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 IPR2024-00442
Patent 9,825,826

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. 9,825,826 ("the '826 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 of $385 per hour. 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:

- The Board's Institution Decision
- Patent Owner's Response and its accompanying exhibits, including Dr. Russ's Declaration (Ex. 2013)

- All other documents referenced herein

3. THE SET-TOP BOX INDUSTRY

5. Dr. Russ emphasizes that "pennies matter" in designing a new set-top box (STB). Ex. 2013, ¶ 76. I agree that cost was important, but of equal, if not greater, importance was offering customers features and services that they wanted. Our competitors were improving the capabilities of their products, and it was important for Scientific-Atlanta including the acquiring company Cisco Systems (hereafter referred to as "S-A") to be ahead of or at least keep up with the competition and the demands of the market. Different customers, whether it be the cable companies, also known as "multiple system operators (MSOs)," that purchased STBs from S-A, or the cable companies' subscribers who used the STBs in their homes, had different expectations on price and features, and S-A offered a variety of models of STB having different feature sets and price points. A typical MSO would buy several different models of STB to satisfy the needs of different subscribers. It was also understood that the price of a particular component would generally decrease over time, as volume scaled and technology improved.

6. Dr. Russ characterizes the Explorer 4200 as a "basic" STB. Ex. 2013, ¶ 77. The Explorer 4200, which was launched in 2002, had fairly sophisticated features, such as 2-way communication with the headend and a DOCSIS modem

that allowed interactive services and high-speed Internet web browsing. Indeed, the DOCSIS modem allowed the STB to use DOCSIS channels for out-of-band signaling. The Explorer 4200 was offered for sale at the same time as the Explorer 8300, which Dr. Russ characterizes as an "advanced" STB. Different customers (e.g., the MSOs or their subscribers) wanted different features, and a POSITA would have considered it obvious to offer the features that customers want.

4. KONSTANTINOS

7. I disagree with Dr. Russ's assertion that "the multi-channel receiver of Konstantinos can output only a predetermined number of channels that is equal to the number of decoders" and "that the system of Konstantinos only produces as many streams as there are decoders." Ex. 2013, ¶ 87. As I stated in my original Declaration (Ex. 1002, ¶ 158), a POSITA would understand that any number of channel selectors 207A…N may be implemented. While a decoder is needed for each channel that is to be displayed to a subscriber, it is the number of channel selectors 207A-N, not the number of decoders, that determines the number of channels that can be simultaneously output from the multi-channel receiver 200. Indeed, Konstantinos actually says that the output streams from the channel selectors 207A-N "may" be decoded, and a POSITA would understand that this means the selected channels may also not be decoded. Ex. 1010, [0043] ("… each output

stream represents a channel that may be further processed by a decoder (not illustrated).”).

5. MOTIVATION TO COMBINE KAMIENIECKI AND KONSTANTINOS

5.1 KONSTANTINOS ALREADY SOLVES THE PROBLEMS THAT DR. RUSS IDENTIFIES

8. I disagree with Dr. Russ’s assertion that using the Konstantinos ADC in the Kamieniecki STB would have been too difficult for a POSITA. Ex. 2013, ¶¶ 90-97. The problems that Dr. Russ identified were already solved by Konstantinos. For example, Dr. Russ states that “additional power supplies” would be needed. Ex. 2013, ¶ 92. Konstantinos addresses the power requirements by disclosing an interleaved sampling and digitization architecture for its ADC 204. Ex. 1010, [0059]-[0061]. Konstantinos expressly states that its structure “improves significantly on power consumption efficiency because the architecture of ADC 204 allows the use of ADC units to be interleaved that are not pushed at extremes of speed and power consumptions as in the standard design.” Ex. 1010, [0061]. As I stated in my original Declaration, Konstantinos addresses an evolving market that was demanding unrestricted multichannel functionality, and Konstantinos’s multi-channel receiver 200 meets that demand. Ex. 1002, ¶¶ 78-86, 127-132, 149-151. A POSITA would understand this, and would have recognized additional benefits such as faster channel switching and greater efficiency by avoiding multiple individual

tuners. Ex. 1002, ¶¶ 149-151. The power concern that Dr. Russ raises is already addressed in Konstantinos, and would not have deterred a POSITA from making the improvement that Konstantinos teaches. Furthermore, a POSITA would have understood that power supplies could be easily modified or alternatively were commercially available at different power levels (wattages), and increasing the available power in a STB design was as simple as modifying or selecting higher-wattage power supplies. If more power was needed, the POSITA would not feel the need to completely redesign a new power supply from scratch.

9. Dr. Russ also alleges that increased on-chip interference would require additional shielding, citing Konstantinos paragraph [0051]. Ex. 2013, ¶ 93. That cited Konstantinos paragraph describes problems that would arise if "[**c]onventional** digital signal processing selectivity techniques" were used for multi-channel tuning. Ex. 1010, [0051] (emphasis added). The rest of Konstantinos's discussion explains how its ADC is a partitioned time-interleaved ADC that addresses the problems with "conventional" techniques. Ex. 1010, [0052]-[0054]. Konstantinos notes that its use of sub-bands "reduces the signal rates substantially, with overall benefits in power consumption, **reduced interference**, etc.)." Ex. 1010, [0104] (emphasis added). The shielding and interference concern that Dr. Russ raises is already addressed in Konstantinos, and would not have deterred a POSITA from making the improvement that Konstantinos teaches. Furthermore, shielding is often simply a

piece of grounded metal on a circuit board, and adding shielding was not a difficult task for a POSITA, so even if the Konstantinos receiver increases interference and needs extra shielding, that was a problem easily solved by the POSITA.

10. Dr. Russ asserts that Kamieniecki uses the SCTE 55-1 or 55-2 OOB communications standard ("SCTE"), modulated using QPSK (Quadrature Phase Shift Keying), whereas Konstantinos uses the DOCSIS standard, modulated using QAM (Quadrature Amplitude Modulation), and that the combination would require "reprogramming" Konstantinos' receiver to receive QPSK channels in addition to receiving QAM channels. Ex. 2013, ¶¶ 95-96, 56-61. I disagree that any such "reprogramming" would have prevented a POSITA from improving the Kamieniecki STB as taught by Konstantinos, for several reasons. First, Dr. Russ assumes Kamieniecki is limited to SCTE and Konstantinos is limited to DOCSIS, such that a significant "reprogramming" would be needed for their teachings to be combined. Ex. 2013, ¶¶ 94-96, 60-61. This is incorrect - there is nothing in Kamieniecki that limits its OOB channel to using any particular standard (nothing limiting it to SCTE), and nothing in Konstantinos limiting it to DOCSIS. Konstantinos discloses the use of DOCSIS, but only as an example embodiment, and never with any limiting language restricting its receiver to DOCSIS. See, e.g., Ex. 1010, [0114] ("The flow of a receiver according to an embodiment hereof is illustrated in FIG. 9. For cable TV and data applications (**e.g.**, for DOCSIS 3.0 and

for DVB-C) …" (emphasis added)). Second, by the 2011 priority date of the '826 Patent, STBs had long been using the DOCSIS standard for communications. Konstantinos, dated in 2008 (several years before the 2011 priority date of the '826 Patent), already acknowledges that it was known for cable receivers to receive DOCSIS channels. The Explorer 4200, which Dr. Russ characterizes as a "basic" STB, was released in 2002 (nearly a decade before the 2011 priority date of the '826 Patent) and included a DOCSIS modem for its communications. See, e.g., Ex. 1031. Years before the 2011 priority date of the '826 Patent, a POSITA would easily understand that STBs were already using DOCSIS for communications, and those STBs still functioned, so the POSITA already knew about achieving OOB functionality in DOCSIS STBs, and a POSITA would not have been deterred by the "reprogramming" that Dr. Russ describes. And third, as I explained in my Declaration, QPSK modulation is simply one type of QAM. Ex. 1002, ¶ 60. So while "QPSK" and "QAM" may sound different when Dr. Russ mentions them by name, a POSITA would understand that they are actually both forms of QAM (Quadrature Amplitude Modulation), and the "reprogramming" that Dr. Russ alleges would not have prevented the POSITA from making the improvement that Konstantinos teaches.

11. Dr. Russ states that replacing Kamieniecki's tuners with Konstantinos' multi-channel receiver is more difficult than what he did at S-A, and that he would

assign that task to those with advanced degrees or "many more years" of experience. Ex. 2013, ¶ 100. I disagree that this would be necessary. First, as I note above, by the time of the 2011 priority date of the '826 Patent, it was already common practice to use DOCSIS modems in STBs, and a POSITA reviewing Kamieniecki's teachings and Konstantinos's teachings would not have had trouble understanding the obviousness of making the improvement that Konstantinos teaches. The POSITA would have understood that existing STBs already used DOCSIS modems for communications. Second, Konstantinos teaches a much-simplified design of a multichannel receiver as compared to using multiple separate tuners and channel selectors. He teaches "a single IC receiver able to provide unrestricted multi-channel functionality." Ex. 1010, [0016], [0042], [0044], Fig. 2. A POSITA would understand that replacing many components with a single integrated circuit required much less effort and complexity in the design process of a STB and would therefore naturally be motivated to use Konstantinos's teachings to meet the demand for unrestricted multi-channel functionality. Furthermore, the manufacturing process would be much easier to achieve with less components using the Konstantinos single IC. Furthermore, the features of multichannel tuning, processing, and monitoring would be valuable to customers to (1) offer more simultaneous programming content for watching and recording to television service subscribers and (2) to the ability to

monitor many channels simultaneously to allow services providers to optimize system performance and improve system maintenance efficiency.

5.2 DOCSIS

12. At paragraph 103 of his Declaration, Dr. Russ mis-states what I said about DOCSIS. I did not allege that DOCSIS 3.0 required simultaneous tuning *and monitoring* of different channels. I clearly stated that DOCSIS 3.0 would require "the simultaneous reception of at least four channels." Ex. 1002, ¶ 79. I explained that DOCSIS 3.0 introduced the concept of "channel bonding," where in each bonded channel multiple independent channels are combined into one larger data stream, and that this called for cable modems to be able to simultaneously receive at least 4 downstream channels and transmit on at least 4 upstream channels. Ex. 1002, ¶ 90. I cited to corroborating disclosures in Renken (Ex. 1002, ¶¶ 90, 104) and Konstantinos (Ex. 1002, ¶ 130), and I would expect a POSITA to know this basic fact about the well-known standard. I believe Dr. Russ's mis-statement is based on a misreading of what I say in paragraph 149 of my Declaration, in which I state "[a] POSITA would have been motivated to apply Konstantinos' teaching of a multi-channel receiver to the monitoring system of Kamieniecki in order to enable simultaneous tuning and monitoring of larger numbers of channels (e.g., four or more) as required by new cable technologies such as DOCSIS 3.0 and the advent of

cable offerings with up to 100 TV channels." Ex. 1002, ¶ 149. In that statement, I am referring to the *combination* of Konstantinos and Kamieniecki. *Id*.

5.3 DR. RUSS COMPARES THE MODIFICATION'S COST AND COMPLEXITY TO DOING NOTHING

13. Dr. Russ states that the modification taught in Konstantinos would "increase cost and complexity" to the point that a POSITA would not have wanted to use Konstantinos' receiver to improve a STB like Kamieniecki's, and he offers discussion about the costs of developing a STB. Ex. 2013, ¶¶ 104-110. Dr. Russ appears to be comparing the cost and complexity of the improvement to simply doing nothing at all. He does not address the fact that, as Konstantinos teaches, the evolving market was demanding unrestricted multi-channel functionality, or that DOCSIS 3.0 required simultaneous receipt of at least 4 channels. Ex. 1010, [0011], [0016]. Dr. Russ ignores this market demand, and does not identify any alternative that would have met that demand in a cheaper or simpler way than Konstantinos. An exemplary alternative is the one identified in Konstantinos, which involves having many single-channel tuners (as in Kamieniecki) in parallel. Ex. 1010, [0006]. But Konstantinos states, and I agree, that "[a]s the number of simultaneously required streams/channels goes beyond two, the conventional approach becomes completely impractical." Ex. 1010, [0006]. I agree it would be cheaper and simpler to do nothing, but a POSITA would have wanted to address the market demand as

taught in Konstantinos, and would have wanted to follow Konstantinos's teachings and improve the Kamieniecki STB to meet the demands of the evolving market.

5.4 KONSTANTINOS'S PRINCIPLE OF OPERATION

14. In paragraph 118 of his Declaration, Dr. Russ proposes a hypothetical in which Konstantinos' receiver only has four channel selectors to comply with DOCSIS 3.0, and that a DVR might be required to record four programs simultaneously. Ex. 2013, ¶ 118. Dr. Russ argues that this would require "repurposing" a channel selector at odd times. *Id*. I think his hypothetical is mooted by Konstantinos's example, cited above, in which sixteen channel selectors are available. A POSITA, confronted with Dr. Russ's hypothetical, would easily see the solution from the sixteen channel selector example in Konstantinos – four receivers can be used for DOCSIS, four can be used for recording TV shows, and another eight would remain available for other use, such as channel monitoring. This flexibility is part of why I believe a POSITA would have considered it desirable to update Kamieniecki's STB as taught in Konstantinos.

15. Dr. Russ again refers to the cost of having additional selectors. Ex. 2013, ¶ 119. But as I note above, his cost analysis simply ignores the market demand that Konstantinos seeks to address. He has not compared the Konstantinos cost with the cost of any other alternative for addressing the market demand, recognized in Konstantinos, for "unrestricted multi-channel functionality." Ex. 1010, [0016]

(emphasis added). A POSITA would recognize that a successful product needs to keep up with market demands, and supply consumers with the features they want, even if added features require added costs. In fact, at Scientific-Atlanta/Cisco, we were working to implement solutions to address the exact market demand problem described by Konstantinos, namely to increase the number of simultaneous channels that could be received by adding multi-channel functionality while maintaining DOCSIS communications.

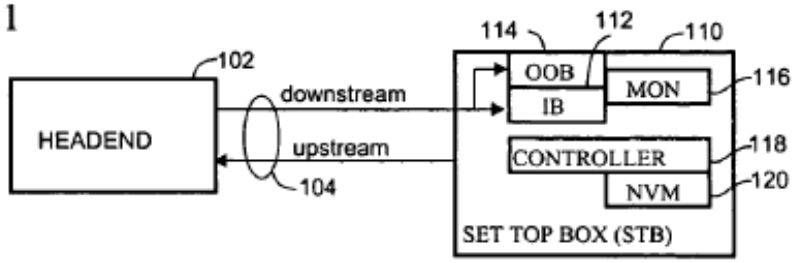
6. THE COMBINATION WOULD NOT BE LIMITED TO ONLY ANALYZING ANALOG SIGNALS

16. Dr. Russ asserts that the combination does not show a signal monitor operable to analyze a digitized signal, and his reasoning is that the monitoring would allegedly be limited to monitoring analog signals, as he alleges that Kamieniecki is limited to analog monitoring. Ex. 2013, ¶¶ 124-131. I disagree for several reasons. First, Kamieniecki does not treat analog differently from digital, and does not limit its monitoring to either. Kamieniecki addresses STBs in digital cable systems (Ex. 1009, [0002]), says that even basic STBs can receive both analog and digital transmissions (Ex. 1009, [0004]), and gives specific examples of digital video standards (Ex. 1009, [0004]). A POSITA would understand that these STBs are able to process both kinds of transmissions, and there's nothing in Kamieniecki to suggest that the STB could process both kinds, but only monitor one kind.

17. Second, in the combination, Konstantinos' multi-channel receiver is used to receive the various RF channels (these would be the analog carrier signals that Dr. Russ discusses), and this receiver includes an analog-to-digital converter (ADC) that produces a digital equivalent to those RF channels. Ex. 1010, [0043] ("The output of LNA/VGA 204 … is digitized in its entirety with an ADC 204."); [0048] ("A composite broadband RF input signal (e.g., a cable TV signal consisting of multiple channels bundled together between 50-1000 MHz) is received from a signal source and digitized as described above. The digitized equivalent of the composite broadband RF signal (left side of FIG. 3) is subsequently split in the frequency domain into a set of sub-signals.") (emphasis added). A POSITA would know that this digital equivalent is, as its name implies, equivalent – it represents the analog signal using digital data. For example, consider an example analog waveform. The signal level (e.g., strength) of that waveform will vary over time, and will have different levels at different times. To produce the digitized version of that waveform, the ADC will produce, for each of the different points in time, digital data representing the level of that waveform at that time. Signal level is one of the qualities that Kamieniecki monitors (e.g., Ex. 1009, [0007]; Pet. 14), and a POSITA would understand determining of this level regardless of whether the signal is analog or digital.

18. Dr. Russ bases his conclusion on the fact that TV channels, including digital TV channels in a digital cable system, are modulated onto analog carrier signals on the coaxial cable. Ex. 2013, ¶ 126. He assumes that these digital TV channels must remain in analog form when they reach the Kamieniecki monitor, but a POSITA would know that, in order to handle digital video (e.g., MPEG, DVB) as Kamieniecki discusses, the STB must have some way of retrieving that digital video from the analog carrier signal. The POSITA would know to do this with a demodulator and an analog-to-digital converter (ADC). Dr. Russ even lists the ADC as his very first "typical" STB component. Ex. 2013, ¶ 62. Kamieniecki's figure does not show the ADC, since Kamieniecki admits that it omits well-known details. Ex. 1009, [0014] ("The transmitter (e.g., modem) and other details of the STB, which are well known to those skilled in the art, are omitted for illustrative clarity."). A POSITA would know that there is an ADC in the STB, and while Dr. Russ argues that an analog signal would be output by the IB/OOB tuner for "further processing," he does not explain why that "further processing" cannot be the processing by the ADC (Ex. 2013, ¶ 128):

FIG. 1



Indeed, a POSITA would recognize that the "further processing" could certainly include the ADC, as it was known that digital signals can be monitored – Konstantinos already states that the digital output of its channel selection can be directly used in an information extraction processor to calculate measurements such as Bit-Error-Rate and other metrics of signal performance per channel or per sub-band, to improve reception quality. Ex. 1010, [0109]. A POSITA would not have limited Kamieniecki's monitoring, in the combination, to just monitoring analog signals, and would have known that it could analyze both analog and digital signals.

19. Dr. Russ refers to my deposition testimony, in which I said that a digital tuner would be a tuner that outputs 1's and 0's. Ex. 2013, ¶ 129. He assumes that I was saying that such a tuner would include a decoder, but that is not what I was saying. When I said that a digital tuner would output 1's and 0's, that would be like the analog tuner that Dr. Russ discusses (Ex. 2013, ¶ 128), outputting a 6MHz analog channel to an ADC that provides a digital equivalent of that analog channel. That analog tuner with its ADC would be an example of a digital tuner. I also note that in the remainder of his paragraph 129 discussion, he argues that the output would not be a "digitized signal" as recited in the claims, but he is not considering the combination. Ex. 2013, ¶ 129. As I noted above, in the combination, the Konstantinos ADC provides the "digitized signal." See also, Ex. 1002, ¶¶ 144-152.

[SIGNATURE PAGE FOLLOWS]

7. CONCLUSION

20. 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: 3/5/2025 By: David B. Lett

David B. Lett