

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 IPR2024-00435
Patent 11,381,866

PATENT OWNER'S SUR-REPLY

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2002	Table of All Petitions Filed By Comcast (As Petitioner or RPI) (2016-2024) [All-Comcast-Petitions]
2003	PTAB Multiple Petitions Study [Multiple-Petitions-Study]
2004	PTAB Multiple Petitions Study Executive Summary [Executive-Summary]
2005	FreeWheel About Webpage (www.freewheel.com/about)
2006	Declaration of Kenneth K. Wang [Wang-Decl.]
2007	Pro Hac Vice Declaration of Nathan Lowenstein [PHV-L]
2008	Pro Hac Vice Declaration of Colette Woo [PHV-W]
2009	Declaration of Samuel H. Russ, Ph.D. [Russ-Decl.]
2010	Curriculum Vitae of Samuel H. Russ, Ph.D. [Russ-CV]
2011	European Patent Application No. 02759732.7.2415 Communication From Examining Division [EPO-Communication-Annex]
2012	European Patent Application No. 02759732.7.2415 Reply To Communication From Examining Division [Zhang-EPO-Reply]
2013	European Patent Application No. 02759732.7.2415 Intent To Grant European Patent [EPO-Grant-Intent]
2014	Reserved
2015	Reserved
2016	Reserved

2017	Reserved
2018	David Lett 1 st Deposition Volume I [Lett-1 st -Depo.-Volume-I]
2019	David Lett 1 st Deposition Volume II [Lett-1 st -Depo.-Volume-II]
2020	IPR2024-00432, Exhibit 1002, Declaration of David Lett [IPR2024-00432-Lett-Decl.]
2021	David Lett 2 nd Deposition [Lett-2 nd -Depo.]

I. INTRODUCTION

The Patent Owner Response (“POR”) demonstrated why Petitioner’s grounds fail. For independent claims 14, 41, 69 and their dependents, the POR (at 9-27) demonstrated that Petitioner failed to show “each digital down converter ... operable to generate a digital channel output corresponding to each desired channel.” For independent claims 1, 27, 55 and their dependents, the POR (at 28-45) demonstrated that Petitioner failed to show, for three independently sufficient reasons, “a DFE [digital front end] ... configured to concurrently select and provide each of the plurality of desired channels.”

Petitioner’s Reply conflates the analysis for these two distinct sets of claims in an effort to obscure the specific deficiencies in each set. But upon even a cursory comparison of Petitioner’s grounds to the express terms of the claims, Petitioner’s arguments collapse under their own weight.

II. PETITIONER FAILS TO SHOW “EACH DIGITAL DOWN CONVERTER ... OPERABLE TO GENERATE A DIGITAL CHANNEL OUTPUT CORRESPONDING TO EACH DESIRED CHANNEL” (CLAIM 14-26, 41-55, 69-82, ALL GROUNDS).

Limitation 14[c] recites “a plurality of digital down converters,” “wherein *each digital down converter* ... is operable to *generate a digital channel output corresponding to each desired channel*” Ex. 1001 [’866] cl. 14. Independent claims 41 and 69 recite identical limitations. *Id.*, cls. 41 (limitation 41[c]), 69

(limitation 69[c]). The Petition relies on Zhang alone as disclosing this limitation. POR, 9-10. Petitioner argues that Zhang's channels C_1 - C_n disclose the claimed "desired channels." Pet., 29. Petitioner further argues and that the "n" complex multipliers in Zhang's demultiplexer 230, which downconvert channels C_1 - C_n , disclose the claimed "digital down converters" that are "each" "operable to generate a digital channel output corresponding to each desired channel":

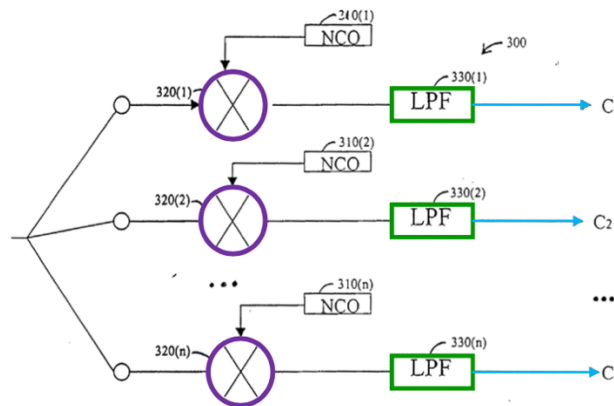


Fig. 3

Ex. 1013, Fig. 3 (annotated)

Pet., 29 (annotation Petitioner's).

As the POR (at 9-27) explained, however, Zhang's channels C_1 - C_n constitute all channels, both desired and undesired, in the entire signal band, and multipliers 320(1)-(n) that downconvert channels C_1 - C_n downconvert all channels. Thus, Zhang's multipliers 320(1)-(n) relied upon by Petitioner are not "*each*" "operable to generate a digital channel output *corresponding to each desired channel*." At

most, *some* of Zhang’s multipliers 320(1)-(n) may in retrospect happen to have corresponded to a subsequently selected desired channel. The Reply fails to rebut these showings.

A. Petitioner’s Assertion That Zhang Channels C_1 - C_n Are The Claimed “Desired Channels” Contradicts Zhang’s Express Disclosures And Prosecution History, And Petitioner’s Expert.

The Reply (at 7-14) argues that channels C_1 - C_n are “desired channels,” and, therefore, multipliers 320(1)-(n) that downconvert channels C_1 - C_n “each” generate an output corresponding to “each desired channel.” The premise of Petitioner’s argument is that channels C_1 - C_n are “desired channels,” but that assertion is irreconcilable with Zhang’s plain disclosures, system structure, and prosecution history, as well as with Petitioner’s own expert’s testimony. POR, 9-27.

Zhang expressly defines “n” as the number of channels “in an entire signal band,” not just some of the channels or just the “desired” channels. Ex. 1013 [Zhang] [0027]. That is the *only* disclosure in Zhang that addresses the meaning of “n.” Petitioner’s own expert, Mr. Lett, confirmed this point in deposition, acknowledging that “n” “refers to both desired *and undesired* channels within the entire band.” Ex. 2018 [Lett-1st-Depo.-Volume-I] 78:14-22.¹ After Zhang downconverts and demultiplexes all n channels C_1 - C_n in the entire signal band, a

¹ All emphases added unless noted otherwise.

selector selects the desired channels D_1 – D_m for transmission to demodulator(s).

Ex. 2009 [Russ-Decl.] ¶¶ 42-46. As the POR (at 15-16) explained, Zhang’s prosecution history confirms that Zhang’s demultiplexer indiscriminately downconverts and outputs all channels, and that only Selector 240 performs selection. In fact, Petitioner’s expert confirmed in his declaration that channels C_1 – C_n are all the channels, and channels D_1 – D_m are the channels desired by the user:

A digital channel demultiplexer 230 ... separates signals of *all the content channels* in the digital RF signals (e.g., channels C_1 to C_n), while a nxm digital *selector 240 selects and forwards only signals for a subset of content channels selected by a subscriber* (e.g., channels D_1 to D_m) to one or more of demodulators

Ex. 2020 [Petitioner’s Expert In IPR2024-00432] ¶ 79; *see also* Ex. 2019 [Lett-1st-Depo.-Volume-II] 7:6-10 (similar); POR, 14-15.

In reply, Petitioner asserts that Zhang and the ’866 patent use “the same circuitry.” Reply, 23. Not so. As the POR (19-20) explained, although Zhang and the ’866 patent both use complex mixers that down convert channels, Zhang’s mixers downconvert both desired and undesired channels. Ex. 2009 [Russ-Decl.] ¶ 50. In contrast, the ’866 patent mixers downconvert only desired channels. *Id.* This distinction is illustrated in a side-by-side comparison of their architectures:

In Zhang, “n” mixers in Digital Channel DeMux 230 down convert both desired and undesired channels C_1 - C_n

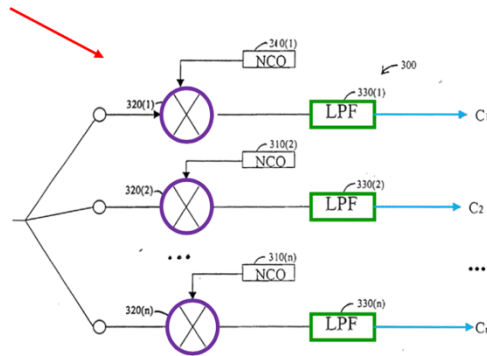
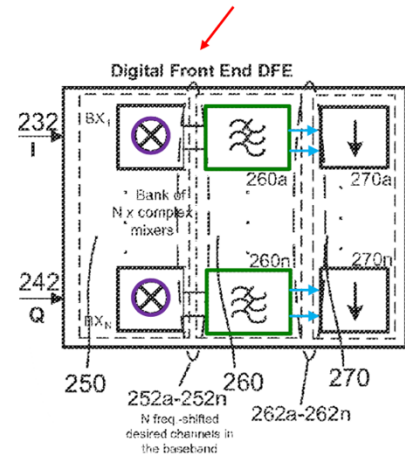


Fig. 3

Ex. 1013, Fig. 3 (annotated)

In the '866 patent, N mixers down convert N desired channels without down converting any undesired channels



Ex. 1001, Fig. 2 (excerpted/annotated)

Ex. 2009 [Russ-Decl.] ¶¶ 55-56.

Petitioner also points to Zhang’s use of the phrase “desired” or “target” frequency, asserting that “it defies common sense for a POSITA to read Zhang’s reference to C_1 - C_n as ‘desired channels,’ and believe that they must include undesired channels.” Reply, 9. First, such an assertion contradicts Petitioner’s own expert’s testimony both in his declaration and at deposition. Ex. 2020 [Petitioner’s Expert In IPR2024-00432] ¶ 79 (“digital channel demultiplexer 230 ... separates signals of all the content channels in the digital RF signals”); Ex. 2018 [Lett-1st-Depo.-Volume-I] 78:14-22 (agreeing that n “refers to both desired and undesired channels in the entire band”); Ex. 2019 [Lett-1st-Depo.-Volume-II] 7:6-10 (“as Zhang discloses, desired and undesired channels come in and desired channels are output the demodulator as a digital data stream.”).

Second, as the POR (at 22-25) explained, Petitioner’s argument is misleading because it disregards the context in which Zhang uses those terms. Zhang demultiplexes the n channels C_1 – C_n from the digitized input by providing n circuit paths, each responsible for extracting one channel. Ex. 2009 [Russ-Decl.] ¶¶ 59-61. Within each path, the signal of interest is downconverted to baseband and passed through a filter that suppresses all others. *Id.* It is in this narrow, path-specific context that Zhang refers to the target signal as “desired,” and the others as “undesired.” But at the system level, all n channels are indiscriminately downconverted and extracted.

This localized usage has no bearing on whether C_1 – C_n as a set constitute the claimed “desired channels.” Petitioner makes no attempt to show or analyze why a target frequency of one circuit element within the overall circuit is the claimed “desired channel” beyond relying on the coincidental use of similar phrasing. Zhang’s Demultiplexer 230 does not output only some of the channels C_1 – C_n . It outputs all of them—collectively representing every channel in the entire signal band, both desired and undesired. Ex. 1013 [Zhang] [0027]. As such, Zhang’s multipliers 320(1)-(n) that Petitioner relies upon do not “each” generate an output corresponding to “each desired channel”—they simply downconvert and output all channels. The fact that one circuit element within that larger structure coincidentally refers to the specific signal it is tasked with processing as “target” or

“desired” does not change the fact that Demultiplexer 230 as a whole outputs all channels. Taken to its logical conclusion, Petitioner’s argument removes all meaning from “desired channels” because all circuit elements always have a “target” or “desired” signal that they process.

Petitioner’s misleading reliance on Zhang’s localized use of the phrase “desired” is also refuted by the ’866 patent specification. Television channels are modulated on RF channels for transmission. Ex. 1002 [Lett-Dec1.] ¶ 59. If a user desires to watch a specific television channel, that television channel must be demodulated when the user receives the RF channel. *Id.*; *see also* Ex. 2021 [Lett-2nd-Depo.] 76:4-8. The ’866 patent explains that the RF spectrum received at the user end contains not just the desired channels that, for example, a user may wish to watch, but also undesired channels. Ex. 1001 [’866] 1:40-42; *see also id.*, 2:10-13, Fig. 1. In the ’866 patent’s prior art systems, the entire frequency spectrum, containing both desired and undesired RF channels, was transmitted to the demodulator. *Id.*, 1:42-45. In such systems, the demodulator would need to identify the desired channels and filter out undesired ones before demodulating desired channels. *Id.* This imposed a substantial hardware burden on the demodulator, “require[ing] a very expensive digital processing circuitry” Ex. 1001 [’866] 2:35-37; Ex. 2019 [Lett-1st-Depo.-Volume-II] 28:17-29:2 (confirming same). In part to address this issue, the ’866 patent embodiments implement an

architecture that transmit only “desired channels” to the demodulators. *See, e.g.*, Ex. 1001 [’866] 6:3-6. The ’866 patent explains that its architecture confers multiple advantages:

First, it eliminates the need of expensive data conversion, filtering and channel selection on the demodulator side. Second, it removes undesired channels from the signal path at an early stage, thus relieves the large dynamic range requirement in the demodulator.

Ex. 1001 [’866] 7:15-19. Nothing in the ’866 patent specification supports the notion that the claimed “desired channel” refers merely to a frequency assigned to one of n data paths in a demultiplexer as a part of the circuit element task allocation, where the demultiplexer as a whole indiscriminately extracts all channels across the entire signal band. Nor does Zhang transmit channels C_1 - C_n to demodulators or otherwise consider them desired as a set. Rather, Zhang expressly explains that it is channels D_1 - D_m , selected by Selector 240, that are transmitted to demodulators because, for example, a user desires to view them. Ex. 1013 [Zhang] [0039]; *see also id.*, [0028].

Petitioner next argues that the circuit elements within each Demultiplexer 230 path can be tuned to extract a specific frequency, and from that asserts that “had Zhang demultiplexed all channels, programmable frequencies would not have been needed.” Reply, 10-11. This reasoning is flawed. Even in a system that

extracts all n channels indiscriminately, each demultiplexer path must be configured to extract a different one of those n channels—*i.e.*, each must be tuned to a distinct frequency. Zhang’s programmable tuning simply enables each identical path to be assigned to a different target frequency. That is entirely consistent with a brute-force demultiplexing architecture. Moreover, Zhang contemplates that the input signal may vary across implementations or over time, and programmable tuning allows the system to adjust accordingly. In any event, Zhang is clear that n is all the channels in the entire signal band, regardless of the specific choice of circuit elements. Ex. 1013 [Zhang] [0027].

Petitioner also relies on the language of Zhang’s own claims, but this effort is equally unavailing. Reply, 9-10. As a threshold matter, this is not a claim construction exercise focused on identifying the broadest reading of Zhang’s claims. Rather, the question is what Zhang—including its claims, read in context—teaches a POSITA. As the POR (at 24-25) explained, Zhang’s claims mirror its embodiments and do not disclose a fundamentally different architecture. The POR (at 25) provided a detailed mapping of Zhang’s claims to its embodiments, and the Reply makes no effort to rebut it.

Instead, Petitioner now relies on specific circuit elements in Zhang’s claims, arguing that, for example, because the claims require “at least one” multiplier or filter, Zhang must not demultiplex all channels C_1 - C_n . Reply, 9. A claim recitation

of “at least one” says nothing about whether Zhang’s system uses one, ten, or hundreds of such elements—and certainly does not imply that each element is limited to processing only a single channel. This reading is unsupported by Zhang’s disclosure and conflicts with how the system is described in all of its embodiments. Petitioner’s argument is not a serious response to the POR’s showing—it is an after-the-fact inference, divorced from the technical record.²

The Reply (at 10) next contends that “ n is a variable that can be equal to or less than all channels in the signal band.” But that is flatly inconsistent with Zhang’s express disclosure. Zhang defines n as the number of channels in “an entire signal band.” Ex. 1013 [Zhang] [0027]. That is the only place in Zhang where n is defined—and it unambiguously refers to *all* channels.

Petitioner tries to dilute this express definition by citing a later statement that “the exact number” of channels C_1 – C_n “depend on the specific application.” Ex. 1013, [0042] (cited at Reply, 11-12). But that language merely reflects that the overall number of channels in the signal band may vary by system implementation; it does not suggest that n ever refers to anything less than the full set of channels in

² For similar reasons, the Reply’s criticism (at 19) that Patent Owner’s expert had not based his opinion of Zhang on its claim 21 is misplaced, as claim 21 does not address whether Zhang extracts all channels.

the entire signal band. Petitioner conflates variability in signal size with selective channel extraction—something Zhang never teaches.

Petitioner's misreading also contradicts Zhang's architecture. Demultiplexer 230 extracts *all* channels C_1 – C_n from the digitized signal, from which Selector 240 selects desired channels D_1 – D_m . Ex. 1013 [Zhang] [0028]; Ex. 2009 [Russ-Decl.] ¶¶ 45-46. If C_1 – C_n did not include all channels, Zhang does not explain how it would ensure that Selector 240 could access a desired channel. Petitioner never explains how Zhang's system could reliably select a channel that was never demultiplexed to begin with.³

The POR (at 15-16) further explained that Zhang's European prosecution confirms that C_1 – C_n represents all the channels in the signal band. To distinguish

³ To the extent the Reply relies on a system that modifies Zhang's express disclosures by, for example, extracting less than all channels in the entire signal band, such an argument is both untimely and unsupported. *See* Ex. 2021 [Lett-2nd-Depo.] 106:9-13 (Petitioner's expert has not relied upon any modification of Zhang for grounds relying only on Zhang). Petitioner fails to present any motivation why a POSITA would extract less than all channels C_1 – C_n in Zhang, where Zhang's architecture is based on extracting all channels and then using a selector to quickly switch between them.

its invention from the prior art, Zhang’s applicant explained that, unlike the prior art system in which “all of the RF channels” C_1 – C_n are transmitted to the demodulator, Zhang’s selector 240 permits selecting and transmitting only desired channels D_1 – D_m . Ex. 2009 [Russ-Decl.] ¶¶ 47-49. This statement—made by the same applicant responsible for the disclosure at issue here—underscores that Zhang extracts all available channels and performs no selection at the demultiplexer stage.

The Reply offers no substantive response. Petitioner simply complains that Patent Owner failed to submit additional European prosecution documents. Reply, 14. But Petitioner identifies no document that contradicts the cited statement, nor does it submit any documents of its own. *Id.*; *see also* Ex. 2021 [Lett-2nd-Depo.] 112:5-14 (Petitioner’s expert did not attempt to locate or review any other European prosecution documents). Petitioner’s hollow objection is meritless and does not diminish the clear import of Zhang’s own admission.

For the foregoing reasons, Petitioner’s assertion that Zhang channels C_1 – C_n are the claimed “desired channels” fails.

B. Petitioner Misapprehends Patent Owner’s Argument As Requiring A Negative Limitation.

Petitioner argues that “Element [14C] places no requirement regarding undesired channels in any respect,” and contends that Patent Owner is improperly

reading a “not generating digital channel outputs corresponding to undesired channels” requirement into the claims. Reply, 15. But Patent Owner’s argument is not centered on generating or not generating an output that contains undesired channels. Petitioner’s Reply misapprehends the argument and ignores the balance of the claim limitation.

Limitation 14[C] recites that “each digital down converter ... is operable to generate a digital channel output corresponding to each desired channel”:

***a plurality of digital down converters ... , wherein each digital down converter, of the plurality of digital down converters, is operable to generate a digital channel output corresponding to each desired channel**, of the plurality of desired channels*

Ex. 1001 [’866] cl. 14.

It is undisputed that Petitioner maps the claimed “plurality of digital down converters” to all of the multipliers 320(1)-(n) in Zhang. Pet., 29. As the POR (at 17-19) explained, because each of the multipliers 320(1)-(n) downconverts one of channels C_1 - C_n , and channels C_1 - C_n constitute all channels in the entire signal band, both desired and undesired, “each” of the digital multipliers 320(1)-(n) in Zhang is not “operable to generate a digital channel output corresponding to each desired channel.” At most, *some* of Zhang’s multipliers 320(1)-(n) may in retrospect happen to have corresponded to a subsequently selected desired channel.

Thus, the issue is not whether the output of the system contains only desired channels. Rather, the issue is that Zhang's multipliers 320(1)-(n) relied upon by Petitioner are not "each" operable to meet the claim limitation. Petitioner has no response.

C. Petitioner Has No Response To The Fact That Its Reliance on C_1 – C_n Conflicts With Its Mapping For Other Limitations.

As the POR (26-28) explained, to the extent channels C_1 – C_n are the claimed "desired channels," Petitioner fails to show other claim limitations. For example, limitation 14[d] recites providing "each digital channel output via a serial interface." Petitioner relies on Zhang's Selector 240 as disclosing "a serial interface" (Data Bus 1) via which the "plurality of desired channels" are provided. Pet., 31. But Selector 240 does not provide channels C_1 – C_n ; it provides channels D_1 – D_m . Zhang's Selector 240 is reproduced below with annotations added:

Figure 5 “selects one or more RF channels D_1 to D_m from the digital RF channels C_1 to C_n and then sends them to appropriate demodulators or outputs ports ... through different data buses” Ex. 1013 [Zhang] [0039]

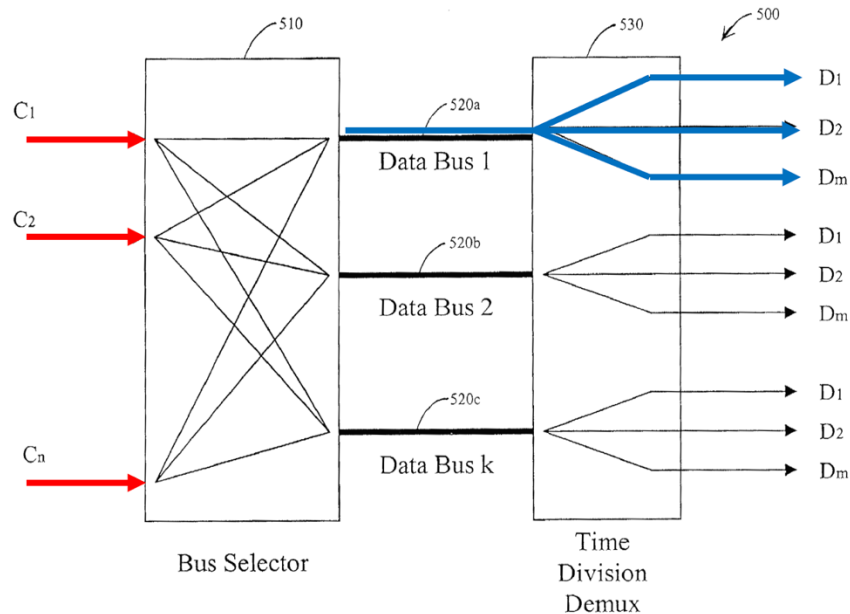


Fig. 5

Thus, to the extent channels C_1 - C_n are the claimed “desired channels,”

Petitioner fails to show that they are provided “via a serial interface.”

III. PETITIONER FAILS TO SHOW A “DFE ... CONFIGURED TO CONCURRENTLY SELECT AND PROVIDE EACH OF THE PLURALITY OF DESIRED CHANNELS.” (CLAIMS 1-13, 27-40, 55-68, ALL GROUNDS).

Limitation 1[c] requires a “**DFE** [Digital Front End] ... configured to *concurrently select and provide each of the plurality of desired channels* without providing any of the plurality of undesired channels.” Ex. 1001 [’866] cl. 1.

Independent claims 27 and 55 recite identical limitations. *Id.*, cls. 27 (limitation 27[c]), 55 (limitation 55[c]). Petitioner contends that Zhang alone discloses this limitation. Pet., 26, 32-33, 50-51, 72. Specifically, Petitioner argues that Zhang’s

“Demultiplexer 230 and a portion of Digital Selector 240” discloses the claimed “digital frontend (DFE),” where the Channel Demultiplexer 230 “select[s] a plurality of desired channels C_1 - C_n ” (Pet., 23), and Selector 240 “provides ‘m’ channels D_1 - D_m ” (Pet., 24). As the POR (at 30-44) demonstrated, Petitioner’s argument fails for three independently sufficient reasons. The Reply fails to rebut any of the reasons.

A. Petitioner Fails To Show That Zhang’s Putative DFE “Selects” Any Channels.

It is undisputed that Petitioner relies on Zhang’s Demultiplexer 230—not Selector 240—for “*select[ing]* ... each of the plurality of desired channels” in the DFE required by limitation 1[C]. POR, 30-31; Reply, 8 (“Zhang’s demultiplexer 230 ... selects from this signal a number ‘n’ of desired channels C_1 - C_n ...”); Ex. 1002 [Lett-Decl.] ¶¶ 110-111. As the POR (30-34) explained, however, Zhang’s Demultiplexer 230 does not “select” any channels; it indiscriminately demultiplexes all channels in the entire signal band. As explained in Section II.A, *supra*, Petitioner’s arguments to the contrary misapprehend Zhang’s express disclosure and its prosecution history. Faced with Zhang’s express disclosures, the Reply raises two arguments as to why Zhang’s indiscriminate demultiplexing of all channels discloses “selecting.” Both arguments fail.

1. Petitioner's Untimely Construction Of "Selecting" Does Not Support Petitioner's Theory.

Having failed to reconcile Zhang's indiscriminate demultiplexing of all channels with the claim language requiring "select[ing] ... desired channels," Petitioner resorts to an untimely construction for "selecting." Reply, 17-18. Petitioner now argues that the "plain and ordinary meaning" of "[s]election ... of a digital channel output is simply extracting a channel from the plurality of frequencies in the digitized RF signal." *Id.* This assertion fails for two reasons.

First, the new construction is untimely. The Petition relied on the plain meaning of "selecting" and offered no construction. Pet., 20. Petitioner's attempt to redefine the term for the first time in its Reply should be disregarded. *Ralph Lauren Corp. v. Lexos Media IP, LLC*, IPR2018-01749, Paper 21, 11 (Apr. 3, 2020) ("we will not consider the new construction proposed ["for the first time in the Reply"] for this claim term."); *Boart Longyear, Ltd. v. Australian Mud Co. Pty Ltd.*, IPR2019-01129, Paper 26, 20 (Nov. 20, 2020) (similar).

Second, even under this new construction, Zhang does not disclose the claimed "selection." Zhang's demultiplexer 230 does not extract "a channel," or even a selected collection of channels, of the "n" channels from the input signal. It indiscriminately demultiplexes *all* channels in the entire signal band. Ex. 1013 [Zhang] [0027] ("an entire signal band with n channels"). Petitioner's reliance on

the fact that Zhang routes each of the n channels through its own dedicated path, with separate tuning and filtering, does not convert indiscriminate demultiplexing of all channels into selection. The claim requires selecting desired channels—not placing every channel in a separate path and calling that “selection.” Zhang’s system does the latter, not the former. *See also* Ex. 2021 [Lett-2nd-Depo.] 49:13-25 (Petitioner’s expert “do[es] not have an opinion” on whether a television system circuitry that indiscriminately demultiplexes all channels from the input signal performs any “selection”).

Therefore, Petitioner’s argument fails under Petitioner’s own proposed construction.

2. Petitioner Misapprehends Patent Owner’s Argument As Requiring A Negative Limitation.

Petitioner argues that “Element [1C] places no requirement on selecting undesired channels,” and contends that Patent Owner is improperly reading a “not selecting any undesired channels” requirement into the claims. Reply, 15. But Patent Owner’s argument does not rest on the assumption that the claims require selecting only desired channels without selecting any undesired channels. Rather, Patent Owner demonstrated that Zhang’s Demultiplexer 230 does not perform any selection at all. It indiscriminately and blindly demultiplexes all channels C_1 – C_n in the entire signal band. POR, 30-34. This is not a case where, for example, Zhang

selects certain channels from the input RF signal, some desired and some undesired.

Zhang's express disclosure confirms this. Zhang does not state that channels C_1 – C_n represent only a subset of the channels in the input signal. To the contrary, it explains that “n” is the number of channels “in an entire signal band.” Ex. 1013 [Zhang] [0028]. The component that demultiplexes channels C_1 – C_n is called a “Digital Channel Demultiplexer 230,” not a selector. *Id.*, [0029]. Consistent with the plain meaning of “demultiplexing,” Zhang describes its function as merely separating the input signal into discrete channels, not making any selection:

A digital channel demultiplexer 230 then demultiplexes the multi-channel digital RF signal into separate digital RF channels C_1 to C_n .

Ex. 1013 [Zhang] [0029]; *see also id.*, Abstract (“A digital channel demultiplexer ... demultiplexes the multi-channel digital RF signal into separate digital RF channels.”). Zhang explains that Selector 240 subsequently “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 .” *Id.* ¶ 28; *see also id.* ¶ 39 (“digital selector 500 digitally selects one or more RF channels D_1 to D_m from the digital RF channels C_1 to C_n ”). This sequencing further confirms that the Demultiplexer 230 does not perform any selection—it simply delivers all available channels for later selection by Selector 240.

Petitioner also invokes a sentence from the '866 specification stating, in passing, that “[i]n one embodiment, N can be equal to the number of all available channels that exist in the licensed frequency spectrum.” Ex. 1001 ['866] 5:56-61 (cited by Reply, 16). But that is a reference to an alternative embodiment—contrasted with the core disclosures, which specify that “N is an integer value corresponding to the number of desired RF channels.” Ex. 1001 ['866] 5:53-55. Thus, if anything, the '866 patent confirms that indiscriminately outputting “all available channels” is different from “selecting desired RF channels.” In fact, selecting desired channels instead of demultiplexing all channels is a main focus of the '866 patent. In its lead embodiment (Figure 2), the number of available channels is ten, but only four are designated as desired. Ex. 1001 ['866] 4:42-51. The system then selects and down converts only those four desired channels—not all ten. POR, 4-6. While the patent acknowledges that other configurations may be possible, every embodiment discussed in the specification involves selection of desired channels, not indiscriminate demultiplexing. “The mere fact that there is an alternative embodiment disclosed in the [asserted patent] that is not encompassed by [our] claim construction does not outweigh the language of the claim, especially when the court’s construction is supported by the intrinsic evidence.” *August Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1285 (Fed. Cir.

2011) (*quoting TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008)).

Petitioner also faults Patent Owner’s expert, Dr. Russ, for stating at deposition that he has not “formed an opinion on the range of capital N [in the ’866 patent].” Reply, 16-17. From that testimony, Petitioner concludes that Dr. Russ’s opinion—that Zhang fails to perform any selection—“lacks foundation.” Reply, 17. But the potential range of values that “N” can take in the ’866 patent has no bearing on whether Zhang performs any “selection.” Dr. Russ’s testimony is focused on Zhang’s architecture, and that architecture clearly shows that Demultiplexer 230 performs no selection. Ex. 2009 [Russ-Decl.] ¶¶ 77-80.

For the foregoing reasons, Petitioner’s argument that Zhang’s indiscriminate demultiplexing of all channels C_1 – C_n in the entire signal band is “selecting” is unsupported and incorrect.

B. Petitioner Fails To Show A “Digital Front End ... Configured To ... Provide A Plurality Of Desired Channels ... Without Providing Any Of The Plurality Of Undesired Channels.”

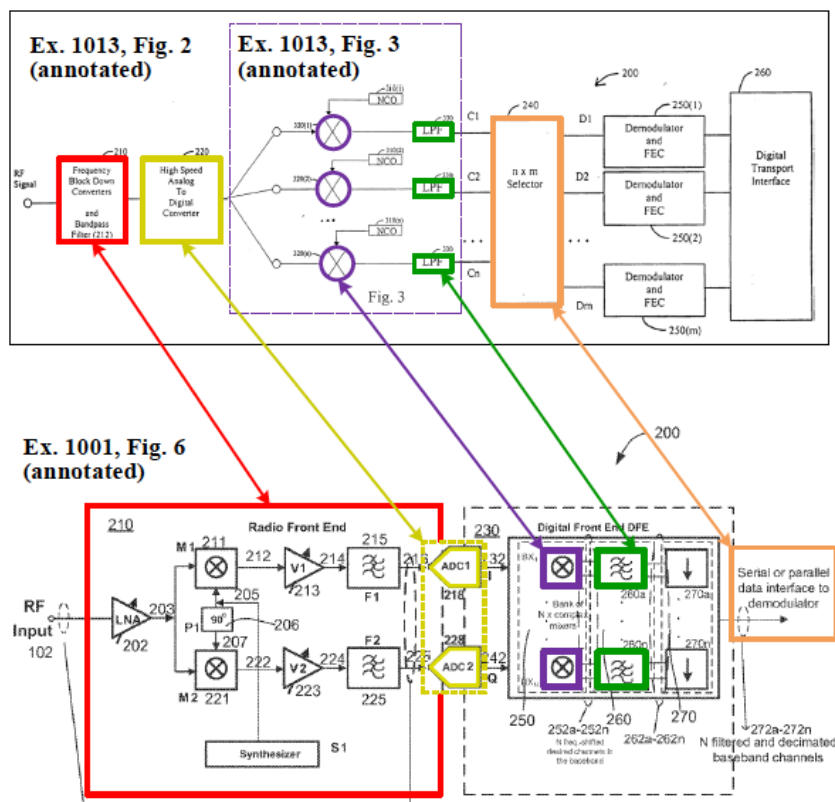
Limitation 1[c] requires a “digital front end (DFE) ... configured to concurrently select and provide a plurality of desired channels ... without providing any of the plurality of undesired channels.” Petitioner relies on Zhang’s Selector 240 for the portion of the claimed “digital front end (DFE)” that “provide[s] a plurality of desired channels ... without providing any of the

plurality of undesired channels.” Pet., 22-23. As the POR (at 42) explained, however, Petitioner failed to show why Zhang’s Selector 240 discloses a “digital front end (DFE)” as claimed. Indeed, Petitioner’s own expert at deposition explained in detail why he had not mapped Zhang’s Selector 240 to the claimed DFE. Ex. 2018 [Lett-1st-Depo.-Volume-I] 145:16-147:13.

In response, Petitioner first argues that “[t]he Petition identified Zhang’s demultiplexer 230 combined with selector 240 for teaching the ‘DFE’” Reply, 20. However, this is irrelevant because, as noted above, it is undisputed that for the “providing” function of the DFE, Petitioner relied exclusively on Zhang’s Selector 240, but failed to show that the Selector 240 is a part of the claimed DFE.

Petitioner next argues that Zhang’s Selector 240 discloses the claimed DFE because it is “digital.” Reply, 20. However, Petitioner’s expert at deposition opined that “anything that has some digital circuitry in it” is not automatically considered a “digital front end,” and “you’d have to be more specific than that.” Ex. 2021 [Lett-2nd-Depo.] 108:13-16. Mr. Lett further opined that “one would need to put it in the context of the type of product,” and “you kind of need to look into details to understand exactly what’s meant by digital front end for the particular use of that term.” *Id.*, 107:24-108:5, 108:13-109:3. Thus, Petitioner has not shown that Selector 240 is a part of the DFE by merely being “digital.”

Petitioner next argues that “it is clear from the Petition that Zhang’s demultiplexer 230 and selector 240 together are a DFE ... because they are the same as the DFE ... disclosed in Figure 2 of the ’866 patent.” Reply, 20-21. But they are not. First, the architecture of the system described in the ’866 patent, including its DFE, is fundamentally different from Zhang. POR, 4-9. Second, it is not at all “clear” from the Petition that Zhang’s Selector 240 is a part of the DFE. To the contrary, Petitioner’s overview of Zhang shows only Demultiplexer 230 as corresponding to the ’866 patent’s DFE, with Zhang’s Selector 240 corresponding to the *output* of the DFE:



Pet., 7 (Petitioner’s annotation); *see also* Ex. 1002 [Lett-1st-Decl.] ¶ 79 (similar).

Petitioner’s expert at deposition reaffirmed that Zhang’s Selector 240 corresponds to the output of the claimed DFE. Ex. 2018 [Lett-1st-Depo.-Volume-I] 145:16-147:13. The Petition elsewhere argued that Zhang’s Demultiplexer 230, not Selector 240, “has the same structure as the ’866 patent’s digital front end,” producing the below comparison:

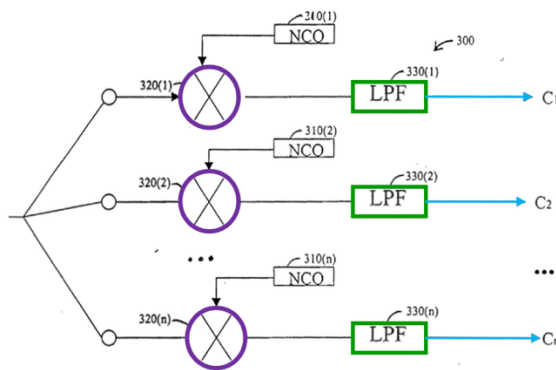
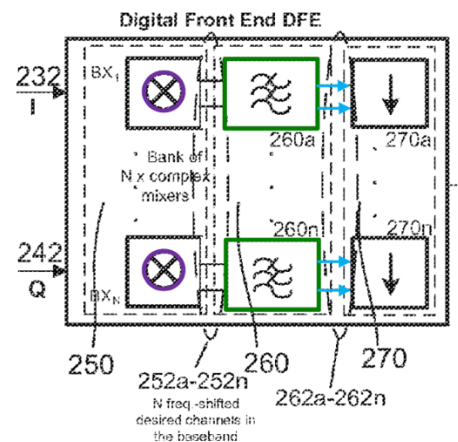


Fig. 3

Ex. 1013, Fig. 3 (annotated)



Ex. 1001, Fig. 2 (annotated)

Pet., 23 (annotation Petitioner’s).

In fact, the Reply’s new annotations again map Zhang’s Selector 240 to the *output* of the ’866 patent’s DFE, not the DFE:

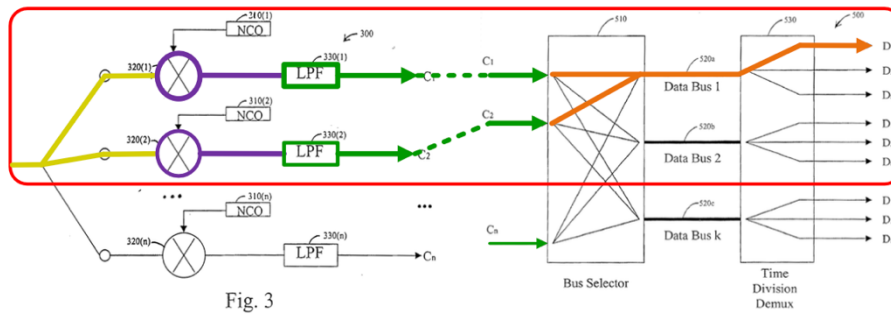
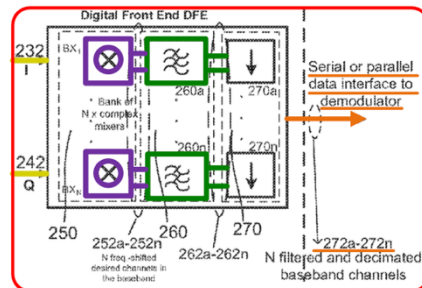


Fig. 3

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



Ex. 1001, Fig. 2 (annotated)

Reply, 21 (annotation Petitioner's). As shown in the figure above, Petitioner uses the color orange for both Zhang's Selector 240 and for the output of the DFE in the '866 patent's Figure 2. Petitioner maps only Zhang's Demultiplexer 230 to the '866 patent's DFE, using the colors purple and green.

Petitioner next argues that "[n]othing in the claim language excludes the DFE from including" Zhang's Selector 240. Reply, 22. Petitioner misapprehends its burden. Petitioner "must identify" "how the challenged claim is to be construed," and "how the construed claim is unpatentable." 37 C.F.R.

§ 42.104(b)(3). Petitioner's expert opined that not any digital circuitry is a "digital front end," and understanding of that term requires "look[ing] into details to understand exactly what's meant by digital front end." Ex. 2021 [Lett-2nd-Depo.]

107:24-108:5, 108:13-109:3. Petitioner has not provided any analysis whatsoever as to what the claimed “DFE” means and why Zhang’s Selector 240 discloses it. Any analysis that Petitioner and its expert have provided points in the opposite direction: that Zhang’s Selector 240 is not part of the DFE. Therefore, Petitioner has not met its burden. POR, 39-41.

Finally, Petitioner argues that “to the extent Zhang alone does not teach a DFE,” “Zhang in view of the applicant’s admitted prior art (AAPA), the knowledge of a POSITA, and Pandey” teaches it. Reply, 22 (citing Pet., 24-27, 32-33, 73-78). Petitioner’s new argument is both untimely and unsupported. The Petition relied on the “applicant admitted prior art,” “the knowledge of a POSITA” and Pandey only for the disclosure of the “serial interface” of limitation 1[c], not for the disclosure of the claimed DFE. Pet., 26-27, 32-33, 73-78. Petitioner’s new reliance on the combination of Zhang with those disclosures for the claimed DFE is untimely. Consolidated Trial Practice Guide, 73 (Nov. 2019) (“Petitioner may not submit new evidence or argument in reply that it could have presented earlier, *e.g.* to make out a *prima facie* case of unpatentability.”); *Wasica Fin. GmbH v. Cont’l Auto. Sys.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017) (“Shifting arguments in this fashion is foreclosed by statute, our precedent, and Board guidelines.”); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016).

Petitioner fails to substantiate even this untimely theory. Petitioner does not provide any explanation as to why these other disclosures disclose a DFE beyond simply being circuitries, or what the claimed DFE even means, or any motivation to modify Zhang to disclose the claimed DFE to “provide” channels as claimed. *Hulu LLC v. Sound View Innovations*, IPR2018-00582, Paper 34, 31-32 (Aug. 5, 2019) (informative) (finding that Petitioner explain how to interpret “system” in the patent, and why it is disclosed by the reference).

For the foregoing reasons, Petitioner has failed to demonstrate disclosure or obviousness of a “digital front end (DFE)” that “provide[s] a plurality of desired channels ... without providing any of the plurality of undesired channels.”

C. Petitioner Fails To Show That Zhang “Concurrently Select[s] And Provide[s] Each Of The Plurality Of Desired Channels.”

Limitation 1[c] recites that the DFE is configured to “*concurrently select and provide* each of the plurality of desired channels” At deposition, Petitioner’s expert opined that the claim requires the acts of “select[ing] and provid[ing]” to occur “concurrently.” Ex. 2019 [Lett-1st-Depo-Volume-II] 76:9-77:5. The POR (at 43-44) explained that Petitioner fails to show disclosure of this limitation as Petitioner’s own expert understand it. Specifically, Petitioner fails to show that sequential processing of data between Zhang’s demultiplexer 230 and

selector 240, upon which Petitioner relies for “selecting” and “providing,” respectively, is concurrent.

Petitioner provides a conclusory statement from its expert that it “is not [his] view” that “selecting must be concurrent with providing.” Reply, 23 (citing Ex. 1078, ¶ 27). But Petitioner’s expert provides no explanation why he opined at deposition that selecting and providing must be concurrent, or why he has now changed his view. Neither the Petition nor the Reply provide any analysis of what “concurrently” modifies in limitation 1[c]. There is no plain meaning analysis. No specification analysis. And no analysis of the contradicting opinions of Petitioner’s expert. Therefore, Petitioner has failed to meet its burden to show disclosure or obviousness of this limitation. POR, 44-45 (citing cases).

Petitioner next attacks a strawman. It argues that “concurrently” cannot be construed to “exclude ... delay inherent in all circuits.” Reply, 24. But the issue here is not a delay “inherent in all circuits.” Petitioner relies on Zhang’s demultiplexer 230 and selector 240 for “selecting” and “providing,” respectively. Pet., 22-24. But Zhang’s demultiplexer 230 and selector 240 are by design sequential such that the selector 240 uses the output of demultiplexer 230 as input. POR, 43-44. Petitioner has not shown that two circuit elements that, by design, process data sequentially are “concurrent” under its plain meaning.

Thus, Petitioner fails to meet its burden because it fails to show that the claims are disclosed or obvious under the construction proposed by its own expert, or to even show what the correct construction is.

IV. CONCLUSION

For the foregoing reasons, Petitioner has failed to demonstrate that any of the claims are unpatentable.

Respectfully submitted,

/ Parham Hendifar /

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Date: May 30, 2025

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Sur-Reply (the “Sur-Reply”) consists of 5,555 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The Sur-Reply complies with the type-volume limitation of 5,600 words as mandated in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Respectfully submitted,

/ Parham Hendifar /

Date: May 30, 2025

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the following documents were served
by electronic service, by agreement between the parties, on the date signed below:

PATENT OWNER SUR-REPLY

EXHIBIT 2021

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Respectfully submitted,

/ Kenneth Wang /

Date: May 30, 2025