taught in Pugel), a POSITA would have been motivated to maintain that transponder signal selection *is responsive to the transponder request signals* to ensure that IRDs receive desired transponder signals while avoiding further processing of signals that are not desired (which would have been wasteful). (Ex.1002-Schonfeld, ¶139.)

Accordingly, the combination of Williams-873 and Pugel renders obvious *selecting and extracting a plurality of digitized transponder signals from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals.*

14[b][3] “combining extracted selected transponder signals into a composite signal;”

Williams-873’s “summer 68 [] *combines*” the *extracted selected “signals* with each other and with any desired frequency-shifted or non-frequency-shifted terrestrial signals (delivered by a level shifter 70) for propagation over the cable network 26 of FIG. 1.” (Ex.1003-Williams-873, 10:24-39 (emphasis added); 4:29-

33 (“A combiner combines the multiplicity of transmodulated signals at different carrier frequency bands to produce a combined signal and a transmitter transmits the combined signal over the communication channel to the individual receivers.”); *see also* Ex.1002-Schonfeld, ¶141.). As shown Willaims-873’s Figure 3, summer 68 of transmodulator 20 combines all selected transponder signals into a composite signal. (Ex.1002-Schonfeld, ¶141.).

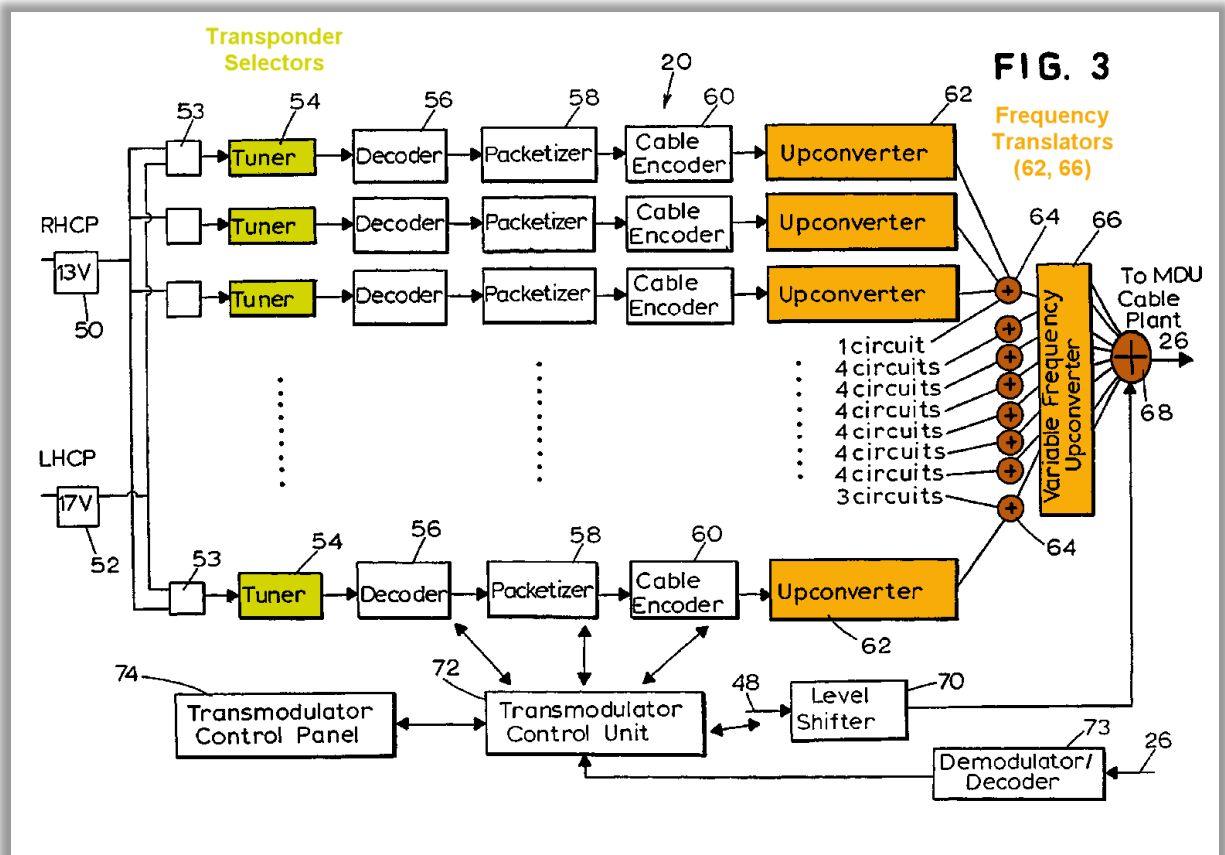


Figure 3 - Transmodulator 20 Includes Summer 68.

The output of summer 68 is the claimed *composite signal*. (Ex.1002-Schonfeld, ¶142.)

Because Williams-873's IRDs are configured to receive analog RF, and not digital, signals, the composite signal transmitted to the IRDs must be an analog RF signal. (Ex.1002-Schonfeld, ¶143.). A POSITA would have understood when combining Williams-873 and Pugel that there are two options to ensure that the digitized selected and extracted transponder signals were provided for distribution as analog RF signals. First, a POSITA could use Williams-873's analog summer 68 but would need to convert each selected and extracted transponder signal from digital to analog prior to summing. (Ex.1002-Schonfeld, ¶143.) Second, and alternatively, a POSITA would have known to replace Williams-873's summer 68 with a digital combiner—as taught in Pugel—and convert the output of the digital combiner into an analog RF signal for distribution. (Ex.1004-Pugel, ¶45; Ex.1003-Schonfeld, ¶143.) Each implementation would have been well within a POSITA's general knowledge and would provide tradeoffs and advantages. (Ex.1002-Schonfeld, ¶143.) As Dr. Schonfeld explains, the first option permits use of Williams-873's analog summer but requires a plurality of digital-to-analog converters prior to summation, while the second option requires replacing the summer with a digital equivalent (as taught in Pugel), but beneficially requires only one digital to analog converter following signal summation. Either of these options would have been obvious implementation and design choices, and neither would result in altering the modulation of the selected transponder signals, as is required in

limitation 14[d]. (Ex.1002-Schonfeld, ¶143.)

Accordingly, *combining extracted selected transponder signals into a composite signal* is obvious over Williams-873 and Pugel.

14[c] “transmitting the composite signal over the single cable from the ODU to the IRDs,”

Williams-873’s transmodulator 20 transmits its output containing the selected transponders “over a communications channel, *such as a cable*, ... to a number of individual receiver units [IRDs] within [a multi-dwelling unit].” (Ex.1003-Williams-873-873, 3:40-4:3 (emphasis added).) The transmission originates at the summer 68 in transmodulator 20, which is part of the ODU or would have been obvious to include in the ODU. (See limitations 14[a]-[b], *supra*; Ex.1004, 10:24-39, Fig. 3; Ex.1002-Schonfeld, ¶145.) The transmission reaches the individual IRDs via a cable network 26 within a multi-dwelling unit, also called a cable plant. (Ex.1003-Williams-873, 10:24-39, Ex.1002-Schonfeld, ¶145.) Figure 1 of Williams-873 shows the transmission by the transmodulator 20 to a plurality of MDU IRDs originating on a single cable. See Footnote 3, *supra*.

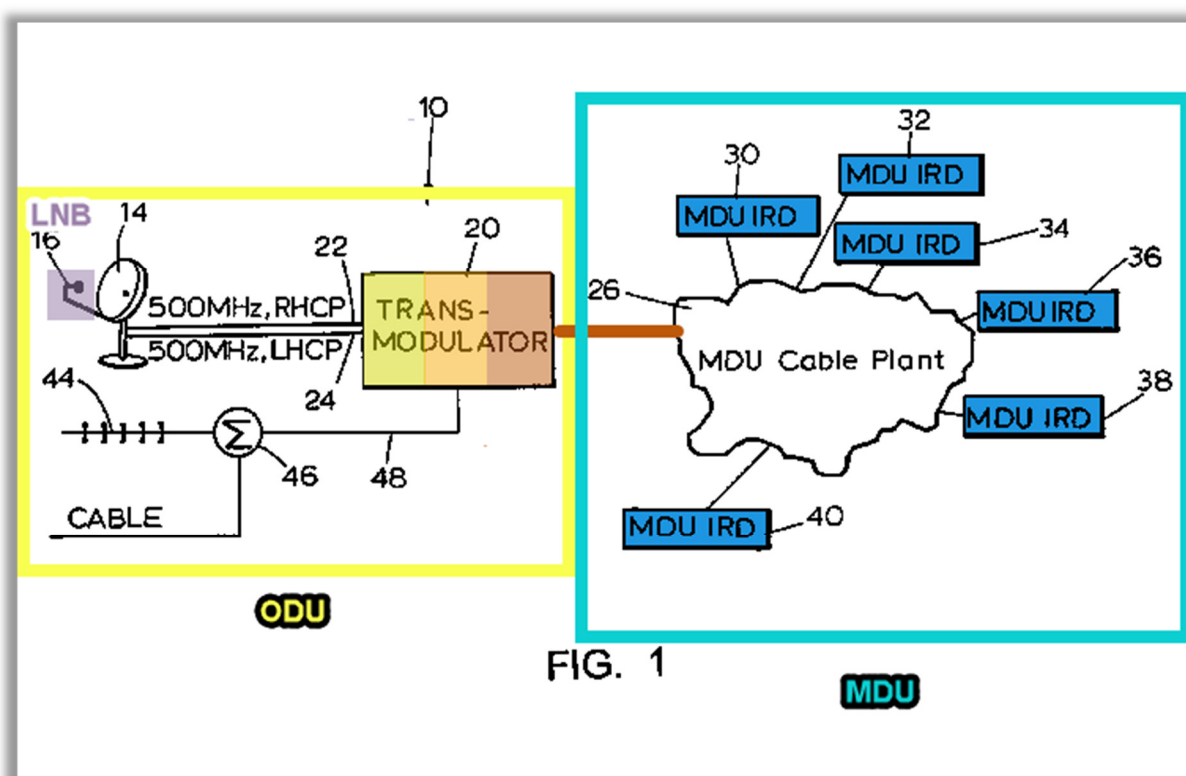


Figure 1 - Signal Distribution System of Williams-873.

The transmission taught in Williams-873 would not result in altering the modulation of the selected transponder signals transmitted on the composite signal, as is required in limitation 14[d]. (Ex.1002-Schonfeld, ¶146.)

Accordingly, Williams-873 discloses *transmitting the composite signal over the single cable from the ODU to the IRDs.*

14[d] “wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.”

In direct contrast to applicant’s mischaracterization of Williams-873 during prosecution of the ’576 patent, Williams-873 does in fact expressly disclose a broadband signal distribution system that **does not alter** the modulation of the

transponder signal. While Williams-873 teaches various embodiments where selected signals are transmodulated prior to combining in many instances, Williams-873 also expressly discloses an alternative embodiment where transmodulation is not required. For example, Williams-873 expressly states that “in some cases, [where] only a few of the selected channels are being distributed, the transmodulator may not need to remodulate the selected signals.” (Ex.1003-Williams-873, 7:15-23 (emphasis added).) Williams-873 further explains that “transmodulator 20 need not remodulate the received transponder signals, but may, instead, shift selected ones of these signals to different frequencies for transmission over the cable network 26.” (Ex.1003-Williams-873, 4:57-60, 15:15-27; Ex.1002-Schonfeld, ¶148.)

Williams-873 goes on to articulate the tradeoffs associated with the alternative embodiment and explained that:

This configuration only reduces the bandwidth used by the signals transmitted over the cable network to the extent that it eliminates some of the received satellite transponder signals. Thus, the more received satellite transponder signals that are to be sent to the IRDs 30-40, i.e., the more transmodulator channels there are, the less viable this option becomes.

(Ex.1003-Williams-873, 15:20-27.) In other words, transmission of the selected signals by shifting the frequency bands, but without remodulation, benefits from bandwidth reduction by the selection of the received signals only and does not gain any further bandwidth reduction due to the remodulation scheme employed.

(Ex.1002-Schonfeld, ¶149.) Therefore, Williams-873's alternative embodiment is only possible in circumstances when the available bandwidth is sufficient to accommodate a limited number of selected signals in their existing modulation format; however, as Dr. Schonfeld explains, the "limited number" of selected signals could easily encompass twenty-plus transponder signals, each containing a plurality of television programs. (Ex.1002-Schonfeld, ¶¶149.) The use cases are, as Williams-873 use of the word "few" might otherwise suggest, not so narrow.

Williams-873 also explains that, although this alternative approach may not realize the potential bandwidth reduction offered by remodulation, it benefits from having a simpler, lower-cost system because, "in this case, each transmodulator channel would [only] need to include a tuner and a frequency shifter" and would not require the complexity associated with remodulation. (Ex.1003-Williams-873, 15:18-20.) This is consistent with the goal of Williams-873 which states that "[t]he present invention relates to a low-cost system and method for distributing a set of programs multiplexed A-V signals ... to a multiplicity of receiver units within one or more MDUs using an MDU cable network or other transmission channel." (Ex.1003-Williams-873, 3:50-54.)

In the '576 prosecution history, the applicant completely ignored that this alternative embodiment does not require remodulation when the number of users is relatively small. In fact, the rationale that it provided for the advantages of the

alleged claimed invention compared to Williams-873 (simplicity of hardware and reduced cost with a small number of users) is precisely the reason a POSITA would be motivated to use the alternative non-remodulating embodiment in Williams-873 in the same circumstances. (Ex.1002-Schonfeld, ¶151.)

When read in full and dismissing the '576 Applicant's mischaracterizations, Williams-873 undeniably discloses a system *wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.* (Ex.1002-Schonfeld, ¶152.) And, as discussed above in limitations 14[b][2], 14[b][3], and 14[c], and by Dr. Schonfeld, the modifications made in view of Pugel—the use of a digital tuner/filter to select and extract, and possibly a digital combiner to combine selected extracted transponders in the digital domain—likewise do not alter modulation. (Ex.1002-Schonfeld, ¶152.)

In conclusion, independent claim 14 is rendered obvious based upon the combination of Williams-873 and Pugel.

3. Dependent Claim 15

The method of claim 14 wherein the step of selecting and extracting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

Pugel teaches using decimator/filter 134 as part of channel selection to “remove” “non-desired channel energy” to “retain only the channel energy

associated with a specific desired channel.” (Ex.1004-Pugel, ¶23.) Because Pugel’s signal selection occurs in the digital domain, a POSITA would understand decimator/filter 134 is a digital filter. (Ex.1002-Schonfeld, ¶154.) A POSITA would also understand Pugel’s disclosure of decimator/filter 134 to be a bandpass filter (specifically, a “*low pass filter*”), as it allows the transponder signal located at baseband to pass through but filters out signals at a higher frequency. (Ex.1002-Schonfeld, ¶154.)

As discussed above in limitation 14[b][1], a POSITA would have known to replace Williams-873’s analog tuner 54 with Pugel’s digital bandpass filter. Williams-873 already teaches that as part of selecting and extracting in the analog domain, transmodulator 20 “filter[s] out the other 15 transponder signals within that band” leaving a single signal “corresponding to a selected” one transponder signal. (Ex.1003-Williams-873, 9:40-48.) The filtering by Williams-873’s analog tuner 54 is the equivalent in the analog domain to Pugel’s mixer 132 decimator/filter 134 operating in the digital domain. (Ex.1002-Schonfeld, ¶155.) After incorporating Pugel’s teaching of digitizing the broadband satellite signal prior to selecting and extracting, it would have been obvious (if not necessary) to modify Williams-873’s filter to operate as digital bandpass filter. (Ex.1002-Schonfeld, ¶155.) A POSITA would have had a reasonable expectation of success in incorporating a digital bandpass filter as part of channel selection. (Ex.1002-Schonfeld, ¶155.)

To be sure, the '576 patent concedes that “digital filtering,” including “applying a band pass filter transfer function to the broadband signal to isolate a single transponder channel,” used “known digital architectures” and was “well known in the digital signal processing field.” (Ex.1001-'576 patent 5:12-29.) And during the *ex parte* reexamination, the Office also acknowledged that “using a digital filter ... would have been part of the ordinary capabilities of a skilled artisan and there would have been a reasonable expectation of success based on similar uses of” digital filters in the “same technological area.” (Ex.1007-'576 Reexam, 297.)

It would have further been obvious to modify Williams-873 so that the *digital bandpass filter* adopted from Pugel has *a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal* being selected. A POSITA would have been motivated to leave a buffer to ensure that the entire transponder signal is selected as insurance against potential signal processing inconsistencies upstream (*e.g.*, down-converting inconsistencies by the LNB whereby it shifts a desired transponder signal to a slightly different center frequency than desired). (Ex.1002-Schonfeld, ¶157.) Setting the filter at least 5% wider than the transponder signal bandwidth would accomplish this goal. (Ex.1002-Schonfeld, ¶157.) As Dr. Schonfeld explains, typically there is an empty frequency band on either side of a transponder (a “guard band”) to avoid interference, so filtering for a frequency range slightly broader than the transponder signal could be performed without selecting

any part of an adjacent transponder signal. (Ex.1002-Schonfeld, ¶157.) Indeed, the '576 patent explains that “typically” a 500 MHz satellite signal contains 16 transponder signals of 24 MHz, leaving 118 MHz for guard bands, approximately 7.25 MHz per transponder (30% of transponder bandwidth). (Ex.1001-'576 patent, 1:44-54; Ex.1002-Schonfeld, ¶157.)⁴ Pugel teaches guard bands of 5.16 MHz, approximately 21% of transponder signal bandwidth. (Ex.1004-Pugel Figs. 2A-2B; Ex.1002-Schonfeld, ¶157.)

Accordingly, claim 15 is obvious over Williams-873 in view of Pugel.

⁴In response to an office action rejecting claim 15 based on Williams-873, applicant misrepresented to the Patent Office that “[t]he bandpass filtering of Williams-873 is 500 MHz wide and spans all transponders output from one polarization of the LNB.” (Ex.1006-'576 FH, 88-89.) As noted above, Williams at 9:40-48 discloses that transmodulator 20 filters out all but a selected transponder signal, meaning that Williams teaches a filter of approximately the size of a transponder channel (on the order of 20-30 MHz), not 500 MHz. (Ex.1002-Schonfeld, ¶157, n. 3.)

4. Dependent Claim 16

The method of claim 14 wherein the step of combining comprises frequency translating the selected and extracted transponder channels to a variable frequency before combining.

In Williams-873, the output of a plurality of transmodulator channels—each row of Figure 3 including selection and extraction of a transponder signal by a tuner 54—ultimately reaches a “variable frequency upconverter 66.” (Ex.1003-Williams-873, 9:28-39, 10:24-39.)

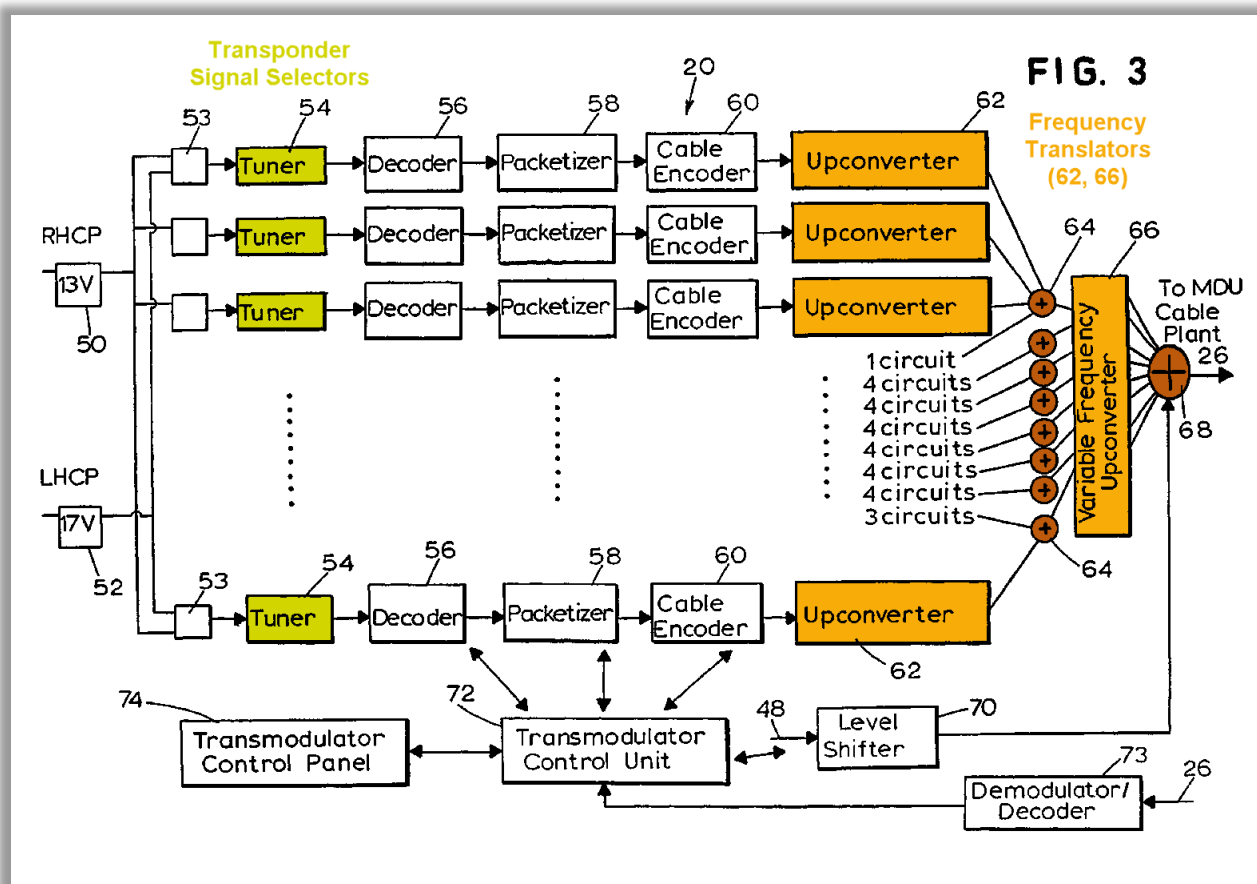


Figure 3 - Transmodulator 20 Includes Variable Frequency Upconverter 66.

Variable frequency upconverter 66 “upconverts each of up to eight groups of

... signals to a different carrier frequency band.” (Ex.1003-Williams-873, 10:24-39; Ex.1003-Schonfeld, ¶160.) Williams-873 teaches that variable frequency upconverter 66 may be under the control of control unit 72, which “control[s] the frequencies at which the [] signals ... are transmitted over the cable network 26,” *i.e.*, on the composite signal. (Ex.1003-Williams-873, 11:36-40; Ex.1002-Schonfeld, ¶160.) The variable frequency converter 66 is part of the *step of combining*, as it sits between one set of summers 64 (*combiners*) and the final summer 68, which combines selected and extracted transponder signals to form the *composite signal*. (Ex.1002-Schonfeld ¶160.) Accordingly, claim 16 is obvious over Williams-873 in view of Pugel.

5. Dependent Claim 17

The method of claim 15 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

Williams discloses this limitation in two ways. First, Williams-873 teaches that as part of selecting and extracting (*i.e.*, before combining), each tuner 54 “may shift the tuned 24 MHz-wide, QPSK-modulated signal down to baseband.” (Ex.1003-Williams-873, 9:47-48.) A POSITA would understand translation to baseband (*i.e.*, a frequency near zero) is a *translation of the selected transponder signals to a predetermined frequency*. (Ex.1002-Schonfeld, ¶161.)

Second, Williams-873 teaches that each *selected transponder signal* is

frequency translated by an upconverter 62 *prior to being combined* by summers 64 and 68. Williams-873 explains that each upconverter 62 “shifts” the selected transponder signal “to an intermediate frequency (IF), preferably comprising one of four different carriers IFs used by the transmodulator 20.” (Ex.1003-Williams-873, 10:16-23.) As shown in Figure 3, each summer 64 is fed by four transmodulator channels (*i.e.*, each row in Figure 3). (Ex.1002-Schonfeld, ¶162.)

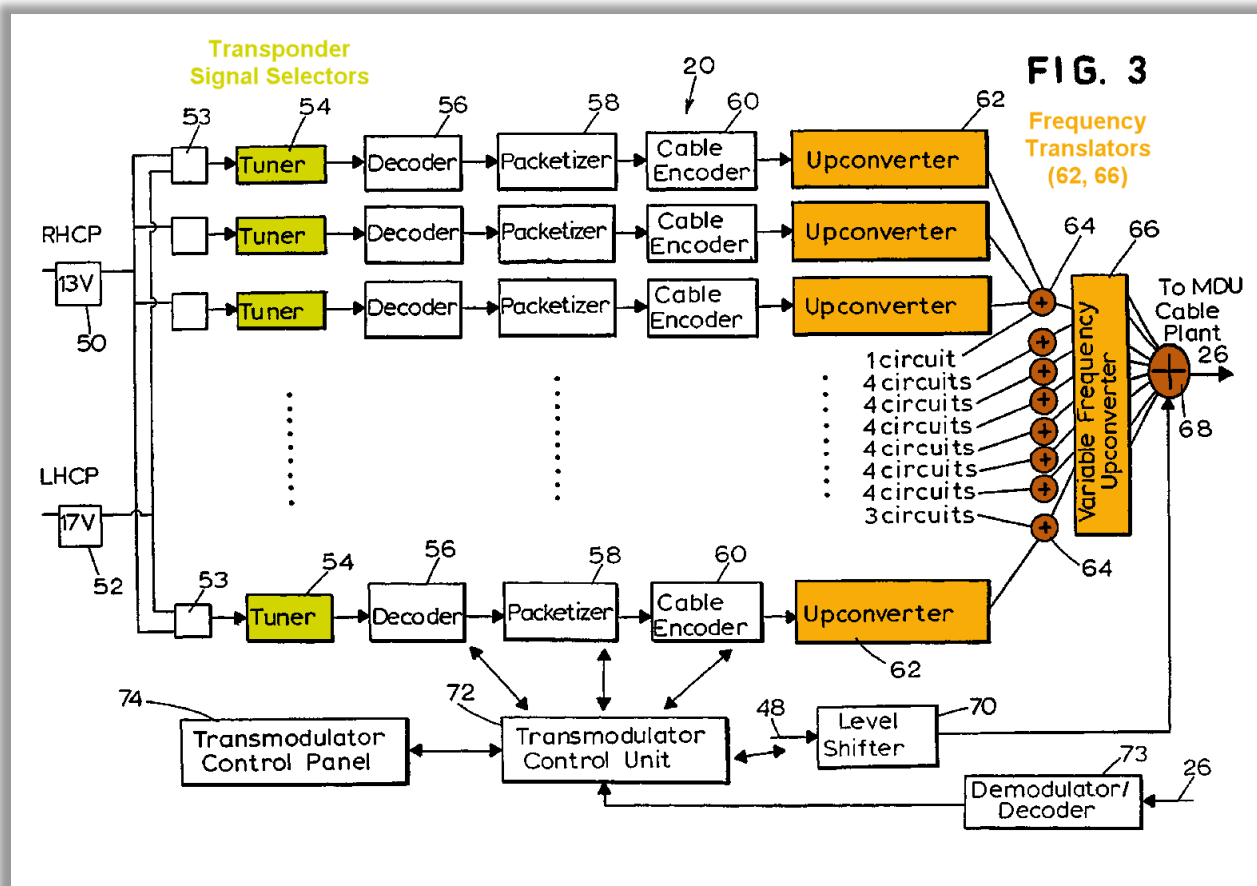


Figure 3 - Each Transmodulator Channel of Transmodulator 20 includes Upconverter 62.

In view of this disclosure, a POSITA would understand that Williams-873

preferably teaches that each of the four transmodulator channels feeding a given summer 64 upconverts (*frequency translates*) to a fixed one of the four carrier IFs, and thus, to a *predetermined frequency before combining*. (Ex.1002-Schonfeld, ¶163.) Accordingly, claim 17 is obvious over Williams-873 in view of Pugel.

6. Dependent Claim 18

The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

Williams-873 teaches that its “combined signal” (*composite signal*) is transmitted over a “communications channel” (*e.g.*, coaxial cable) to a plurality of “individual receivers” (*IRDs*) within a multi-dwelling unit, defined as “any [] type of building or structure in which multiple signal receivers may be located.” (Ex.1003-Williams-873, 4:22-32, 4:50-5:5, 5:57-58.) As shown in Figure 1, the composite signal enters the MDU plant (the network of cables within the MDU, such as a home) on a single cable. (Ex.1003-Williams-873 3:50-54; Ex.1002-Schonfeld, ¶164; *see also* Footnote 3, *supra*.)

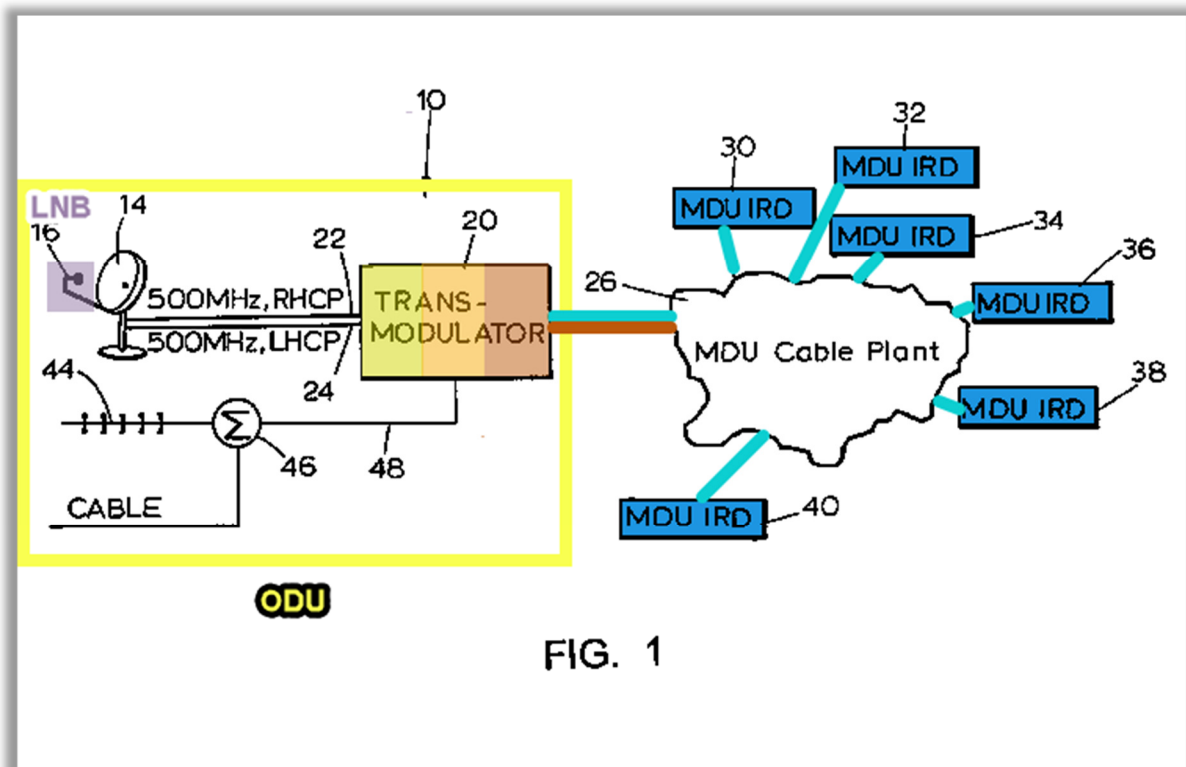


Figure 1 - Williams-873's Video Distribution System.

A POSITA would understand that for the signal originating on the single cable to be distributed to a plurality of IRDs within the home, was usually over transmitted over multiple cables inside the multi-dwelling unit—one terminating at each IRD. Using a splitter to duplicate the signal for output to a plurality of other IRDs was well known in the art. (Ex.1002-Schonfeld, ¶165; *see also* Footnote 3, *supra*.) Accordingly, claim 18 is obvious over Williams-873 in view of Pugel.

7. Dependent Claim 19

The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

Consistent with Patent Owner's interpretation of single cable in its infringement contentions (*see n.3*), Williams-873 also discloses that "satellite signal requests" (*transponder request signals*) are transmitted over the cable (*i.e.*, the cable connecting the transmodulator 20 and cable plant 26) from each IRD. (Ex.1003-Williams-873, 10:53-11:5; Ex.1002-Schonfeld, ¶166.) Specifically, Williams-873 teaches that "satellite signal requests may be transmitted from the IRDs 30-40 over the cable network [*i.e.*, plant] 26 at, for example, a dedicated frequency." (Ex.1003-Williams-873, 7:24-47 ("the IRD sends a request to the transmodulator 20 to tune to" and "transmit the requested signal over the cable network 26. This request may be sent via the cable network 26 ... the request signal may be sent to the transmodulator using the well-known Multi-Media Cable Network System (MCNS protocol), which provides communication over the same cable as the video signals.")) Because the cable network 26 is connected to the transmodulator 20, a POSITA would understand that transponder request signals from the IRDs are transmitted over the network, particularly in view of Williams-873's disclosure of MCNS. (Ex.1002-Schonfeld, ¶166.)

Williams-873 further discloses that all IRDs receive the same composite

signal. (Ex.1002-Schonfeld, ¶167.) As taught in Williams-873, the “combined signal” is sent by a “transmitter” “over the communication channel” (*i.e.*, cable) “to the individual receivers” (IRDs). (Ex.1003-Williams-873, 4:22-32, 4:60-5:5 (“a further aspect of the present invention” is “a method of distributing a subset of a plurality of individual signals associated with a composite signal to multiple individual receivers.”)) Because the composite signal is created based on the requests of the various IRDs (see claim 14, *supra*), a POSITA would understand this disclosure to mean that the composite signal is provided to each IRD so that each receives its requested signal. (Ex.1002-Schonfeld, ¶167.) Accordingly, claim 19 is obvious over Williams-873 in view of Pugel.

8. Dependent Claim 20

The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

Williams-873 discloses that the “request to the transmodulator 20 to tune to” a “requested signal” (*transponder request signal*) may be transmitted to the transmodulator 20 “via any desired wireless network.” (*i.e.*, *transmitted over a wireless link to the ODU*). (Ex.1003-Williams-873, 7:24-47, 10:53-11:5; Schonfeld ¶168.) Accordingly, claim 20 is obvious over Williams-873 in view of Pugel.

9. Dependent Claim 21

The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a

variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

See claims 16 and 19, supra.

10. Dependent Claim 22

The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

See claims 14 and 19, supra.

11. Dependent Claim 23

The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

See claim 20, supra.

12. Dependent Claim 34

The method of claim 14, wherein selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal.

See claim 15, supra.

As Dr. Schonfeld explains, to the extent “pass band filter transfer function” has meaning to a POSITA that can be understood in light of the specification, it refers simply to the digital application of a bandpass filter on a digital signal. (Ex.1002-Schonfeld, ¶173; *see also* Ex.1001-’576 patent at 5:12-15 (“Digital filtering 340 is used to select one or more of the transponder output signals. The digital filter may operate by applicating a band pass filter transfer function to the

broadband signal to isolate a single transponder channel.”.) Pugel discloses using a digital bandpass filter on a digital signal as part of selecting and extracting a signal from a digitized broadband signal, and the ’576 patent refers to this “filtering technique” as “well known in the digital signal processing field.” (*See* claim 15, *supra*.) It would have been obvious to modify Williams-873’s teaching of an analog filter and replace it with a digital band pass filter to process the digitized broadband signal and gain the well known advantages associated with digital processing of satellite television signals. (Ex.1002-Schonfeld, ¶173.) Accordingly, this claim is obvious over Williams-873 in view of Pugel.

13. Dependent Claims 35 and 36

35. The method of claim 14, further comprising converting the selected signal to an analog signal using a digital to analog converter prior to combining.

36. The method of claim 14, wherein the combining is performed in the digital domain.

See limitation 14[b], *supra*.

Whether to combine selected transponders in the analog domain as taught in Williams-873 (which first requires converting the selected signal to an analog signal using a digital to analog converter prior to combining) or to modify Williams-873 to combine in the digital domain (as taught in Pugel) is an implementation decision within the skill and knowledge of a POSITA, with each option providing well known

advantages and disadvantages relative to the other option. (Ex.1002-Schonfeld, ¶175; *see* limitation14[b], *supra*.) As such, these claims are obvious over Williams-873 in view of Pugel.

14. Dependent Claim 37

The method of claim 17, wherein frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency.

Pugel teaches the user of mixers 132 which “operate[] to perform a frequency rotation function,” which is a digital operation allowing a desired part of a digital signal (*e.g.*, a selected transponder signal) to be translated to a desired frequency. (Ex.1004-Pugel, ¶22; Ex.1002-Schonfeld, ¶¶176.) Specifically, Pugel’s *digital mixers* 132 operate on the digital signal from the A/D converter, which are *data samples*. (Ex.1004-Pugel, ¶¶18-19 (“The A/D converter 120 comprises a high-speed analog-to-digital converter operating at a sampling rate of FS.”), 25 (“In an exemplary embodiment, the A/D converter 120 operates using an 8 bit sample.”); Ex.1002-Schonfeld, ¶176.) The mixers “mix[] the digital signal S3 with a respective numerically controlled oscillator (NCO) signal to produce respective in-phase I and quadrature Q signal components,” allowing the mixer to “*rotat[e]*” a “selected channel to baseband from the under-sampled digital signal S3.” (Ex.1004-Pugel, ¶22 (“This may be accomplished by using a numerical table to extract (or rotate) the desired channel frequency from the digital signal comprising all available

frequencies processed by the A/D converter 120.”.) A POSITA would understand this disclosure to teach the application of a *rotating phasor to the data samples to translate their frequencies*. (Ex.1002-Schonfeld, ¶176.)

A POSITA would have been motivated to further modify Williams-873 to employ the digital mixers of Pugel. As discussed above in claims 16 and 17, Williams-873 teaches frequency translating selected, extracted transponder signals before combination via a variable frequency upconverter 66. (Ex.1003-Williams-873, 10:24-39; Ex.1002-Schonfeld, ¶177.) Williams-873 does not disclose what circuitry or components make up the variable frequency upconverter 66, although it teaches the use of “standard ... mixer circuitry” for other frequency translation operations. (Ex.1003-Williams-873, 10:40-52; Ex.1002-Schonfeld, ¶177.) In view of Pugel, it would have been obvious to further modify Williams-873 (in addition to the obvious modifications discussed in claim 14) so that the variable frequency upconverter 66 is a digital mixer. To obtain further advantages from processing in the digital domain, a POSITA would have been motivated to additionally perform frequency translation in the digital domain, especially where the signals have already been digitized prior to transponder selection. (Ex.1002-Schonfeld, ¶177.) Pugel expressly recognizes the benefits of its digital frequency translating: “avoid[ing]” the need for “analog mixers.” (Ex.1004-Pugel, ¶51; Ex.1002-Schonfeld, ¶177.) And a POSITA would have had a reasonable expectation of success modifying Williams-

873 to use digital mixers, which were well known in digital signal processing before the '576 patent's priority date. (Ex.1002-Schonfeld, ¶177.)

15. Dependent Claim 38

The method of claim 14, further comprising frequency translating the digitized broadband signal prior to selecting and extracting transponder signal.

Pugel teaches that each mixer 132 “mixes the digital signal S3” (*digitized broadband signal*) “with a respective numerically controlled oscillator (NCO)” wherein “[t]he respective NCO frequency is selected to derotate a desired signal or channel” to “baseband.” (Ex.1004-Pugel, ¶¶22.) That is, the entire *digitized broadband signal* is *frequency translated* in such a way (derotated) that a desired transponder signal is translated to a near-zero frequency *prior to selection and extraction*. (Ex.1002-Schonfeld, ¶178.) A POSITA would have understood that rotating a signal to baseband prior to selection and extraction simplifies the filtering operations necessary to select and extract a transponder signal. With the selected transponder signal rotated to baseband, only a “high-pass filter” is needed to filter out frequencies above the selected transponder signal; otherwise, a “low-pass filter” would also be necessary to tune out lower frequencies. (Ex.1002-Schonfeld, ¶178.)

It would have been obvious to additionally incorporate this aspect of Pugel into Williams-873. Williams-873 teaches that its analog tuner 54 “may shift the tuned 24 MHz-wide, PSK-modulated signal down to baseband,” but only after

selection occurs (Ex.1003-Williams-873, 9:47-48.) A POSITA would have been motivated to further modify Williams-873 such to shift the entire broadband signal (which is digitized, *see* claim 14) so that the desired transponder signals are located at baseband prior to selection and extraction, as in Pugel, to obtain the advantages discussed in the preceding paragraph. (Ex.1002-Schonfeld, ¶179.) Accordingly, this claim is obvious over Williams-873 in view of Pugel.

16. Dependent Claim 39

The method of claim 38, wherein frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

A POSITA would have been motivated to modify Williams-873 to include Pugel's teaching of frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband. (*See* claim 38, *supra.*; *see also* Ex.1002-Schonfeld, ¶¶178-80.)

17. Dependent Claim 40

The method of claim 14, further comprising maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal.

Williams-873 teaches "generat[ing] an information signal, known as side data, which may include ... frequency index set-up information," "frequency assignments," and "information ... indicating the carrier frequencies, etc., of the ... signals that are on the cable network 26." (Ex.1003-Williams-873, 4:40-45, 15:53-

16:21.) A POSITA would understand that Williams-873's side data includes a *channel translation table* that *specifies assigned frequency slots for transponder channels in the composite signal*. (Ex.1002-Schonfeld, ¶181.)

The side data (*channel translation table*) is maintained by the transmodulator 20, which is part of the *outdoor unit* (or would have been obvious to include in the ODU). (*Id.*, 15:53-16:4 (“[T]he transmodulator 20 may actively signal the channel locations, ordering, frequency assignments, etc. of the transmodulated satellite signals ... using side data.”); *see also* Ex.1002-Schonfeld, ¶182 (discussing POSITA knowledge and state of art regarding assigning transponder channel frequencies within a composite signal).) Accordingly, claim 40 is obvious over Williams in view of Pugel.

18. Dependent Claim 41

The method of claim 38, further comprising providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channels.

The transmodulator 20 of Williams (part of the ODU) maintains side data, which is a *channel translation table* specifying assigned frequency slots for transponder channels in the composite signal. (*See* claim 40, *supra*.) The transmodulator 20 communicates the side data to IRDs. (Ex.1003-Williams-873, 16:5-21 (IRDs receive “information from the transmodulator 20 indicating the carrier frequencies, etc. of the ... signals that are on the cable network 26.”)) A

POSITA would understand that the side data *allows the IRDs to tune to a desired selected translated transponder* signal located at a particular frequency *channel*, because the side data contains information relating to the channel frequencies on the composite signal. (Ex.1002-Schonfeld, ¶183.) Accordingly, claim 41 is obvious over Williams-873 in view of Pugel.

19. Dependent Claim 42

The method of claim 14, wherein selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal information from non-selected transponder channel.

See claims 15 and 38-39.

Pugel discloses *translating digitized broadband signal* so that a selected transponder channel is located at baseband. (*See id.*) Pugel further discloses using a filter/decimator 134 on the translated digitized broadband signal “to retain only the channel energy associated with [the] specific desired channel” located at baseband (*i.e., substantially removing signal information from non-selected transponder channels*). (*See* claim 15, *supra*; Ex.1002-Schonfeld, ¶185.) Pugel’s filter is a *low pass filter* because it allows to pass the selected transponder signal (located effectively around 0 MHz), while removing signal information from the non-selected transponder signals at higher frequencies. (Ex.1002-Schonfeld, ¶185.)

A POSITA would have been motivated to incorporate the baseband

translation and low-pass filter aspects of Pugel in the place of Williams-873's analog filter and would have had a reasonable expectation of success to achieve known benefits from filtering digitally in so doing. (*See* claims 15, 38-39, *supra*.) Accordingly, claim 42 is obvious over Williams-873 in view of Pugel.

20. Independent Claim 8

a. Construction of Means-Plus-Function Terms

Independent claim 8 and its dependent claims 9-13 are not asserted in the co-pending district court litigation and Patent Owner has not advanced any construction for these claims. Because the claim limitations either recite the term “means ... for” and/or other well known “nonce” words (*i.e.*, “unit”), Petitioners contend that these terms require construction pursuant to 35. U.S.C. § 112, ¶6. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1349 (Fed. Cir. 2015) (*en banc*) (internal citations omitted), *Diebold Nixdorf, Inc. v. Int'l Trade Comm'n*, 899 F.3d 1291, 1301 (Fed. Cir. 2018). Additionally, the phrase “means in the first unit for” appears in four different limitations in claim 8 and is associated with different functions. The phrase “*means in the second unit for*” appears twice and is likewise associated with different functions. Therefore, Petitioners consolidate its proposed claim construction and detailed description of how Williams-873 on a limitation-by-limitation basis below.

8[pre] A signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a

broadband signal from a plurality of sources between a first unit and a second unit over a communication medium comprising:

See limitation 14[pre]. To the extent the preamble is limiting, it is disclosed in Williams-873. Williams-873's Figure 1 discloses a *satellite distribution system*. Williams-873 *distributes signals* comprising a plurality of "transponder signals" (*plurality of transponder channels*) selected and extracted from a received "broadband K-u-band satellite signal (comprising up to 32, QPSK-modulated transponder signals transmitted from one or more satellites.>"). (Ex.1003-Williams-873, Abstract, 3:50-4:3, 5:59-6:1, 15:15-27.) The signals are distributed from Williams-873's ODU (*first unit*) to one or more IRDs disposed within a multi-dwelling unit (*second unit(s)*) over a single cable (*see n.3*) and an MDU cable plant (*communication medium*). (Ex.1003-Williams-873, Abstract, 3:50-4:30, 6:12-34; Ex.1002-Schonfeld, ¶188.) The recited "first unit" and "second unit" are addressed below and incorporated here. In short, Williams-873 disclose claim 8's preamble.

8[a] means in the first unit for digitizing the broadband signal from each of the plurality of sources;

"Means in the first unit for"

- **Function:** digitizing the broadband signal from each a plurality of sources.
- **Corresponding Structure:** an ODU is the "first unit" including analog to digital converters. (Ex.1001-'576 patent, 3:5-9, 4:56-

5:3, 7:5-31, 8:45-47, 11:3-12, Figs. 6-9; Ex.1002-Schonfeld, ¶189.)

See limitation 14[b][1], *supra*. As Dr. Schonfeld explains, it would have been obvious to incorporate the analog-to-digital converters of Pugel into the transmodulator 20 of Williams-873. The analog-to-digital converters of Pugel function to “directly convert[] a plurality of carrier signals,” *i.e., broadband signals from each of the plurality of sources*, “into a digital data stream.” (Ex.1004-Pugel, ¶6; Ex.1002-Schonfeld, ¶189.) Accordingly, this limitation is obvious over Williams-873 in view of Pugel.

8[b] means in the first unit responsive to information transmitted by the second unit for extracting selected channels from the digitized broadband signals in the digital domain, and

“Means in the first unit for”

- **Function:** extracting selected channels from the digitized broadband signals in the digital domain in response to information transmitted for extracting selected channels.
- **Corresponding Structure:** an ODU including a controller and digital filters, the filters “tuned by programming a set of filter coefficients to select a specific pass band.” (Ex.1001-’576 patent, 3:5-9, 4:29-34, 5:12-42, 8:49-51, 8:52-60; Ex.1002-Schonfeld, ¶190.)

See limitation 14[b][2] and claims 15, 34, *supra*. As Dr. Schonfeld explains, it would have been obvious to substitute the digital filters of Pugel into Williams-873's transmodulator 20 in place the analog tuners, which is part of the ODU of Williams-873 (*first unit*). (Ex.1002-Schonfeld, ¶190.) Pugel's digital tuners are used to "extract from the digital data stream data carried by" a carrier signal (*i.e.*, to *extract selected transponder channels from the digitized satellite broadband signals*). (Ex.1004-Pugel, ¶¶5-6; see limitation 14[b][2], *supra*.) The tuners of Williams-873 perform selections under direction of control unit 72 (a controller, as in the '576 patent), which receives the "requests for ... satellite signals" transmitted "from each of the IRDs" (*second unit(s)*), and a POSITA would have been motivated to retain the request-based selection after incorporating Pugel's digital tuners (Ex.1003-Williams-873, 6:35-42; Ex.1002-Schonfeld, ¶190.) Accordingly, this limitation is obvious over Williams-873 in view of Pugel.

8[c] means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

"Means in the first unit for"

- **Function 1:** combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels.

- **Function 2:** transmitting the composite signal over a medium.
- **Corresponding Structure:** an ODU including a signal summer (such as 380, 670, 950, or 1740) output to a cable. (Ex.1001-'576 patent, 4:29-34, 5:31-42, 6:32-46, 8:49-51, 8:65-9:13, 11:50-57, Figs. 8-9, 17; Ex.1002-Schonfeld, ¶191.)

See limitations 14[b][3], 14[c]-[d], *supra*. Summer 68 of Williams-873 (also called “combiner”) “combines” *selected channels* “with each other ... for propagation over the cable network 26” as a *composite signal*. (Ex.1003-Williams-873 10:24-39, 4:29-33, Fig. 3; Ex.1002-Schonfeld, ¶191.) As Dr. Schonfeld describes the process of combining selected channels in Williams-873 would *not involve demodulating channels or changing the modulation of the channels*. (Ex.1002-Schonfeld, ¶191.) Like the '576 patent's signal summer, the summer/combiner in Williams-873 outputs the *composite signal* and connecting to a cable (*medium*) to the output of the summer, *transmits the composite signal* over that *medium*. (Ex.1002-Schonfeld, ¶191.) Williams-873 discloses this limitation.

8[d] means in the second unit for receiving the composite signal and demodulating and decoding at least one channel, and

“Means in the second unit for”

- **Function 1:** receiving the composite signal and demodulating and decoding at least one channel.

- **Corresponding Structure:** IRD including a tuner and cable decoder. (Ex.1001-'576 patent, 6:62-66, 9:20-25, 9:34-10:18, 10:48-51; Ex.1009-AAPA-Williams-419, 14:4-67 (incorporated into the '576 patent); Ex.1002-Schonfeld, ¶192.)

The '576 disclosure is sparse as to the corresponding structure performing these claimed functions beyond the fact that they are performed by an IRD/STB (e.g., Ex.1001-'576 patent, 6:64-66.) However, AAPA Williams-419 provides a detailed description of typical IRD components responsible for *demodulating and decoding at least one channel*: a tuner (for tuning “to the frequency associated with a selected” channel), and a cable decoder, such as a “standard DVB cable decoder” which “includes a ... demodulator that demodulates” the tuned channel, and an “R-S decoder” to perform decoding. (Ex.1009-AAPA Williams-419, 14:27-54, 16:28-32; Ex.1002-Schonfeld, ¶192.) Williams-873 contains the identical disclosure of AAPA Williams-419 as to the cable decoder, and similar disclosure regarding the tuner, and thus discloses this limitation. (*Compare* Ex.1003-Williams-873, 16:6-56 *with* Ex.1009-AAPA-Williams-419, 14:11-43; Ex.1002-Schonfeld, ¶192.)

8[e] means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

“Means in the first and second units:”

- **Function 1:** bi-directionally communicating control information

between the second unit and first unit.

- **Corresponding Structure:** communications interfaces of an ODU (*first unit*) and IRD(s) (*second unit(s)*) for communication via cable, wireless RF, and/or wireless IR. (Ex.1001-'576 patent, 3:10-19, 4:28-41, 9:5-13; Ex.1002-Schonfeld, ¶193)

See limitations 14[a], 8[b], claims 40-41, *supra*. The transmodulator 20 of Williams-873 (part of the ODU/*first unit*) communicates to the IRDs (*second unit(s)*) *control information* it calls “side data,” specifying “frequency index set-up information,” “frequency assignments,” and “which transponder signals are being ... transmitted over the cable network 26 and the frequencies at which the ... transponder signals are located on the cable network.” (Ex.1003-Williams-873, 4:40-45, 11:22-35, 15:53-16:35 (IRDs receive “information from the transmodulator 20 indicating the carrier frequencies, etc. of the ... signals that are on the cable network 26.”).) The IRDs communicate *control information* constituting “requests for ... satellite signals” to the ODU that the control unit of the ODU uses for channel selection. (Ex.1003-Williams-873, 6:35-42, 11:22-35; Ex.1002-Schonfeld, ¶193; see limitation 8[b], *supra*.) The *bi-directional communication* of *control information* is performed via “the cable network 26” or using “any other wire or wireless network.” (Ex.1003-Williams-873, 7:24-47, 11:22-35; Ex.1002-Schonfeld, ¶193.) Thus, Williams-873 discloses this limitation, and claim 8 is obvious over Williams-

873 in view of Pugel.

21. Dependent Claim 9

The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

See limitation 8[e]. The IRD (*second unit*) transmits *control information* that is a “requests for ... satellite signals” from the ODU (*channel selection requests*), and the ODU (*first unit*) transmits *control information* that “specifi[es] which transponder signals are being ... transmitted over the cable network 26 and the frequencies at which the ... transponder signals are located on the cable network.” (*channel mapping information*). (*Id.*; Ex.1002-Schonfeld ¶194.) Accordingly, claim 9 is obvious over Williams-873 in view of Pugel.

22. Dependent Claim 10

The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

“Means in the first unit for”

- **Function:** carrier offset correction
- **Corresponding Structure:** an ODU is the “first unit” including two filters, power measurement circuitry, and a rotating phasor (Ex.1001-’576 patent, 7:38-8:4; Ex.1002-Schonfeld, ¶¶195-97.)

It would have been obvious to a POSITA to modify the ODU of Williams-873 to include means for carrier offset correction in view of Pugel. Correction of carrier offset, which refers to the deviation of the analog RF carrier frequency band from the range at which it was communicated, is a standard and routine procedure in most communications systems. (Ex.1002-Schonfeld, ¶¶195-96.) Without some means to account for potential variations in the frequency band of a received RF signal, satellite distribution systems such as Williams-873 and Pugel would be susceptible to selecting and distributing only portions of received television signals. And because offset impacts the entire received broadband signal, *see* Ex.1001-'576 patent, 7:38-8:4, failure to account for it could render ineffectual distribution of any desired transponder signals. A POSITA would have known to perform a correction on the entire broadband signal prior to performing transponder signal selection and found it desirable to do so in order to, for example, simplify signal selection. (Ex.1002-Schonfeld, ¶196.)

Pugel discloses structures that can be used for carrier offset on a digitized broadband signal: programmable digital filters and numerically controlled oscillators (to apply a rotating phasor). (Ex.1004-Pugel, ¶¶21-23; Ex.1002-Schonfeld, ¶197.) A POSITA would have had a reasonable expectation of success using these structures to perform carrier offset correction using any of the “several know[n] techniques” following digitization in the modified system of Williams-873.

(Ex.1001-'576 patent, 7:38-8:4; Ex.1002-Schonfeld, ¶197.) Accordingly, claim 10 is obvious over Williams-873 in view of Pugel.

23. Dependent Claim 11

The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

See claim 8, *supra*. The '576 patent teaches, and Williams-873 discloses, that the structure of the *first unit is a satellite outdoor unit* and the structure of the *second unit is a satellite integrated receiver decoder unit* (IRD). For the reasons set forth in claim 8, this claim is obvious over Williams-873 in view of Pugel.

24. Dependent Claim 12

The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

See claims 8, 11, *supra*. The '576 patent specification teaches, and the Williams-873 reference discloses, that the structure of the *communication medium consists of a single coaxial cable connected to the satellite outdoor unit* and the cable network 26. (See limitation 8[pre], *supra*.) For the reasons set forth in claims 8 and 11, this claim is obvious over Williams-873 in view of Pugel.

25. Dependent Claim 13

The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

See claim 8, *supra*. Williams discloses that among the *communications medium* that its ODU (*first unit*) and STBs (*second unit(s)*) use to communicate *control information* (*see* limitation 8[e]) is cable network 26 over which the ODU transmits the composite signal (*see* limitation 8[c], *supra*.) A POSITA would understand that the communication medium also includes the cable connecting the ODU and the cable network 26. (Ex.1002-Schonfeld, ¶200.) Accordingly, claim 13 is obvious in view over Williams-873 in view of Pugel.

X. INSTITUTION SHOULD BE GRANTED

A. The Board Should Not Decline Institution under § 325(d)

The Board should not deny this Petition under § 325(d). The combination of Williams-873 and Pugel was never considered during the prosecution or reexamination of the '576 patent. The examiner did rely on Williams-873 as anticipatory art to reject the independent claims during prosecution of the '576 patent. *See* §IV.B.1, *supra*. However, Petitioners have established that the examiner erred in a manner material to the patentability of the challenged claims by misapprehending undisputable disclosure in Williams-873 of a broadband signal distribution system embodiment that does **not** alter the modulation of the transponder signal. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper No. 6 at 8 (PTAB Feb. 13, 2020) (precedential) (setting forth two-part test for § 325(d) denial).

During original prosecution, the '576 patent applicant incorrectly argued that “[a]n important distinction between applicant’s invention and the Williams[-873] reference is that **Williams[-873] uses transmodulation where the applicant’s invention does not transmodulate.**” (See §IV.B.1, *supra* and 14[d], *supra*.) Both the applicant and examiner overlooked Williams-873’s teaching of an alternative embodiment recommending that “**in some cases, [where] only a few of the selected channels are being distributed, the transmodulator may not need to remodulate the selected signals**” (Ex.1003-Williams-873, 7:15-23 (“**may, instead, shift selected ones of these signals to different frequencies for transmission over the cable network 26.**”) (emphasis added), 4:57-60, 15:15-27; Ex.1002-Schonfeld, ¶¶148-152.) Nothing in the prosecution history, including the examiner’s reasons for allowance, demonstrates that the examiner was aware of Williams-873 non-transmodulation embodiment, which Petitioner established clearly discloses “modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting”—the exact limitation added by the '576 patent applicant to overcome Williams-873. See §IX.A.2, *supra*. The additional facts and evidence presented in this Petition, along with Dr. Schonfeld’s declaration prove that the Examiner overlooked and misapprehended Williams-873’s teachings. (See §§V.B.1-2, IX.A.2, limitation 14[d]; Ex.1002-Schonfeld, ¶¶148-152, 99.)

Second, during reexamination, the Patent Office also erred by overlooking the

combination of Williams-873 and Pugel. As presented herein, Williams-873 discloses all limitations of independent claims except for *digitizing the plurality of satellite broadband signals* which was added during reexamination. The Patent Office did not have evidence of Pugel or Dr. Schonfeld's testimony and therefore misapprehended and overlooked how a POSITA would have understood these disclosures and how a POSITA would have been motivated to combine Williams's signal distribution system with Pugel's digital converter for digitizing satellite broadband signals. (IX.A.1-2, V.B.2; Ex.1002-Schonfeld, ¶¶70-84, ¶¶112-123, 131-133.) Since Williams and Pugel disclose all limitations of the challenged claims, the Patent Office's errors are material to patentability.

B. The Board Should Not Decline Institution under § 314(a)

Consistent with the Director's June 21, 2022 Guidance, Petitioners agree not to proceed in the related district court litigation against the challenged claims on the same grounds included in the Petition or any grounds that could have reasonably been raised if the Petition is instituted.

XI. CONCLUSION

For the above reasons, claims 8-23 and 34-42 are invalid and should be canceled.

Dated: February 21, 2023

Respectfully submitted,

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LISTING OF CLAIMS

Independent Claim 8

8[*pre*] A signal distribution system for distributing signals comprising a plurality of satellite transponder channels of a broadband signal from a plurality of sources between a first unit and a second unit over a communication medium comprising:

8[*a*] means in the first unit for digitizing the broadband signal from each of the plurality of sources;

8[*b*] means in the first unit responsive to information transmitted by the second unit for extracting selected channels from the digitized broadband signals in the digital domain, and

8[*c*] means in the first unit for combining the selected channels into a composite signal without demodulating channels and without changing the modulation of the channels and transmitting the composite signal over the medium; and

8[*d*] means in the second unit for receiving the composite signal and demodulating and decoding at least one channel, and

8[*e*] means in the first unit and second units for bi-directionally communicating control information between the second unit and the first unit.

Dependent Claim 9

The signal distribution system of claim 8 wherein the control information comprises channel selection requests originating from the second unit and the control information comprises channel mapping information originating from the first unit.

Dependent Claim 10

The signal distribution system of claim 8, further comprising a means in the first unit for carrier offset correction.

Dependent Claim 11

The signal distribution system of claim 8 wherein the first unit is a satellite outdoor unit and the second unit is a satellite integrated receiver decoder unit.

Dependent Claim 12

The signal distribution system of claim 11 wherein the communication medium consists of a single coaxial cable connected to the satellite outdoor unit.

Dependent Claim 13

The signal distribution system of claim 12 wherein the means for communicating uses the same communication medium as the composite signal.

Independent Claim 14

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

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

14[*b*][1] digitizing the plurality of satellite broadband signals

14[*b*][2] selecting and extracting a plurality of transponder signals from the received satellite broadband signals, wherein the selecting is responsive to the transponder request signals;

14[*b*][3] combining extracted selected transponder signals into a composite signal;

14[*c*] transmitting the composite signal over the single cable from the ODU to the IRDs,

14[*d*] wherein the modulation of the transponder signal is not altered by the steps of selecting, combining, and transmitting.

Dependent Claim 15

The method of claim 14 wherein the step of selecting and extracting a transponder signal comprises the step of: filtering a transponder signal with a band pass filter having a bandwidth ranging from 5% to 100% wider than the bandwidth of the transponder signal.

Dependent Claim 16

The method of claim 14 wherein the step of combining comprises frequency translating the selected and extracted transponder channels to a variable frequency before combining.

Dependent Claim 17

The method of claim 15 further comprising frequency translating the selected transponder channels to a predetermined frequency before combining.

Dependent Claim 18

The method of claim 14 further comprising the step of splitting the composite signal inside a home and distributing to a plurality of IRDs.

Dependent Claim 19

The method of claim 14 wherein the transponder request signal is transmitted over the cable from an IRD and all IRDs receive the same composite signal.

Dependent Claim 20

The method of claim 14 wherein the transponder request signal is transmitted over a wireless link to the ODU.

Dependent Claim 21

The method of claim 14 further comprising the steps of: frequency translating the selected transponder channels to a variable frequency before combining; and splitting the composite signal inside a home and distributing to a plurality of IRDs.

Dependent Claim 22

The method of claim 21 wherein the transponder request signal is transmitted over the cable from an IRD.

Dependent Claim 23

The method of claim 21 wherein the transponder request signal is transmitted over a wireless link to the ODU.

Dependent Claim 34

The method of claim 14, wherein selecting and extracting comprises applying a pass band filter transfer function to the digitized broadband signal.

Dependent Claim 35

The method of claim 14, further comprising converting the selected signal to an analog signal using a digital to analog converter prior to combining.

Dependent Claim 36

The method of claim 14, wherein the combining is performed in the digital domain.

Dependent Claim 37

The method of claim 17, wherein frequency translating comprises using a digital mixer to apply a rotating phasor to the data samples to translate their frequency.

Dependent Claim 38

The method of claim 14, further comprising frequency translating the digitized broadband signal prior to selecting and extracting transponder signal.

Dependent Claim 39

The method of claim 38, wherein frequency translating comprises translating the original digitized broadband signal to locate a selected transponder channel at baseband.

Dependent Claim 40

The method of claim 14, further comprising maintaining a channel translation table at the outdoor unit, the channel translation table specifying assigned frequency slots for transponder channels in the composite signal.

Dependent Claim 41

The method of claim 38, further comprising providing the channel translation table to the IRD to allow the IRD to tune to a desired selected translated transponder channels.

Dependent Claim 42

The method of claim 14, wherein selecting and extracting comprises low-pass filtering the translated digitized broadband signal thereby substantially removing signal information from non-selected transponder channel.

CERTIFICATE OF WORD COUNT UNDER 37 CFR § 42.24(d)

Under 37 C.F.R. § 42.24(d), the undersigned certifies that the word count for this *Petition for Inter Partes Review* totals 13,496, excluding the parts exempted by 37 C.F.R. § 42.24(a).

The word count was made using the built-in word count function in the Microsoft® Word software used to prepare this document.

Dated: February 21, 2023

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that true copies of this PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 7,130,576 and supporting materials (Exhibits 1001-1035 and Power of Attorney) have been served by FedEx® delivery service on Patent Owner at the correspondence address for the attorney of record for the '576 Patent shown in USPTO records:

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