

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2025-00180
Patent 11,785,275 B2

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE
UNDER 37 C.F.R. § 42.23**

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EXHIBITS

Previously Filed:

- Ex. 1001: U.S. Patent No. 11,785,275 (“the ’275 patent”)
- Ex. 1002: Expert Declaration of David B. Lett
- Ex. 1003: Curriculum Vitae of David B. Lett
- Ex. 1004: Certified Prosecution History of the ’275 patent
- Ex. 1005: Certified Prosecution History of U.S. Patent No. 11,490,152 (“the parent”)
- Ex. 1006: Reserved
- Ex. 1007: Certified Prosecution History of U.S. Provisional App. No. 61/170,526 (“’526 provisional”)
- Exs. 1008-1012: Reserved
- Ex. 1013: U.S. Pub. No. 2003/0056221 (“Zhang”)
- Ex. 1014: U.S. Patent No. 7,237,214 (“Pandey”)
- Ex. 1015: Excerpts of “IEEE Std 100-2000, The Authoritative Dictionary of IEEE Standards Terms, Seventh Edition” (IEEE Press. 2000) (“IEEE Std 100”)
- Ex. 1016: Excerpts of Jan M Rabaey, “Digital Integrated Circuits: A Design Perspective” (Pearson, 2nd ed. 2002) (“Rabaey”)
- Ex. 1017: A. P. Chandrakasan, “Ultra low power digital signal processing,” Proceedings of 9th International Conference on VLSI Design, Bangalore, India, 1996, pp. 352-357 (“Chandrakasan”)
- Ex. 1018: S. Mirabbasi and K. Martin, “Classical and Modern Receiver Architectures,” IEEE Communications Magazine, vol. 38, no. 11, pp. 132-139, November 2000 (“Mirabbasi”)
- Ex. 1019: U.S. Patent No. 6,061,406 (“Carson”)

- Ex. 1020: Reserved
- Ex. 1021: Data-Over-Cable Service Interface Specifications, DOCSIS 2.0, Radio Frequency Interface Specification, CM-SP-RFIV2.0-I11-060602
- Exs. 1022-1024: Reserved
- Ex. 1025: J. Crols and M. S. J. Steyaert, “Low-IF topologies for high-performance analog front ends of fully integrated receivers,” IEEE Transactions on Circuits and Systems II: Analog and Digital Signal Processing, vol. 45, no. 3, pp. 269-282, March 1998 (“Crols”)
- Ex. 1026: Reserved
- Ex. 1027: U.S. Patents and Patent Applications Family Tree for the ’275 patent
- Exs. 1028-1032: Reserved
- Ex. 1033: Excerpts of W. Ciciora, J. Farmer, D. Large, and M. Adams, “Modern Cable Television Technology: Video, Voice, and Data Communications” (2nd ed. 2004) (“Ciciora”)
- Ex. 1034: Excerpts of J. Crols and M. Steyaert, “CMOS Wireless Transceiver Design” (1997)
- Ex. 1035: U.S. Patent No. 7,340,230 (“Khoini-Poorfard”)
- Ex. 1036: U.S. Pub. No. 2003/0217362 (“Summers”)
- Ex. 1037: U.S. Pub. No. 2006/0256799 (“Eng”)
- Ex. 1038: U.S. Pub. No. 2006/0083335 (“Seendripu”)
- Ex. 1039: Excerpts of Chris Bowick, “RF Circuit Design” (2nd ed. 2008)
- Ex. 1040: Reserved

- Ex. 1041: Excerpts of Roland Priemer, “Introductory Signal Processing” (1991)
- Ex. 1042: U.S. Patent No. 7,272,375 (“Tuttle”)
- Ex. 1043: U.S. Patent No. 7,130,576 (“Gurantz”)
- Ex. 1044: U.S. Patent No. 5,278,837 (“Kelley”)
- Ex. 1045: Jeffrey Hugh Reed, “Software Radio: A Modern Approach to Radio Engineering” (2002)
- Ex. 1046: U.S. Patent No. 7,213,042 (“Cannon”)
- Ex. 1047: Reserved
- Ex. 1048: Excerpts of William Buchanan, “Computer Busses” (2000) (“Buchanan”)
- Ex. 1049: U.S. Patent No. 7,079,528 (“Ziegler”)
- Ex. 1050: Excerpts of “Software Defined Radio: Enabling Technologies” (Walter H.W. Tuttlebee ed., 2003)
- Ex. 1051: U.S. Pub. No. 2005/0183015 (“Dunton”)
- Exs. 1052-1072: Reserved
- Ex. 1073: Expert Declaration of Dr. Sylvia Hall-Ellis
- Ex. 1074: Reserved
- Ex. 1075: U.S. Patent No. 6,791,995 (“Azenkot”)
- Ex. 1076: U.S. Patent No. 6,542,203 (“Shadwell”)
- Ex. 1077: International Publication No. WO 2004/059933 (“Zhang ’933”)
- Ex. 1078: U.S. Pub. No. 2004/0250284 (“Dong”)
- Ex. 1079: U.S. Patent No. 3,968,444 (“Tenny”)

Previously Served (Not Filed):

Ex. 1080: Supplemental Expert Declaration of Dr. Sylvia Hall-Ellis

Previously Filed:

Ex. 1081: Reserved

Ex. 1082: April 1, 2025 *Ex Parte* Reexamination Certificate and February 10, 2025 Notice of Intent to Issue *Ex Parte* Reexamination Certificate; Reexamination No. 90/019,255 re US 9,210,362

Ex. 1083: Complaint, *Entropic Communications, LLC v. Comcast Corporation, et al.*, 2:25-cv-07969-JWH-KES (C.D. Cal. Aug. 23, 2025)

Ex. 1084: Joint Claim Construction and Pre-Hearing Statement, *Entropic Communications, LLC v. Cox Communications, Inc., et al.*, 2:23-cv-01049-JWH-KES (C.D. Cal. Apr. 19, 2024)

Filed Herewith:

Ex. 1085: Reply Declaration of David B. Lett

Ex. 1086: United States Frequency Allocations, The Radio Spectrum, U.S. Department of Commerce, National Telecommunications and Information Administration, October 2003

Ex. 1087: Excerpts from *Entropic Communications, LLC v. Comcast Corp. et al.*, No. 2:23-cv-01050 (C.D. Cal.), Document 128-20 (Exhibit 20 of Entropic's Second Amended Complaint – Entropic's infringement chart for the '275 patent)

Ex. 1088: The American Heritage College Dictionary, fourth edition, 2002, excerpt including definition of “select”

Ex. 1089: Transcript of Deposition of Dr. Russ

Ex. 1090: Final Written Decision (Paper 45) in IPR2024-00432 finding all claims of U.S. Patent No. 9,210,362 (“the '362 patent”) unpatentable

Ex. 1091: Final Written Decision (Paper 45) in IPR2024-00435 finding all

claims of U.S. Patent No. 11,381,866 (“the ’866 patent”) unpatentable

Ex. 1092: Final Written Decision (Paper 46) in IPR2024-00438 finding all claims of U.S. Patent No. 11,399,206 (“the ’206 patent”) unpatentable

Ex. 1093: Transcript of Oral Hearing held on July 18, 2025 for IPR2024-00432, IPR2024-00435, and IPR2024-00438

Ex. 1094: U.S. Patent No. 11,399,206 (“the ’206 patent”)

I. INTRODUCTION

All claims are unpatentable for at least the same reasons the Board found similar claims in related patents unpatentable over Zhang. See Exs. 1090-1092. Petitioner challenged all claims based on Grounds A-I, which are each founded on Zhang. Patent Owner's Response asserts only that Zhang does not teach element [1E] requiring "*selecting, by a digital frontend (DFE) coupled to the ADC, the plurality of desired channels from the digitized signal.*"¹ This element and PO's arguments are substantially the same as in the prior IPRs decided against PO (Ex. 1089, 16:6-17:4, 202:19-203:12), and thus PO's arguments here should likewise fall. Regardless, PO is wrong for multiple reasons.

First, PO misapprehends how Zhang operates. The Petition identified two mappings of Zhang's digital circuitry to the claimed "*digital frontend (DFE)*": (1) demultiplexer 230 alone and (2) demultiplexer 230 combined with all or part of selector 240. In both mappings, Zhang's circuitry performs [1E]'s "*selecting...the plurality of desired channels from the digitized signal.*" Zhang even uses the same circuitry—a plurality of multiplier-filter chains—as the '275 patent. Yet, PO incorrectly argues that Zhang does not meet [1E] because PO alleges demultiplexer

¹ PO disputes that Zhang discloses [11E] for the same reasons as [1E], which is substantially similar. The discussion herein for [1E] applies equally to [11E].

230 extracts all channels from its digitized input signal. PO's argument fails because Zhang discloses demultiplexer 230 selecting only desired channels.

Second, PO's argument is tacitly based on an improper claim construction that imports a negative limitation—"without selecting any undesired channels"—into the claimed "*selecting...the plurality of desired channels.*" PO wrongly requires the claimed "*selecting*" to select less than all channels and therefore preclude selecting undesired channels. Ex. 1088, 4. Neither the claim language nor specification supports rewriting the claims in this fashion. But even under PO's tacit narrowing of [1E], both mappings meet it because Zhang's desired channels C_1 - C_n (in mapping 1) and Zhang's desired channels D_1 - D_m (in mapping 2) are less than all channels.

Indeed, regarding mapping 2, PO does not even dispute that selecting D_1 - D_m meets "*selecting...the plurality of desired channels*" under its narrow interpretation. PO contends only that Zhang's selecting D_1 - D_m is *from* C_1 - C_n and not *from* the digitized signal. But this contention also hinges on an overly-narrow claim interpretation (requiring "directly from"), and ignores that mapping 2 includes demultiplexer 230 directly receiving the digitized signal. In short, the claims are not patentable regardless of PO's constructions.

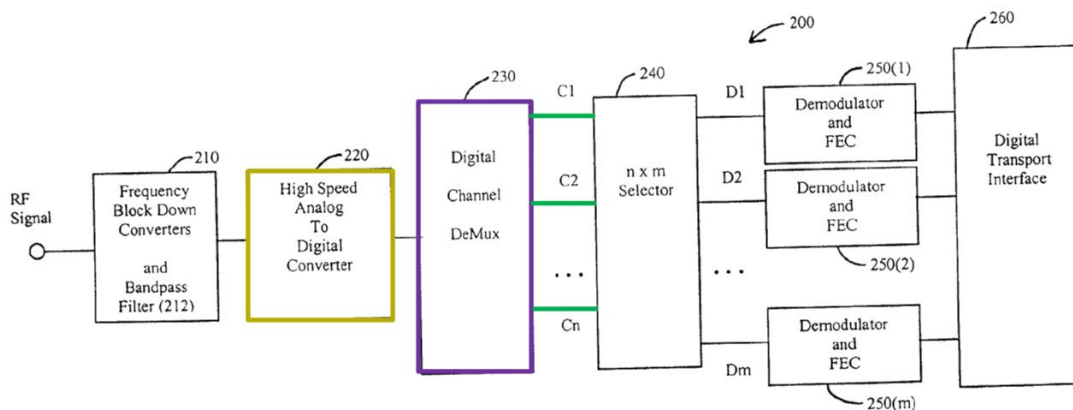
Finally, PO wrongly asserts that the examiner "rejected" applying Zhang during prosecution. The examiner never mentioned Zhang, let alone distinguished Zhang from the '275 claims. The mere citation of the patent that issued from Zhang

(“Zhang-Patent”) during prosecution is irrelevant.

II. THE PETITION EXPLAINED HOW ZHANG TAUGHT SELECTING DESIRED CHANNELS IN TWO SEPARATE WAYS

The Petition showed that Zhang discloses [1E]’s “selecting, by a digital frontend (DFE) coupled to the ADC, the plurality of desired channels from the digitized signal” in two alternate ways (or mappings), each of which independently renders the claims unpatentable (as the Board has held in the prior related IPRs). Pet. 31-34; Ex. 1085, ¶5; Exs. 1090-1092.

For mapping 1, Zhang’s demultiplexer 230 alone (“DFE”) selects target RF channels C_1 - C_n (“desired channels”) from the multi-channel digital signal (“digitized signal”) output by ADC 220:

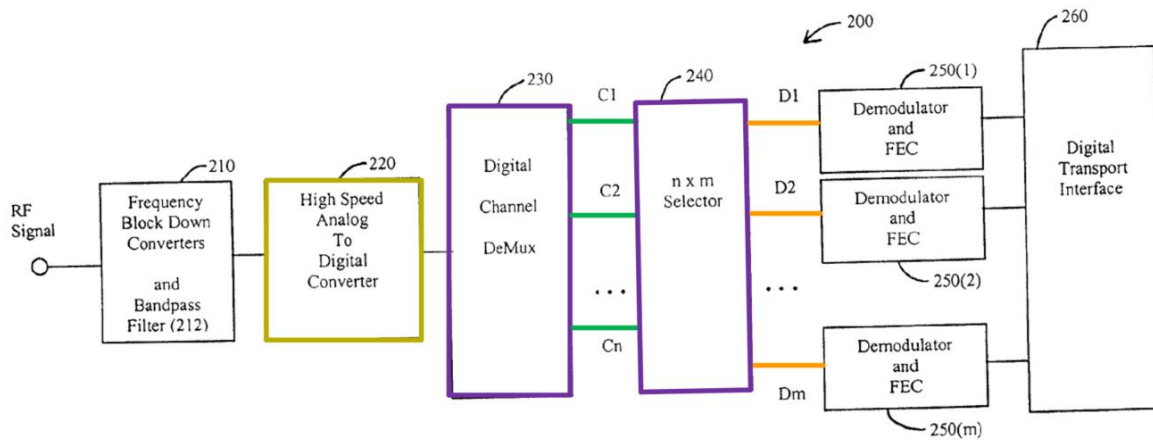


Ex. 1013, Fig. 2 (annotated)

Pet. 31-33. Some or all of target RF channels C_1 - C_n are then output as D_1 - D_m to demodulator(s) 250(1)-250(m). Pet. 35-37. In particular, where $m=n$, all target RF channels C_1 - C_n are output to demodulators 250(1)-250(m), thereby teaching

“outputting...the selected plurality of desired channels” in [1F] consistent with the first mapping for [1E]. Pet. 35-37.

For mapping 2, Zhang’s **demultiplexer 230** in combination with all or part of **selector 240** (“DFE”) selects **RF channels D_1 - D_m** (“desired channels”) from the digital signal output by **ADC 220**:



Ex. 1013, Fig. 2 (annotated)

Pet. 33-34. **Selected RF channels D_1 - D_m** are then output to demodulator(s), thereby teaching “outputting...the selected plurality of desired channels” in [1F] consistent with the second mapping for [1E]. Pet. 37-38.

The following shows an example of how Zhang’s demultiplexer 230 and selector 240 operate to provide certain of **channels C_1 - C_n** as **channels D_1 - D_m** to demodulator(s):

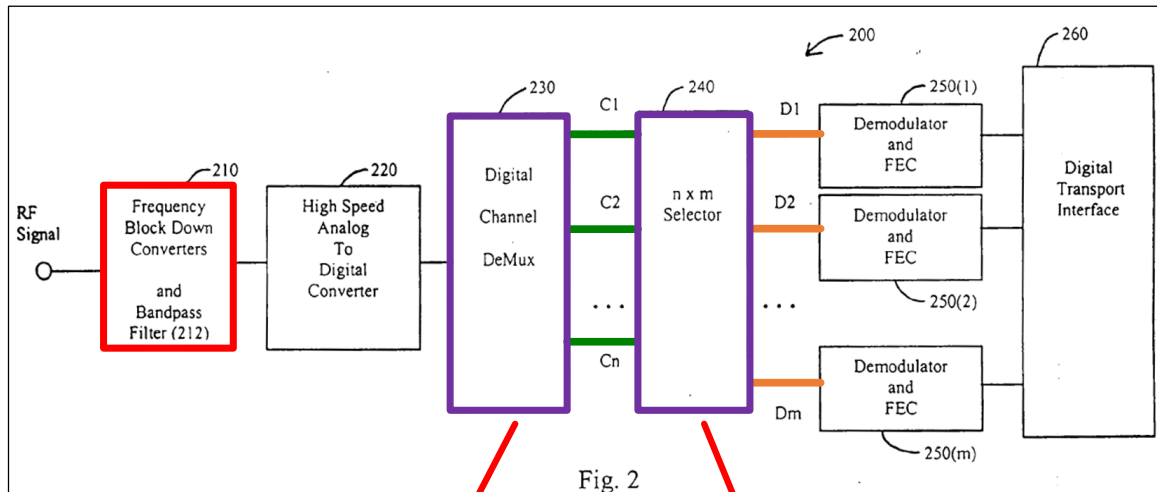


Fig. 2

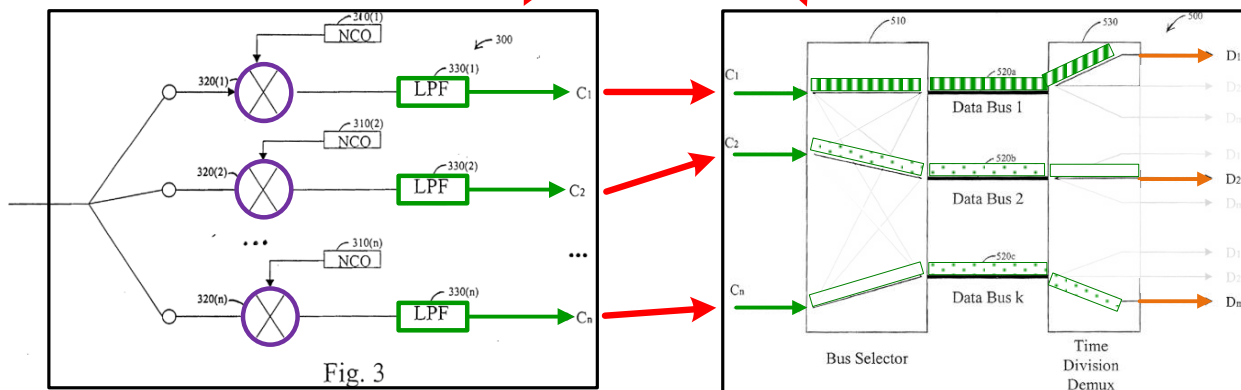


Fig. 3

Ex. 1013, Figs. 2, 3, 5 (annotated)

PO does not dispute this. Nor does PO assert this circuitry is different from that of the '275 patent. Ex. 1089, 167:13-25. PO's only alleged structural difference is the number of complex multipliers: PO alleges Zhang's number ('n') of complex multipliers is equal to every channel whereas the '275 patent only has a number ('N') of complex multipliers equal to the number of desired channels. POR, 22-23. Essentially, PO argues that Zhang's 'n' is not equal to the '275 patent's 'N.' But, both 'n' and 'N' are simply variables to represent 1 or more; nothing in Zhang defines 'n' otherwise. And, the claims do not even recite multipliers.

Because they are so readily dispatched and because PO admits D_1 - D_m are desired channels (POR, 4; Ex. 1093, 71:14-17, 134:3-5), PO's arguments regarding mapping 2 is addressed first below.

III. THAT ZHANG'S D_1 - D_m ARE SELECTED DESIRED CHANNELS IS UNDISPUTED AND ELEMENT [1E] DOES NOT LIMIT THE MANNER IN WHICH THEY ARE SELECTED

Zhang teaches the structural and functional limitations of [1E]. The functional limitation requires "*selecting...the plurality of desired channels from the digitized signal.*" The structure is "*a digital frontend (DFE),*" but there is no other requirement aside from it being "*coupled to the ADC.*"

A. Zhang's Demultiplexer 230 In Combination With All Or Part Of Selector 240 Discloses [1E]'s "Digital Frontend (DFE)"

Regarding the structure, Zhang's demultiplexer 230 is coupled to ADC 220 and the "DFE" is taught by Zhang's demultiplexer 230 in combination with all or part of selector 240. Pet. 33-34; Ex. 1091, 17. PO does not dispute that Zhang's demultiplexer 230 and selector 240 *together* are the "DFE."

Instead, PO raises a strawman and argues that Petitioner fails to show why Zhang's selector 240 *alone* discloses the "DFE." POR, 49-56. This argument fails because Petitioner never mapped the DFE to Zhang's selector 240 alone.

More particularly, PO attempts to use the following drawing (showing Petitioner's first mapping) to dispute Petitioner's second mapping.

frontend” as requiring and/or prohibiting specific structure.² The term “digital frontend” is also not a term of art that connotes a specific structure. Ex. 1085, ¶10; Ex. 1089, 108:10-118:13. The ’275 patent’s specification and figures merely use “DFE” to refer to the box drawn around example circuitry situated after its ADC and before its demodulator. Ex. 1001, 3:3-10, 4:25-27, 5:56-7:20, 9:43-10:38, 10:65-11:3, 11:40-43, 11:56-64, 12:11-19, Figs. 2, 4, 6-7, 9-10. Accordingly, Petitioner’s second mapping—essentially drawing a box around demultiplexer 230 and all or part of selector 240—is consistent with the ’275 patent’s use of “digital frontend.”

PO’s arguments (POR, 49-56) that Petitioner’s second mapping failed to show a “DFE” have no merit. Besides showing that Zhang’s demultiplexer 230 and selector 240 process digital signals, the Petition noted that they are *digital circuits* and situated *before demodulation*, just like the ’275 patent’s DFE. Pet. 34. Petitioner’s expert, Mr. Lett, also highlighted that Zhang expressly describes its system as a “wide-band front-end[.]” Ex. 1013, [0045]; Pet. 34 (citing Ex. 1002, ¶137).

B. Zhang’s Demultiplexer 230 In Combination With Selector 240 Performs [1E]’s Functional Language

PO alleges that the claimed “*selecting...the plurality of desired channels from the digitized signal*” excludes Zhang’s D₁-D_m from being “*desired channels*”

² The ’866 claims show the DFE’s broad scope. Ex. 2018, claims 1, 3, 5-8, 31-36.

because D_1 - D_m are selected from C_1 - C_n and thus are purportedly not “*from the digitized signal.*” POR, 4, 38-45. This argument attacks the same strawman noted above—Patent Owner’s fiction that the DFE in the second mapping is selector 240 alone. But Petitioner’s second mapping relies on *both* Zhang’s demultiplexer 230 and all or part of selector 240 for selecting D_1 - D_m from the digitized signal *at the input of demultiplexer 230*, which is the input of the DFE in the second mapping. Nothing in the claims prevents Petitioner from identifying both demultiplexer 230 and selector 240 as the “DFE,” or precludes the relied-upon DFE in Zhang from internally selecting C_1 - C_n between receiving the digitized signal at its input and outputting D_1 - D_m . Zhang’s selection of C_1 - C_n is part of selecting D_1 - D_m and nothing in the claims precludes the earlier selection of C_1 - C_n .

As shown below, the input to the relied-upon DFE in Zhang (i.e., input to 230) is the digitized signal from the ADC 220, *not* the individual channels C_1 - C_n . And, the output of the relied-upon DFE is D_1 - D_m , which are the desired channels. It necessarily follows that the relied-upon DFE is selecting desired channels D_1 - D_m “from the digitized signal.” Ex. 1090, 26-29; *see also* Ex. 1089, 123:13-20.

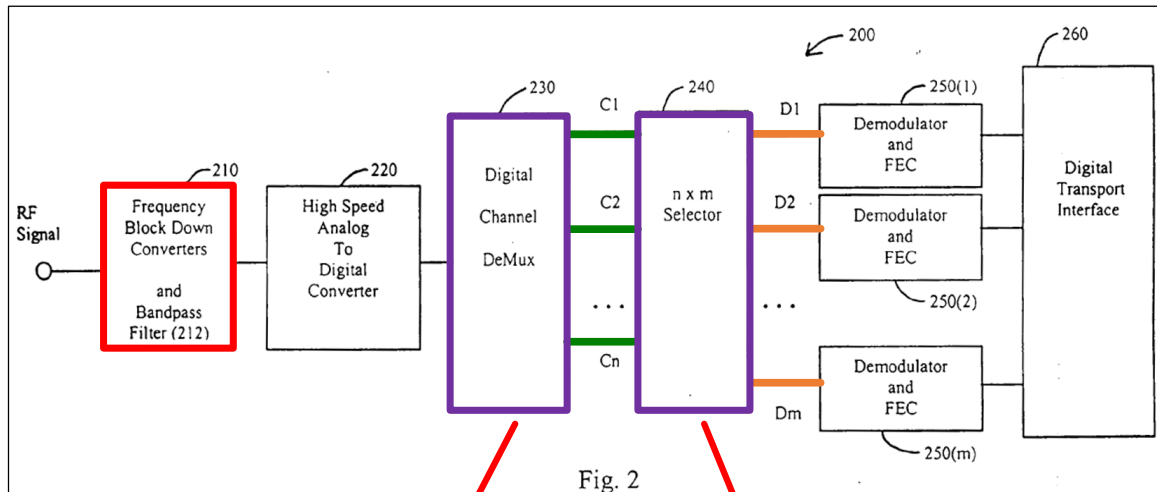


Fig. 2

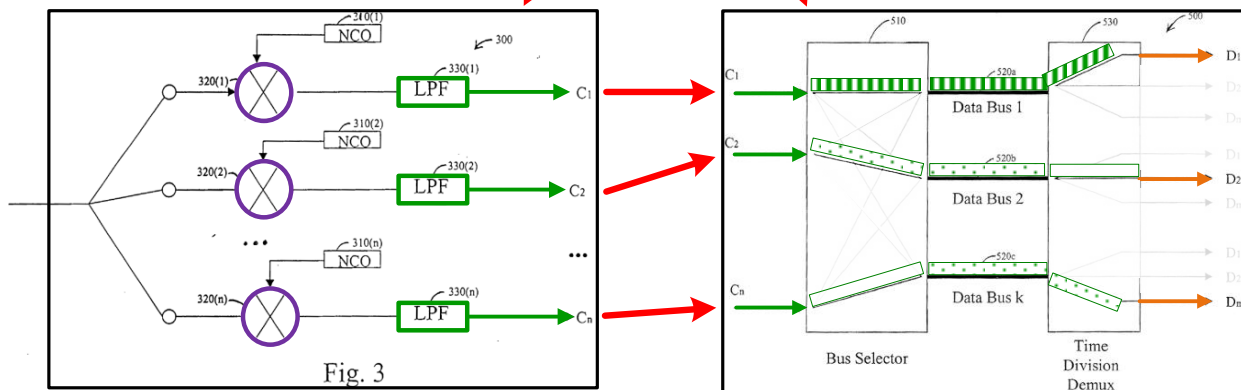


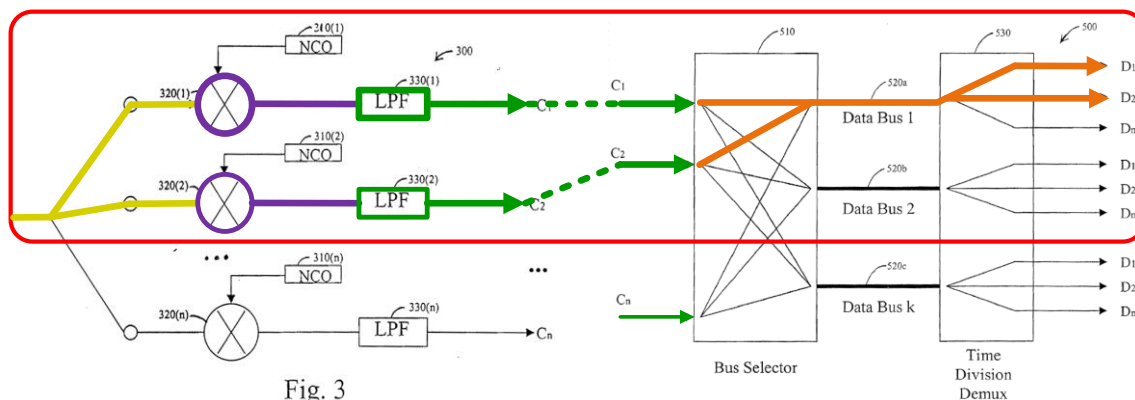
Fig. 3

Ex. 1013, Figs. 2, 3, 5 (annotated)

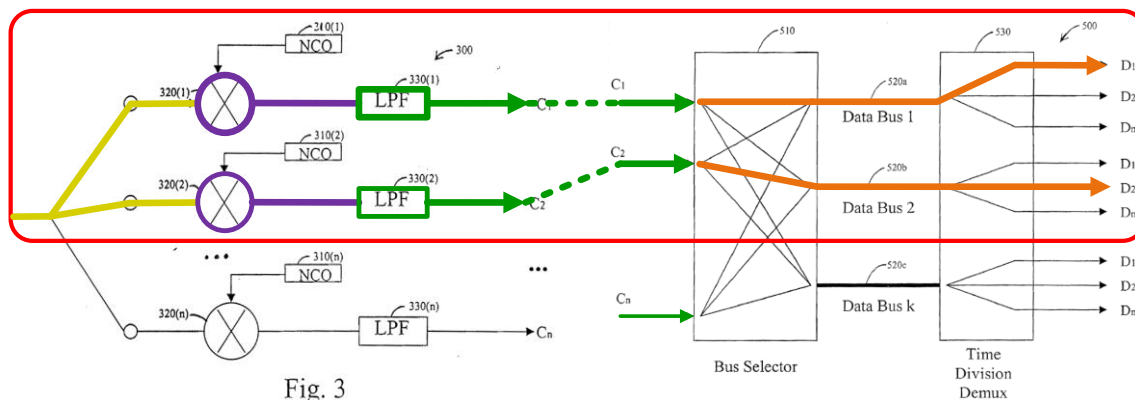
The claims do not prevent [1E]’s “selecting” from being performed by a demultiplexer that selects individual channels from the incoming digitized signal in combination with a selector that passes selected channels to demodulator(s). Element [1E] does not exclude *any* particular manner in which desired channels are selected and output to demodulator(s), provided only that a digital frontend is used.

Further, the ’275 specification and Zhang use the same circuitry. Zhang’s digital circuitry (**red** box below) for selecting and outputting (in series or parallel) desired channels D_1 - D_m matches the ’275 patent’s Figure 2 circuitry for selecting

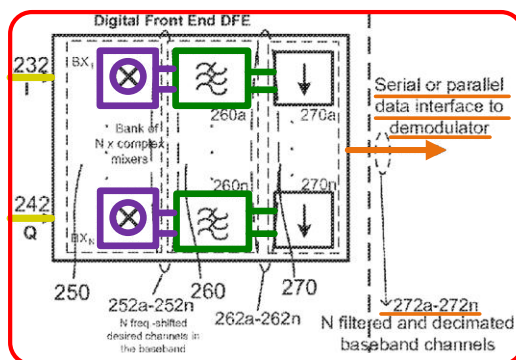
and outputting desired channels 272a-272n. Ex. 1013, [0028], [0030]-[0032], [0038]-[0039], [0042], [0048], claims 17, 21, 34, 36-41; Ex. 1085, ¶6.



Ex. 1013, Figs. 3, 5 (annotated)



Ex. 1013, Figs. 3, 5 (annotated)



Ex. 1001, Fig. 2 (annotated)

PO readily admits that the '275 patent and Zhang both digitize an input signal with desired and undesired channels, use similar complex mixers to extract desired

channels, and achieve the same result by outputting just desired channels. POR, 1, 7-8; Ex. 1085, ¶6. Even if the claims required the particular circuitry disclosed in the '275 patent, Zhang discloses it. This should be a moot point, however, because limiting the claims to that circuitry is improper given their breadth. *Info-Hold, Inc. v. Applied Media Techs. Corp.*, 783 F.3d 1262, 1266-1267 (Fed. Cir. 2015).

In short, Zhang's digital circuitry (230 with all or part of 240) performs the recited "selecting" and "outputting" functions of [1E] and [1F]. Zhang's digital circuitry would not have output D_1 - D_m *but for* its "selecting...[them] from the digitized signal" as there is no other source for them.³ Ex. 1085, ¶8; Ex. 2022, 59:18-61:21. PO's arguments (POR, 41-45) about *how* Zhang performs selecting—by first extracting C_1 - C_n and outputting a subset or all of them as D_1 - D_m —is immaterial because [1E] does not exclude such selection.

PO also loses the game it plays with the meaning of "selecting." POR, 47-49. First, Petitioner never construed "selecting" to require only "extracting." PO asserts that Petitioner construed "selecting" to be "simply extracting" in IPR2024-00432

³ PO concedes that C_1 - C_n are "from the digitized input signal" output by the ADC. POR, 3. Each D_1 - D_m is the same as one of C_1 - C_n : the "D" and "C" labels do not make them different. Each is "from the digital signal." Ex. 1085, ¶7; Ex. 1094, claim 1 (using "from" broader than "directly from").

(POR, 47) by taking a quote out of context. Petitioner was addressing the first mapping where demultiplexer 230 performs selecting by extracting C_1 - C_n , as in the '275 patent. Ex. 2026, 32.⁴ With respect to the second mapping, Zhang's demultiplexer 230 in conjunction with selector 240 also clearly performs "selecting" under its ordinary meaning. Ex. 1013, [0028]-[0029]; POR, 18; Ex. 1088, 4.

Second, even under the purported construction, D_1 - D_m are extracted from the digitized signal because D_1 - D_m are some or all of C_1 - C_n , which are undisputedly extracted from the digitized signal. Thus, even if the purported construction were adopted, mapping 2's selecting D_1 - D_m still discloses [1E].

C. Zhang Discloses The Claims Even If The Claims Require Selecting Directly From The Digitized Signal

PO attempts to use claim differentiation to argue that [1E] requires selecting desired channels *directly* from the digitized signal and thus somehow excludes Zhang's D_1 - D_m . But, the relied-upon digital circuitry in Zhang includes demultiplexer 230, which performs selecting *directly* on the digitized signal output by the ADC. Thus, the claims are unpatentable even under PO's tacit construction that "*selecting...from the digitized signal*" requires "directly from."

Moreover, PO's claim differentiation argument fails because it compares

⁴ Likewise, PO misuses Mr. Lett's testimony. POR, 48 (citing only Ex. 2021, 82:16-18); Ex. 1085, ¶9 (citing Ex. 2021, 76:17-83:23).

significantly different claims from different patents. PO compares [1E] of the '275 patent to [1B] of the '866 patent. POR, 45-47. The three cases cited in the POR make clear that the doctrine does not apply to PO's comparison. POR, 47. The first two cases compared nearly identical claims within the *same* patent. *SightSound Techs., LLC v. Apple Inc.*, 809 F.3d 1307, 1318 (Fed. Cir. 2015); *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006). The third case, *Clare*, acknowledged that the doctrine might indicate a difference between nearly identical limitations in two related patents, but rejected it because it would have resulted in the claims of one of the patents excluding a disclosed embodiment. *Clare v. Chrysler Group LLC*, 819 F.3d 1323, 1330-1331 (Fed. Cir. 2016).

For all of these reasons, Petitioner's second mapping renders claim 1 unpatentable.

IV. ZHANG'S C₁-C_n ARE SELECTED DESIRED CHANNELS UNDER EITHER THE CORRECT CONSTRUCTION OR THE INCORRECT CONSTRUCTION TACITLY ARGUED BY PO

In Petitioner's first mapping, Zhang's demultiplexer 230 alone is mapped to the "DFE" and Zhang's channels C₁-C_n are mapped to the "desired channels." Zhang's demultiplexer 230 selects C₁-C_n from the digitized signal output by the ADC, thereby disclosing [1E]. Pet. 31-33. PO disputes this, alleging that C₁-C_n must include both desired and undesired channels. POR, 5-6.

This argument fails for two reasons. *First*, Zhang does not require C₁-C_n to

include undesired channels, but rather discloses selecting less than all channels for C_1 - C_n , just as in the '275 patent. Ex. 1090, 23-24; Ex. 1091, 18. *Second*, PO's implicit construction for "*selecting...the plurality of desired channels*"—excluding selection of undesired channels—is wrong. Ex. 1091, 16. Nothing in the claims excludes the additional selection of undesired channels. Thus, whether or not C_1 - C_n includes some undesired channels is inconsequential. These issues are discussed below.

PO's remaining arguments that C_1 - C_n are not "desired channels" because they are not all output and that outputting all C_1 - C_n is theoretical happenstance are also refuted. Notably, with respect to the first mapping, PO does not dispute that Zhang's demultiplexer 230 alone is the claimed "DFE" and that C_1 - C_n are selected "from the digitized signal." Indeed, PO concedes that C_1 - C_n are "demultiplexed *from* the digitized input signal." POR, 3 (emphasis added).

A. Zhang Discloses That C_1 - C_n Are Selected Desired Channels Even Under PO's Construction

1. Zhang Expressly Identifies C_1 - C_n As "desired channels" And That The Number Of Them May Be Less Than The Number Of Channels Received

Any dispute as to whether channels C_1 - C_n are the claimed "desired channels" should be resolved by Zhang referring to each target RF channel that becomes one of the C_1 - C_n channels as either a "desired RF channel" or "desired channel," and referring to other channels filtered out by the demultiplexer as "undesired." Ex.

1013, [0032], claims 34, 36, 37. Zhang explains that its system receives a multi-channel analog signal having a wide range of frequencies and uses “select” frequencies to extract C_1 - C_n and that “ C_1 - C_n contain content channels that are selected or used by a subscriber.” Ex. 1013, [0012], [0023]-[0024], [0028]-[0029], claims 3, 13, 21; Ex. 1085, ¶¶11-12. It defies common sense to read Zhang’s reference to C_1 - C_n as “desired channels,” and conclude they *must* include undesired channels as PO argues.

Zhang’s claims also support that selecting C_1 - C_n is the claimed “selecting” of desired channels. Ex. 1013, [0048], claims 1-3, 10-11, 13, 17, 21, 23, 27-28, 30, 33-34, 36, 41); Ex. 1002, ¶¶108-109, 113. For example, claim 17 recites “one or more low-pass filters (LPF) configured to receive the multi-channel digital RF signal,” and claim 21 recites “at least one complex multiplier configured to receive a multi-channel digital RF signal.” In these examples, the number of channels demultiplexed from a multi-channel digital RF signal may be as few as a single channel (e.g., demultiplexed by “one complex multiplier” and “one [] low pass filter[]”).⁵ Claim 34 also recites a “plurality of select frequencies” for demultiplexing separate RF channels (e.g., C_1 - C_n) from “at least one multi-channel

⁵ PO’s expert, Dr. Russ, ignores these teachings from Zhang’s claims. *See generally* Ex. 2013 (never addressing claims 17 or 21).

RF signal.” Nothing in this claim requires the number of channels in the multi-channel RF signal and the separate RF channels to be the same (i.e., nothing requires C_1 - C_n to include all channels, desired and undesired, from the multi-channel signal). Zhang’s claims instead teach a number of channels in the multi-channel RF signal that is independent from the number of demultiplexed channels C_1 - C_n . Ex. 1085, ¶14. These claims show that C_1 - C_n would have included *less than* all channels and thus exclude undesired channels. *Id.*

Further, Zhang’s ‘n’ is a variable meaning one or more to capture Zhang’s flexible architecture, including flexibility to select a variable amount of desired channels C_1 - C_n . Ex. 1013, [0028]-[0042], [0048]. It is not defined to identify the number of all channels in the input signal as PO alleges. PO’s only support for that allegation is Zhang’s paragraph [0027] (POR, 16; Ex. 1089, 156:1-3), but that merely describes the capability of ADC 220 to digitize an entire signal band including a variable number of channels. Ex. 1085, ¶¶13, 16; Ex. 1089, 154:15-155:15. Zhang is not defining ‘n’ to be the total number of channels, much less defining it for application throughout Zhang (e.g., in C_1 - C_n). Even if ‘n’ in paragraph [0027] had to match ‘n’ in C_1 - C_n , paragraph [0027] still only states that the “entire signal band with n channels can be converted” which is true even if ‘n’ is less than all channels because the ‘n’ channels would be included within the entire band. Regardless, the disclosure in paragraph [0027] is eclipsed by Zhang’s other

disclosures. Ex. 1090, 24; Ex. 1091, 29-30.

PO also ignores that Zhang, like the '275 patent, discloses using numeric controlled oscillators (NCOs) 310 to “select” target frequencies so C_1 - C_n are less than all input channels. Ex. 1013, [0012], [0032]; *see also*, Ex. 1089, 95:18-97:13. Had Zhang demultiplexed all channels, programmable frequencies would not have been needed. Ex. 1085, ¶17.

PO's reading of Zhang turns a blind eye to practical television receiver architectures at the time. Typically, a television receiver would have circuitry for simultaneously demultiplexing only a few channels, as a subscriber/user would only watch a few channels simultaneously. Ex. 1085, ¶18; Ex. 1089, 25:16-27:6. As both Zhang and the '275 patent demonstrate, it was known that television channels are spaced at 6 MHz intervals within non-contiguous portions of a frequency spectrum that includes very high frequencies (VHF) and ultra high frequencies (UHF) (e.g., 300 MHz-3GHz). Ex. 1013, [0006]; Ex. 1001, 2:16-42; Ex. 1086. It was also known that television receivers received input signals having over a hundred television channels. Ex. 1089, 24:18-25:20. With this background, Zhang certainly would not have mandated demultiplexer 230 to include a multiplier-filter chain for each RF channel. Such architecture is impractical because it unreasonably increases costs, power consumption, and heat. Ex. 1085, ¶18; Ex. 1089, 23:5-24:17, 37:20-40:13, 103:7-24, 107:7-25, 170:11-172:4. Accordingly, Zhang discloses that the number

of multiplier-filter chains depends on the number of channels “to be demultiplexed,” not the number of input channels. Ex. 1013, [0030], [0033]; Ex. 1085, ¶18.

Finally, it would have at least been obvious that C_1 - C_n do not include all channels in the input signal for the same reasons (given in the Petition) that it would have been obvious that C_1 - C_n are only the non-contiguous channels that a subscriber selects (or desires). Pet. 23-26; Ex. 1085, ¶21; Ex. 1086. Specifically, a POSITA would have been motivated to design Zhang’s demultiplexer 230 to have flexibility to select whichever content channels the subscriber desires. Pet. 24-26; Ex. 1085, ¶21. A POSITA would have also been motivated to only demultiplex channels that a user is interested in (or subscribed to) to reduce costs by omitting unnecessary multiplier-filter chains for undesired channels, and therefore C_1 - C_n would have been less than all channels in the input signal. Pet. 27-28; Ex. 1085, ¶21. Moreover, Zhang’s demultiplexer 230 would not have targeted channels in the frequencies between the desired television channels C_1 - C_n , and therefore C_1 - C_n would not have included all channels in the input signal. Ex. 1089, 143:20-144:7 (agreeing C_1 - C_n do not include aeronautical radionavigation channels); *see also id.*, 47:1-50:22, 54:21-57:12, 73:15-23, 75:5-15. Indeed, PO does not dispute that Zhang’s C_1 - C_n are non-contiguous and meet “*the plurality of desired channels are non-contiguous*” in [1B].

All of the above confirms that C_1 - C_n include only desired channels and

exclude undesired channels. As discussed below, PO's arguments to the contrary are unavailing.

2. Contrary To PO's Assertions, Petitioner's Expert Repeatedly Explains That C_1 - C_n Are Less Than All Channels

PO misleadingly attempts to use Mr. Lett's deposition testimony to argue that C_1 - C_n are all channels. First, PO cites a small portion from Mr. Lett's deposition in the prior IPRs about the use of 'n' in one sentence of Zhang's paragraph 27. POR, 16 (citing Ex. 2019, 78:14-22). PO leaves out that Mr. Lett also opined that Zhang's 'n' is a variable equal to *or less than* all channels. Ex. 2019, 78:2-13, 79:17-80:10, 81:1-20, 83:10-14, 84:11-85:13, 85:24-86:12, 89:5-9; Ex. 1085, ¶19. Mr. Lett clarified that Zhang's paragraph 42 explains "in a different way [from paragraph 28]" that 'n' can be any value up to the total number of channels. Ex. 2019, 84:11-86:1; Ex. 1013, [0041]-[0042]; Ex. 1085, ¶20.

Similarly, PO misuses Mr. Lett's deposition testimony in this proceeding. PO cites Mr. Lett's confirmation that Zhang's Figure 6 example demultiplexed all channels in the input signal. POR, 19-20 (citing Ex. 2022, 44:13-17). However, PO ignores that Mr. Lett prefaced his answer with "[i]n this example" because, as he has repeatedly opined, demultiplexer 230 demultiplexes only desired channels (which are less than all channels in other examples). Ex. 2022, 35:13-36:16, 40:13-41:10, 43:22-44:11, 48:1-14, 49:3-13, 52:7-10, 59:7-17; Ex. 1085, ¶20.

3. The Presence Of Selector 240 Does Not Require That C_1 - C_n Include All Channels, Desired And Undesired

PO and its expert incorrectly argue that Zhang's selector 240 is only needed because C_1 - C_n necessarily includes all channels. POR, 8-10, 23, 26.

Selector 240's purpose is to provide fast channel search capabilities (i.e., quickly switch between channels to improve the user experience). Ex. 1013, [0028], [0047]; Ex. 1085, ¶¶22-24. This does not mean that selector 240 has to select less than all of C_1 - C_n , nor does it imply that C_1 - C_n must include all channels in the input signal.⁶ Ex. 1085, ¶¶24-27. Where C_1 - C_n are less than all channels, selector 240 still provides fast switching among those channels. *Id.* Thus, selector 240's presence does not mean that C_1 - C_n must encompass all channels, including undesired channels.

⁶ Dr. Russ's opinion should be given little weight because Zhang's fast-channel change feature in paragraph 28 does not support his conclusion that "Zhang by design extracts more channels from the input signal than are desired (i.e., Zhang extracts all channels) so that new desired channels can be selected without having to extract them from the input signal" and because he is "unwilling" or "not able" to provide basic opinions. Ex. 2013, ¶84; Ex. 1089, 92:17-95:16, 99:18-103:5, 145:18-148:17; *Upjohn Co. v. Mova Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. 2000).

4. Zhang’s European Prosecution History Does Not Require C₁-C_n To Include All Channels

PO and Dr. Russ cite the prosecution history in Zhang’s related EP application (POR, 20-21), but do not provide the EP application or references. Ex. 1089, 19:5-20. Thus, Dr. Russ’s opinion lacks support and should be accorded no weight. 37 C.F.R. § 42.65; Fed. R. Evid. 702(b); *Upjohn Co.*, 225 F.3d at 1311. Moreover, the discussion during EP prosecution is irrelevant. It relates to selector 240 and why its additional selection of D₁-D_m was distinguishable over the references. Ex. 1085, ¶28. However, the additional selection of D₁-D_m by selector 240 for fast channel changing says nothing about whether C₁-C_n includes undesired channels. *Id.*; Ex. 1090, 24-25.

For all these reasons, PO’s argument that C₁-C_n include undesired channels fails. Even if the claims had a negative limitation prohibiting selection of undesired channels, as PO suggests, the claims are still unpatentable.

B. PO Misconstrues “selecting...the plurality of desired channels” to Require Not Selecting Any Undesired Channels

As explained, Zhang discloses selecting desired channels C₁-C_n without selecting undesired channels. Moreover, PO’s assertion that [1E] requires this is wrong. PO mischaracterizes Zhang as “indiscriminately extract[ing] all channels from the digitized input signal without any selection” to argue that extracting all channels from the digitized signal is excluded from the claims. POR, 6. PO

effectively argues that “*selecting...the plurality of desired channels*” requires *only* selecting desired channels *without selecting any undesired channels*. POR, 6-9. But [1E] places no requirement on how the system treats undesired channels, and PO’s argument that “not selecting undesired channels” should be written into the claims to preclude extracting all channels is incorrect. Ex. 1085, ¶¶29-30.

To begin, the claim language itself does not support PO. The claims use the open-ended transition “comprising,” and thus do not exclude additional, unrecited steps, such as selecting undesired channels. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 811 (Fed. Cir. 1999); Ex. 1091, 16. PO’s other related patents make clear that PO knew how to insert explicit negative limitations into claims when desired. See Ex. 2018, claim 1 (“without providing”), Ex. 1094, claim 1 (“without selecting...undesired channels”). No such limitations appear in the ’275 patent claims.

The ’275 specification also does not support importing such negative limitations. PO’s expert misrepresents the ’275 patent disclosure. Referring to Figure 2 of the ’275 patent, Dr. Russ states that the “bank of N mixers (blue) selects N desired channels, without selecting any undesired channels.” POR, 6; Ex. 2013, ¶ 35 (citing Ex. 1001, 5:56-61, 6:1-11). However, the ’275 patent does not contain the “without selecting any undesired channels” language. While Dr. Russ describes one alleged embodiment, he conveniently skips other embodiments described *in the*

same paragraph in which N is “equal to the number of *all* available channels that exist in the licensed frequency spectrum” or “*all* receivable channels within a geographic area.” Ex. 1001, 5:60-6:1 (emphasis added), Fig. 2; Ex. 1089, 123:21-130:25. “All” channels include the undesired channels shown in Figure 2. *Id.*; Ex. 1085, ¶31. In short, the ’275 patent specification explicitly discloses the selection of undesired and desired channels.

PO’s entire argument improperly rests on excluding, from the scope of the claims, the disclosed embodiments of the ’275 patent where N includes all channels. *Nobel Biocare Servs. AG v. Intradent U.S., Inc.*, 903 F.3d 1365, 1381 (Fed. Cir. 2018). Without any support in the claims or the specification, PO’s reading of “without selecting any undesired television channels” into the claims is improper.

The Board should instead apply the ordinary meaning of “selecting...the plurality of desired channels from the digitized signal.” *Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 874-875 (Fed. Cir. 2004). This selecting includes extracting at least two desired channels from the digitized signal, which is exactly what the signal paths in the ’275 system do. Ex. 1085, ¶¶32-33. Each path includes a mixer/multiplier and filter that picks out one channel from the digitized signal and outputs it on its own path. *Id.*; Ex. 1001, 6:8-23, 7:3-15; Ex. 1089, 85:17-86:12, 167:18-25.

Thus, in the ’275 patent, a plurality of desired channels are selected as

required by [1E] as long as two of the output paths include desired channels, irrespective of what the other paths include. Ex. 1001, 5:61-6:3, Fig. 2.⁷

C. Zhang's Channels C_1 - C_n Are "Desired Channels" Under Any Reasonable Construction

As discussed, Zhang's C_1 - C_n are the claimed "desired channels" at least because Zhang describes them as containing content channels that are "selected or used by a subscriber" and expressly refers to them as "desired." Ex. 1013, [0028], [0032]; Ex. 1091, 18. The '275 patent does not define "desired channels" and instead only uses the term in various examples including: (1) the number N of desired channels can be "all available channels that exist in the licensed frequency spectrum;" and (2) " N can be equal to the number of all receivable channels within a geographic area." See *e.g.*, Ex. 1001, 1:35-58, 2:33-39, 5:56-6:7. Likewise, the '275 patent does not define "undesired channels"—it simply uses the term in contrast with desired channels (*e.g.*, part of the swath of channels that are not desired channels). Ex. 1001, 1:46-51. PO also has not proposed an express construction for "desired channels" or "undesired channels." Accordingly, there is no need to construe "desired channels" and the ordinary meaning (which includes channels that are selected, used, or accessed by a subscriber) should apply, which is clearly met

⁷ Even PO's infringement contentions do not show selecting less than all channels. Ex. 1087, 2-10.

by Zhang's C_1 - C_n . Ex. 1085, ¶34; Ex. 1089, 27:17-28:16, 78:11-81:6.

Contrary to PO's suggestion, Petitioner's expert did not construe "desired channels" to require them to be demodulated. POR, 32-33. Regardless, even requiring desired channels to be demodulated (which would be an improper importation into the claims), C_1 - C_n are demodulated. Ex. 1085, ¶35. This is especially clear when $m=n$ (which is one of Zhang's disclosed embodiments), such that selector 240 selects all of C_1 - C_n for D_1 - D_m . But even for $m<n$, all of C_1 - C_n would have been output to demodulators eventually (just not concurrently) in at least some cases. This is because Zhang's selector 240 is for fast channel changing among an evolving set of channels. Ex. 1013, [0028]-[0029], [0047]. Zhang's selector 240 flexibly changes which of C_1 - C_n are selected as D_1 - D_m for output to demodulators 250 at a given time, but would eventually output them all based on subscriber selections. Ex. 1085, ¶35.

D. Zhang Meets All Limitations When Channels C_1 - C_n Are Mapped to the Claimed "Desired Channels"

PO's argument (POR, 35-38) that Zhang fails to teach "*outputting...the selected plurality of desired channels*" in [1F] when C_1 - C_n are mapped to the "desired channels" also fails. For similar reasons that Zhang's C_1 - C_n are "desired channels" even when construing them to require demodulation, C_1 - C_n are also output to demodulators. Specifically, all of C_1 - C_n are clearly output as D_1 - D_m when $m=n$ and they are also all eventually output when $m<n$. Ex. 1085, ¶36.

PO superficially treats D_1 - D_m as being different from C_1 - C_n , but they are not. Ex. 1089, 197:15-23. Channels D_1 - D_m are channels C_1 - C_n and only relabeled as they pass through the selector 240 to reflect the different ways they are transferred to demodulators 250. Ex. 1090, 26. Regardless of how they are transferred (e.g., databases used), C_1 - C_n are output to the demodulators. Ex. 1085, ¶37.

PO's "theoretical happenstance" argument fares no better. POR, 37-38. First, Zhang discloses that selector 240 "selects one or more of the RF channels D_1 to D_m from one or more of the digital RF channels C_1 to C_n ." Ex. 1013, [0028]. This disclosure includes selecting all of C_1 - C_n for D_1 - D_m . Ex. 1085, ¶38. Further, like 'n,' 'm' is a variable representing 1 or more. Zhang places no limit on 'm,' except that it would not be greater than 'n.' Zhang does not require 'm' to be less than 'n.' Thus, $m=n$ is not "theoretical happenstance" (as PO argues), but rather one of the expressly disclosed embodiments in Zhang. *Id.* Using variables 'm' and 'n' is simply a short-hand way for Zhang to expressly disclose various embodiments. Accordingly, Zhang discloses that C_1 - C_n *would* (not just *could*) have been selected for D_1 - D_m . *Id.* As such, PO's cited cases (POR, 38) are inapplicable here.

V. ZHANG WAS NEVER REJECTED DURING PROSECUTION AND THE PROSECUTION HISTORY DOES NOT MAKE THE CLAIMS PATENTABLE OVER ZHANG

PO misleadingly argues that the examiner "rejected" applying Zhang during prosecution. POR, 5-6. Although the Zhang-Patent was cited on an IDS, the

examiner never mentioned it, much less distinguished it from the claims. Contrary to PO's assertion, there is no indication that the examiner "found that [Zhang and other references] do not disclose the 'selecting' limitation because the input signal in those references is merely separated into its constituent channels by a demultiplexer." POR, 5-6.

The Notice of Allowance merely referenced "Claxton"—not Zhang—and regurgitated [1E]-[1F]. Ex. 2025, 6-7 (only distinguishing the claims from Claxton's channelizer—not Zhang's demultiplexer 230); *see also* Ex. 1082, 6-7 (never discussing Zhang's disclosure). Moreover, the examiner erred by apparently dismissing all the IDS materials, including the Zhang-Patent, as being cited for "other patents, i.e. US 8223,775" involved in Entropic's litigations. *Id.*, 6. Regardless, the prosecution history does not change that Zhang discloses the claims.

VI. CONCLUSION

For the reasons above (which are supported by Mr. Lett's Reply Declaration (Ex. 1085, ¶¶1-39)) and in the Petition, all claims of the '275 patent are unpatentable and should be canceled.

Respectfully submitted

Dated: November 4, 2025

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply totals 5596, which is less than the 5,600 allowed under 37 CFR § 42.24(c)(1), as counted by the Word Count feature of Microsoft Word. This total includes 5558 words as counted by the Word Count feature of Microsoft Word and 38 words used in annotations.

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

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.105, I hereby certify that I caused a true and correct copy of this **PETITIONER’S REPLY TO PATENT OWNER’S RESPONSE UNDER 37 C.F.R. § 42.23** in connection with IPR2025-00180 to be served via e-mail on November 4, 2025, in its entirety on the following counsel of record for Patent Owner:

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