

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2025-00180
Patent 11,785,275 B2

**REPLY DECLARATION OF DAVID B. LETT
IN SUPPORT OF PETITIONER'S REPLY**

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I, David B. Lett, declare that I have personal knowledge of the facts set forth in this declaration and, if called to testify as a witness, could and would do so competently.

1. Introduction

1. I have been retained as an expert witness on behalf of the Petitioner, Comcast Cable Communications, LLC, for the above-referenced *inter partes* review proceeding.

2. I have been asked to provide a reply declaration regarding certain matters pertaining to U.S. Patent No. 11,785,275 (“the ’275 patent”) (Ex. 1001) and the unpatentability grounds set forth in the Petition for this proceeding.

3. I am being compensated at my usual consulting rate or testimony rate. My compensation is in no way dependent upon my opinions or testimony or the outcome of this proceeding. I have no financial interest in the party or in the outcome of this proceeding.

2. Materials considered

4. In addition to those mentioned in my previous declaration, I have reviewed the following documents:

- Patent Owner’s Response and its accompanying exhibits, including Dr. Russ’s Declaration (Ex. 2013); and
- All other documents referenced herein including Ex. 1086, which is a chart called “United States Frequency Allocations” that was published by the U.S.

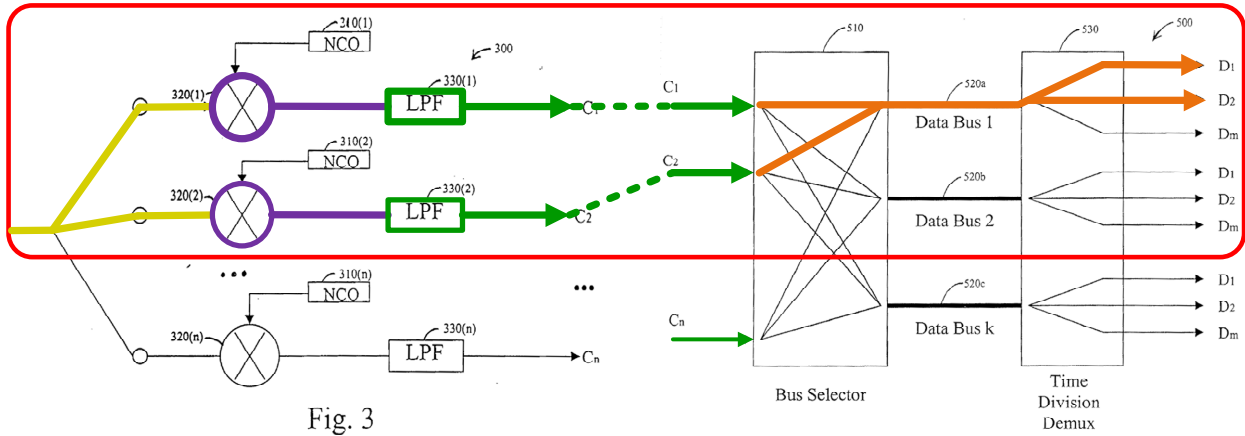
Department of Commerce in October 2003. This chart was on the Internet (see capture by Wayback machine of the chart at <https://web.archive.org/web/20040426050952/http://www.ntia.doc.gov/osmhome/allochrt.pdf>) and I was familiar with this chart. In my opinion, a POSITA would have been familiar with this chart and would have been able to locate it. Ex. 1089, 42:9-43:19.

3. Zhang discloses element [1E]’s functional language as the selection of D_1 - D_m

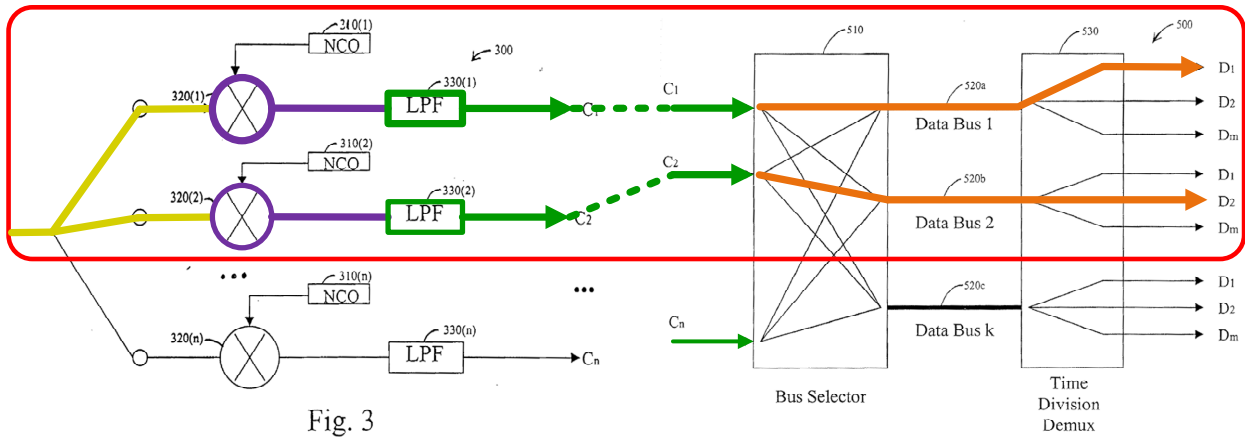
5. As my previous declaration describes, there are two ways to map Zhang to the claims. In the second way, I mapped the combination of Zhang’s demultiplexer 230 and all or part of Zhang’s selector 240 to the claimed “DFE” and I mapped Zhang’s selected RF channels D_1 to D_m to the claimed “desired channels.” Ex. 1002, ¶ 136. I also explained how the combination of Zhang’s demultiplexer 230 and all or part of the selector 240 perform the claimed “selecting” step in element [1E]. Ex. 1002, ¶¶ 136-140.

6. As I show below, the ’275 patent specification and Zhang use the same circuitry. Zhang’s digital circuitry (in the red box) that selects and outputs desired channels D_1 - D_m matches the ’275 patent’s Figure 2 digital circuitry that selects and outputs desired channels 272a-272n. Ex. 1013, [0030]-[0032], [0038]-[0039], [0042], [0048], claims 36-37. Focusing on just two paths (which is all that is required by the claims since two is a plurality and the claims only recite selecting

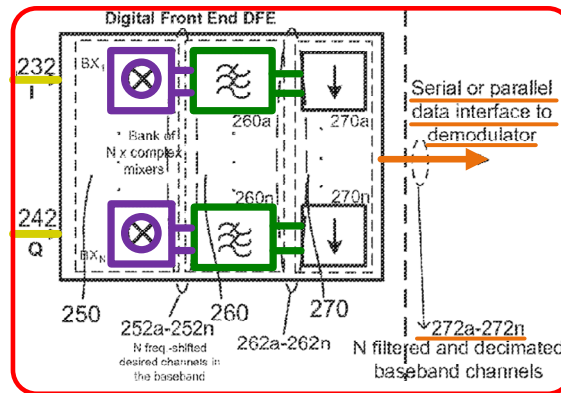
the plurality of desired channels) clearly illustrates how the combination of Zhang's demultiplexer 230 and selector 240 receives the digitized signal (yellow), selects D1 and D2 from the digitized signal (by first extracting/selecting C1 and C2), and outputs D1 and D2 in various ways (including in series or parallel) to at least one demodulator.



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



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



I note that Dr. Russ readily admits that “both Zhang and the ’275 patent involve a digitized RF input signal, and, ultimately, output desired channels,” that “[s]imilar to the ’275 patent, Zhang digitizes an input signal (yellow), consisting of ‘n’ desired

and undesired channels, in the analog to digital converter 220 (yellow),” and that “Zhang’s Digital Channel DeMux 230 uses complex mixers similar to the ’275 patent to extract channels.” Ex. 2013 ¶¶ 34-37.¹ Dr. Russ’s argument against the second mapping is that Zhang’s “channels D₁-D_m are not selected ‘from the digitized signal,’ as required.” Ex. 1013, ¶¶ 87-102. In my opinion, this argument fails for 3 main reasons: 1) it is based on a distorted reading of the claim (no POSITA would read the claim as Dr. Russ does to try to support his argument), 2) it ignores that I relied on a combination of the demultiplexer 230 and selector 240 for the claimed “DFE,” and 3) it treats D₁-D_m as though they are different from C₁-C_n (but D₁-D_m are just one or more of C₁-C_n with no change to the data of the channels). With regards to the first reason, a POSITA would not read the “from the digitized signal” language of the claim to exclude any in-between processing of the digitized signal. In other words, a POSITA would not read this claim language as meaning “directly from the digitized signal without performing any other function on the digitized signal before ultimately selecting the desired channels,” which seems to be how Dr. Russ is essentially reading the claim. Rather, a POSITA would understand that D₁-

¹ Note that Dr. Russ’s cited paragraphs use yellow annotation for both the RF input 102 and the ADCs 218 and 228, whereas the drawing in my declaration above uses yellow annotations to identify the digitized output of the ADCs.

Dm are selected from the digitized output of the ADC because they are selected from C1-Cn which are selected from the digitized output of the ADC, as even Dr. Russ acknowledged. Ex. 1089, 123:13-20. As an example, POSITAs (e.g., engineers in the cable industry) would regularly describe channels output from a set top box as being selected “from” the input analog signal received by the set top box from a cable headend even though the set top box performed multiple processes in-between. With regards to the second reason, Dr. Russ seems to be ignoring that I relied on a combination of the demultiplexer 230 and selector 240, such that the combined digital circuitry is directly receiving the digitized signal from the ADC. In my opinion, a POSITA reading element [1E] would understand that it is met by Zhang’s digital circuitry (the combination of demultiplexer 230 and selector 240) first receiving the digitized signal from the ADC, then extracting/selecting the channels C1-Cn, and then selecting D1-Dm among C1-Cn, such that D1-Dm are selected from the digitized signal. Another way to look at it is that Zhang’s demultiplexer 230 and selector 240 have two stages of selecting—a first stage to extract/select C1-Cn and a second stage to select D1-Dm—but together they are still selecting D1-Dm from the digitized signal. I note that there is nothing in the claims that cuts against this view, which is the view a POSITA would have. I also note that Dr. Russ’ argument about guard bands not being in C1-Cn (see Ex. 1013, ¶ 98) is irrelevant because I did not map C1-Cn to the digitized signal. The second mapping (like the first

mapping) relies on the digitized signal coming out of Zhang's ADC. With regards to the third reason, Dr. Russ annotates Zhang's Figure 5 (see Ex. 1013, ¶ 94) by coloring C1-Cn red and coloring D1-Dm blue to try to make them seem different, but in actuality D1-Dm are just labels for channels C1-Cn that are passed. That is, the data for the channels in D1-Dm is the same as the data for those channels in C1-Cn that are passed by the selector 240. So, at least because C1-Cn are from the digitized signal, D1-Dm are also from the digitized signal.

7. It is my view that, end-to-end, just as the '275 patent selects desired channels 272a-272n from the digitized signal and outputs them, Zhang's digital circuitry (including demultiplexer 230 and all or part of selector 240) selects channels D₁-D_m from the digitized signal and outputs them. Merely because Zhang's desired channels are labeled with a "D" at the output of 240 and a "C" at the input of 240 does not make them different. They are still "from the digitized signal."

8. Dr. Russ concedes that Zhang receives a digitized input signal that includes desired channels, extracts the desired channels using demultiplexer 230, and outputs those desired channels from Selector 240 as D₁-D_m to a demodulator. Ex. 2013, ¶¶ 38, 93-94. A POSITA would have understood that Zhang's digital circuitry could not have output channels D₁-D_m *in any other way than* by "select[ing them] ... from the digitized signal" as there is no other source for them.

9. Finally, I note that the Patent Owner is trying to play games with the meaning of “selecting” by using my reliance on the extracting done by the demultiplexer 230 in the first mapping to argue that the selector 240 does not do “selecting” because it’s not doing extracting. POR, 47-49. Patent Owner is misusing my deposition testimony from the previous IPRs by pulling it out of context. POR, 48 (citing Ex. 2021, 82:16-18). There I was only explaining why I was relying on the demultiplexer 230 (similar to the first mapping in this proceeding) for performing the selection that was required in the claims of the related patent. Ex. 2021, 76:17-83:23. I was not defining “selecting” to require “extracting.” I was just pointing out that Zhang’s demultiplexer 230 performs extracting just like the ’275 patent. The selector 240 in Zhang of course does “selecting” under the plain and ordinary meaning of the term by picking out channels. Ex. 1088. Zhang even says that selector 240 “selects one or more of the RF channels D_1 to D_m ” and that “digital selector 640 digitally selects one or more RF channels D_1 to D_m .” Ex. 1013, [0028], [0042]. The Patent Owner also admits that the selector 240 performs selecting. POR, 18. Nevertheless, even if element [1E]’s “selecting” required “extracting,” the second mapping still meets it because D_1 - D_m are extracted from the digitized signal as they are simply one or more of C_1 - C_n , which are extracted from the digitized signal.

4. Zhang's demultiplexer 230 in combination with all or part of selector 240 are the claimed "DFE"

10. I note that Patent Owner argues that "Petitioner, however, fails to show why Zhang's Selector 240 discloses a 'digital front end (DFE)' as claimed." POR, 49. However, Petitioner and I never relied on only Zhang's selector 240 for the claimed DFE. Instead, for the second mapping, we relied on the demultiplexer 230 in combination with all or part of the selector 240. This is entirely consistent with the '275 patent, which does not define the DFE or even describe it as requiring any specific structure or prohibiting it from having any specific structure. The '275 patent's specification and figures simply use the term digital front end (DFE) as a label for a box it draws around some of the example digital circuitry situated after its ADC and before its demodulator. *See* Ex. 1001, 3:3-10, 4:25-27, 4:42-43, 5:56-7:20, 9:43-10:38, 10:65-11:3, 11:40-43, 11:56-64, 12:11-19, Figs. 2, 4, 6-7, 9-10. The claims themselves also do not provide any structure to the DFE (besides requiring it to be coupled to the ADC) that would tell a POSITA that the claimed DFE has to be some particular structure. I also note that the term digital front end (DFE) is not a term of art that indicates a specific structure to a POSITA. Even Dr. Russ was not able to provide any specific known structure for a DFE and only relies on the claims, which again do not require any specific structure. Ex. 1089, 108:10-118:13. A POSITA would understand that the term could be used to encompass various digital circuitry in different cases, and in the case of Zhang would have

understood it as optionally including the selector 240. This is especially true given that, as I explained in my first declaration (Ex. 1002, ¶ 137), Zhang even expressly describes its system, including the demultiplexer 230 and selector 240, as a “wide-band front-end[.]” Ex. 1013, [0045]. Therefore, in my opinion, there is no reason that the claimed “DFE” cannot include Zhang’s selector 240 (which is a digital circuit that “digitally selects” channels *before* the demodulator just like the ’275 patent’s DFE (Ex. 1013, [0028], [0038]-[0042], Figs. 2, 6)), and thus no reason that the combination of the demultiplexer 230 with all or part of selector 240 cannot be mapped to the claimed “DFE” as done in the second mapping.

5. Zhang expressly identifies C_1 - C_n as “desired channels” and the number of them to be less than the number of channels received in the digitized signal

11. Zhang expressly refers to C_1 - C_n as “desired RF channels” and repeatedly states that the exact number ‘n’ of selected channels will depend on the specific application. Ex. 1013, ¶¶ [0028], [0030] (stating “the exact number of the elements will depend on the number of RF channels to be demultiplexed” as opposed to depending on the total number of channels in the input signal), [0032]-[0033], [0042]. Also, nothing in paragraph [0032] of Zhang, which discusses how the desired/target channels are separated out, requires that the separated channels to be every channel in the input digitized signal. In my view and that of a POSITA’s, it would defy common sense for Zhang to refer to undesired channels as “desired channels” as Dr. Russ argues.

12. Zhang further states that “ C_1 to C_n contain content channels that are selected or used by a subscriber,” and that each of C_1 - C_n is output for demodulation via D_1 - D_m . Ex. 1013, [0028]-[0029], [0038]-[0039]. Similarly, Zhang’s claim 3 describes channels C_1 - C_n as those comprising data streams “to be accessed or used by a subscriber.” Ex. 1013, claim 3. 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 as Dr. Russ argues. Ex. 2013, ¶¶ 34-38, 50-76.

13. Dr. Russ reads too much into paragraph [0027] of Zhang. A POSITA would have understood that paragraph [0027] does not define ‘n’ as denoting the total number of channels in the entire signal band of the input signal as Dr. Russ argues. Ex. 2013, ¶ 36. Rather, that paragraph is discussing the abilities of the ADC and emphasizing that it must be designed to operate with a sufficient speed so it can convert the entire analog signal. Even Dr. Russ does not dispute that this is the overall point of paragraph [0027] in Zhang. Ex. 1089, 154:15-155:15. Given the context of paragraph [0027] of Zhang, a POSITA would especially not have taken that paragraph as a definition of ‘n’ to be used in setting how many channels C_1 - C_n are going to be demultiplexed.

14. I also note that Zhang’s claims support my opinion that C_1 - C_n are the selected desired channels and not all channels including undesired channels. Ex. 1013, [0048] (Zhang explains that the embodiments should be accorded the widest

scope consistent with the claims). Zhang's claims clearly disclose examples where the number of multiplier-filter chains (and therefore the number of channels C_1 - C_n since each multiplier-filter chain selects one of channels C_1 - C_n) are less than the number of channels in the entire multi-channel RF signal. For example, claim 17 of Zhang recites "one or more low-pass filters (LPF) configured to receive the multi-channel digital RF signal," and claim 21 of Zhang recites that "at least one complex multiplier configured to receive a multi-channel digital RF signal." In each of these examples, the number of channels demultiplexed from a multi-channel digital RF signal can be as few as a single channel (*e.g.*, demultiplexed by "one complex multiplier"). In my view, because these claims recite receiving a multi-channel signal (*i.e.*, a signal with a plurality of channels), but can include a single complex multiplier or filter, a POSITA would have understood that these claims disclose embodiments where C_1 - C_n include less than all channels, and thus exclude undesired channels. Claim 34 is another example that refers to a "plurality of select frequencies" used to demultiplex separate RF channels (*e.g.*, C_1 - C_n) from "at least one multi-channel RF signal." Nothing in Zhang's claim 34 requires the number of channels in the at least one multi-channel RF signal and the separate RF channels to be the same (*i.e.*, the claims do not require C_1 - C_n to include all channels, desired and undesired from the multi-channel RF signal). Further, claim 37 (which depends from claim 34) describes functionality of Zhang's demultiplexer and recites

“filtering undesired RF channels and passing only the target RF channel.” Zhang’s claims instead teach a number of channels in the multi-channel RF signal that is independent from the number of demultiplexer channels C_1 - C_n . Ex. 1013, claims 17, 21, 34. These claims show that C_1 - C_n can include less than all channels and thus exclude undesired channels.

15. In addition, a POSITA would have understood that Zhang discloses that channels C_1 - C_n are not necessarily all channels in the digitized signal from the ADC because (1) ‘n’ is a variable that is only defined as one or more, (2) Zhang uses numerical controlled oscillators (NCOs) designed to provide flexibility to choose the target frequencies, and (3) practical applications of similar wideband television receivers did not have separate circuits for each channel.

16. First, a POSITA would have understood that Zhang is only using ‘n’ as a variable to mean 1 or more and did not define ‘n’ to identify the number of all channels in the input signal. Ex. 1013, [0028]-[0042], [0048] (Zhang explains that a POSITA would understand the variations, alternatives, and equivalents and that the embodiments should be accorded the widest scope consistent with the claims). I note that Patent Owner and Dr. Russ’ only support for their position that Zhang redefined ‘n’ comes from paragraph [0027] of Zhang. POR, 16; Ex. 2013, ¶ 51. But there, Zhang is merely describing that the ADC 220 is capable of digitizing an entire signal band including a number of channels that does not need to be fixed (i.e., is

variable and could be high). A POSITA would have understood that Zhang is not defining 'n' to be the total number of channels, and especially would have recognized that Zhang's paragraph [0027] is not teaching that the alleged definition is to be applied to 'n' throughout Zhang's specification (e.g., where Zhang discloses C1-Cn). The point of using 'n' in Zhang is to disclose the various circumstances (e.g., that C1-Cn can be equal to or less than all channels in the analog signal band) and flexibility of Zhang's architecture (e.g., no set number of multiplier-filter chains). I also opined during my deposition in the previous IPRs that Zhang's architecture is flexible, where 'n' is a variable that can be equal to or less than all channels in the signal band, and the exact number will depend on the specific application. Ex. 2019, 78:2-22, 79:17-80:10, 81:1-20, 83:10-14, 84:11-85:13, 85:24-86:12, 89:5-9. In any event, the disclosure in paragraph [0027] of Zhang is far outweighed by the clear disclosure in the claims (e.g., claim 21) that the number of channels selected by the demultiplexer 230 may be less than all channels in the input signal and Zhang's other disclosures.

17. Second, as I explained during the deposition in the previous IPRs, in the demultiplexer in Figure 3 of Zhang, the purpose of the numeric controlled oscillators 310 is to tune the channel selection to different frequencies so that for a particular application, the user can decide which channels in the frequency band are desired. Ex. 2019, 86:1-12. This would have been understood by a POSITA in view

of Zhang's description of the numeric control oscillators (NCOs) being able to target "select" frequencies. Ex. 1013, [0012], [0030]-[0031]. A POSITA would have understood that Zhang uses well-known NCOs, like the '275 patent (see Ex. 1001, 6:54-62), because it provides flexibility to select desired channels. See Ex. 1089, 95:18-98:4 (Dr. Russ also agreed that NCOs provide this flexibility). Such flexibility is needed when building a television receiver to work in different environments (e.g., in different geographical areas with different television programming and therefore different RF channels) and for different subscribers (e.g., with different subscriptions and different interests in television programming). Had Zhang demultiplexed all channels, programmable frequencies would not have been needed because those frequencies would have been static values, one for every channel in the band. See Ex. 1013, [0007]-[0008], Fig. 1 (where Zhang discusses the problem with prior art that needs one tuner for each of the RF channels in the input signal).

18. Third, the reading of Zhang by Patent Owner and Dr. Russ is unreasonable given practical set top boxes and television receiver architectures at the time of Zhang. For example, a typical television receiver would have circuitry for simultaneously demultiplexing only a few channels (e.g., around 2), as a subscriber/user would only be able to watch a few channels at once anyway. Ex. 1089, 25:16-27:6. As both Zhang and the '275 patent demonstrate, it was known

that television channels are spaced at 6 MHz intervals within non-contiguous portions of a frequency spectrum that includes very high frequencies (VHF) and ultra high frequencies (UHF) (e.g., 300 MHz-3GHz). Ex. 1013, [0006]; Ex. 1001, 2:16-42; Ex. 1086 (U.S. Frequency allocations showing TV channels spaced apart at different frequencies); Ex. 1033, 515-520 (showing example channel allocations). It was also known, at the time of Zhang, that television receivers received over a hundred television channels in the input signal. *See, e.g.*, Ex. 1013 [0042] (Zhang disclosing a possible 630 channels (35 RF channels with 18 content channels each)). A POSITA would have known that a subscriber/user cannot watch over a hundred television channels at once and trying to store that many channels at once would fill up a hard drive quickly. Furthermore, a POSITA would know that (as disclosed by Ex. 1033, 515-520) a typical 750 MHz cable television system at the time had over 100 RF channels (typically with multiple television content channels for each RF channel), even though this example disclosed by Zhang for illustration has only 35 input RF channels starting at 540 MHz. Ex. 1089, 24:18-25:20. A POSITA would have had this background knowledge and would have understood that Zhang's demultiplexer 230 would not have included a multiplier-filter chain for each channel in the input signal. That would have been impractical at least because it would have been unnecessarily expensive and driven up costs and because it would have undesirably increased power consumption and heat. Ex. 1013, [0009], [0028]-

[0029], [0044]; Ex. 1089, 23:5-8, 24:6-17, 37:20-40:13, 103:7-24, 107:7-25, 170:11-171:2, 172:11-25. Zhang would have known this (Ex. 1013, [0008]; Ex. 1089, 170:11-171:2), which explains why he discloses that the number of multiplier-filter chains depends on the number of channels “to be demultiplexed,” as opposed to the total number of RF channels in the analog input signal. Ex. 1013, [0030], [0033]; See Ex. 1089, 91:9-92:9 (likewise Dr. Russ agreed that the number of chains in the ’275 patent depends on the desired channels to be demultiplexed as Zhang discloses and not the total number of RF channels). In other words, Zhang’s ‘n’ in C_1 - C_n can be less than or equal to the number of channels in the RF input spectrum. A POSITA would understand that, although possible, having ‘n’ elements equal to the number of channels on the input is not practical or desired because it is expensive and uses excessive power. Commercial viability of these systems are very sensitive to cost and power as disclosed by Zhang. Ex. 1013, [0009], [0026], [0044], [0047]. Implementing the number of input channels worth of complex multipliers, NCOs, and LPFs elements are wasteful (higher cost and power). Also, in practical systems, the number of usable channels is less than the number of input channels due to several reasons, one of which is non-contiguous (non-used or undesired or unauthorized) channels. Dr. Russ apparently overlooks that Zhang describes that the RF channels “need not be contiguous” and bases his opinions only on the Figure 6 example. Ex. 1089, 185:25-186:20.

6. I repeatedly explained that ‘N’ is a variable less than or equal to the number of channels in the plurality of frequencies.

19. The Patent Owner’s Response cites a single response in my deposition testimony in which I agreed that paragraph 27 of Zhang says ‘n’ channels refers to both desired and undesired channels in the entire signal band from the ADC. POR, 16 (citing Ex. 2019, 78:14-22). I was answering specifically about **just one embodiment** disclosed by Zhang paragraph 27: “**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, [0027], *emphasis added*. The Patent Owner’s Response leaves out that I go on to opine (before and after the portion of my deposition testimony cited in the POR) that Zhang discloses that ‘n’ is a variable that can be equal to or less than all the channels in the signal band. Ex. 2019, 78:2-13, 79:17-80:10, 81:1-20, 83:10-14, 84:11-85:13, 85:24-86:12, 89:5-9. In other words, as I explained in the previous section, a POSITA would have understood that the use of ‘n’ in paragraph 27 does not define ‘n’ to be the total number of channels in the entire input signal for use throughout Zhang’s specification. Instead, a POSITA would have understood that ‘n’ retains its normal meaning as a variable representing an integer value of 1 or more.

20. For example, I clarified that paragraph 42 of Zhang (referring to Figure 6) explains “in a different way [from paragraph 28]” that ‘n’ can be any value up to the total number of channels in the signal band. Ex. 2019, 84:11-86:1; Ex. 1013, ¶¶

[0041]-[0042]. I note that Patent Owner attempts to misuse my most recent deposition testimony about Zhang's Figure 6 by arguing that I agreed that Figure 6 shows an example where the demultiplexer 630 demultiplexes all the RF channels in the input signal. *See* POR, 19-20 (citing Ex. 2022, 44:13-17). However, the Patent Owner conveniently overlooks that I only agreed that was the case "In this specific example." Ex. 2022, 44:13-17. Zhang clearly indicates that Figure 6 is just one example and never even implies that all channels in the input signal must be demultiplexed. In fact, from Zhang's disclosures that Figure 6 is a "specific embodiment" and that "In other embodiments, the signal can be outside [the 540-750 MHz range]," a POSITA would understand that Zhang is describing examples where the demultiplexer is not demultiplexing all RF channels in the range. Ex. 1013, [0041]. This is also further shown by Zhang's use of "e.g." when Zhang discloses "e.g., 35 RF channels C1 to C35" and Zhang's statement that "The exact number will depend on the specific application." Ex. 1013, [0042]. In addition, a POSITA would have understood that by including Figure 2 using 'n' for the number of channels C₁-C_n in contrast to using C₁-C₃₅ in Figure 6, Zhang is disclosing that C₁-C_n is a variable number of channels where 'n' can be "at least one" which includes a plurality and less than or equal to the number of channels in the RF input signal. Ex. 1013, Claims 21, 37 ("filtering undesired RF channels and passing only the target RF channel").

7. To the extent Zhang somehow does not disclose that C_1 - C_n is less than all channels, it would have at least been obvious for C_1 - C_n to exclude the undesired channels based on Zhang alone

21. In my opinion, it would have at least been obvious that channels C_1 - C_n do not include all channels in the input signal for the same reasons that I provided in my first declaration for why it would have been obvious that channels C_1 - C_n are only the non-contiguous channels that a user or subscriber selects or desires. Ex. 1002, ¶¶ 111-113. In particular, a POSITA would have been motivated to design Zhang's demultiplexer 230 to have flexibility to select whichever content channels the user or subscriber desires. As I previously discussed, a POSITA would have also been motivated to only demultiplex channels that a user or subscriber is interested in or subscribed to in order to reduce costs by omitting unnecessary multiplier-filter chains for undesired channels, and therefore C_1 - C_n would have been less than all channels in the analog input signal. Ex. 1002, ¶ 116. In addition, Zhang's demultiplexer 230 would not have targeted channels in the frequencies between the desired television channels C_1 - C_n and therefore C_1 - C_n would not have included all channels in the analog input signal. Ex. 1086 (U.S. Frequency allocations showing TV channels spaced apart at different frequencies); Ex. 1033, 515-520 (showing example channel allocations). I note that neither Patent Owner or Dr. Russ dispute that Zhang's C_1 - C_n are non-contiguous and meet the claimed "wherein the plurality of desired channels are non-contiguous" in element [1B]. Further, at his deposition,

Dr. Russ acknowledged that it was known for television channels to be non-contiguous and that a POSITA would have designed television receivers to select only television channels and not other channels in the input. Ex. 1089, 47:1-50:22, 54:21-57:12, 73:15-23, 75:5-15, 143:20-144:7.

8. Dr. Russ's assertion that Zhang's selector 240 is only needed because C_1 - C_n includes all channels is incorrect

22. Dr. Russ provides the opinion that Zhang's channel selector 240, which selects and outputs channels D_1 - D_m from C_1 - C_n , is only needed because C_1 - C_n includes all channels. Ex. 2013, ¶¶ 38, 64, 69. I disagree with this opinion.

23. Zhang describes that the primary purpose or advantage/benefit of the selector 240 is to improve the user experience by allowing the user to flip through television channels faster, an additional feature as compared with the '275 patent that can be used optionally for fast channel change (not supported by '275) or not (just like '275). Ex. 1013, [0028] ("Channel-search capabilities of the digital selector 240 renders it much faster than traditional analog channel switching through RF tuners."), [0047] ("Moreover, the RF channel search through a digital selector is much faster than traditional analog channel switch through RF tuners."). The selector 240 provides fast channel changing due to its ability to multiplex multiple channels onto a single data bus. This is supported by Zhang's description of the example of the selector 240 shown in Figure 5 (which is labeled as 500): "Because a bus clock is much faster than the channel-sampling rate, each bus can be used by

multiple RF channels with the use of time division multiplexing which occurs before the selected RF channels enter the data buses. Hence, each data bus provides data to multiple demodulators and each output RF signal from a channel demultiplexer (not shown) can be selected to use any data bus.” Ex. 1013, [0039]. By delivering multiple channels to a demodulator at once, the bus selector (within the selector 240/500) makes it possible to deliver television channels to a user/subscriber faster when the user/subscriber flips between channels. A POSITA would have been familiar with other fast channel change methodologies like simultaneously tuning to and demodulating channels that are adjacent to the channel that a user is watching so that the next channel can be delivered quickly when a user presses a channel up or down button, and a POSITA would have understood that Zhang’s selector provides an alternative method to such type of channel change method by using a bus selector that multiplexes multiple channels onto a data bus. Thus, a POSITA would have recognized that Zhang’s selector 240 has 2 different functions: (1) to provide fast channel changing and (2) to reduce the number of channels that are output to demodulators. The POSITA would have also understood that the ability of Zhang’s selector 240 to provide fast channel changing is independent from its ability to reduce the number of channels output to the demodulators. The selector 240 is capable of providing fast channel changing because it can multiplex multiple channels onto a single data bus and it is capable of reducing the number of channels

because it can choose less than all channels to put on a data bus. Even in the case where Zhang's selector 240 selects all channels C₁-C_n, it still provides the benefit of fast channel changing. So, for all these reasons, Dr. Russ is wrong that there is no need for the selector 240 if the demultiplexer 230 only selects desired channels instead of all channels.

24. Although Dr. Russ cites paragraph 28 of Zhang for stating that selector 240 provides fast channel search capabilities, Dr. Russ wrongly uses that statement to support his argument that "Zhang by design extracts more channels from the input signal than are desired." Ex. 2013, ¶ 84 (citing Ex. 1013, [0028]). In fact, as explained above, the fast channel search capabilities show that the selector has a separate utility from selecting only desired channels. Indeed, Dr. Russ's deposition testimony confirms that the selector 240 is for providing fast channel changing because it is able to rapidly switch between channels and does not need to wait for the NCOs to settle to new frequencies when a channel is changed. Ex. 1089, 179:1-180:25. Dr. Russ, however, incorrectly assumes that each NCO would be programmed with a fixed frequency to output all channels (even undesired channels). *Id.* There is no basis for that in Zhang and instead a POSITA would understand the opposite—that Zhang's NCO's are programmable to generate a select frequency to select desired channels C₁-C_n. Ex. 1013, [0012], [0029], [0032], claims 11, 21, and 41.

25. The same benefits Dr. Russ identified for selector 240 switching between allegedly all channels—rapid switching (user pressing channel up or channel down button, for example) and not waiting on the NCOs 310 in the demultiplexer 230 to settle to new frequencies—applies equally where C_1 - C_n includes less than all of the channels in the input, but more channels than the demodulator is capable of decoding at one time. The bottom line is that using Zhang's selector 240 to switch between desired channels is faster than re-setting the NCOs and allowing the signal to settle through the complex mixers and filters.

26. If a user was not authorized to watch a particular channel, there would be no reason to include it in channels C_1 - C_n , and thus it would be an undesired channel. An example of such would be an optional channel that the user did not subscribe to (*e.g.*, HBO) that cable providers at the time charged extra fees for a customer to view. Ex. 1089, 181:19-182:16.

27. By extracting some of the desired and authorized channels C_1 - C_n the user desires to watch at different times, the user is able to quickly switch between these desired channels using selector 240. Just because the user is not capable of watching all desired channels C_1 - C_n at the same time does not mean they are undesired.

9. The prosecution history of Zhang's related EPO application does not appear to be applicable.

28. Dr. Russ further discusses the prosecution history in Zhang's related EPO application that allegedly supports that Zhang's C_1 - C_n include all channels. Ex. 2013, ¶¶ 58-61. Dr. Russ quotes a communication from the EPO, apparently discussing the claims in that case in comparison to prior art references D1 and D2. The exhibits provided by the Patent Owner do not include the related EPO patent application or the prior art that was allegedly being distinguished in that case. Therefore, I cannot determine whether a POSITA would concur with the EPO opinion. I note that Dr. Russ neither recalled reviewing the D1 and D2 references nor even included them in the list of materials he reviewed. Ex. 1089, 18:8-14, 19:5-20, 200:20-201:9. Nevertheless, the discussion in the EPO application references a "selector," and to the extent this refers to selector 240, the discussion would appear to be how selector 240 selecting channels D_1 - D_m is distinguishable over the cited art. As Dr. Russ stated at his deposition, the passage in the EP prosecution simply argues that "Zhang is distinct over the art because it has a selector," and that "prior-art systems don't have a selector, basically." Ex. 1089, 201:2-9. In my view, this is irrelevant since the operation of selector 240 does not affect or provide any indication about what channels are included in C_1 - C_n . Again, the selection in Zhang of C_1 - C_n is accomplished using the capabilities of the channel demultiplexer 230, not the $n \times m$ selector 240.

10. Zhang's channels C_1 - C_n are "select[ed]" according to the plain and ordinary meaning of this term

29. The Patent Owner's Response effectively argues that "*selecting...the plurality of desired channels*" requires ***only*** selecting desired channels *without selecting any undesired channels*. POR, 6-9. I believe this is wrong for a few reasons, including that element [1E] of the '275 patent does not include any limitations about not selecting undesired channels.

30. Dr. Russ misrepresents the '275 patent disclosure. Dr. Russ explains that in Figure 2 of the '275 patent, there is a bank of 'N' mixers for selecting "N desired channels, without selecting any undesired channels." Ex. 2013, ¶ 35 (citing Ex. 1001, 5:56-61, 6:1-11). While Dr. Russ describes one embodiment, he skips over the other embodiments described in the same paragraph in which 'N' is "equal to the number of *all* available channels that exist in the licensed frequency spectrum" or "*all* receivable channels within a geographic area." Ex. 1001, 5:60-6:1, Fig. 2; Ex. 1089, 123:21-130:25 (during his deposition, he admitted to excluding these other embodiments). All channels include the undesired channels shown in Figure 2. *Id.* Thus, just like Zhang as described above, the '275 patent also discloses that the number of output channels can be less than or equal to the number of channels in the input frequency spectrum.

31. A POSITA would have understood that plain and ordinary meaning of "selecting...the plurality of desired channels . . ." includes what each signal path

shown in Figures 2 and 3 in the '275 system does. Each path includes a mixer 250 and filter 260 that picks out one channel from the plurality of frequencies in the digitized RF signal and outputs that channel on its own output path 272. Ex. 1001, 5:53-7:15; Ex. 1089, 85:17-86:12, 167:18-25 (Dr. Russ admits that “The mixer-filter chain disclosed in Zhang picks out a channel in the same way that the mixer-filter chain in the '275 patent picks out a desired channel.”). In the '275 patent, a plurality of desired channels is selected as required by element [1E] as long as two of the paths 272 include desired channels, irrespective of what the other paths include. Ex. 1001, 5:61-66, Fig. 2. This plain and ordinary meaning of “select” is entirely consistent with the '275 patent disclosure. *Id.*

32. Patent Owner’s argument seems to be that if what goes into Zhang’s demultiplexer 230 is the same as what comes out, then nothing was selected. However, this description of C_1 - C_n as the “entire band” is misleading. What goes into Zhang’s demultiplexer is a digitized wide-band signal having a plurality of frequencies including those on which channels C_1 - C_n are modulated. Ex. 1013, ¶ [0032]. What comes out of the demultiplexer is only channels C_1 - C_n , each at baseband and each isolated on its own path, thus enabling the demodulator to decode them. The “entire band” of frequencies that is present at the input is not present at the demultiplexer outputs. Ex. 1013, ¶ [0032].

33. Properly understood, Zhang's demultiplexer 230, which down converts desired channels C_1 - C_n , meets element [1E]. Zhang's demultiplexer 230 receives a digitized wide-band signal having a plurality of frequencies on which channels C_1 - C_n are modulated. Ex. 1013, ¶¶ [0027]-[0028], [0030]-[0032], [0042], claim 8, Figs. 2-3. The demultiplexer 230 outputs only channels C_1 - C_n , each at baseband and each isolated on its own path, thus enabling the demodulator to decode them. The Patent Owner acknowledges this basic point, that each of channels C_1 - C_n is picked out from the plurality of frequencies in the wideband signal. POR, 22-24; Ex. 2013, ¶¶ 63-66, 68. This is "select[ing]" under its plain and ordinary meaning of the term, and is identical to how each path in the '275 patent works to select a channel. Ex. 1088, 4 (definition of select is to "pick out").

11.Zhang's channels C_1 - C_n are the claimed "desired channels" under any reasonable construction

34. For sake of clarity, I reiterate here that I have applied the plain and ordinary meaning of the terms "desired channels" and "undesired channels" in this case. I note that neither Patent Owner nor Dr. Russ has proposed a construction for "desired channels" or "undesired channels." I also note that the '275 patent does not define "desired channels" and instead only uses the term in various examples including: (1) the number 'N' of desired channels can be "all available channels that exist in the licensed frequency spectrum;" and (2) "N can be equal to the number of all receivable channels within a geographic area." *See e.g.*, Ex. 1001, 1:35-58, 2:33-

39, 5:56-6:7. Similarly, the '275 patent does not define “undesired channels,” and instead it simply uses the term in contrast with desired channels (e.g., the undesired channels are the part of the swath of channels that are not the desired channels). Ex. 1001, 1:46-51. Although I have not construed the term “desired channels,” it is my opinion that the plain and ordinary meaning and any reasonable construction would include channels that are selected, used, or accessed by a subscriber, which is how Zhang describes his channels C_1 - C_n . Ex. 1013, [0028], claim 13. Dr. Russ also seems to agree that these examples are included in the plain and ordinary meaning. Ex. 1089, 27:17-28:16, 78:11-81:6. That is, a POSITA would have understood that the channels C_1 - C_n are desired channels because they would correspond to the television channels that a user/subscriber desires to watch or record based on the user’s selection of the television channels with a remote control. On the other hand, a POSITA would have understood that undesired channels include those channels in the swath of channels in the input signal that are not selected by the user/subscriber (e.g., because a user has not chosen to watch or record a corresponding television channel), that are not used by the user/subscriber (e.g., because they are in bands used for other non-television purposes, like aeronautical and/or military uses, that are between the non-contiguous bands used for television), or that are not accessed by the user/subscriber (e.g., because the user has not subscribed to a corresponding television channel such as HBO). Ex. 1001, 1:46-48; Ex. 1086 (U.S. Frequency

allocations showing TV channels spaced apart at different frequencies); Ex. 1033, 515-520 (showing example channel allocations).

35. Further, it is my opinion that even if “desired channels” is construed to require demodulation, Zhang’s channels C1-Cn are demodulated and therefore still meet them. This is easily understood in the situation where $m=n$ (which is one of the embodiments that Zhang discloses), such that the selector 240 selects all of channels C1-Cn for channels D1-Dm. However, a POSITA would have also understood that even when ‘m’ is less than ‘n’ ($m < n$), all of C1-Cn would have been output to demodulators eventually (just not concurrently) in at least some cases. This is because Zhang’s selector 240 is for fast channel changing among an evolving set of channels. Ex. 1013, [0028]-[0029], [0047]. A POSITA would have understood that Zhang’s selector 240 flexibly changes which channels of C1-Cn are selected as D1-Dm for output to the demodulators 250 at a given time, but would eventually output them all based on a subscriber’s selections. For example, a POSITA would understand that in one embodiment Zhang’s channels C1-Cn correspond to all channels that the user is subscribed to (but not all available channels from the cable television provider, such as HBO) and D1-Dm are the channels selected based on a user using a remote control to select television channels to watch, which would eventually (in at least some cases) be each channel he is subscribed to (i.e., all of C1-Cn).

12.Zhang meets element [1F] when channels C_1 - C_n are the claimed “desired channels”

36. I note that Patent Owner and Dr. Russ also argue that Zhang does not meet element [1F] if C_1 - C_n are mapped to the “desired channels.” POR, 35-38; Ex. 2013, ¶¶ 77-86. They basically argue that Zhang does not output the same channels C_1 - C_n that the demultiplexer selects because they say that D_1 - D_m must be fewer channels. First, this argument is wrong because all of C_1 - C_n are clearly output as D_1 - D_m when ‘m’ is equal to ‘n,’ which is disclosed by Zhang. Ex. 1013, [0028], [0042]. The argument also fails when ‘m’ is less than ‘n’ because even then all of C_1 - C_n would have been eventually output as D_1 - D_m , as I explained in the previous section. When ‘m’ is less than ‘n,’ the user may output some or all ‘n’ channels to the demodulator, just not concurrently/simultaneously. Ex. 1013, [0028]-[0029], [0038]-[0039]. So, for example, if the number of “C” channels is 8 ($n=8$) and the number of “D” outputs is 4 ($m=4$), then there are more C channels than there are D outputs, so only four of channels C_1 - C_8 can be output simultaneously. But all of the C channels are still output over time.

37. In addition, I note that Patent Owner and Dr. Russ incorrectly treat channels D_1 - D_m as though they are different from channels C_1 - C_n , but channels D_1 - D_m are channels C_1 - C_n (and there is a one-to-one correspondence when $m=n$). The labels only change as they pass through the selector 240 to reflect the different ways that they are transferred to demodulators 250, but the underlying data for the

channels stays the same. Ex. 1089, 197:15-23 (Dr. Russ also acknowledged that the data for the channels is not modified). Regardless of how channels C_1 - C_n are transferred (e.g., regardless of the number of data buses used for the transfer), channels C_1 - C_n would have all been eventually output to the demodulators, even when $m < n$.

38. I also disagree with Patent Owner's and Dr. Russ' arguments about theoretical happenstance. POR, 37-38; Ex. 2013, ¶¶ 83-85. First, Zhang discloses that selector 240 "selects one or more of the RF channels D1-Dm from one or more of the digital RF channels C1-Cn." Ex. 1013, [0028]. This disclosure includes selecting all of channels C1-Cn for D1-Dm. In addition, just like 'n,' 'm' is also simply a variable representing 1 or more. Zhang does not place a limit on 'm,' except that a POSITA would understand that it would not be greater than 'n.' A POSITA would have understood that Zhang does not require 'm' to be less than 'n.' Thus, 'm' being equal to 'n' is not "theoretical happenstance," but rather one of the expressly disclosed embodiments in Zhang. A POSITA would have understood based on at least Zhang [0028] that using variables 'm' and 'n' is simply a shorthand way for Zhang to expressly disclose a variety of embodiments. For these reasons, it is my opinion that a POSITA would find that Zhang discloses that C1-Cn would (not just could) have been selected for D1-Dm.

[SIGNATURE PAGE FOLLOWS]

13.CONCLUSION

39. All of the statements made in this declaration of my own knowledge are true. All statements made based on information and belief are believed to be true.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: 11/03/2025 By: David B. Lett
David B. Lett