

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 RESPONSE

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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
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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]
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I. INTRODUCTION

Petitioner fails to prove that any of the challenged claims are invalid. Each ground is founded upon Zhang, but Zhang describes a different system from that disclosed and claimed in the '866 patent.

While both Zhang and the '866 involve systems that receive an RF input signal and output a plurality of desired channels, the method by which they achieve this result is decisively different. Specifically, in the '866 patent, only desired channels are selected and down converted from the RF input signal. In contrast, Zhang's system first down converts and extracts ***both*** desired and undesired channels C_1 - C_n from the digitized RF input signal and then selects the desired channels D_1 - D_m from this extracted collection of channels C_1 - C_n . *See* Section II.

Petitioner fails to prove that Zhang discloses or renders obvious the claimed systems of the '866 patent. Independent claims 14, 41, and 69 recite “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***.” The Petition relies on Zhang's channels C_1 - C_n as the claimed “plurality of desired channels,” and on Zhang's “ n ” complex multipliers that down convert channels C_1 - C_n as the claimed “plurality of digital down converters.” However, Zhang's express disclosures, as well as its prosecution history, unambiguously confirm that channels C_1 - C_n encompass all

channels, both desired and undesired. Thus, because channels C_1 - C_n encompass both desired and undesired channels, the complex multipliers that down convert them are not “each” operable to “generate a digital channel output corresponding to each desired channel.” *See* Section III.

Petitioner likewise fails to show that independent claims 1, 27 and 55 are disclosed or obvious for three independently sufficient reasons. *See* Section IV. These claims recite “a digital frontend (DFE) ... configured to concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels.” Petitioner, again, identifies channels C_1 - C_n , as “the plurality of desired channels,” and relies on demultiplexer 230 to “select ... each of the plurality of desired channels.” Again, however, because channels C_1 - C_n encompass all channels in the “entire signal band,” the digital channel demultiplexer 230 that merely demultiplexes all channels C_1 - C_n does not “select” any channels. *See* Section IV.A.

Second, Petitioner relies on Zhang’s selector 240 to disclose “a digital front end ... configured to ... provide each of the plurality of desired channels.” However, Petitioner fails to show that Zhang’s selector 240 is a part of the claimed “digital front end.” Petitioner’s expert at deposition opined that it is “more logical” to map Zhang’s selector 240 to the **output** of the claimed digital front end, not to the digital front end itself. Ex. 2018 [Lett-1st-Depo.-Volume-I] 145:16-

147:13. Consistent with this opinion, the Petition in various places has mapped only the digital channel demultiplexer 230, not the selector 240, to the claimed digital front end. Pet., 7, 23. Thus, Petitioner has failed to show “a digital front end ... configured to provide each of the plurality of desired channels.” *See* Section IV.B.

Third, Petitioner’s expert at deposition opined that “a digital frontend (DFE) ... configured to concurrently select and provide each of the plurality of desired channels” requires that the acts of “select[ing]” and “provid[ing]” channels to be performed “concurrently.” Ex. 2019 [Lett-1st-Depo-Volume-II] 76:9-77:5.

Petitioner maps Zhang’s demultiplexer 230 as performing the claimed “select[ing],” and Zhang’s selector 240 as performing the claimed “provid[ing].” Zhang, however, is unambiguously clear that its demultiplexer 230 and selector 240 operate sequentially, not concurrently. Therefore, Petitioner has failed to show the limitation “to concurrently select and provide” under the interpretation provided by its own expert. *See* Section IV.C.

Thus, for these reasons and more, Petitioner fails to prove that any claim is disclosed and/or obvious under any of its grounds.

II. ZHANG, UNLIKE THE '866 PATENT, DOWN CONVERTS AND EXTRACTS ALL CHANNELS, BOTH DESIRED AND UNDESIRED.

Zhang is the cornerstone of each of Petitioner's grounds. Pet., 11-12.

Though both Zhang and the '866 patent involve a digitized RF input signal, and, ultimately, output desired RF channels, the method by which they achieve this result is critically different. Specifically, the '866 patent selects and down converts *only* the desired channels without selecting or down converting any undesired channels. In contrast, Zhang down converts and extracts *all* channels, *both* desired and undesired, from the digitized input RF signal, and only later selects the desired channels from the extracted channels.

At the outset, however, understanding what a “down conversion” is requires a brief discussion of the underlying technological background. As Dr. Russ explains:

In order to transmit information, the information is first converted into a baseband signal. However, the baseband signal cannot be directly transmitted, including because its frequency is too low for effective transmission. Therefore, the baseband signal is modulated on a signal at a much higher frequency in order to be transmitted. Additionally, by modulating different data streams at different frequencies, multiple data streams can share a common medium, such as a coaxial cable. This higher frequency signal is called a transmission carrier, and it is this modulated transmission carrier that is transmitted

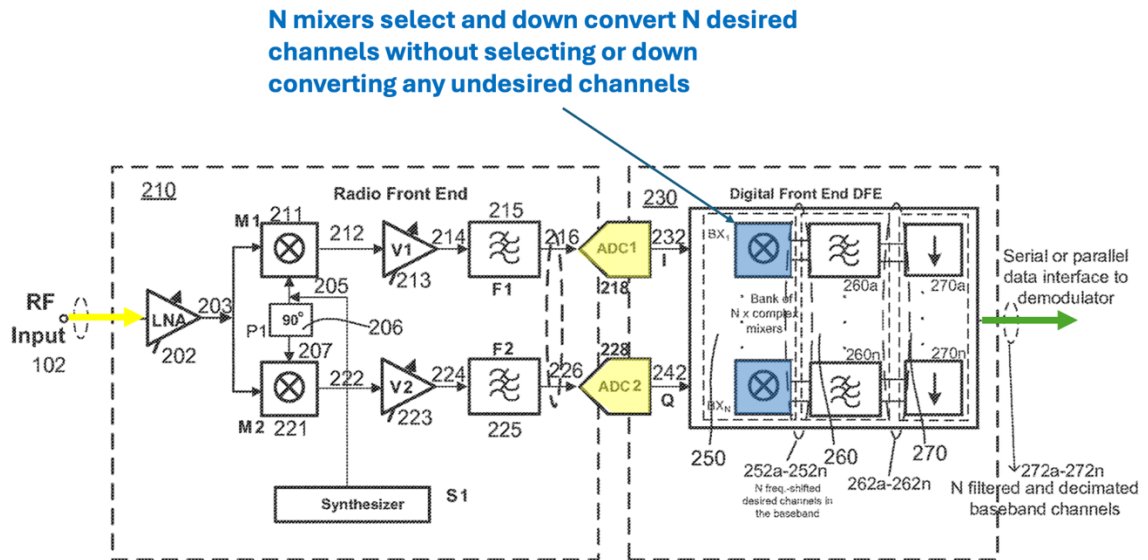
out of the antenna. In such instances, the baseband signal is said to be “up converted” to the transmission carrier.

At the receiver, when the modulated carrier signal is received, it should be “down converted” from the carrier frequency to the baseband frequency. Sometimes this down conversion is directly to the baseband frequency, and sometimes it is done in multiple stages by first down converting the carrier signal to an “intermediate frequency.” Sometimes, the down conversion is performed by a circuit element called a “mixer.”

Ex. 2009 [Russ-Decl.] ¶¶ 32-33.

As Dr. Russ explains, the ’866 patent outputs desired channels by selecting and down converting only the desired channels from the digitized input RF signal:

The Figure 2 embodiment of the ’866 patent, annotated below, is illustrative. There, the analog input RF signal (yellow) is first digitized in the analog to digital converters (yellow). Ex. 1001 [’866] 5:48-51. Then, a bank of N mixers (blue) selects and down converts N desired channels, without selecting or down converting any undesired channels, from the digitized input RF signal. *Id.*, 5:51-55, 5:63-6:6. The selected and down converted desired channels are then output to demodulators (green). *Id.*, 7:10-14.



'206 Pat. Fig. 2 (modified and annotated)

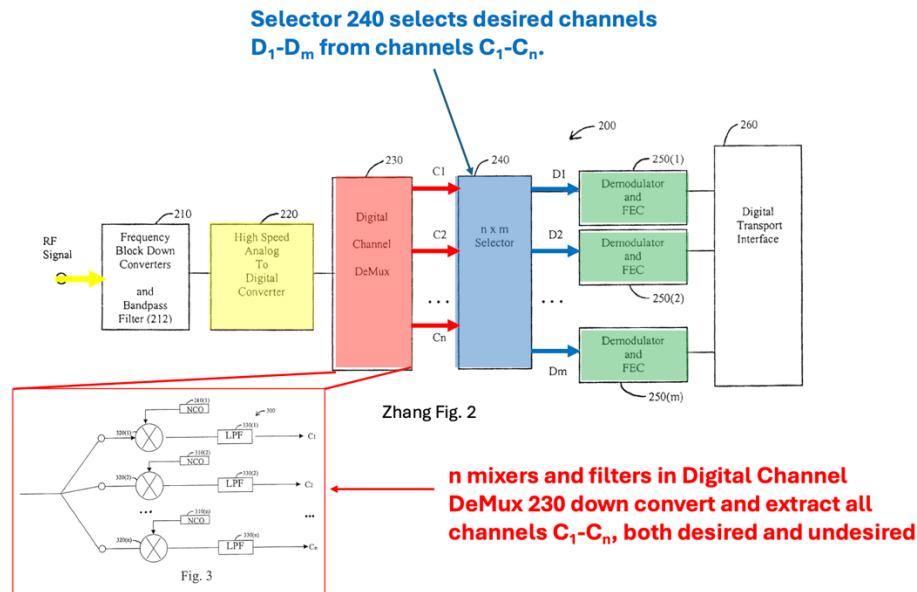
Ex. 2009 [Russ-Decl.] ¶ 34.

In contrast, Zhang does not select, down convert or extract only the desired channels from the digitized RF input signal. Per Dr. Russ:

In Zhang, creating an output of desired channels is achieved through a different method, which I explain in the context of Zhang's Figures 2 and 3, annotated below. Similar to the '866 patent, Zhang digitizes an input signal (yellow), consisting of "n" desired and undesired channels, in the analog to digital converter 220 (yellow). Ex. 1013 [Zhang] [0027] ("In this specific embodiment, ADC 220 is a high-speed ADC so that an entire signal band with n channels can be converted"). Note that the letter "n" in Zhang denotes the number of both desired and undesired channels, whereas the letter "N" in the '866 patent denotes the number of desired channels.

Unlike the '866 patent, however, Zhang's method then down converts and extracts from the digitized RF input signal *all* channels C_1 - C_n , *both* desired *and* undesired, in the Digital Channel DeMux 230 (red). *Id.*, [0028] ("A digital channel demultiplexer 230 then demultiplexes the multi-channel digital RF signal into separate digital RF channels C_1 to C_n ."). The exemplary architecture of Zhang's Digital Channel DeMux 230 is shown in Zhang's Figure 3, which I have included in the annotation below. Note that even though Zhang's Digital Channel DeMux 230 uses complex mixers similar to the '866 patent to extract channels, the complex mixers down convert both desired and undesired channels, unlike the '866 patent.

Once both desired and undesired channels C_1 - C_n are down converted and extracted from the digitized input signal, the digital channel selector 240 (blue) selects the desired channels and outputs them to demodulators (green). *Id.*, [0028] ("an $n \times m$ digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then selects one or more of the RF channels D_1 to D_m from one or mor of the digital RF channels C_1 to C_n ."); [0039] ("In operation, 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 and then sends them to appropriate demodulators").



Ex. 2009 [Russ-Decl.] ¶¶ 35-37.

As Petitioner's expert, Mr. Lett, testified, Zhang's use of a different method from the '866 patent is not coincidental. Rather, Zhang's method allows the user to select a different channel as the desired channel D_1 - D_m from the already extracted channels C_1 - C_n , instead of having to select, down convert and extract new desired channels from the digitized input RF signal:

Q. So did I understand correctly that Zhang demultiplexes more channels that at one time may be sent to the demodulator so that the user can switch between the desired channels at a faster speed?

A. Yeah. So Zhang discloses the digital selector provides the subscriber with fast channel search capabilities. That's in paragraph in 28 cited in Zhang.

Ex. 2019 [Lett-1st-Depo-Volume-II] 8:14-22; *see also id.*, 8:4-8 (Petitioner’s expert opining that “I don’t think it’s wasted. It’s really—it’s there for a quick channel change to the new—to the new desired channel that may be going from an undesired to a desired channel.”); Ex. 1013 [Zhang] [0028] (“Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners.”).

As explained below, the different methodologies utilized by Zhang and the ’866 patent result in the Petition’s grounds failing to disclose or render obvious multiple claim limitations.

III. 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*, 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. 14.¹

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

¹ This POR follows the Petition’s claim-limitation conventions.

limitation in all grounds. Pet. 28-29 (“Zhang thus discloses the digital downconverters of Element [14C] for the same reasons it discloses the DFE of Element[1C]”); 33 (limitation 41[c]); 54 (limitation 69[c]); Pet., 72 (claim 14); Pet., 50 (claim 41).² As explained below, however, the plurality of digital down converters relied upon by Petitioner in Zhang down convert both desired and undesired channels, and thus are not “*each*” “operable to generate a digital channel output *corresponding to each desired channel*.”

Specifically, Petitioner argues that channels C_1 - C_n in Zhang disclose the claimed “desired channels.” Pet., 29. Petitioner further argues and that the “n” complex multipliers in Zhang’s demultiplexer 230, which down convert 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”:

Zhang’s demultiplexer 230 (below left) ... include[es] a plurality of signal paths, each with a complex multiplier 320 (purple) and filter 330 (green) that are operable to generate “target *channels C_1 - C_n* (light blue) selected by the subscriber (*claimed “desired channels.”*).

² The Petition relies on its discussion of limitation 14[c] for the corresponding limitations 41[c] and 69[c]. Therefore, this POR discusses limitation 14[c] with the understanding that the same argument applies to claims 41 and 69.

[citation]. *Each path in Zhang is one of a “plurality of digital down converters ... operable to generate a digital channel output corresponding to each desired channel, of the plurality of desired channels” as recited in Element [14C].*

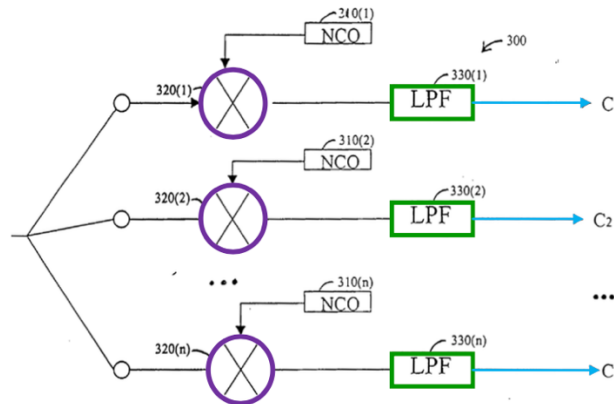


Fig. 3

Ex. 1013, Fig. 3 (annotated)

Pet., 29 (annotation Petitioner’s) (internal citations omitted). But, as discussed below, both Zhang and its prosecution history confirm that channels C_1 - C_n encompass both desired and undesired channels. Indeed, Petitioner’s mapping of Zhang’s channels C_1 - C_n to the claimed “plurality of desired channels” contradicts Petitioner’s mapping in other claim limitations. Thus, as explained below, because channels C_1 - C_n encompass both desired and undesired channels, the “n” mixers which down convert channels C_1 - C_n in Zhang’s channel demultiplexer 230 (purple in the annotation above), are not “each” “operable to generate a digital channel output corresponding to each desired channel.”

A. Zhang And Its Prosecution History Confirm That Channels C_1 - C_n Are All Channels In The Entire Signal Band, Both Desired And Undesired.

Zhang makes clear that channels C_1 - C_n include both desired and undesired channels. The letter “n” in Zhang denotes the number of channels, both desired and undesired, in the “entire signal band.” For example, Zhang explains:

An ADC 220 then converts the down-converted multi-channel analog RF signal to a multi-channel digital RF signal. In this specific embodiment, ADC 220 is a high-speed ADC so that *an entire signal band with n channels* can be converted.

Ex. 1013 [Zhang] [0027]; Ex. 2009 [Russ-Decl.] ¶ 42.

This is undisputed and Petitioner’s expert agreed that the number of channels “n” includes both desired and undesired channels:

Q. So you agree that in paragraph 27 of Zhang, in the sentence that says, “In this specific embodiments” – “embodiment, ADC 220 is a high-speed ADC so an entire signal band with n channels can be converted,” end quote. So you agree in this sentence, *lower case letter n refers to both desired and undesired channels within the entire band*; correct?

A. It seems to, *yes*.

Ex. 2018 [Lett-1st-Depo.-Volume-I] 78:14-22.

Zhang then explains that its digital channel demultiplexer 230 demultiplexes the input RF signal into channels C_1 - C_n :

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] [0027]. Consequently, because “n” in Zhang denotes the total number of channels, both desired and undesired, the demultiplexed channels C_1 to C_n also include both desired and undesired channels. Ex. 2009 [Russ-Decl.] ¶¶ 43-44.

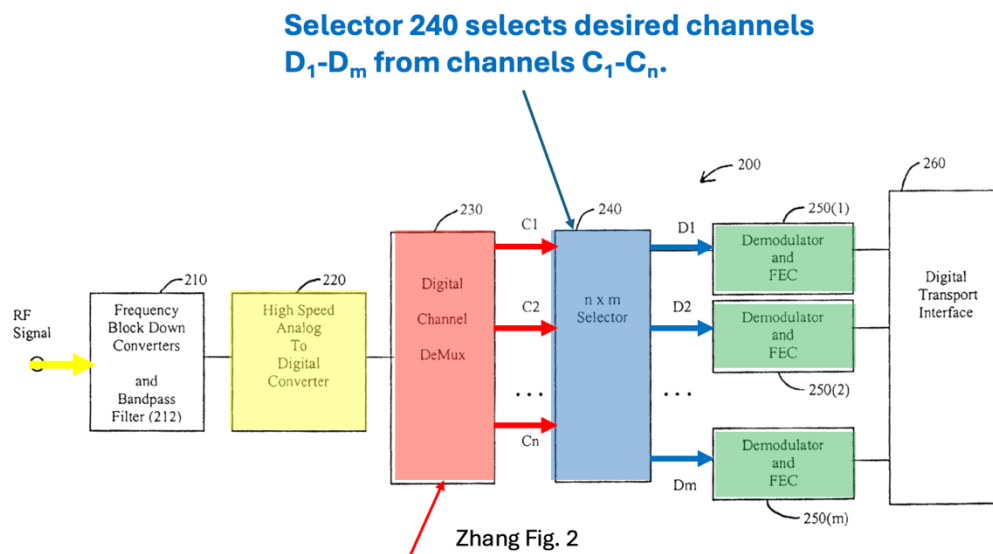
The balance of Zhang further confirms that channels C_1 to C_n include both desired and undesired channels. Specifically, Zhang explains that after channels C_1 - C_n are extracted from the input RF signal, an $n \times m$ selector 240 selects the desired channels D_1 - D_m from the total channels C_1 - C_n :

Still referring to FIG. 2, an $n \times m$ digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n *and then 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 .* ... [O]nly the selected channels are later demodulated unlike the systems using RF tuners which demodulate all of the RF channels.

Ex. 1013 [Zhang] [0028]; *see also id.*, [0039] (“In operation, 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 and then sends them to appropriate demodulators* or output ports (not shown) through different data buses (not shown).”); [0042] (“For example, in FIG.

6, there are 35 separate RF channels C_1 to C_{35} . Of those RF channels, 20 RF channels D_1 to D_{20} are selected. Those 20 selected RF channels are sent to a set of demodulators 650(1 ... 20) for demodulation.”).

Zhang’s operation per its Figure 2, annotated below, confirms that the digital channel demultiplexer 230 demultiplexes channels C_1 - C_n containing both desired and undesired channels, and $n \times m$ selector 240 selecting desired channels D_1 - D_m for transmission to demodulators 250 (green):



Ex. 2009 [Russ-Decl.] ¶¶ 45-46.

Notably, while Petitioner’s expert in his declaration regarding limitation 14[c] in this IPR states that channels C_1 - C_n are “selected by the subscriber,” he admitted in his declaration in the co-pending IPR2024-00432 that channels C_1 - C_n

constitute “all” channels, and that it is channels D_1 - D_m that are “selected by the subscriber”:

Ex. 1002 [Petitioner’s Expert In IPR2024-00435, ¶ 126]	Ex. 2020 [Petitioner’s Expert In IPR2024-00432, ¶ 79)]
“Zhang’s Digital Channel Demultiplexer 230 (below left), ... include[es] a plurality of signal paths, each including a complex multiplier 320 (purple) and filter 330 (green) (collectively the claimed “plurality of digital down converters”) ... operable to generate “target” <i>channels $C_1 - C_n$ (light blue) selected by the subscriber (the claimed “desired channels”).</i>”	“A digital channel demultiplexer 230 (green/purple) then separates signals of <i>all the content channels</i> in the digital RF signals (<i>e.g., channels C_1 to C_n</i>), while a $n \times m$ digital selector 240 selects and forwards only signals for a <i>subset of content channels selected by a subscriber (e.g., channels D_1 to D_m)</i> to one or more of demodulators 250(1), 250(2), . . . 250(m) (blue) ...”

Zhang’s prosecution history also confirms that channels C_1 - C_n encompass both desired and undesired channels, and that it is the selector that takes the extracted channels C_1 - C_n as the input, and selects the desired channels D_1 - D_m from the extracted channels C_1 - C_n . As Dr. Russ explains:

Zhang’s European Patent Application claims recited “a digital channel demultiplexer ... to demultiplex the digital RF signal into separate digital RF channels ($C_1 \dots C_n$),” and “a selector ... configured to receive the separate digital RF channels and to select one or more separate digital RF channels ($D_1 \dots D_m$).” Ex. 2012 [Zhang-EPO-Reply] 6.

The European Patent Office (EPO) noted that the independent claims “appear to be not new.” Exhibit 2011 [EPO-Communication-

Annex] 2-3. In response, the applicant explained that it is the selector that distinguished Zhang from its prior art, where all of the channels were demodulated:

The provision of a selector allows the selection of specific RF channels for demodulation dependent on the specific application in which the apparatus is implemented (paragraph 37 of the application) this allows for power consumption to be optimized because only the selected channels are later demodulated *unlike systems which demodulate all of the RF channels* (e.g. [Reference] D1 and [Reference] D2). Thus, the invention provides apparatus which is not only faster, but also dissipates less heat, than systems such as those in D1 and D2, because fewer resources are required when demodulating only the selected RF channels (paragraph 25).

Ex. 2011 [EPO-Communication-Annex] 2-3. Subsequently, the EPO accepted the Zhang applicant's argument and allowed the claims without any further rejection. Ex. 2013 [EPO-Grant-Intent] 1.

A POSITA reviewing the above would recognize that from Zhang's applicant's own perspective, the digital channel demultiplexer 230, like Zhang's prior art, demultiplexed both desired and undesired channels C_1 - C_n without performing any selection, and it was Zhang's selector that, unlike Zhang's prior art, only transmitted desired channels D_1 - D_m to demodulators.

Ex. 2009 [Russ-Decl.] ¶¶ 47-49. Thus, Zhang's prosecution history further confirms that channels C_1 - C_n contain both desired and undesired channels.

B. “Each” Mixer In Zhang Is Not “Operable To Generate A Digital Channel Output Corresponding To Each Desired Channel.”

Because channels C_1 - C_n contain both desired and undesired channels, “each” of the “n” complex multipliers that down convert the channels C_1 - C_n is not “operable to generate a digital channel output corresponding to each desired channel.” As previously noted, Petitioner relies on the “n” complex multipliers in Zhang’s Figure 3 for the disclosure of the claimed “plurality of digital down converters”:

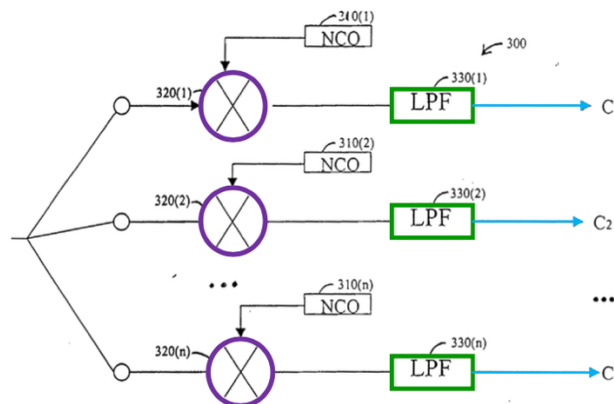


Fig. 3

Ex. 1013, Fig. 3 (annotated)

Pet., 29 (annotation Petitioner’s). Specifically, Zhang explains that its Figure 3 “can be used to implement digital channel demultiplexer 230 of Fig. 2.” Ex. 1013 [Zhang] [0030] (relied upon by Pet., 29). In Zhang’s Figure 3, there are “n” complex multipliers 320 (1...n), each of which is responsible for down converting one of channels C_1 - C_n . Ex. 1013 [Zhang] [0030] (“Digital tuner 300 includes a

bank of n ... complex multipliers 320 (1... n) One chain of each of these elements is used for each RF channel.”). These “ n ” complex multipliers 320 (1... n) in Zhang’s Figure 3 are what is relied upon by Petitioner for the disclosure of the claimed “plurality of digital down converters.” Pet., 29; Ex. 2009 [Russ-Decl.] ¶ 52.

Zhang, however, is clear that the output of its Figure 3 circuitry is channels C_1 - C_n :

Digital tuner circuit 300 then *outputs* the separated RF channels *C_1 to C_n* , each RF channel being centered at the baseband.

Ex. 1013 [Zhang] [0032]. Because channels C_1 - C_n contain both desired and undesired channels, “each” of the “ n ” complex multipliers that down convert the channels C_1 - C_n in Zhang’s Figure 3 is not “operable to generate a digital channel output corresponding to each desired channel.”

This is also confirmed by the number “ n ” of Zhang’s complex multiplier 320 (1... n). As noted, Zhang discloses “ n ” complex multipliers 320 (1... n), each responsible for down converting one of the channels C_1 - C_n . Ex. 1013 [Zhang] [0030]. As discussed above, it is undisputed that the number “ n ” is the number of both desired and undesired channels in the “entire signal band.” Ex. 1013 [Zhang] [0027]; Ex. 2009 [Russ-Decl.] ¶¶ 53-54; Ex. 2018 [Lett-1st-Depo.-Volume-I] 78:14-22. Thus, the number “ n ” of the complex multipliers 320 (1... n) in Zhang,

which is also the total number of channels, further confirms that the “n” complex multipliers are not “each” “operable to generate a digital channel output corresponding to each desired channel.”

C. Petitioner’s Arguments Are Inconsistent With Zhang And With Petitioner’s Other Arguments.

Petitioner’s arguments for why Zhang’s channels C_1 - C_n supposedly contain only desired channels, and why their corresponding complex multipliers are “each” “operable to generate a digital channel output corresponding to each desired channel,” are unavailing, contrary to Zhang’s express disclosures discussed above, and contrary to Petitioner’s own mapping of Zhang to other claim limitations.

Petitioner first relies on the fact that Zhang’s Digital Channel DeMux 230 in an embodiment is implemented through complex mixers and argues that because the ’866 patent also relies on complex mixers to extract channels, it supposedly follows that channels C_1 - C_n are the claimed “desired channels,” and that “each” of Zhang’s mixers is “operable to generate a digital channel output corresponding to each desired channel.” Pet., 29 (“Zhang’s demultiplexer 230 (below left) has the same structure as the ’866 patent’s digital front end 230 (below right)”).

But, as explained above, even though Zhang and the ’866 patent both use complex mixers that down convert channels, unlike the ’866 patent’s mixers, Zhang’s mixers down convert both desired and undesired channels. This is shown

below by adding additional annotations (red) to Petitioner's annotation comparing Zhang Figure 3 with the '866 patent Figure 2 (at Pet., 29). As can be seen in the figures and explained in more detail below, in Zhang, the number of complex multipliers 320 (1...n) is the same number "n" as the number of all channels, both desired and undesired, in the entire signal band. In contrast, the number of mixers N in the '866 patent is the number of desired channels.

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

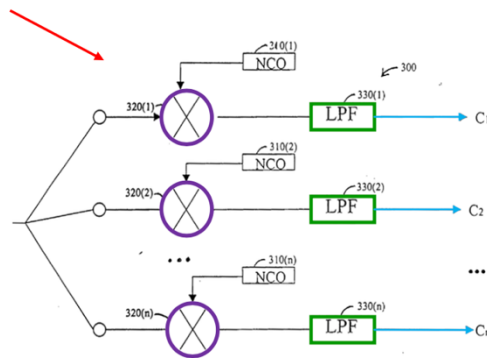
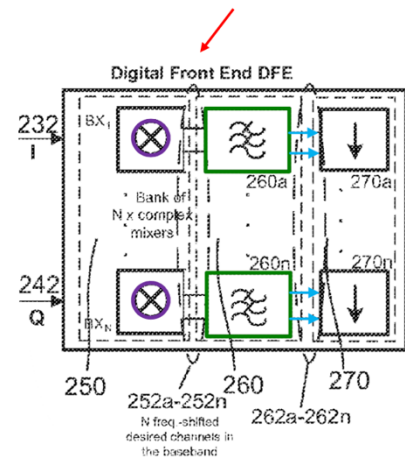


Fig. 3

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. As Dr. Russ further explains, Zhang's description of its Figure 3 confirms that its complex mixers down convert both desired and undesired channels C_1 - C_n :

At a high level, if Zhang's Figure 3 down converted and output only desired channels, there would have been no need for the subsequent channel selector 240 to select desired channels D_1 - D_m from

channels C_1 - C_n . This is in contrast to the '866 patent's Figure 2, where the output of the Digital Front End is sent to demodulators because the down conversion in the Digital Front End is only for the desired channels. Details of Zhang's Figure 3 confirm this distinction.

First, in Zhang's Figure 3, there are "n" complex multipliers 320 (1...n), each used for down converting a single channel. Ex. 1013 [Zhang] [0030] ("One chain of each of these elements is used for each RF channel."). As explained above, Zhang is clear that the number "n" in its disclosure denotes all channels, both desired and undesired, in an "entire signal band." Ex. 1013 [Zhang] [0027]. Thus, the number "n" of complex multipliers 320 (1...n) has a one-to-one correspondence with the total number "n" of desired and undesired channels, further confirming that they are not "each" "operable to generate a digital channel output corresponding to each desired channel." Second, Zhang states that the output of its Figure 3 circuitry is channels C_1 to C_n . Ex. 1013 [Zhang] [0032] ("Digital tuner circuit 300 then outputs the separated RF channels C_1 to C_n , each RF channel being centered at the baseband."). Channels C_1 - C_n include both desired and undesired channels, further confirming that the "n" complex multipliers down convert both desired and undesired channels.

Ex. 2009 [Russ-Decl.] ¶¶ 57-58.

Petitioner also cites multiple out-of-context statements from Zhang to imply that channels C_1 - C_n include only desired channels. Petitioner is incorrect.

Petitioner relies on Zhang's use of the phrase "target channel" in its discussion of its Figure 3, but as Dr. Russ explains, Petitioner's reliance is misplaced. The "target channel" is simply the specific one of the n channels (consisting of both desired and undesired channels) that a particular mixer path is responsible for extracting:

Petitioner relies upon Zhang's use of the phrase "target channel" in its discussion of Figure 3 to argue that Figure 3 only outputs desired channels. Pet., 29 (citing Ex. 1013 [Zhang] [0032]). Petitioner misapprehends Zhang's disclosure. As explained, Zhang is clear that its Figure 3 outputs both desired and undesired channels, and Petitioner is incorrect in its interpretation of Zhang's use of the phrase "target channel."

Specifically, in Zhang's Figure 3, annotated below, the digitized input RF signal is sent in parallel to multiple data paths, each of which is responsible for extracting one of the channels C_1 - C_n from the digitized input signal. It is in this context that Zhang states that each data path is responsible for extracting its "target channel," which only means the specific one of channels C_1 - C_n that the data path is responsible for. "Target channel," thus, does not refer to a "desired" channel but, rather, a particular channel for a particular data path, which may ultimately be desired or undesired.

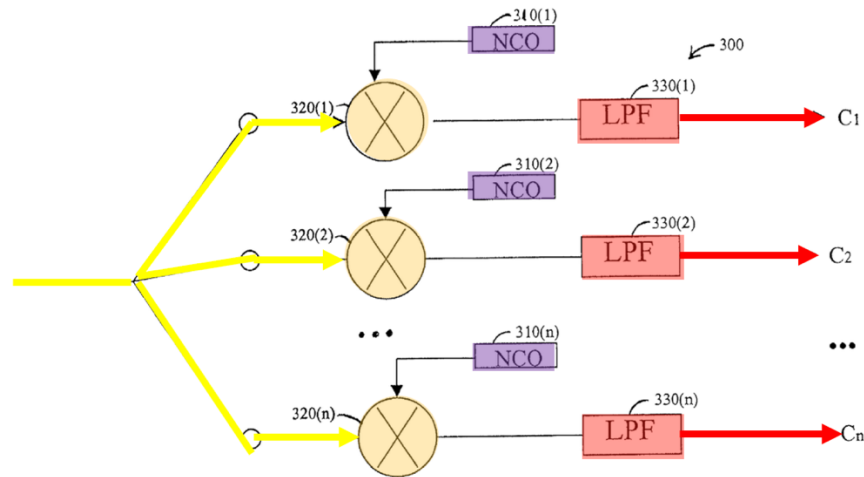


Fig. 3

Ex. 2009 [Russ-Decl.] ¶¶ 59-60.

Zhang’s detailed explanation of how its Figure 3 operates further confirms Petitioner’s misinterpretation of Zhang’s “target channel.” As Dr. Russ explains:

In Zhang’s Figure 3, annotated above, the digitized input RF signal (yellow) is transmitted in parallel through multiple data paths, each of which is responsible for extracting one of channels C_1 - C_n . Ex. 1013 [Zhang] [0030]-[0031]. In each data path, the way a channel is extracted is that a numerical local oscillator NLO 310 (purple) provides the frequency for the one of channels C_1 - C_n for which that specific data path is responsible. *Id.*, [0032]. A complex multiplier 320 (orange) multiplies the digitized input RF signal with the provided frequency to down convert the channel to baseband. *Id.* Then a corresponding low pass filter LPF 330 (red) filters out all channels other than the one of C_1 - C_n for that data path. *Id.* In this context, Zhang states that the complex mixer 320 (orange) is provided with the “characteristic

frequency of a desired RF channel,” which means the frequency of the one of channels C_1 - C_n for which this specific data path is responsible. Similarly, Zhang states that the LPF (red) only permits the “target RF channel” to pass, which, again, means the specific one of channels C_1 - C_n for which this specific data path is responsible. *Id.* Nothing in Zhang’s discussion of its Figure 3 changes its consistent disclosure that channels C_1 - C_n contain both desired and undesired channels.

Ex. 2009 [Russ-Decl.] ¶ 61.

Petitioner also cites Zhang’s claims 34, and 36-37 to argue that channels C_1 - C_n contain only desired channels. Pet., 29. But, as Dr. Russ explains, those claims closely follow Zhang’s Figure 3 embodiment discussed above, and Petitioner misapprehends their disclosure—which, of course, cannot claim a system that is entirely different from Zhang’s specification:

Claims 34, 36 and 37 depend from independent claim 28. Claim 28 claims the function of Zhang’s digital channel demultiplexer in Zhang’s Figure 3, which extracts both desired and undesired channels from the input signal, and recites “[a] method for demultiplexing a digital multi-channel RF signal into a plurality of separate content channels.” As detailed in the table below, claims 34, 36 and 37 recite various details of Zhang’s digital channel demultiplexer 230 from Zhang’s Figure 3, including functions of the mixers, local oscillators and low pass filters. As noted above, however, Zhang’s discussion of its Figure 3 is the *only* disclosure in Zhang of “target channels” and “target frequencies,” and Zhang’s use of these phrases does not mean

selecting only desired channels as the '866 patent does. Rather, it only refers, in context, to the specific one of channels C_1 - C_n (consisting of both desired and undesired channels) for which the specific data path is responsible for extracting.

Zhang Claims	Zhang Fig. 3 (Annotated)
34. The method of claim 28 wherein the demultiplexing further comprises: providing a plurality of select frequencies, each select frequency being associated with a corresponding and separate RF channel; and multiplying the at least one multi-channel RF signal with each of the select frequencies to obtain separate RF channels. 36. The method of claim 34 further comprising shifting the target RF channel to a baseband. 37. The method of claim 34 further comprising filtering undesired RF channels and passing only the target RF channel.	Fig. 3

Thus, as is clear from the above, similar to Zhang’s Figure 3, “target RF channel” in Zhang’s claims refers to the one of the channels C_1 - C_n for which this path is responsible, and “undesired RF channels” refers to the remaining ones of channel C_1 to C_n other than the one for which this path is responsible.

Ex. 2009 [Russ-Decl.] ¶¶ 62-63.

Petitioner also relies on Zhang's statement that "RF channels C_1 to C_n contain channels that are selected or used by a subscriber." Pet., 25 (citing Exhibit 1013 [Zhang] [0028]). That portion of Zhang does not state that channels C_1 to C_n contain "only" desired channels. Instead, in context, reproduced below in full, this statement simply means that the "channels that are selected or used by a subscriber" are contained within the broader set of "RF channels C_1 to C_n ." Consistent with this, Zhang states that channels C_1 to C_n contain all channels in the entire signal band, from which actual desired channels D_1 to D_m can be selected:

Still referring to FIG. 2, an $n \times m$ digital selector 240 receives the demultiplexed digital RF channels C_1 to C_n and then 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 . RF channels C_1 to C_n contain content channels that are selected or used by a subscriber. Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners.

Ex. 1013 [Zhang] [0028]; *see also* Ex. 2009 [Russ-Decl.] ¶ 64.

In fact, not only is Petitioner's assertion that Zhang's channels C_1 - C_n disclose the claimed "desired channels" incorrect and contrary to Zhang's disclosure, it is also inconsistent with Petitioner's mapping of Zhang to other claim limitations.

For example, limitation 14[d] recites “wherein the plurality of digital down converters is operable to provide each digital channel output via a serial interface.” Petitioner relies on Data Bus 1 within Zhang’s $n \times m$ selector 240 as disclosing a serial interface (Data Bus 1) via which the plurality of down converters “provide” the “plurality of desired channels.” Pet., 31. Zhang’s $n \times m$ 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]

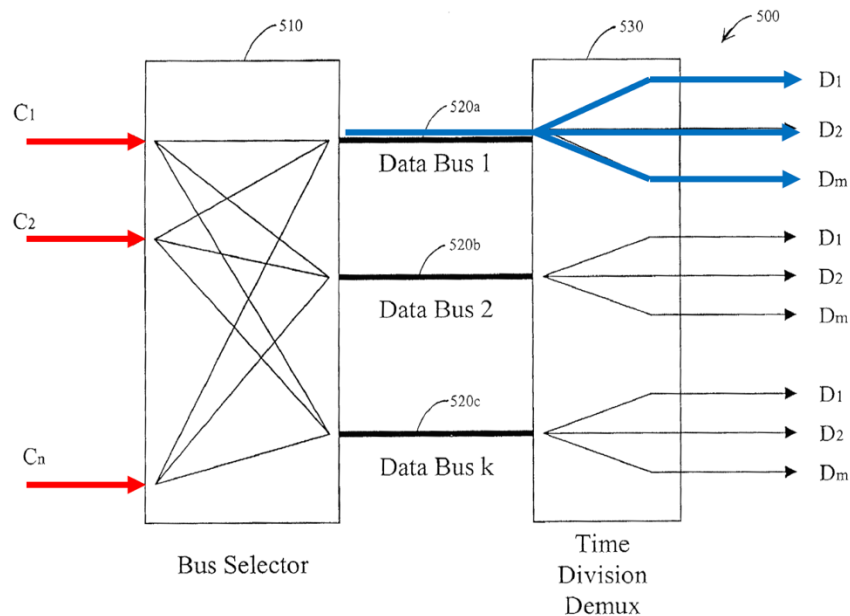


Fig. 5

As is clear from Zhang’s Figure 5, what is “provided” on Data Bus 1 in the selector 240 are channels D_1 - D_m (blue) shown on the right-hand side output of data bus 1, not channels C_1 - C_n (red). This is consistent with the balance of Zhang’s disclosure that explains the digital selector in Fig. 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” Ex. 1013 [Zhang] [0039].

Thus, to the extent Petitioner’s mapping of limitation 14[c] relies on Zhang’s channels C_1 - C_n as the claimed “plurality of desired channels,” and on Zhang’s complex multipliers 320 (1...n) for the disclosure of the claimed down converters that are “each” “operable to generate a digital channel output corresponding to each desired channel,” that mapping contradicts Petitioner’s mapping for limitation 14[d], where Petitioner must rely on channels D_1 - D_m as “the plurality of desired channels” output by down converters via a serial bus. Ex. 2009 [Russ-Decl.] ¶ 65-67.

For all of the foregoing reasons, Petitioner’s reliance on Zhang’s channels C_1 - C_n as the “plurality of desired channels,” and on Zhang’s complex multipliers 320 (1...n) as the claimed “plurality of digital down converters” fails.

IV. 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 (“Zhang thus discloses element 1[c]”); 32-33 (limitation 27[c]); 51 (limitation 55[c]); 50 (claim 27); 72 (claim 1).³

Specifically, Petitioner argues that Zhang’s “Demultiplexer 230 and a portion of Digital Selector 240” discloses the claimed “digital frontend (DFE),” providing an annotated Figure 2 reproduced below:

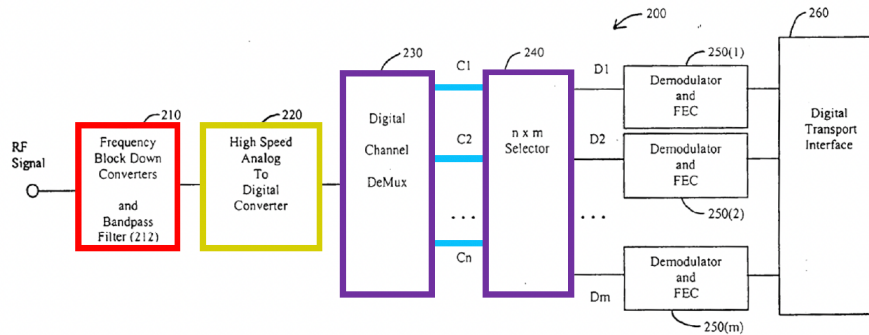


Fig. 2

Ex. 1013, Fig. 2 (annotated)

Pet., 22 (annotation Petitioner’s).

Petitioner argues that in Zhang’s Figure 2, the Digital Channel Demultiplexer 230 “select[s] a plurality of desired channels C_1 - C_n ” (Pet., 23), and

³ The Petition relies on its discussion of limitation 1[c] for the corresponding limitations 27[c] and 55[c]. Therefore, this POR discusses limitation 1[c] with the understanding that the same argument applies to claims 27 and 55.

Selector 240 “provides ‘m’ channels D_1 - D_m ” (Pet., 24). Petitioner’s argument fails for three independently sufficient reasons.

First, Zhang’s channels C_1 - C_n are not “desired channels,” and Zhang’s Digital Channel Demultiplexer 230 does not “select” any desired channels. Rather, channels C_1 - C_n encompass all channels in the entire signal band, and the Demultiplexer 230 blindly demultiplexes all channels into separate channels without performing any selection. *See* Section IV.A. Second, while Petitioner relies on Zhang’s Selector 240 to “provide[] ‘m’ channels D_1 - D_m ,” it fails to show that Zhang’s Selector 240 is a part of the claimed “Digital Front End.” *See* Section IV.B. Third, Petitioner’s expert at deposition opined that the claim requires that the “selecting” and “providing” of the desired channels be “concurrent,” but Petitioner fails to show that Zhang discloses the claims under its expert’s proffered construction. *See* Section IV.C.

A. Zhang’s Channel Demultiplexer 230 Does Not “Select” Any Desired Channels.

As noted, limitation 1[c] requires a “DFE ... 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. Petitioner argues that Zhang’s channels C_1 - C_n disclose the claimed “plurality of desired channels,”

and Zhang's Channel Demultiplexer 230 performs the claimed "selecting" of the plurality of desired channels:

Digital tuner 300 (an embodiment of demultiplexer 230) (below left) has the same structure as the '866 patent's digital front end 230 (below right), including multiple signal paths for concurrently ***selecting*** and providing ***a plurality of desired channels C_1 - C_n*** (light blue).

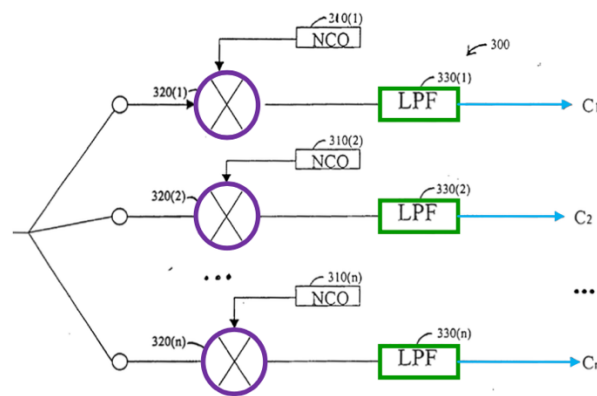


Fig. 3

Ex. 1013, Fig. 3 (annotated)

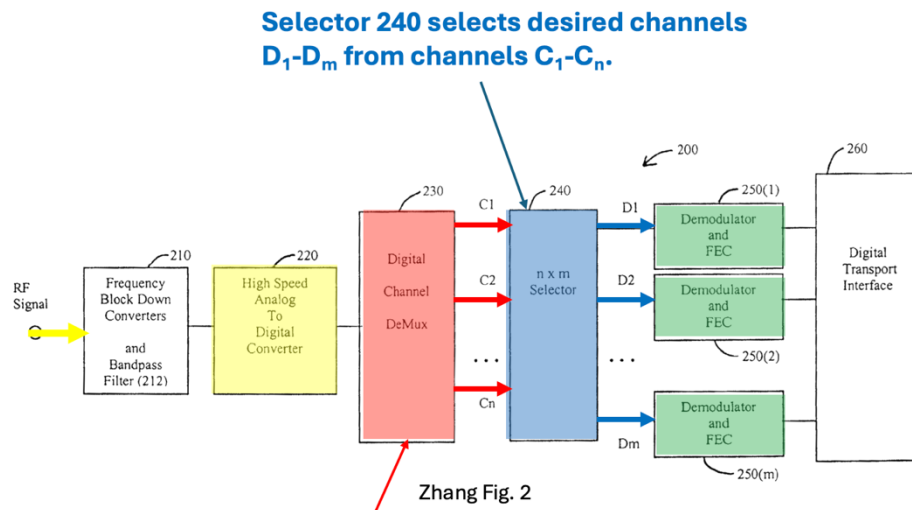
Pet., 23 (Petitioner's annotation); *see also* Ex. 1002 [Lett-Decl.] ¶¶ 110-111 (similar). However, for the reasons discussed in Section III, incorporated by reference here, and summarized below, channels C_1 - C_n in Zhang are not a "plurality of desired channels." Similarly, Zhang's Demultiplexer 230 does not "select" any desired channels; rather, it demultiplexes all channels, both desired and undesired, without performing any selection. Ex. 2009 [Russ-Decl.] ¶¶ 73-76.

As Dr. Russ explains, channels C_1 - C_n encompass all channels in the entire signal band, both desired and undesired:

As explained in paragraphs 42-46 in connection with Claim 14, Zhang teaches that the letter “n” in Zhang denotes the number of channels, both desired and undesired, in the “entire signal band.” Ex. 1013 [Zhang] [0027]. Zhang further explains that its digital channel demultiplexer 230 demultiplexes the input RF signal into channels C_1 - C_n . Ex. 1013 [Zhang] [0027]. Consequently, because “n” in Zhang denotes the total number of channels, both desired and undesired, the demultiplexed channels C_1 to C_n , therefore, also include both desired and undesired channels.

As further explained in paragraphs 42-46, Zhang teaches that after channels C_1 - C_n are extracted from the input RF signal, an $n \times m$ selector 240 selects the desired channel D_1 - D_m from the total channels C_1 - C_n . Ex. 1013 [Zhang] [0028]; *see also id.*, [0039] (“In operation, 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 and then sends them to appropriate demodulators* or output ports (not shown) through different data buses (not shown).”); [0042] (“For example, in FIG. 6, there are 35 separate RF channels C_1 to C_{35} . Of those RF channels, 20 RF channels D_1 to D_{20} are selected. Those 20 selected RF channels are sent to a set of demodulators 650(1 ... 20) for demodulation.”).

I schematically showed the operation of Zhang through an annotation of its Figure 2, reproduced below:



Digital Channel DeMux 230 extracts all channels C_1 - C_n , both desired and undesired, from the digitized input RF signal.

As further explained in paragraphs 47-49, a POSITA reviewing Zhang's prosecution history would also understand that, from the perspective of Zhang's own applicant, channels C_1 - C_n encompass all channels, both desired and undesired.

Ex. 2009 [Russ-Decl.] ¶¶ 77-80; *see also* Ex. 2018 [Lett-1st-Depo.-Volume-I] 78:14-22.

As Zhang's channels C_1 - C_n encompass all channels, it follows that Zhang's Channel Demultiplexer 230 that demultiplexes channels C_1 - C_n does not "select" any desired channels. As Dr. Russ explains:

As explained in paragraphs 42-49 and summarized above, therefore, Zhang's Digital Channel Demultiplexer 230, which demultiplexes channels C_1 - C_n from the digitized RF input signal, does

not perform any “selection” because channels C_1 - C_n encompass all channels in the “entire signal band.” Ex. 1013 [Zhang] [0027].

As also explained in paragraphs 55-61, Petitioner’s reliance on Zhang’s Figure 3 to implement the Digital Channel Demultiplexer 230 does not change Zhang’s operation. Zhang explains that its Figure 3 “can be used to implement digital channel demultiplexer 230 of Fig. 2.” Ex. 1013 [Zhang] [0030] (cited at Pet., 25). The output of Zhang’s Figure 3 circuitry is channels C_1 to C_n . Ex. 1013 [Zhang] [0032] (“Digital tuner circuit 300 then outputs the separated RF channels C_1 to C_n , each RF channel being centered at the baseband.”). Thus, Zhang’s Digital Channel Demultiplexer 230, whether implemented through Zhang’s Figure 3 or otherwise, does not disclose “selecting” any desired channels. Rather, it blindly demultiplexes all channels C_1 - C_n in the “entire signal band.” Ex. 1013 [Zhang] [0027].

Ex. 2009 [Russ-Decl.] ¶¶ 81-82.

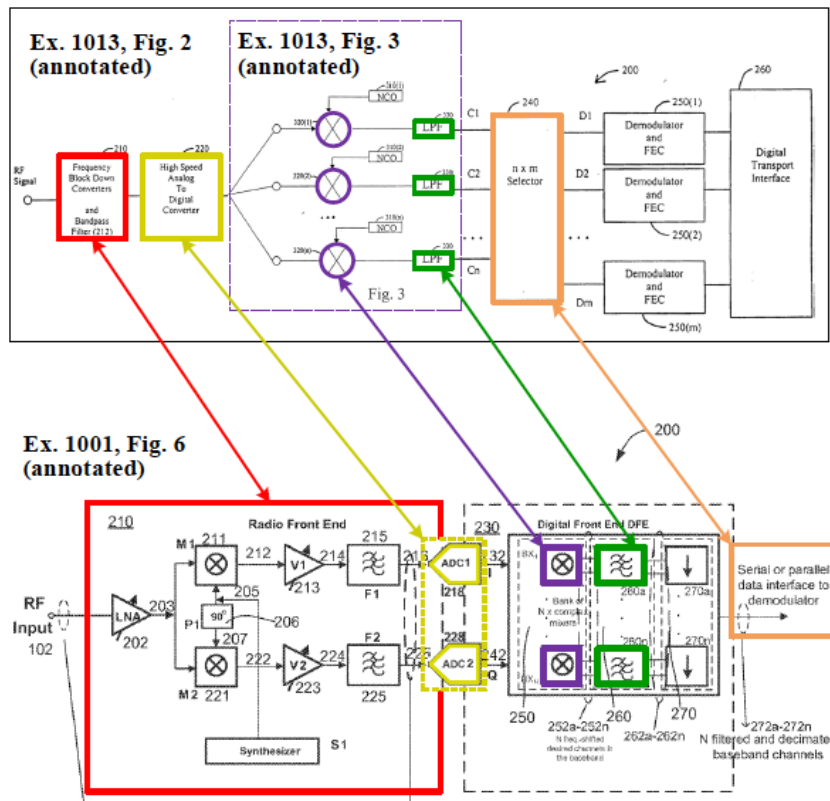
Therefore, for the foregoing reasons, Petitioner has not shown disclosure or obviousness of a “DFE ... configured to concurrently *select* and provide *each of the plurality of desired channels.*”

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 disclosure 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. Petitioner, however, fails to show why Zhang’s Selector 240 discloses a “digital front end (DFE)” as claimed.

Contrary to Petitioner’s contention that Zhang’s Selector 240 is a digital front end, Petitioner’s elsewhere confirms that Zhang’s “Digital Channel Demultiplexer 230” alone, not Zhang’s Selector 240, corresponds to the claimed “digital front end (DFE).” For example, Petitioner’s overview of Zhang, discussed in more detail below, shows only Digital Channel Demultiplexer 230 as corresponding to the ’866 patent’s Digital Front End (DFE), with Zhang’s Digital Selector 240 corresponding to the *output* of the DFE:



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

In the annotation provided by Petitioner above, the upper figure is Zhang’s Figure 2, and the lower figure is Figure 6 of the ’866 patent. Ex. 2009 [Russ-Decl.] ¶¶ 85-86. In Figure 6 of the ’866 patent (lower figure), the dotted box on the right-hand side of the figure is labeled “Digital Front End DFE” 230. As can be seen above, Petitioner has mapped Zhang’s Selector 240 (upper figure) using the color orange to the arrow titled “serial or parallel data interface to demodulator” that is output from the digital front end 230 in the ’866 patent (dotted box in the lower figure).

Thus, Petitioner has mapped Zhang's selector 240 to the *output* of the '866 patent's digital front end (DFE).

At deposition, Petitioner's expert confirmed that he is mapping Zhang's Selector 240 to the "output" of the claimed "digital front end" in the '866 patent, and further opined that it is "more logical" to do so:

Q. Now, why did you map ... the $n \times m$ selector 240 in Zhang to the output of the Digital Front End DFE arrow titled serial or parallel to demodulator in Figure 6 of the '866 patent?

A. Because the $n \times m$ selector outputs serial or parallel interface to a demodulator.

Q. That's the one that you said is like a switch; right?

A. Among other things.

...

Q. *What is the basis of your opinion that the $n \times m$ Selector 240 in Zhang is analogous to the output of the digital front end 230 in Figure 6 of the '866 patent?*

A. As we've been talking about—and we can go through it in more detail if you want—the $n \times m$ selector— *$n \times m$ selector can output serial or parallel data to a demodulator.*

Q. Is that it?

A. Yes.

Q. So in your opinion, *would it be wrong to map the $n \times m$ selector 240 from Zhang to the output of filters 260 within the digital front end in Figure 6 of the '866 patent?*

A. Well, the output of the Figure 6 annotated below is on the right side. *And what we're mapping to is the output to demodulators. So it is more logical to map that to the output.* And then we come along later and explain the decimation.

Ex. 2018 [Lett-1st-Depo.-Volume-I] 145:16-147:13.⁴

Logically, if Zhang's selector 240 maps to the **output** of the digital front end, it cannot be the front-end itself. Petitioner made a similar mapping when it compared Zhang's Figure 3 embodiment (which implements only Zhang's digital channel demultiplexer 230) with the digital front end in the '866 patent's Figure 2. Pet., 23; *see also* Ex. 2009 [Russ-Decl.] ¶ 87-89. Specifically, Petitioner argued that:

Digital tuner 300 (an embodiment of demultiplexer 230) (below left) *has the same structure as the '866 patent's digital front end 230* (below right), including multiple signal paths for concurrently selecting and providing a plurality of desired channels C_1 - C_n (**light blue**). *Compare* Ex. 1013, Fig. 3 (filters 330), [0030]-[0034], claims 34, 36-37 *with* Ex. 1001, Fig. 2 (filters 260), 6:3-8; Ex. 1002, ¶ 110. Like the

⁴ Objections by counsel are omitted.

'866 patent's DFE, each path includes a complex multiplier 320 (purple) followed by a low pass filter (LPF) 330 (green).

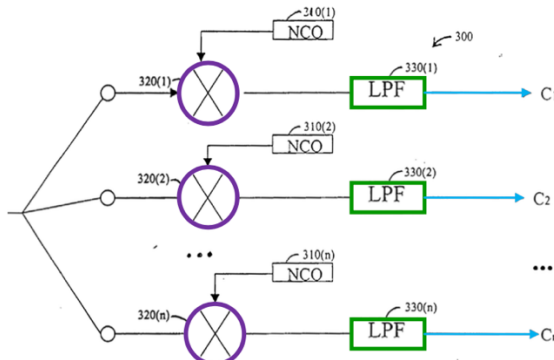
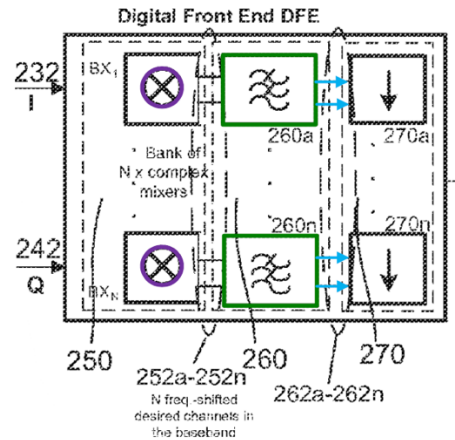


Fig. 3

Ex. 1013, Fig. 3 (annotated)



Ex. 1001, Fig. 2 (annotated)

Pet., 23 (annotation Petitioner's). Notably, the digital tuner 300 in Zhang, which Petitioner argues “has the same structure as the '866 patent's digital front end,” is an implementation of Zhang's digital channel demultiplexer 230, not Zhang's Selector 240. Ex. 1013 [Zhang] [0030] (“FIG. 3 is a simplified high-level schematic diagram of a digital tuner 300, which in some embodiments of the present invention, can be used to implement digital channel demultiplexer 230 of FIG. 2.”). Petitioner provides no explanation as to why and how Zhang's selector 240 is a part of the claimed “digital front end (DFE).”

“In an *inter partes* review, the burden of persuasion is on the petitioner to prove unpatentability by a preponderance of the evidence, 35 U.S.C. § 316(e), and that burden never shifts to the patentee.” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016) (*quoting Dynamic Drinkware, LLC v. Nat'l*

Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015)). Furthermore, “mere conclusory statements” cannot satisfy Petitioner’s burden. *In re Magnum Oil*, 829 F.3d at 1380. In accord, the Board has rejected flawed, inconsistent mapping similar to the one in this case by other petitioners:

Having considered the additional briefing submitted since our Decision on Institution, we determine that Petitioner’s mapping of the [claim to the reference] remains fatally flawed. Petitioner’s obviousness contentions ... include neither supporting evidence nor analysis to undergird its proposed mapping

Hulu, LLC v. Sound View Innovations, LLC, Case IPR2018-00582, Paper 34, 30 (August 5, 2019) (informative) (finding the claims were not shown to be unpatentable).

In the instant case, Petitioner has merely made a conclusory assertion that Zhang’s Selector 240 is a part of the claimed “digital front end (DFE).” Pet., 22-23. Petitioner has provided no analysis or evidence to support its contention. Furthermore, its contention contradicts its mapping of Zhang to the claimed digital front end elsewhere in the Petition, as shown above and at length by its expert at deposition. Therefore, Petitioner fails to meet its burden as a matter of law.

The Petition’s citation to its expert declaration does not save it as its expert declaration merely mirrors the same conclusory statement in the Petition.

Compare Pet., 22-24 *with* Ex. 1002 ¶¶ 110-112. In fact, Petitioner’s expert at his

deposition opined at length as to why the Selector 240 in Zhang does not correspond to the claimed digital front end. Ex. 2018 [Lett-1st-Depo.-Volume-I] 145:16-147:13. Thus, Petitioner’s expert declaration is entitled to little weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15 (August 24, 2022) (precedential) (expert testimony that “merely repeats, *verbatim*, the conclusory assertion for which it is offered to support,” without any additional analysis, is entitled to little weight); *Rockwell Automation, Inc. v. Automation Middleware Solutions, Inc.*, IPR2017-00048, Paper 13,16 (April 18, 2017) (“The Rizzi Declaration lacks any support for the conclusions reached. Petitioner’s assertion is, therefore, not backed up by persuasive evidence.”).

Nor can Petitioner attempt to meet its burden for the first time in its Reply. *Hulu, LLC v. Sound View Innovations, LLC*, Case IPR2018-00582, Paper 34, 30 (August 5, 2019) (informative) (“We also agree with Patent Owner ... that Petitioner’s reply arguments attempting to justify its mapping of the ‘system application’ to Hvasshovd’s client are untimely.”); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1389-70 (Fed. Cir. 2016) (“Unlike district court litigation—where parties have greater freedom to revise and develop their arguments over time and in response to newly discovered material—the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute.”).

Petitioner, thus, 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”:

Q. Did you fully understand the limitation that in claim 27, that said “wherein the DFE is configured to concurrently select and provide each of the plurality of desired channels without providing any of the plurality of undesired channels.” Did you fully understand that limitation of claim 27?

A. Yes.

Q. Okay. And did you fully understand what the word concurrently means in that limitation?

A. At the same time.

Q. Okay. In claim 27, what is it that has to happen concurrently?

A. Selecting and providing each of the plurality of desired channels without providing any of the plurality of the undesired channels.

Q. So *in your opinion, do the acts of selecting and providing have to happen concurrently in claim 27?*

A. *It seems to.* Again, I'm not an attorney. Maybe there's some other meaning that I don't understand, but it seems to me that they both have to occur.

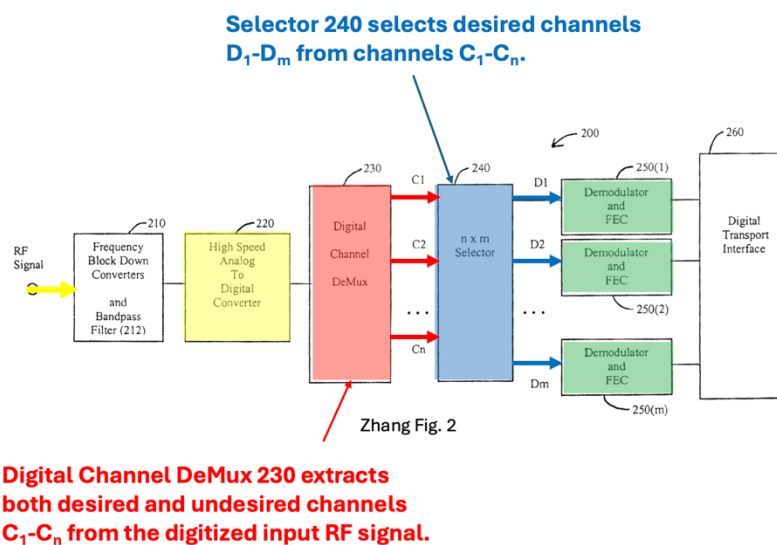
Ex. 2019 [Lett-1st-Depo-Volume-II] 76:9-77:5.

As explained below, Petitioner has failed to show that Zhang discloses or renders obvious the claims under Petitioner's expert's understanding of the claims.

The Petition argues that Zhang's digital channel demultiplexer 230 performs the claimed "select[ing]," and Zhang's selector 240 "provides the desired channels via a serial interface as recited in Element [1C]." Pet., 22-24. However, as Zhang is clear, its channel demultiplexer 230 and selector 240 process the data sequentially, not concurrently. Zhang explains that the digital channel demultiplexer 230 "demultiplexes the multi-channel digital RF signal into separate digital RF channels C_1 to C_n ." Ex. 1013 [Zhang] [0028]. Zhang explains that the selector 240 then "receives" the demultiplexed channels C_1 - C_n , and selects channels D_1 - D_m from the received channels:

Still referring to FIG. 2, an $n \times m$ digital *selector 240 receives* the demultiplexed digital RF channels C_1 to C_n *and then 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 [Zhang] [0028]. This sequential processing is also shown in Zhang's Figure 2, reproduced below with annotations added. As can be seen in the figure, the Digital Channel DeMux 230 (red) first demultiplexes channels C_1 - C_n and sends the demultiplexed channels to the selector 240. The selector 240 (blue) then selects channels D_1 - D_m from the received channels.



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. *Google LLC v. Neonode Smartphone LLC*, IPR2021-01041, Paper 52, 26 (Jan. 11, 2023)(“Because [the petitioner] has the burden of persuasion, [the patent owner] has no obligation to precisely define the [claim] term gliding . . . away or explain how the term differs from the term flick in [the reference].”) (citing 37 C.F.R. § 42.104(b)(3); 35 U.S.C. §316(e)); *DISH Network LLC v. Sound View Innovations LLC*, IPR2020-01035, Paper 19, 14 (Jan. 19, 2021) (denying institution because

Petitioner had failed to show that the claims are obvious based on the construction proposed by Petitioner).

V. CONCLUSION

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

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Response (the “POR”) consists of 8,559 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The POR complies with the type-volume limitation of 14,000 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,

/ Kenneth Wang /

Date: January 14, 2025

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the following documents were served
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PATENT OWNER RESPONSE

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