UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Cox Communications, Inc.
Petitioner
v.

Entropic Communications, LLC.
Patent Owner

Inter Partes Review No.
IPR2024-00578

Patent No. 9,825,826
Filing Date: November 23,2015
Issue Date: November 21, 2017

DECLARATION OF DR. JAMES MARTIN

TABLE OF CONTENTS

I. Introduction....3

II. Information Considered....7

III. Obviousness....7

IV. U.S. Patent No. 8,223,826....10

V. Claim Construction....15

VI. Level of Skill in the Art....15

VII. Prior Art....17

A. U.S. Patent No. 8,649,421 to Renken, et al. (Ex. 1005)....17

B. U.S. Patent Publication No. 5,808,671 to Maycock, et al. (Ex. 1006)....26

C. U.S. Patent Publication No. 2010/0253557 to Kidambi, et al. (Ex. 1007)....29

D. U.S. Patent No. 7,394,871 to Zhang, et al. (Ex. 1008)....30

VIII. Motivation to Combine the Prior Art....31

A. Motivation to Combine Maycock with Kidambi and/or Zhang....31

IX. Analysis and Identification of How the Claims are Unpatentable....36

A. Claims 1, 2, 3, 4, 6, 8, and 9 are unpatentable as obvious over Renken in view of the Knowledge of a POSITA....36

B. Ground 2: Claims 1, 2, 3, 4, 6, 8, and 9 are unpatentable as obvious over Maycock in view of Kidambi and further in view of the knowledge of a POSITA....61

C. Ground 3: Claims 1, 2, 3, 4, 6, 8, and 9 are unpatentable as obvious over Maycock in view of Zhang and further in view of the knowledge of a POSITA 86

Petitioner Cox Communications, Inc.
Exhibit 1003 - Page 3 of 92

I, James Martin, declare as follows:

I. Introduction

1. I am an independent consultant. I am over eighteen years of age, and I would otherwise be competent to testify as to the matters set forth herein if I am called upon to do so.

2. I have prepared this Declaration for consideration by the Patent Trial and Appeal Board in the *Inter Partes* Review of U.S. Patent No. 8,223,826 ("the '826 Patent").

3. I provide this Declaration at the request of Cox Communications, Inc. in connection with the above-captioned *Inter Partes* Review. I have been informed and understand that Cox Communications, Inc. contends that claims 1-4, 6, 8, and 9 of the '826 Patent are invalid.

4. I have been asked to provide my opinions regarding: (1) the field of art pertinent to the '826 Patent; (2) the level of ordinary skill in that field of art as of approximately the filing date of the application that yielded the '826 Patent; (3) how a person having such ordinary skill in the art ("POSITA") of the '826 Patent would have understood certain terms used in the claims of the pertinent '826 Patent; (4) how a POSITA of the '826 Patent would have understood the contents of various patents and other art that was publicly available before the priority date of the '826 Patent; (5) whether

any of those documents—alone or in combination with each other and/or the general knowledge of a person of ordinary skill in the art—disclose each and every element of any of the Asserted Claims; and (6) whether the Asserted Claims would have been obvious to one of ordinary skill in the art in light of the references that I considered alone or in combination with each other and/or the general knowledge of a person of ordinary skill in the art.

5. I am being compensated at my standard hourly rate of $350 per hour. My compensation is not dependent on the outcome of, or any issue in relation to, the above captioned *Inter Partes* Review. I have no interest in either party.

6. In forming my opinions, I relied on my own personal knowledge, recollection, and experience in the field and on documents and information referenced in this Declaration.

7. My complete qualifications and professional experience as well as the list of litigation matters in which I have been engaged as an expert over the previous four years are described in my *Curriculum Vitae*, a copy of which can be found in Exhibit 1004. The following is a brief summary of my relevant qualifications and professional experience.

8. I am not an attorney. As shown in my *curriculum vitae*, I have extensive industry experience with telecommunications, including broadband access,

specifically DOCSIS Cable HFC access networks, systems, and services. Specifically, I have over thirty years of relevant industry and academic experience.

9. I divide my background summary into two parts. The first part summarizes my education and relevant work experiences prior to August 2002 when I left the corporate world and entered the academic world. The second part summarizes the academic research and consulting engagements which are relevant for this Declaration. Please refer to my CV for further details. I point out that I contributed to the DOCSIS 3.0/3.1 CableLabs standards as well as the IEEE 802.16 WiMAX standards.

10. I received a B.S. degree in Electrical Engineering from the University of Illinois (Champaign/Urbana) in 1983. My focus was wireless communications. I received an MS in Computer Science from Arizona State University (Tempe, AZ) in 1989. I received a Ph.D. from North Carolina State University (Raleigh, NC) in Electrical Engineering in 1999. My dissertation research involved TCP congestion control. I invented the TCP variant referred to as delay-based TCP congestion control. Aspects of this work, along with aspects of my academic research discussed below, have been foundational to the Cable Industry's relatively recent adoption of delay-based Active Queue Management (AQM) methods such as

CoDel and PIE.

11. My industry employment includes 6 years at Motorola, 2 years at a startup (FileNet), 10 years at IBM, and 2 years at Gartner. At Motorola, I worked on chip set design and embedded system design for military satellite communications (the DAMA program to be specific). At IBM, I worked on R&D topics related to Systems Network Architecture (SNA) networking system. While at IBM, my work generated 3 patents in the 2001-2005 timeframe. At Gartner, I was a telecommunications consultant based out of Raleigh NC. I was also an Adjunct Faculty at N.C. State University. During this time period, I developed a simulation model of the DOCSIS 1.1 protocols.

12. In August of 2002, I joined Clemson University as an Assistant Professor in the Computer Science Department. Much of my research during the 2002-2015 time period explored resource allocation strategies for DOCSIS-based cable access systems. The 2015 publication in IEEE Communications Magazine "DOCSIS 3.1: Scaling broadband cable to Gigabit Speeds", co-authored with leading Industry technical leaders, identified open problems in DOCSIS 3.1. Two that are relevant to this Declaration are: 1) Channel aware packet scheduling taking into account bonded channels and channel profiles; 2) Channel and spectrum analysis/monitoring with Proactive Network Management, and

specifically, how it should be used to autonomically adapt the network based on spectrum issues.

13. The DOCSIS lineage originates from the 'Aloha with reservations' protocol. Academic and industry research in ATM over wireless, which again cemented the duality between DOCSIS cable and wireless, led to the IEEE 802.16 standards (WiMAX). In the 2012 timeframe, I switched my main research focus to wireless. From 2012 through present, my wireless research evolved from WiMAX, to 802.11 and now to 3GPP 5G/6G. The majority of my ideas and research in wireless involves methods for monitoring and characterizing channels. I have numerous papers that present ideas I have developed related to wireless system optimization and spectrum sharing.

II. Information Considered

14. I have considered the following documents:

a. The '826 Patent (Ex. 1001);

b. The prosecution history of the '826 Patent (Ex. 1002); and

c. The other materials cited in my declaration.

III. Obviousness

15. I have been informed and understand that a claim is obvious in light of the prior art if the difference or differences between the claimed subject matter

and the prior art are such that the subject matter as a whole would have been obvious, at the time the invention was made, to a person having ordinary skill in the art. I have been informed and understand that the Supreme Court provided an outline for analyzing obviousness in which it rejected an earlier test in favor of an "expansive and flexible approach" using "common sense." I have also been informed and understand that the Supreme Court explained that under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed. I have also been informed and understand that the Supreme Court explained that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." I further have been informed and understand that the Court pointed to other factors that may show obviousness. These factors include the following principles:

a. combination that unites old elements with no change in their respective functions is unpatentable. As a result, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results,
b. a predictable variation of a work in the same or a different field of

endeavor is likely obvious if a person of ordinary skill would be able to implement the variation,

c. an invention is obvious if it is the use of a known technique to improve a similar device in the same way, unless the actual application of the technique would have been beyond the skill of the person of ordinary skill in the art. In this case, a key inquiry is whether the improvement is more than the predictable use of prior art elements according to their established functions,

d. an invention is obvious if there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims,

e. inventions that were "obvious to try" — chosen from a finite number of identified, predictable solutions, with a reasonable expectation of success — are likely obvious,

f. known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable toone of ordinary skill in the art, and

g. an explicit teaching, suggestion, or motivation in the art to

combine references, while not a requirement for a finding of obviousness, remains "a helpful insight" upon which a finding of obviousness may be based.

IV. U.S. Patent No. 8,223,826

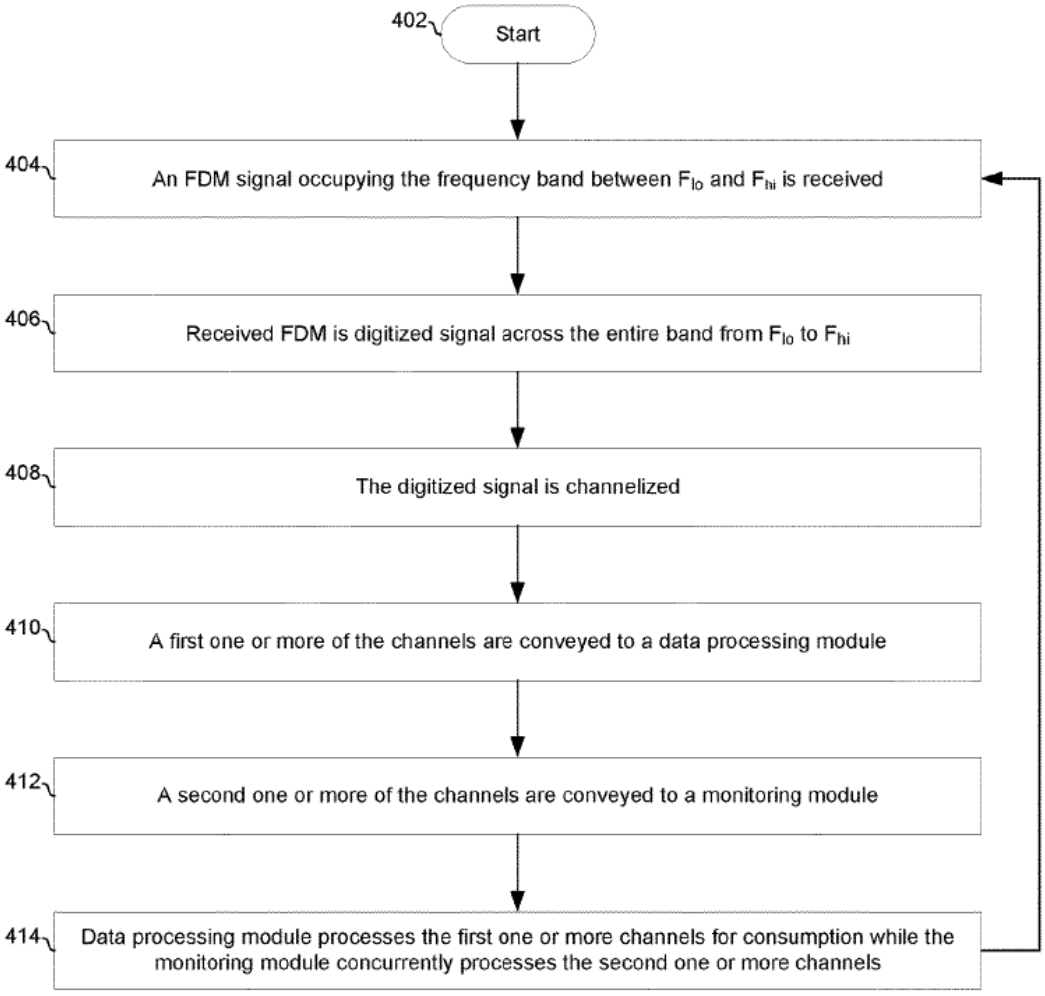
16. I have been informed that the earliest priority date to which the Patent Owner may claim the '826 Patent is entitled to is September 8, 2011.

17. The '826 Patent relates generally to signal processing and in particular to spectrum monitoring. Ex. 1001, 1:37-40. The '826 Patent states, "Network-based services can become unacceptable if network parameters fall outside of those for which receivers in the network were designed." *Id.,* 1:44-46. And the '826 Patent provides examples of these parameters: "the number of channels on the plant, the types of channels, the signal levels of those channels. . . ." *Id.,* 1:46-50. The '826 says that it is solving these alleged problems by utilizing a system and method for spectrum monitoring. *Id.,* 1:63-64.

18. The system and processes that the '826 Patent describes were all conventional in 2011. For example, the '826 Patent describes a conventional process in which a headend receives television signals and data. Ex. 1001, 2:55-57. Two modulators, a video modulator and a CMTS, modulate the television signals and data, respectively, onto carriers. Ex. 1001, 2:59-62. The outputs are then

combined, which "result[s] in a frequency division multiplexed (FDM) signal comprising one or more television channels and/or one or more DOCSIS channels." Ex. 1001, 2:55-56.

19. The '826 patent sets out an example process for spectrum monitoring at the customer's premises, which receives the FDM signal:



Ex. 1001, Fig. 4.

20. In the example process shown in Figure 4, the receiver circuit 150a, 150b of a gateway 120a, 120b at a customer's premise receives "a frequency division multiplexed (FDM) signal comprising one or more channels (e.g., satellite television channels, cable television channels, and/or DOCSIS channels) occupying a frequency band between F_{lo} and F_{hi}." Ex. 1001, 6:39-43. The patent continues: "the received FDM signal is digitized across the full band from F_{lo} and F_{hi}." *Id.,* 6:43-44. Then, "the digitized signal is channelized into one or more bands" and "a first one or more of the bands are conveyed to a data processing module." *Id.,* 6:44-47. "[A] second one or more of the bands are output to a monitoring module." *Id.,* 6:47-48. "[T]he data processing module processes one or more of the first one or more bands to recover data on those bands." *Id.,* 6:47-48. "[T]he monitoring module concurrently processes the second one or more bands to determine characteristics of all or a portion of the frequency band from F_{lo} and F_{hi}." *Id.,* 6:51-53.

21. The '826 Patent provides a list of example characteristics,

> signal power level vs. frequency, delay vs. frequency, phase shift vs. frequency, type and/or amount of modulation, code rate, interference levels, signal to noise ratio, a transfer function of the channel of over which the signal was received, an impulse response of the channel over which the signal was received, and/or any other characteristic

> that may help assess characteristics of the channel over which the signal was received, assess characteristics of the transmitter that sent the signal and/or any otherwise be pertinent to performance of the communication system.

Id., 3:45-57. The monitoring module "may control the transmission of network management/maintenance messages by the device 150. Such message may comprise, for example, network status updates indicating whether one or more communication parameters of one or more received television or DOCSIS channels are outside acceptable bounds. . . ." *Id.,* 3:63-67.

22. The '826 Patent further describes that gateways 120a and 120b may then transmit the messages to the CMTS 114. Ex. 1001, 3:4-6. Once received, "[t]he CMTS 114 may process the messages and, in an example embodiment, adjust transmission parameters (e.g., modulation parameters, transmit power, frequency offsets, etc.) and/or perform other maintenance/management based on the received messages." *Id.,* 3:11-15.

23. The '826 Patent includes 2 independent claims and 16 dependent claims. I have been informed that a dependent claim includes all of the limitation of an independent claim and is narrower in scope than an independent claim. Of the claims of the '826 Patent, claims 1, 2, 3, 4, 6, 8, and 9 are addressed in my declaration.

24. Claim 1 recites:

> **[pre]** A method comprising:
> **[a]** performing by one or more circuits of a receiver coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network:
> **[b]** receiving, via said HFC network, a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels;
> **[c]** digitizing said received signal to generate a digitized signal;
> **[d]** selecting a first portion of said digitized signal;
> **[e]** selecting a second portion of said digitized signal;
> **[f]** processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;
> **[g]** analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and
> **[h]** controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages.

25. Dependent claim 2 recites "wherein said network management messages indicate whether a parameter is outside of acceptable bounds." Claims 3, 4, 6, and 8 recite various example parameters or characteristics. And claim 9 recites "configuring, by said one or more circuits, a bandwidth and/or center

frequency of said selected first portion of said digitized signal."

26. I reviewed the prosecution history of the '826 Patent and did not identify anything that affected my opinion. The claims were amended to overcome a rejection, but the Applicant did not explain the amendment. The claims were then allowed, again without any explanation. *See,* Ex. 1002, pp. 25, 39.

V. Claim Construction

27. I have been informed and understand that in an *inter partes* review claim terms are construed according to their ordinary and customary meaning as understood by one of ordinary skill in the art in view of the specification and the prosecution history of the patent.

28. In my opinion the claims of the '826 Patent use terms that have ordinary and customary meanings in the art and do not use these terms inconsistently with those ordinary and customary meanings. Therefore, it is my opinion that no terms need explicit construction.

VI. Level of Skill in the Art

29. I am informed and understand that a person of ordinary skill in the art is a hypothetical person presumed to have known the relevant art at the time of the alleged invention. I am informed and understand that factors that may be considered in determining the level of ordinary skill in the art may include: (A)

the type of problems encountered in the art; (B) prior art solutions to those problems; (C) the rapidity with which innovations are made; (D) the sophistication of the technology; and (E) the educational level of active workers in the field.

30. Upon consideration, in my opinion, a person of ordinary skill in the art is someone with at least: i) a Bachelor of Science in electrical engineering or an equivalent subject and three or more years of experience working in the field of cable and/or satellite signal processing and communication systems; ii) a Master's in electrical engineering or an equivalent subject and one or more years of experience working in the field of cable and/or satellite television signal processing and communication systems; or iii) a Ph.D. in electrical engineering or an equivalent subject and at least some experience working in the field of cable and/or satellite television signal processing and/or communication systems.

31. Additional education may substitute for professional experience, and significant work experience may substitute for formal education. Such academic and industry experience would be necessary to appreciate what was obvious and/or anticipated in the industry and what a POSITA would have thought and understood at the time.

32. As of the relevant time frame for the '826 Patent, I possessed at least

such experience and knowledge of a POSITA; hence, I am qualified to opine on the ’826 Patent.

VII. Prior Art

A. U.S. Patent No. 8,649,421 to Renken, et al. (Ex. 1005)

33. Renken is a U.S. Patent. It is entitled “Cable Modem for Network Measurements.” I am informed that the Renken patent is prior art to the ’826 Patent.

34. Renken describes and provides a solution to the same problem that is described in the ’826 Patent—how to remotely monitor video signals in a cable network. Ex. 1005, 1:14-17 (Renken describes “systems, methods and devices for monitoring cable networks, and in particular to monitoring cable networks using measurement capable cable modems.”). Specifically, Renken describes using “intrinsic capabilities of DOCSIS(R) 3.0 compatible cable modems” (*id*., 4:13-17) to create “an economical network monitoring system and method.” *Id.,* 4:4-6.

35. In the system that Renken describes, the HFC network 1 sends cable TV (analog and digital) signals as well as data signals to a customer’s premises. Ex. 1005, 7:42-47; Fig. 1. “[D]ata services are provided using a DOCSIS transceiver 3, which is commonly referred to as a Cable Modem Termination System (CMTS).” *Id.,* 7:48-51. “TV services are provided using CATV

transmitters 129, which may include digital TV (DTV) transmitters and analog TV transmitters." *Id.,* 7:53-55. The CMTS and CATV transmitters are both located at the network operator's headend 5. *Id*., Fig. 1, 7:51-54. "Cable modems perform [] network tests using currently idle receivers or transmitters while continuing to provide data services for the subscriber with the remaining transmitters and receivers." *Id.,* 7:16-19. The Renken Patent refers to cable modems that provide "active and/or passive network measurements while simultaneously supporting customer services, and which include suitable measurement control means" as measurement-capable modems (MCCMs). *Id.,* 7:36-41. The following Figures illustrate a high-level view of the system described in Renken:

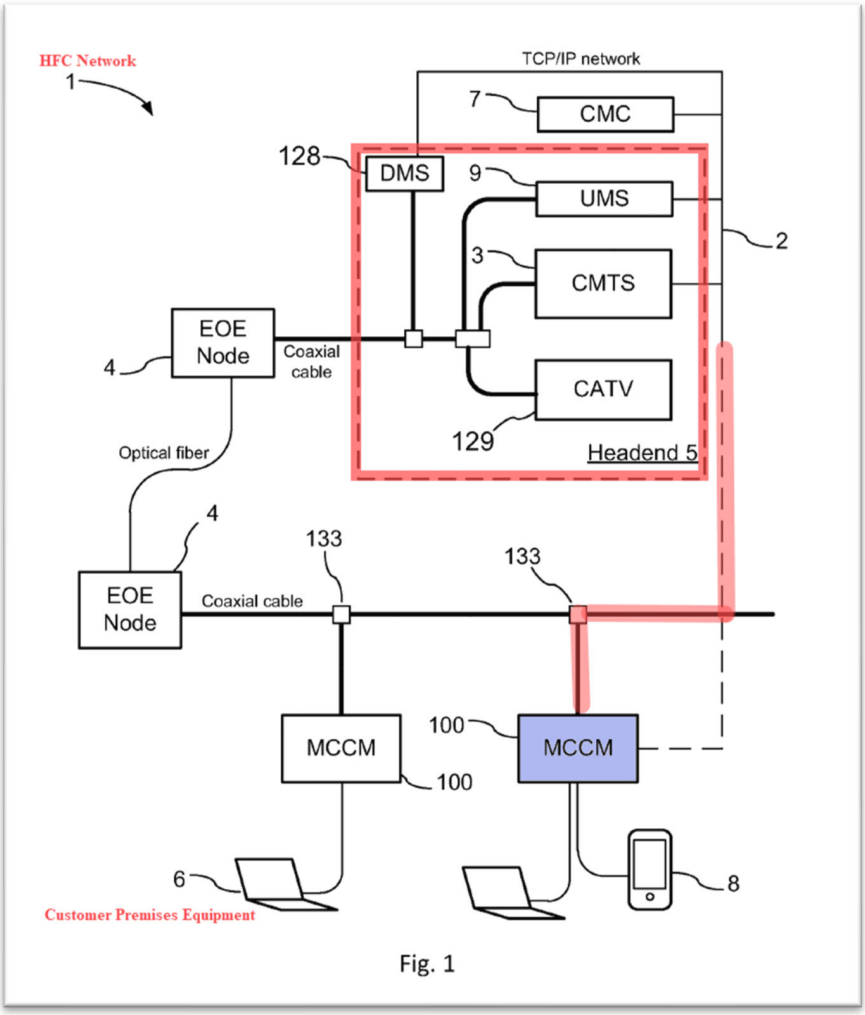


Fig. 1

Ex. 1005, Fig. 1 (annotated).

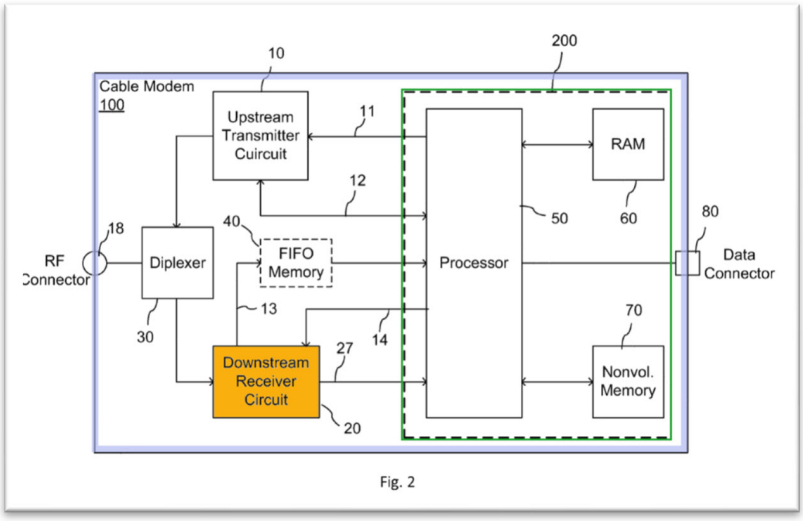


Fig. 2

Ex. 1005, Fig. 2 (annotated).

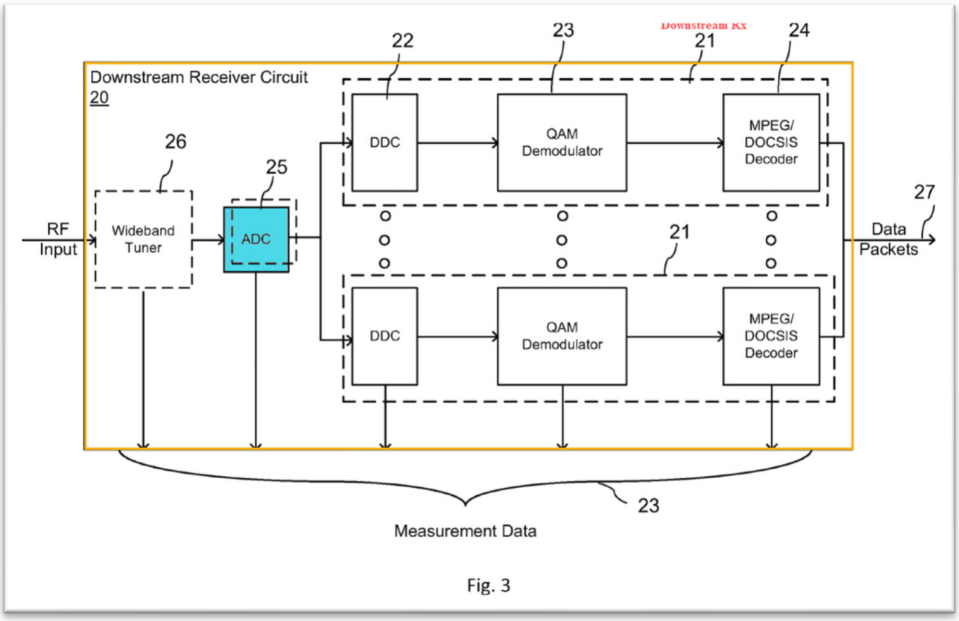


Fig. 3

Ex. 1005, Fig. 3 (annotated).

36. "The MCCM 100 transforms digital data transmitted over RF to one or more data interfaces, such as Ethernet, USB, and others as known in the art."

Ex. 1005, 9:24-27. "[T]he MCCM 100 includes a cable port 18 in the form of an RF cable connector for connecting to a cable network, and a data port 80 for connecting to CPE 6 for providing customer services." *Id.,* 7:30-34.

37. Further, the MCCM routes the signals to the downstream receiver circuit which digitizes the received signals from the CMTS and/or CATV. 9:19-60, 11:19-40, Figs. 2-3. The MCCM is able to provide more downstream throughput than the customer premises equipment ("CPE") requires, thus rendering one or more of the receivers 21 idle and available for downstream measurements. *See, Id.,* 11:8-11. "Since each of the receivers 21 is tunable in frequency and adjustable in modulation format it can accept, an idle receiver 21 may be used to perform measurements on signals other than those participating in the DOCSIS connection, including analog and digital TV signals, by tuning the idle receiver 21 to a desired central wavelength." Ex. 1005, 11:12-18.

38. "[T]he DDC 22 of any idle receiver 21, i.e. the receiver 21 that is not currently in use by the MCCM 100 for receiving customer-directed data, may be used to perform various measurements." Ex. 1005, 12:38-41. The output of the DDC is demodulated into digital data for a particular channel. *Id.,* 12:49-52. Further, measurements may be taken in the downstream receiver circuit without interrupting normal operation and messages that include information about the

measurements can be queried by and are sent to the measurement controller 300 at the headend. Ex. 1005, 10:56-11:18, 12:38-13:38.

39. I understand that before filing the Renken Patent, Renken filed what is known as a provisional patent application. Ex. 1010. I have been informed that in order for the Petition to rely on the filing date of the Renken provisional application, the provisional must disclose the portions on which I rely in this declaration and on which the Petition relies, and the provisional must also provide written support that would allow a POSITA to make or use whatever is claimed in at least one of the claims in the Renken patent. I believe the Renken Patent is entitled to rely on the filing date of the Renken Provisional. *First,* Renken's provisional discloses the portions of the Renken Patent on which I rely. *Compare* Ex. 1005 Figs. 2, 3, 7, 8, 17 and associated discussion with Ex. 1010, Figs. on pp. 3, 4, 7, 8, 10 and associated discussion. *Second*, the Renken Provisional, Ex. 1010 provides sufficient written support for at least claim 1 of Renken's Patent, Ex. 1005, as I demonstrate in the following table:

Renken Patent, Ex. 1005	**Renken Provisional, Ex. 1010**
1. A measurement-capable cable modem (MCCM) comprising:	"In the preferred embodiment of this invention, subscriber modems are configured with software providing these extra measurement capabilities." Ex. 1010., p. 1.
a cable port for connecting to a cable network;	"Multiple MCCMs working together, as directed by the CMC, could detect

	that there is a problem with one or more non-DOCSIS channels in one part of the cable network." *Id*., p. 13. *See* "Fig. 1 Cable Modem Block Diagram Description" – "RF Connector" *Id*., p. 3.
a data port for connecting to a customer premises equipment (CPE) for providing customer services;	*See* "Fig. 1 Cable Modem Block Diagram Description" – "Data Connector" *Id*.
a plurality of transmitters coupled to the cable port for transmitting upstream digital communication signals from the CPE over one or more upstream channels of the cable network;	*See* "Fig. 1 Cable Modem Block Diagram Description" – "Upstream Transmitter" bank. *Id*. As the dashed lines indicate optional elements, here one upstream transmitter is required; however, additional upstream transmitters may be included to improve effectiveness. *Id*., p. 3. "A DOCS IS 3.0 compliant modem will have the ability to transmit at multiple frequencies. If a transmitter is not currently being used by the CM for data transmit, it can be used to perform sweep style measurements to the headend. The measurement program would have the ability to configure the transmitters for various types of transmissions so as to perform upstream tests. Use of spare upstream transmitters would facilitate tests[.]" Ex.1010, p. 4.
a plurality of receivers coupled to the cable port for receiving downstream digital communication signals over one or more downstream channels of the	*See* "Fig. 1 Cable Modem Block Diagram Description" – "Downstream Receiver" bank Ex. 1010, p. 3.

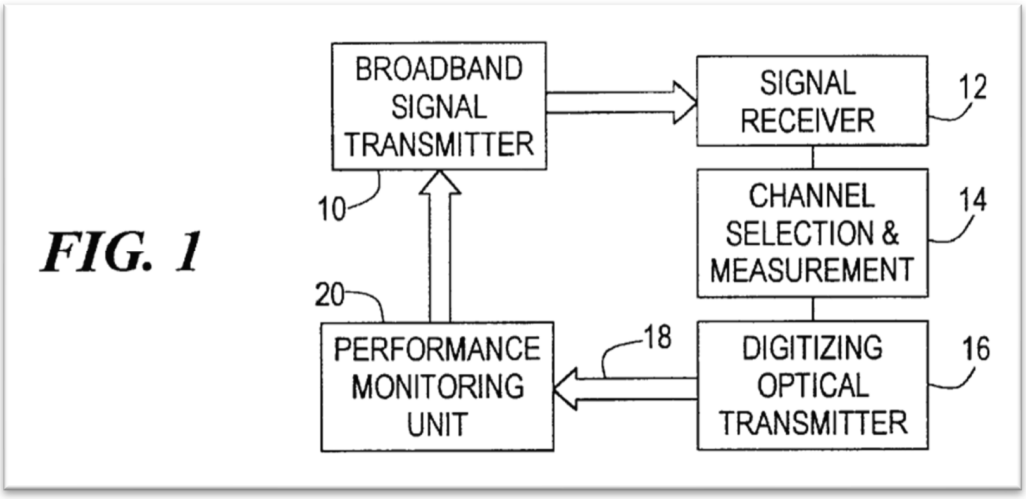
cable network for communicating to the CPE; and,	*See Id*., Fig. 2; p. 4. "The CM has one or more downstream receivers, each capable of demodulating one or more downstream channels. Note that DOCSIS 3.0 currently specifies that up to eight downstreams could be present as the bonded DOCSIS channel group and that as we go forward with future DOCSIS specifications, it looks like the number of bonded channels will only increase. A DOCSIS 3.0 downstream receiver is typically made up of the following components:" *Id*.
a modem controller coupled to the transmitters and the receivers for controlling thereof, wherein the modem controller is configured for tunably allocating at least one of the receivers and at least one of the transmitters for data communications between the cable network and the CPE, while leaving at least another one of the receivers as a currently idle receiver that is not allocated for the data communications, or leaving at least another one of the transmitters as a currently idle transmitter that is not allocated for the data communications;	"The wideband tuner allows the CM to tune to a group of channels. Depending on the implementation, a tuner's bandwidth could be as narrow as 6 MHz or as wide as 1 GHz. The input into the tuner is analog RF data from the diplexer cutoff frequency to approximately 1 GHz. It converts RF signals at a band of frequencies to corresponding frequencies centered at an intermediate frequency (IF). A tuner is optional because all tuning processes can be performed purely digitally using one or more ADCs and DDCs. The tuner could be queried or use the FIFO to gather data for the following measurements: Level[,] Spectrum style measurements[,] Downstream frequency response[.]" *Id*., pp. 4-5. "The cable modem examines its hardware configuration to determine how many downstream receivers are

	not being used. If at least one downstream receiver is idle, then the cable modem has resources available for measurement of non-DOC SIS downstream channels." *Id*., p. 12. *See, e.g. Id*., p. 11 (Steps 1-6 disclosing how a central measurement controller (CMC) is initialized, the MCCM establishes a DOCSIS connection to the CMTS. The MCCM determines how many idle receivers are available to take measurements, the MCCM sends a measurement capable list to the CMC – which generates a measurement plan, the MCCM receives the measurement plan, performs the measurements, and sends the results to the CMC).
wherein the modem controller further comprises a measurement controller for utilizing the currently idle receiver or the currently idle transmitter to perform a network measurement.	*See, e.g. Id*., p. 11 (Steps 1-6 disclosing how a central measurement controller (CMC) is initialized, the MCCM establishes a DOCSIS connection to the CMTS. The MCCM determines how many idle receivers are available to take measurements, the MCCM sends a measurement capable list to the CMC – which generates a measurement plan, the MCCM receives the measurement plan, performs the measurements, and sends the results to the CMC). "**Digital Measurement Capabilities** - These measurement capabilities are available if at least one downstream receiver is idle and if the cable modem hardware and measurement software

	can support the necessary requirements to accomplish them….**Digital Signal Type Capabilities** - These capabilities indicate what types of digital signals can be measured by the cable modem … Once the MCCM has constructed its measurement capability list, it sends it to the CMC so that the CMC can generate an appropriate measurement plan for the modem." *Id*., p. 12. "Instead of using measurement capability lists, the CMC could construct an arbitrary measurement plan and send it to all or some MCCMs in the network. It would then be up to the MCCMs to verify that they have the required resources available to perform the requested measurement before actually performing the measurement. Some level of resource availability verification would probably always need to be run on the MCCM because at any time the CMTS could change the channel bonding group for load balancing activities" *Id*., p. 13.

B. U.S. Patent Publication No. 5,808,671 to Maycock, et al. (Ex. 1006)

40. I understand that Maycock is prior art to the '826 Patent. Maycock addresses and solves the same problem as the '826 patent—how to remotely monitor video signals. Ex. 1006, Title, Abstract, 1:6-9, 2:20-23.



Ex. 1006, Fig. 1

41. In Maycock's system, received broadband video signals are processed by channel selector 14, labeled in Figure 1 as "channel selection & measurement," which measures parameters of the signals and then selects a channel for further analysis. Ex. 1006, 3:9-16, 3:30-50. A selected channel is transmitted to performance monitoring unit 20, which performs the functionality described below with respect to Figure 3.

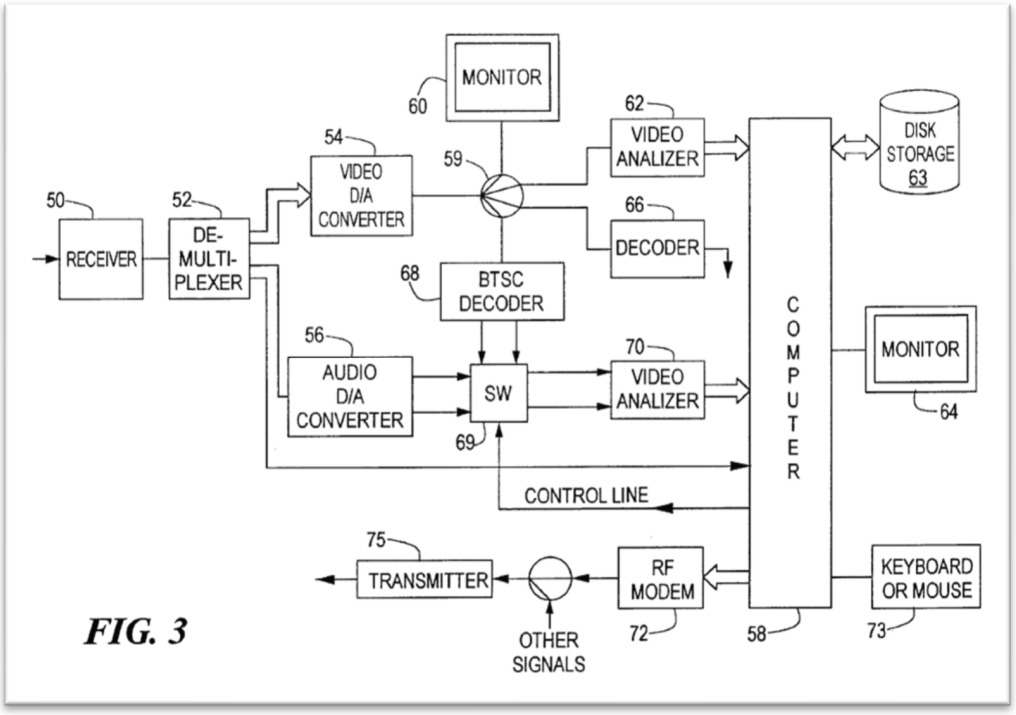


FIG. 3

Ex. 1006, Fig. 3.

42. At monitoring unit 20, Maycock explains that a digitized signal is received at receiver 50. Ex. 1006, 5:65-6:7. Receiver 50 outputs the digitized signal to demultiplexer 52, where it separates the digitized signal into three outputs and sends those outputs to computer 58, video digital-to-analog converter 54, and audio digital-to-analog converter 56. Ex. 1006, 6:2-7. The video portion of demultiplexer's 52 output is analyzed—to measure signal quality parameters—at video analyzer 62 and is decoded to demodulate information contained in the video signal. Ex. 1006, 6:24-29, 6:38-43. Similarly, the audio portion of the output from demultiplexer 52 is analyzed at [audio] analyzer 70 and decoded at BTSC decoder

68 to process the audio for stereo output. Ex. 1006, 6:45-60. Computer 58 operates both to store measured information and to monitor information output from demultiplexer 52. Ex. 1006, 6:2-7, 6:62-67, 7:21- 35.

43. Maycock's monitoring system can be used "with suitable modification, for compressed digital signals of the future and satellite frequency modulated signals in both analog." Ex. 1006, 2:37-46; *see also Id*., Abstract.

C. U.S. Patent Publication No. 2010/0253557 to Kidambi, et al. (Ex. 1007)

44. I understand that Kidambi is prior art to the '826 Patent. Kidambi teaches digitizing an entire bandwidth of an incoming television system at a set-top box prior to performing error correction. Ex. 1007, [0082]-[0084]. To do so, Kidambi teaches using a specialized wideband ADC called an M-channel time-interleaved analog-to-digital converter (MCTIADC) and then correcting offset, gain, and timing errors in the digital signal. Ex. 1007, Title, Abstract, [0005].

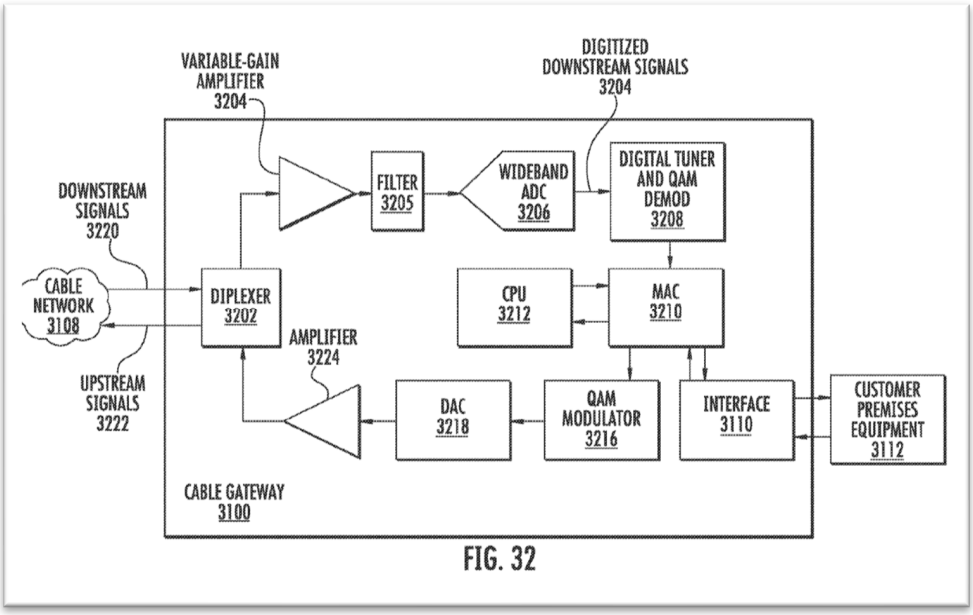


FIG. 32

Ex. 1007, Fig. 32.

45. Kidambi's Figure 32 depicts cable gateway 3100 using a wideband, multi-channel, time-interleaved, analog-to-digital converter 3206 to digitize signals (*e.g.*, all of the signals) received from cable network 3108. Ex. 1007, [0084]. Kidambi emphasizes that the entire received bandwidth is digitized, so that the system can tune to multiple channels in the digital domain rather than in the analog domain. Ex. 1007, [0082], [0084].

46. Kidambi expressly described the benefits of simultaneously digitizing multiple channels instead of single-channel digitization. Ex. 1007, [0082].

D. U.S. Patent No. 7,394,871 to Zhang, et al. (Ex. 1008)

47. I understand that Zhang is prior art to the '826 Patent., Zhang

discloses systems and methods to process broadband signals. Ex. 1008, 1:28-30. 3:15-18. Zhang teaches wideband digitization, including allowing simultaneous reception of multiple content streams while enabling wideband return communications in satellite and cable systems. Ex. 1008, 6:52-61. Zhang also explains that conventional systems with one analog tuner per RF channel results in "the cost, power consumption, and complexity go[ing] up as the required number of RF channels goes up." Ex. 1008, 1:66-2:2. Zhang then describes an improved system with a wideband ADC converter to digitize multiple channels at once. Ex. 1008, 6:38-61.

VIII. Motivation to Combine the Prior Art

A. Motivation to Combine Maycock with Kidambi and/or Zhang

48. It is my opinion that a POSITA would have been motivated to combine the teachings of Maycock with Kidambi and/or Zhang for at least the following reasons.

49. Maycock is analogous art to the '826 Patent. Both systems monitor television signals and also help ensure that quality television/data services are provided to their customers. *See, e.g.,* Ex. 1001, Abstract, 1:44-60; Ex. 1006, 1:31-44, 2:20-29, 3:2-16, 7:21-25, 7:41-53.

50. Maycock teaches monitoring one channel at a time, while expressly

recommending performing multiple, successive signal monitoring processes to collect data for multiple television channels. Ex. 1006, 7:27-29, 8:1-25. Further, Maycock teaches or at least suggests that the base system may be digital. Specifically, Maycock discloses using an analog-to-digital converter 38 to convert a selected channel for digitization before monitoring the signal "so as not to degrade the performance of the received signal." Ex. 1006, 4:28-30. Further, Maycock's system may be used "*with suitable modification*, *for compressed digital signals of the future* and satellite frequency modulated signals in both analog and digital formats." *Id*., 2:41-46 (emphasis added). A POSITA would have been aware of and recognized that federal discussions surrounding the transfer from analog TV to Digital Television (DTV) indicated that DTV, with digital tuners and digital modems, was the future of cable TV/Internet technology.[1] In my opinion, a POSITA would have also recognized that digitizing an analog process, as Maycock suggests, was well-known at the time of the alleged invention. Maycock teaches everything in the '826 Patent, but to the extent the Maycock is found lacking, one

[1] A general example of the federal mandate to transfer from analog to digital tv can be found here:

transition.fcc.gov/Bureaus/Mass_Media/Notices/fcc95315.html#Footnote 4.

of skill in the art would have turned to Kidambi and/or Zhang.

Kidambi:

51. In my opinion, there is a motivation in Maycock or in the knowledge of one of skill in the art at the time to expedite data sampling. Maycock suggests that the port-to-port sampling of analog inputs would be expedited if the analog signals are individually converted into digital data where a microprocessor controls port-to-port sampling, using a digital multiplexer for fast switching between different inputs. Ex. 1006, 5:10-22. Further, in my opinion, a POSITA would recognize that Maycock teaches that a non-analog solution to monitoring signals would improve signal quality. *Id*., 2:41-46 ("Also, the present apparatus may be used with amplitude modulated vestigial side band signals (i.e. the normal CATV format) and, with suitable modification, for compressed digital signals of the future and satellite frequency modulated signals in both analog and digital formats.").

52. Kidambi is in the same field of endeavor, i.e., processing cable systems' signals, and is a reference that one of skill in the art who is looking at Maycock would turn to. Specifically, Maycock and Kidambi both disclose systems for transmitting and receiving television signals. *See, e.g*. Ex. 1006, 4:1-6; Ex. 1007, ¶83.

53. Kidambi teaches the need for wideband digitization (e.g., digitizing

many channels simultaneously even though it requires a "very high sampling rate." Ex. 1007, [0082]-[0084]). Kidambi details digitization using a wideband ADC 3206. Ex. 1007, [0084], Fig. 32. While Kidambi's measurements/monitoring may occur in an apparatus different from Maycock, Maycock teaches general measurements and monitoring activities that were well-known years prior to the alleged invention and could be utilized in different types of apparatus.

54. Further, Maycock recognizes certain major challenges associated with monitoring cable network received and transmitted signals, such as system cost and complexity. Ex. 1006, 1:52-55, 2:5-8. Those same challenges are also recognized in Kidambi. Ex. 1007, [0082] (Kidambi discloses that instead of the cost and complexity surrounding having a tuner for each channel the Kidambi system can digitize the entire bandwidth of the cable system – then as more channels are added to the system, "the incremental cost for each additional channel is relatively low and should decrease rapidly over time as digital process technology advances.").

Zhang:

55. Similarly, Zhang is in the same field of endeavor as Maycock – disclosing systems and methods to process broadband signals. Ex. 1008, 1:28-30. 3:15-18. Further, in my opinion, a POSITA would be motivated to incorporate

Zhang's wideband ADC into Maycock's signal monitoring system because it would increase the ability to monitor multiple (or all) channels simultaneously, thereby increasing the efficacy of monitoring.

56. Zhang teaches wideband digitization, including allowing simultaneous reception of multiple content streams while enabling wideband return communications in satellite and cable systems. Ex. 1008, 6:52-61. Zhang also explains that conventional systems with one analog tuner per RF channel results in "the cost, power consumption, and complexity go[ing] up as the required number of RF channels goes up." Ex. 1008, 1:66-2:2. Zhang then describes an improved system with a wideband ADC converter to digitize multiple channels at once. Ex. 1008, 6:38-61.

57. The aforementioned cost and complexity challenges addressed by Maycock are also addressed by Zhang. Ex. 1008, 1:66-2:2, 2:7-9 ("At least some embodiments are characterized by lower cost, lower power consumption, and/or lower complexity."). For example, Zhang details reducing cost by employing a single downconverter (combined with a high speed ADC). Ex. 1008, 3:54-63 ("Because demodulator 200 requires only one single stage frequency-block down-converter, instead of many RF tuners as in the prior art, the cost of the overall system is reduced.").

58. By incorporating Zhang's disclosure of wideband capture and digitization into Maycock, in my opinion, a POSITA would understand that the fundamental benefits of digital RF communications would include at least: 1) reduced cost; 2) reduced power consumption; 3) greater flexibility; 4) more efficient use of the underlying physical medium; and 5) better positioned to leverage rapid advances in relevant chip technology.

IX. Analysis and Identification of How the Claims are Unpatentable

A. Claims 1, 2, 3, 4, 6, 8, and 9 are unpatentable as obvious over Renken in view of the Knowledge of a POSITA

59. It is my opinion that, Renken in view of the knowledge of a POSITA makes claims 1, 2, 3, 4, 6, 8, and 9 obvious.

1. Independent claim 1

a. *Claim 1 Preamble – A method comprising:*

60. I understand that the preamble is not necessarily limiting, i.e., the prior art does not necessarily have to disclose what is set out in the preamble. In this case, whether or not it is limiting does not affect my opinion as, in my opinion, Renken discloses the preamble. Renken discloses how various components perform "in operation," in other words, the method of operation. Ex. 1005, Abstract, 9:24-27, 10:25-29, 12:38-44, 15:27-33, 15:42-45, Figs. 7-15 and 17, Claims 10-19; Ex. 1010, pp. 7-13 (steps and flow diagrams detailing how the

Renken system works). Additionally, the '826 Patent discloses that "[i]n operation, the MCCM 100 transforms digital data transmitted over RF to one or more data interfaces, such as Ethernet, USB, and others as known in the art." Ex. 1005, 9:24-27.

b. *Claim 1a – performing by one or more circuits of a receiver coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network*

61. In my opinion, Renken discloses element 1a, including that in "the HFC network 1, which is also referred to herein as cable network 1, data services are provided using a DOCSIS transceiver 3, which is commonly referred to as a Cable Modem Termination System (CMTS). As shown, the CMTS 3 is located at the cable television and data network operator's headend 5 [] . . ." Ex. 1005, 7:47-52; *see, e.g*. 7:42-8:12, Fig. 1.

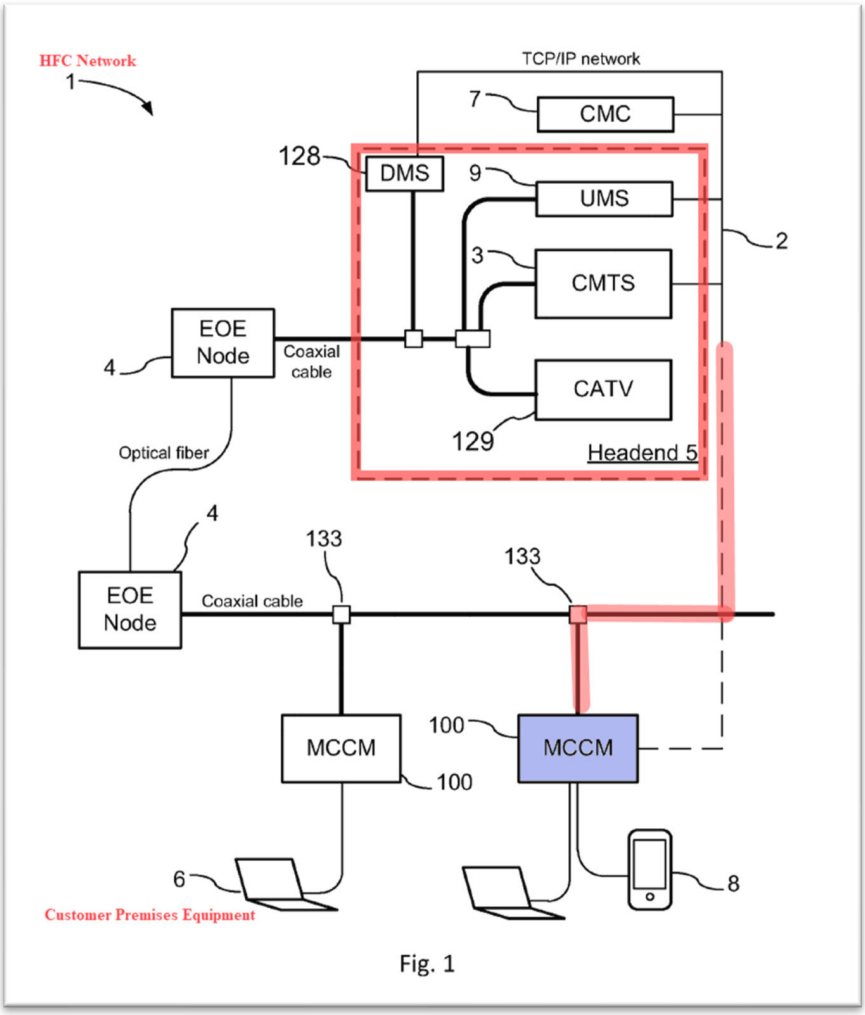


Fig. 1

Ex. 1005, Fig. 1 (annotated).

62. Further, "signals are distributed using coaxial cables … to a plurality of MCCMs 100 located at the customer premises." *Id.*, 7:61-64. And each "MCCM 100 is connected to customer premises equipment (CPE) 6," where "CPE may refer to any computing device having a suitable data interface, such as a personal computer, a laptop, a smartphone, a smart appliance, a TV set, etc." *Id.*, 8:18-23. Each MCCM possesses at least one receiver circuit (Downstream

Receiver Circuit 20). *Id.*, 6:51 ("cable modems may include multiple downstream receivers"), *see, e.g.* Fig. 2 below.

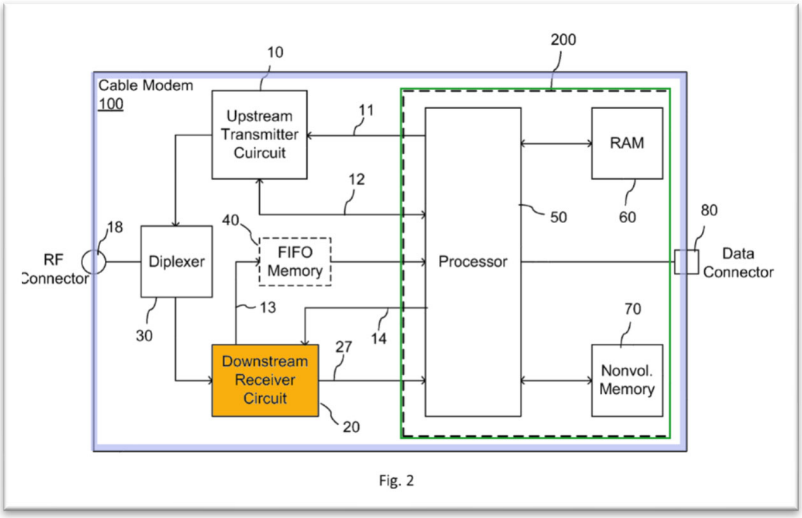


Fig. 2

63. Further, Renken describes that "DOCSIS 3.0 compliant cable modems" for network monitoring are used to receive and transmit video and data to a cable operator's head end over their existing infrastructure. *See e.g.* Ex. 1010, p. 1, 5-6. I have personal knowledge that HFC, a broadband telecommunications network, was widely known to be used by the cable industry well before 2011. For example, this Techopedia website, What is Hybrid Fiber-Coaxial Cable (HFC

cable)? - Definition from Techopedia[2] provides an accurate, if high-level description of HFC in my opinion. Therefore, in my opinion, a POSITA would understand that a hybrid fiber-coaxial (HFC) network would be used between a headend and a customer premise.

c. *Claim 1b – receiving, via said HFC network, a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels;*

64. Renken discloses that an HFC network delivers a signal including multiple channels, including CATV channels and data channels, from the head end to MCCMs located at customer premises. Ex. 1005, Fig. 1; 7:42-64; 8:61-64 (All these signals [including CATV channels and DOCSIS channels] are distributed using coaxial cables, and, optionally fibers to a plurality of MCCMs 100 located at the customer premises."); Ex. 1010, pp. 4-6 ("Additionally, MPEG and DOCSIS decoders that are being used as part of the active DOCSIS connection can be used to passively perform a downstream throughput measurement on each downstream channel."). Renken further discloses that "[e]ach MCCM is connected to Customer

[2] Rouse, "Hybrid Fiber-Coaxial Cable" https://www.techopedia.com/definition/25805/hybrid-fiber-coaxial-cable-hfc-cable

Premises Equipment (CPE) … Here, CPE may refer to any computing device have a suitable data interface, such as a personal computer, a laptop, a smart phone, a 'smart' appliance, a TV set, etc. Each MCCM 100 extracts from the downstream RF signal those data packets that are aimed at the corresponding CPE 6, and directs them to that CPE 6." *Id*., 8:13-26. Therefore, in my opinion, Renken discloses claim 1b.

d. *Claim 1c – digitizing said received signal to generate a digitized signal*;

65. Renken discloses that the MCCM digitizes the signal received from the HFC. Specifically, Renken discloses that the received signal from the HFC is provided to a Receiving Circuit (RC) 20 in the MCCM "that may be embodied using conventional receiver architecture for DOCSIS ® 3.0 compliant cable modems as known in the art." *Id*., 10:57-58; Figs. 2, 3; Ex. 1010, Fig. 2, p. 1, 4, 5. The Receiving Circuit 20 of Renken is shown below.

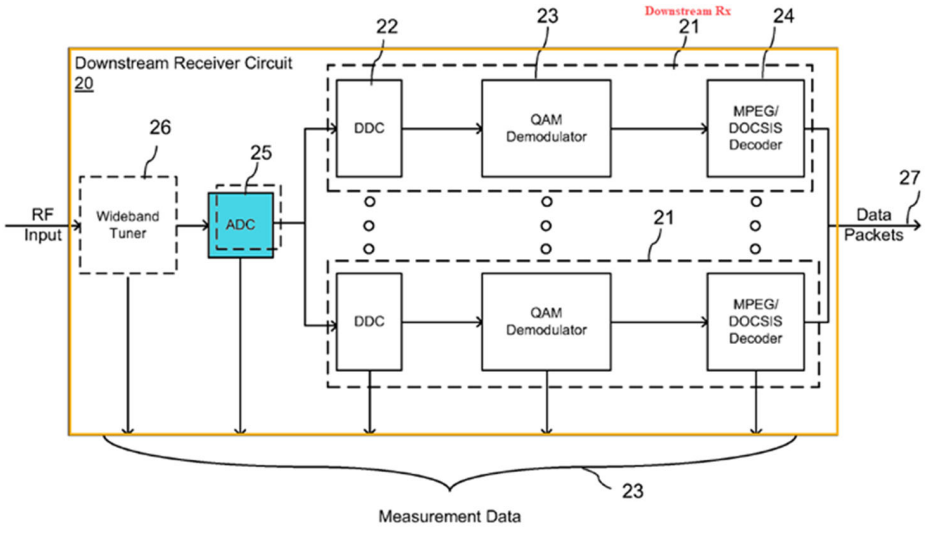


Fig. 3

Id., Fig. 3; Ex. 1010, p. 4.

66. The RC 20 of Renken includes a wideband tuner 26 and one or more Analog to Digital Convertors (ADC) 25. *Id.*, 11:22-27. As described by Renken, the wideband tuner 26 receives the RF input from the received signal and "converts the downstream RF signals to corresponding signals centered at an intermediate frequency." Id., 11:32-36; Ex. 1010, p. 4. The ADC 25 of Renken then "converts the analog IF output from the wideband tuner 26 into a digitized IF signal." *Id.*, 11:39-40; Ex. 1010, p. 5. Therefore, in my opinion, Renken discloses claim 1c.

e. Claim 1d – selecting a first portion of said digitized signal;

67. It is my opinion that Renken discloses selecting a first portion of digitized signal. If not, in my opinion, a POSITA would understand from Renken

and their knowledge of the art that a "portion" of a signal might include any part of up to and including the whole signal that is received by the receiver. The disclosure in Renken regarding a modem controller allocating active and idle receivers discloses selecting both the first portion (claim element 1d), which is received by an idle receiver, and the second portion (claim element 1e), which is received by an active receiver.

68. Renken discloses selecting a first portion of digitized signal wherein the MCCM's "modem controller is configured for tunably allocating at least one of the receivers [second portion]… for data communications between the cable network and the CPE, while leaving at least another one of the receivers as a currently idle receiver that is not allocated for the data communications, [first portion]" Ex. 1005, 4:38-41. *See, e.g. Id*., 4:60-67 ("The method comprises: a) allocating at least one of the receivers … to data communications between the CMTS and the CPE, leaving at least another one receiver … as a currently idle receiver … that is not allocated to the data communications; and, b) performing a network measurement using the currently idle receiver …."), 4:67-5:3; Ex. 1010, pp. 4-6.

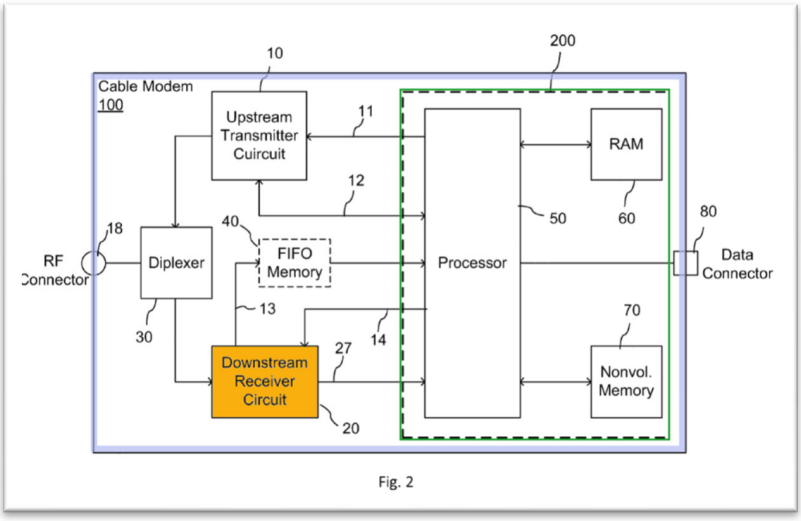


Fig. 2

Ex. 1005, Fig. 2; Ex. 1010, p. 3. Specifically, the received signal, RF input, enters the Downstream Receiver Circuit 20 and the output from the ADC are signals traveling to active and idle downstream receivers 21. Ex. 1005, Figs. 1-3; Ex. 1010, p. 3-6.

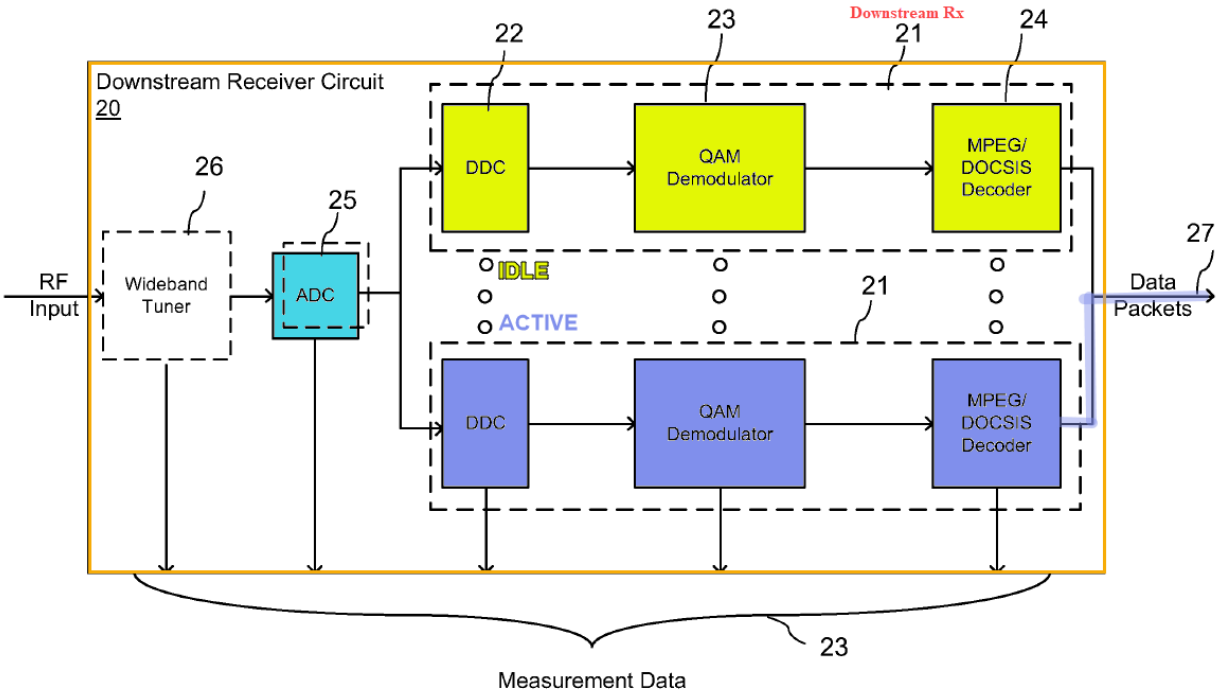


Fig. 3

Ex. 1005, Fig. 3 (annotated); Ex. 1010, p. 4.

69. As explained by Renken, the "DDC 22 is responsible for filtering out, i.e., selecting a particular downstream channel, such as a DOCSIS 6 or 8 MHz wide channel, from the digital IF output of the ADC 25." *Id.*, 12:22-24. An idle, not active, receiver 21 may be available to perform various signal measurements on a portion of the digitized signal selected by the DDC, constituting "selecting a first portion of said digitized signal." *Id.*, 12:38-43 ("In operation, the DDC 22 of any idle receiver 21, i.e. the receiver 21 that is not currently in use by the MCCM 100 for receiving customer-directed data, may be used to perform various measurements under the direction of the controller 200"); *Id.*, 12:38-43; Ex. 1010,

p. 12 ("The cable modem examines its hardware configuration to determine how many downstream receivers are not being used. If at least one downstream receiver is idle, then the cable modem has resources available for measurement of non-DOCSIS downstream channels."), Ex. 1010, p. 5 ("The QAM demodulator in a CM is responsible for demodulating an individual digital channel so that I/Q samples are converted into digital data. Any extra unused QAM Demodulators can be used to perform measurements"). It is therefore my opinion that Renken discloses claim 1d or Renken makes claim 1d obvious.

f. Claim 1e – selecting a second portion of said digitized signal;

70. *See* analysis for claim element 1[d].

71. Renken discloses selecting a second portion of a digitized signal wherein "modem controller is configured for tunably allocating at least one of the receivers [, second portion]… for data communications between the cable network and the CPE, while leaving at least another one of the receivers as a currently idle receiver that is not allocated for the data communications, [first portion]" Ex. 1005, 4:28-34. Accordingly, the active receiver 21 via the MCCM 10 contains the "second portion of said digitized signal." It is therefore my opinion that Renken discloses claim 1e or Renken makes claim 1e obvious.

g. Claim 1f – processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

72. Renken discloses that the receiver in use by the MCCM containing the "second portion of said digitized signal" processes the digitized signal to baseband, where I and Q samples are converted to data for a specific downstream channel. Ex. 1005, 12:22-53 ("The DDC 22 is responsible for filtering out, i.e. selecting, a particular downstream channel, such as a DOCSIS 6 or 8 MHz wide channel, from the digital IF output of the ADC 25. In one embodiment, it converts a digitized real-valued signal centered at the intermediate frequency to a baseband complex signal centered at a zero frequency as known in the art. This complex baseband signal may be composed, for example, of an in-phase signal component I, and a quadrature signal component Q. The input to DDC 22 is the digital IF data from the ADC 25, which typically covers the entire downstream frequency span of the wideband tuner 26. The output of the DDC 22 are I and Q samples for a particular downstream channel within the wideband downstream frequency span. A DOCSIS 3.0 compatible CM typically has four to eight DDCs per downstream receiver circuit 20, one per channel receiver 21…The output signal of the DDC 22 is demodulated by QAM Demodulator 23, whereby the I and Q samples from the DDC 22 are converted into digital data corresponding to a particular digital

channel."). *See also Id*., Fig. 3; Ex. 1010, p. 5 ("The QAM demodulator in a CM is responsible for demodulating an individual digital channel so that I/Q samples are converted into digital data."), Fig. 2 at p. 4. A POSITA would be familiar with DOCSIS, including the DOCSIS 3.0 MAC specifications, which were first available in 2007, and would recognize that the "digital data," data packets 27, from the "active" channels are information "recovered" from the active channels and provided to the CPE 6 downstream. *See, e.g.* Ex. 1005, 8:18-26. That is, pursuant to the DOCSIS 3.0 and earlier, a cable modem learns, either through a static configuration file obtained during booting or through a DOCSIS control message over a predetermined control channel, everything it needs to know to be able to tune the correct set of receive channels to receive DOCSIS downstream data. It is therefore my opinion that Renken discloses claim 1f or Renken makes claim 1f obvious.

h. Claim 1g– analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

73. Renken discloses that "QAM Demodulators 23 of the currently idle receiver or receivers 21 can be queried by the measurement controller 300 to perform a number of measurements, including measuring the following parameters known in the art: MER (modulation error ratio), EQ Stress, Group Delay, in-

channel frequency response." Ex. 1005, 12:53-58. Further, the DDC 22 of any idle receiver 21, may be used to perform various measurements. *See, e.g., Id.*, 12:22-48, 12:58-13:2, Fig. 5; Ex. 1010, Fig. 2, pp. 4-6.

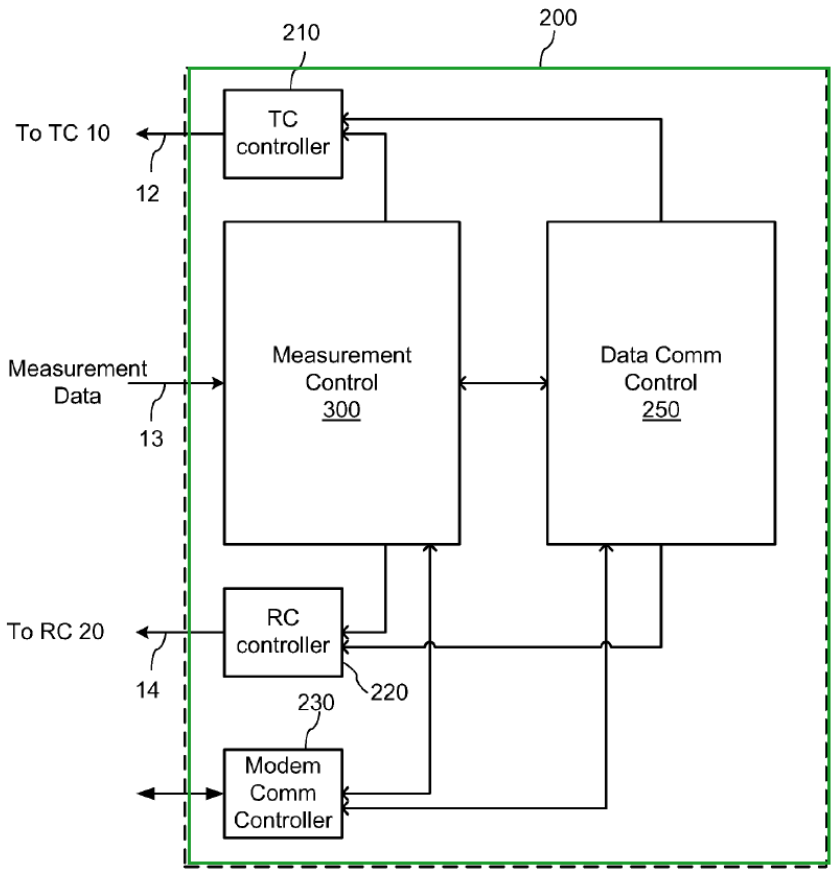


Fig. 5

Ex. 1005, Fig. 5.

74. The monitoring functionality in the MCL analyzes which receivers are idle and able to take a measurement. Ex. 1005, 14:15-64 ("The present invention further provides the MCL 300 within the modem controller 200 for supporting

network measurement and monitoring functionality of the MCCM 100. Functions of the MCL 300 may include a) identifying which of the receivers 21 and transmitters 31 are currently idle and are available for measurements, b) conducting the measurements using the currently idle receivers and transmitters in according with a measurement plan, and c) optionally receiving, processing and/or storing measurement data 13 from the RC 20. For this purpose, the MCL 300 is operatively coupled to one or both of the TCC 210 and RCC 220 for controlling the currently idle receivers 21 or transmitters 31 during the measurement, which may include setting the respective central frequencies, modulation formats, tuner bandwidth, receiver filter bandwidth, transmit power, etc."). *See also, Id*., 15:10-13. Therefore, it is my opinion that Renken discloses claim 1g.

i. Claim 1h – controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages.

75. Renken discloses that an MCCM reports its measurement results via the transmission of network (i.e., IP) messages pursuant to a request from the Central Management Controller (CMC) sent to the MCCM by the CMTS. *See, e.g.*, Ex. 1005, 22:3-23:33, Fig. 17; Ex. 1010, pp. 8-11. Specifically, Renken discloses that the "the CMC signals the MCCM via internet protocol messaging to perform

specific measurements with the unused receivers and/or transmitters." Ex. 1010 p. 1, Ex. 1005, 8:45-45 ("the CMC 7 schedules and instruct[s] MCCMs 100 to perform real time measurements and then collects, evaluates and stores measurement results received from the MCCMs 100, for the purpose of remotely performing automated end-of-line diagnostics."). Renken notes that the flowchart illustrated as Fig. 8 details triggering a new plan from the headend, checking resources, executing the measurement plan if resources (idle receivers or transmitters) are available, sending a measurement report to the headend, then waiting for a new plan/timer expiration/change in measurement capabilities. Ex. 1005, 17:59-18:17 ("The measurement may be initiated by receiving a new measurement plan from the CMC 7 or the LMC 8 in step 510, or at scheduled time instances or time intervals, or when a measurement plan timer expires."). Therefore, it is my opinion that a POSITA would recognize that after completing the measurement," "CM receiving a measurement plan," or" measurement plan timer expires" satisfy "controlling the transmission."

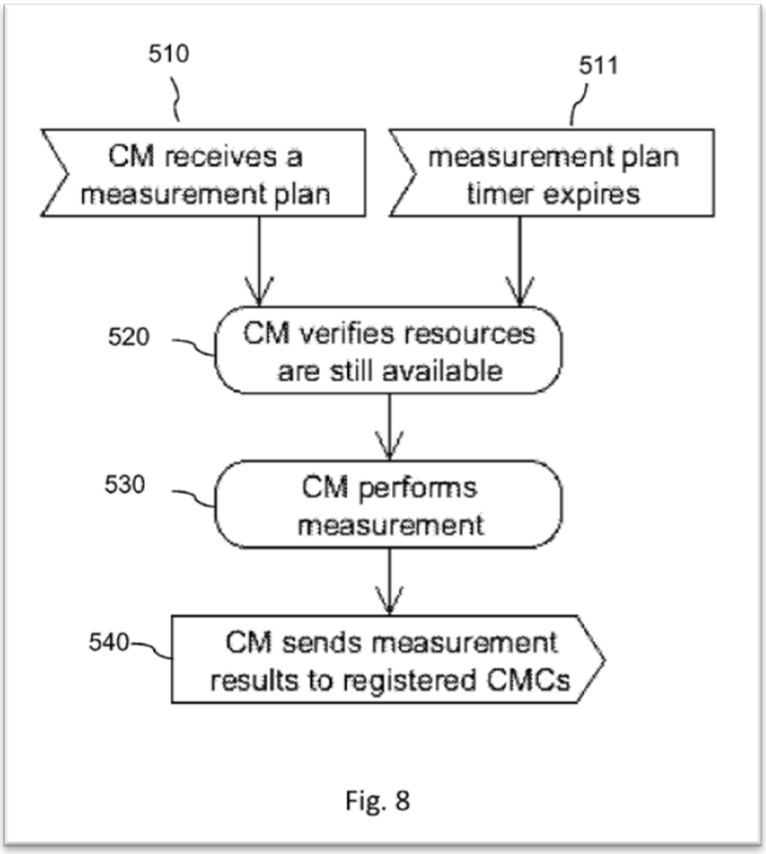


Fig. 8

Id., Fig. 8.

76. In response to the request from the CMC the MCCM completes the requested measurements and then "the MCCM 100 may send the measurement result to CMC 7 over the TCP/IP network 2, for example utilizing a DOCSIS connection to the CMTS 3." *Id*., 9:8-18. Additionally, Renken discloses that the "the CMC 7 receives a message from the MCCM 100 that contains the measurement capability list 350, or a measurement report." *Id*., 22:58-60; *see, also*, 23:11-15. In my opinion, a POSITA would be aware that TCP/IP messaging was a

prevalent communication protocol and the time and understand that measurements are sent via IP messages from the MCCM to the CMC. For example, Renken cites to U.S. Patent no. 6,393,478 and states that it "discloses systems in which a cable modem is utilized to transmit status information to another device for analysis over the network" and this patent transmits status information using TCP/IP. *Id*. 3:21-25. It is therefore my opinion that Renken discloses claim 1h or Renken makes claim 1h obvious.

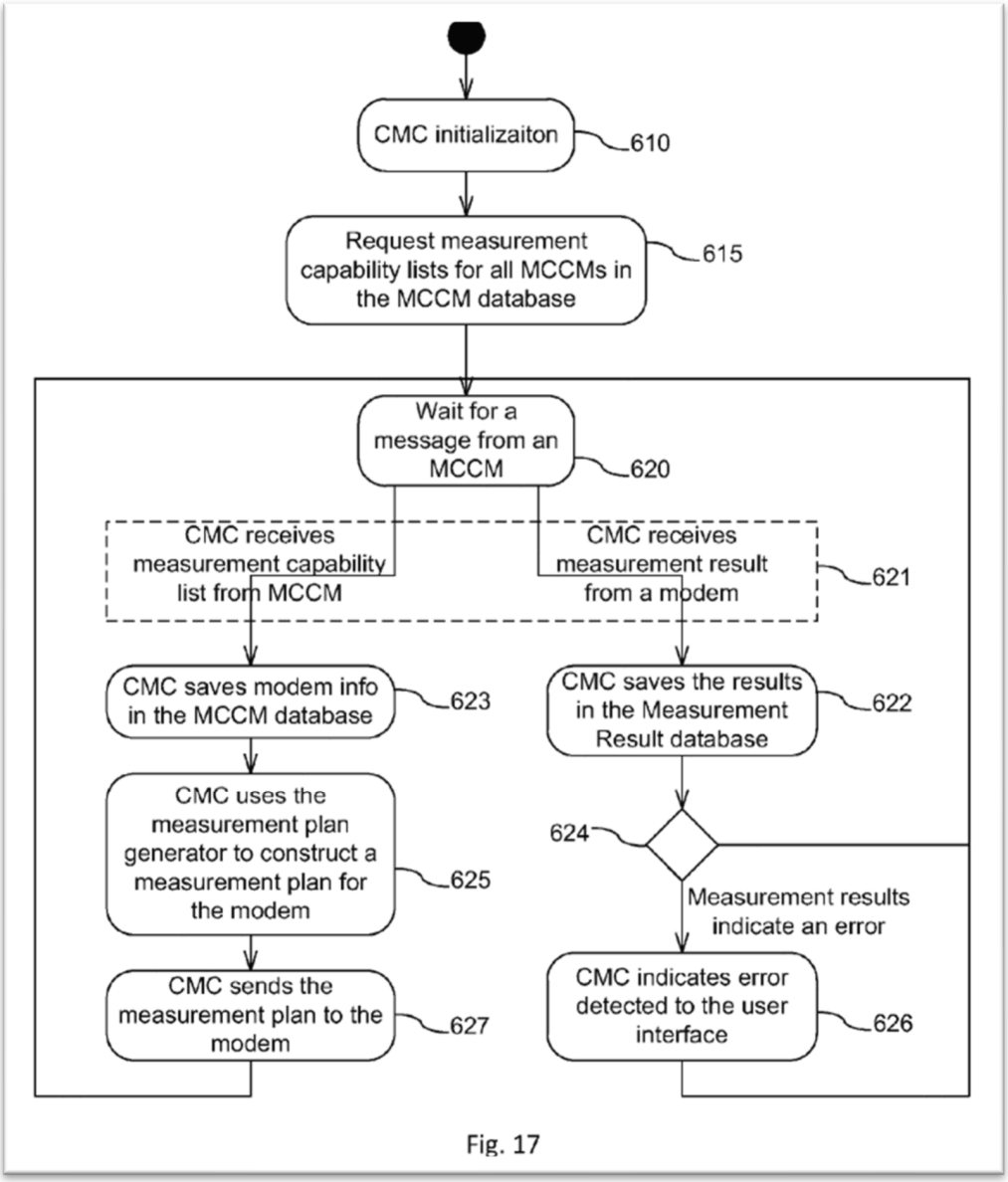


Fig. 17

Id., Fig. 17.

2. Dependent claim 2 – *The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.*

77. Renken discloses that analysis measurements are taken from MCCMs 100. They are then compared to each other. If abnormally high or low signals for

an MCCM 100 (in comparison to the system or to some pre-determined value) are detected, an error report may be generated. *See, e.g.,* Ex. 1005, 22:22-39; Ex. 1010, p. 11 ("Parse the measurement results to determine if a network error has been detected. If a problem has been detected, the CMC could indicate this problem to the user."). If a signal is abnormal when compared to a pre-determined value, in my opinion, a POSITA would understand that parameter to be outside of acceptable bounds. Further, in my opinion, a POSITA would understand that the network management messaging would indicate that an error is detected (a parameter is outside of acceptable bounds). *See* Ex. 1005, Fig. 17; Ex. 1010 Fig. 4 at 10 ("CMC indicates error detected to the user interface"). It is therefore my opinion that Renken discloses claim 2 or Renken makes claim 2 obvious.

3. Dependent claim 3 – *The method of claim 2, wherein said parameter is a modulation parameter of said received signal.*

78. Renken discloses that measurements, including modulation error ratio, "MER") may be performed with QAM demodulators. Ex. 1005, 12:38-13:15; Ex. 1010, p. 5. Therefore, in my opinion, Renken discloses claim 3.

4. Dependent claim 4 – *The method of claim 2, wherein said parameter is a transmit power of said received signal.*

79. Renken discloses that the MCL 300 within the modem controller 200 may conduct "measurements using the currently idle receivers and transmitters in

according with a measurement plan… [where measurements] may include setting the respective central frequencies, modulation formats, tuner bandwidth, receiver filter bandwidth, ***transmit power***, etc." Ex. 1005, 14:40-15-9 (emphasis added); Ex. 1010, p. 2 ("Digital measurements such as Level, MER, Pre- and Post-Forward Error Correction (FEC) Bit Error Rate (BER), DQI (Digital Quality Index, defined in US Patent 7,792,183), Errored Seconds, Constellation, and lnqress under the carrier"), p. 5 ("Any extra unused DDCs can be used to perform measurements such as: Analog or digital channel level"). Therefore, in my opinion, Renken discloses claim 4.

5. Dependent claim 6 – *The method of claim 1, wherein said characteristic is signal power vs. frequency.*

80. Renken discloses that measurements are performed as specified by a measurement plan. Ex. 1005, Abstract ("[a] currently idle receiver is tuned to a target downstream channel under directions of a modem measurement controller, and is queried by the measurement controller to perform a measurement as specified by a measurement plan.").

81. Further, the MCCM measures information to compute downstream (and upstream) signal strength on a frequency-by-frequency basis, i.e., "signal power v. frequency" via a measurement request from the downstream measurement system (DMS) located at the network's headend. Ex,1005, 22:15-18

("the measurement plan generator 740 may send measurement requests to UMS 9 and/or DMS 128, or query them to coordinate their respective measurement plans with the measurement plans being generated by CMC 7. "); *see, e.g.*, Ex. 1005, 22:22-39 ("a downstream measurement system (DMS) 128 (provided at the location of the CMTS) 'perform[ing] downstream spectral measurements, that is to measure the cable network transmission characteristics in dependence on channel frequencies, i.e. on channel per channel basis. … [T]he DMS 128 performs level measurements on DOCSIS downstream channels generated by the CMTS and/or the analog and digital TV channels generated by the CATV transmitters 129, and reports these measurements to the [central measurement controller] CMC.' Ex. 1005, 20:27-36."); Ex. 1010, p. 5 ("The ADC allows for measuring level and spectrum style measurements within the frequency span covered by the analog IF input").

82. Additionally, the QAM demodulators 23 may determine in-channel frequency responses which are related to peak-to-valley power difference of a channel or frequency range. Ex. 1005, 12:38-13-15. ("QAM Demodulators 23 of the currently idle receiver or receivers 21 can be queried by the measurement controller 300 to perform a number of measurements, including measuring the following parameters known in the art: MER (modulation error ratio), EQ Stress,

Group Delay, in-channel frequency response. Depending on the MCCM hardware, the QAM demodulator 23 may also be queried by the measurement controller 300 to provide the following measurements: I/Q samples that can be used by the measurement controller 300 to generate constellation plots, Ingress under the carrier, DQI™ (Digital Quality Index).”). In my opinion, a POSITA would have at least a basic understanding of digital communications via their education and experience and would understand the in-channel frequency responses may be defined by signal power v. frequency.

83. Additionally, when measurements are taken accessing each demodulator’s 23 equalizer tap values, “in-channel frequency response from the equalizer's complex frequency response is computed.” Ex. 1005., 5:64-65, Fig. 13; Ex. 1010, 5 (“Any extra unused QAM Demodulators can be used to perform measurements such as…In-channel frequency response”).

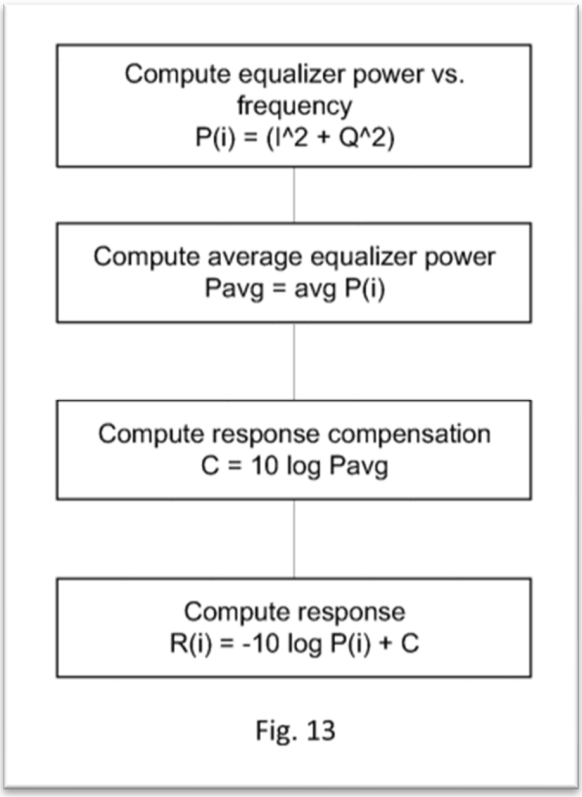


Fig. 13

Id., Fig. 13. It is therefore my opinion that Renken discloses claim 6 or Renken makes claim 6 obvious.

6. Dependent claim 8 – The method of claim 1, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.

84. Renken discloses a signal to noise ratio estimate may be determined from the QAM demodulator 23, while the MPEG/DOCSIS decoder 24 may have rate counters and packet error counters that can be read by the controller 200 to measure Bit Error Rate (BER). Ex. 1005, 12:38-13:15; Ex. 1010, p. 5.

85. Further, Renken discloses:

> Digital Measurement Capabilities …may indicate whether the MCCM 100 is capable of performing the following non-exclusive list of digital measurements: Carrier level, MER, BER, DQI™, Ingress under the carrier, IQ sampling, Errored Seconds, Digital Hum. Here IQ sampling means capturing pairs of I and Q amplitudes at symbol times from the output of the DDC 22 in order to display or analyze a QAM constellation. The values at the symbol time may be interpolated between values taken at periodic sample times. Errored Seconds is an error performance indicator that refers to a counter of one-second intervals in which uncorrected bit errors are detected in the output of QAM demodulator, and which can be obtained by querying the MPEG/DOCSIS decoder 24.

Ex. 1005, 17:31-43; Ex. 1010, pp. 1-2. In my opinion, a POSITA (and any undergraduate student at the time who had taken a basic Electrical Engineering course in digital communications) would understand the foundations of digital communications and therefore measures that are used to characterize an RF channel, including signal-to-noise ratio (SNR), peak-to-average-ratio, noise levels, bit error rate (BER), and symbol error rate (SER). Further, in my opinion, a POSITA would understand how to calculate/derive measures in actual systems, including SNR and MER, and how to calculate/derive SNR, noise levels, average signal power and MER from digital measurement capabilities. It is therefore my opinion that Renken discloses claim 8 or Renken makes claim 8 obvious.

7. Dependent claim 9 – The method of claim 1, configuring, by said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.

86. Renken discloses that in configuring the system that either a 6 or 8 MHz wide downstream channel is selected from the digital IF output of the ADC 25. Ex. 1005, 12:22-37. *See also*, Ex. 1005, 11:19-12:5; Ex. 1010, p. 5. It is therefore my opinion that Renken discloses claim 9 or Renken makes claim 9 obvious.

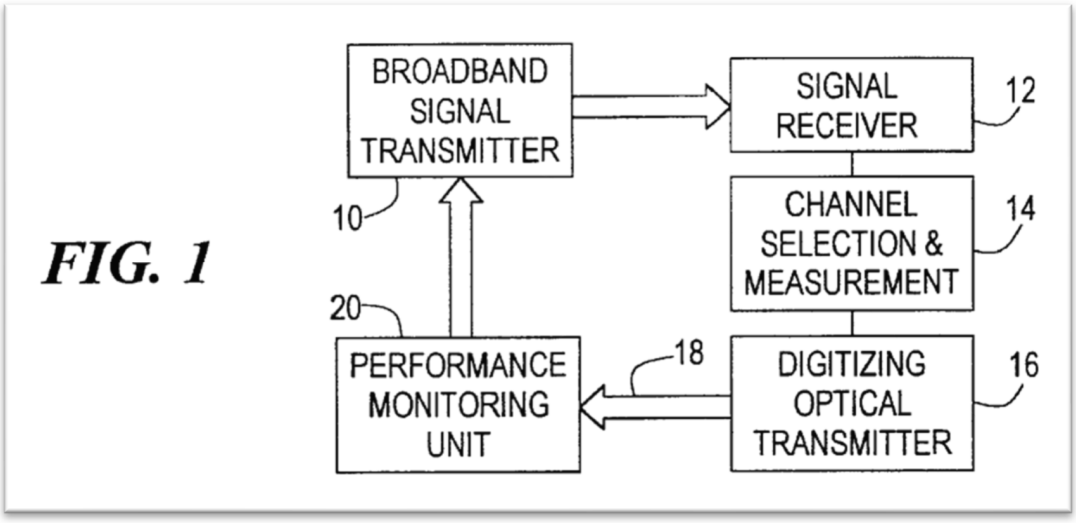
B. Ground 2: Claims 1, 2, 3, 4, 6, 8, and 9 are unpatentable as obvious over Maycock in view of Kidambi and further in view of the knowledge of a POSITA

87. It is my opinion that the combination of Maycock and Kidambi makes claims 1, 2, 3, 4, 6, 8, and 9 obvious.

1. Independent claim 1

a. *Claim 1 Preamble – A method comprising:*

88. To the extent that it is limiting, in my opinion, Maycock discloses the preamble, Ex. 1006, Title, Abstract ("Apparatus for and a method of …"), 2:52-54, Fig. 1, claim 18.



Ex. 1006, Fig. 1. To the extent Maycock does not disclose the preamble, in my opinion, Kidambi does. *See, e.g.*, Ex. 1007, claim 14.

b. *Claim 1a – performing by one or more circuits of a receiver coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network:*

89. In its background section, Maycock describes various conventional cable television systems, including systems that measure various parameters associated with the transmitted signal, and then identifies problems with those conventional systems." Ex. 1006, 1:11-2:17. Figure 1 of Maycock illustrates "video signal transmission headend 10 . . . provides analog video signals which are received . . . by a signal receiver 12." Ex. 1006, 3:2-5. Thus, in my opinion Maycock discloses "a television . . . service provider headend."

90. Maycock further discloses that the video may be "transmitted through,

for example, a co-axial cable, an optical fiber cable, a terrestrial microwave or a satellite system." Ex. 1006, 1:7-9, *see also, Id*., Abstract. Moreover, Maycock discloses a network using a combination of optical fiber and coaxial cables, and, thus, discloses a hybrid fiber coaxial (HFC) network. Id., 3:29-39; 4:1-4. Maycock notes that its system may be used "with suitable modification, for compressed digital signals of the future and satellite frequency modulated signals in both analog and digital formats." *Id.*, 2:41-46. Further, Maycock discloses that a signal carrying multiple channels is sent from the headend to a signal receiver. Ex. 1006, Figs. 1, 1A, 2, 3, 1:12-15, 1:47-50, 3:60-4:6, 7:28-30, 8:1-25. Moreover, as I discussed above, a POSITA would have knowledge that an HFC network was used by the cable industry at this time as its broadband telecommunications network.

91. Additionally, Kidambi discloses communicating television, voice, and data over a cable network via a "hybrid fiber/coaxial cable television (CATV) network" from provider's headend to be received by a receiver, such as a cable modem, set-top box, and cable gateway which in turn provide data to customer premises equipment, including a television. Ex. 1007, ¶82-83. Thus, Kidambi discloses a data provider headend. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1a obvious.

c. *Claim 1b – receiving, via said HFC network, a signal that carries a plurality of channels, wherein said*

Petitioner Cox Communications, Inc.
Exhibit 1003 - Page 64 of 92

channels comprise one or both of television channels and data channels;

92. Maycock notes that conventional fiber optic cable television technology is capable of transmitting "over 80 channels of audio and video programming over 200 km." Ex. 1006, 1:48-50. Maycock further discloses that this signal is sent via the HFC network from the headend to a receiver. *Id*., 3:1-4; 3:60-4:6. Thus, Maycock discloses receiving "a signal that carries a plurality of channels, wherein said channels comprise one ***or*** both of television channels and data channels."

93. Further, Kidambi discloses transmitting and receiving television, voice, and data signals over an HFC cable network between provider's headend and a receiver at a customer's location, such as a cable modem, set-top box, and cable gateway. Ex. 1007, ¶¶83-84.

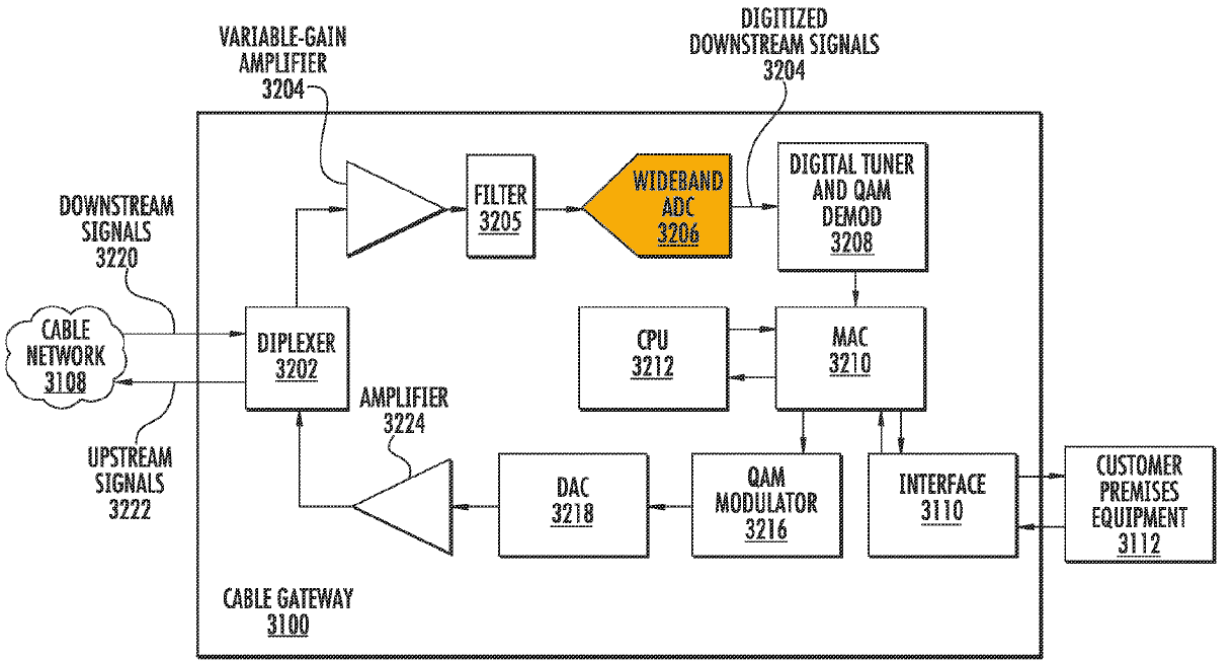


FIG. 32

Ex. 1007, Fig. 32 (annotated). Kidambi explains that "communication system receivers such as that used in cable modem and set-top-box systems are trending toward processing more channels to provide faster broadband access and more video services to the home. One alternative to having a tuner for each channel is to digitize the entire bandwidth of the cable system. Once this is achieved, the number of channels decoded from the spectrum is completely defined in the digital domain." *Id.*, ¶82.

94. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1b obvious.

d. *Claim 1c – digitizing said received signal to generate a digitized signal;*

95. Both Maycock and Kidambi disclose digitizing the received signal to generate a digitized signal. *See e.g*., Ex. 1006, 3:2-28, 3:60-67, 4:25-58, 6:2-37, Fig. 2. Claim 1; Ex. 1007, ¶¶ 43-45, 52-53, 58-60, 85, Figs. 2, 4, 8, 12, 32, Claim 1.

96. Kidambi discloses input signal, x(t), with M channels digitized by M ADCs 210, where the digital outputs are processed in DSP 240. Id., ¶¶ 5, 45, Fig. 2.

Petitioner Cox Communications, Inc.
Exhibit 1003 - Page 67 of 92

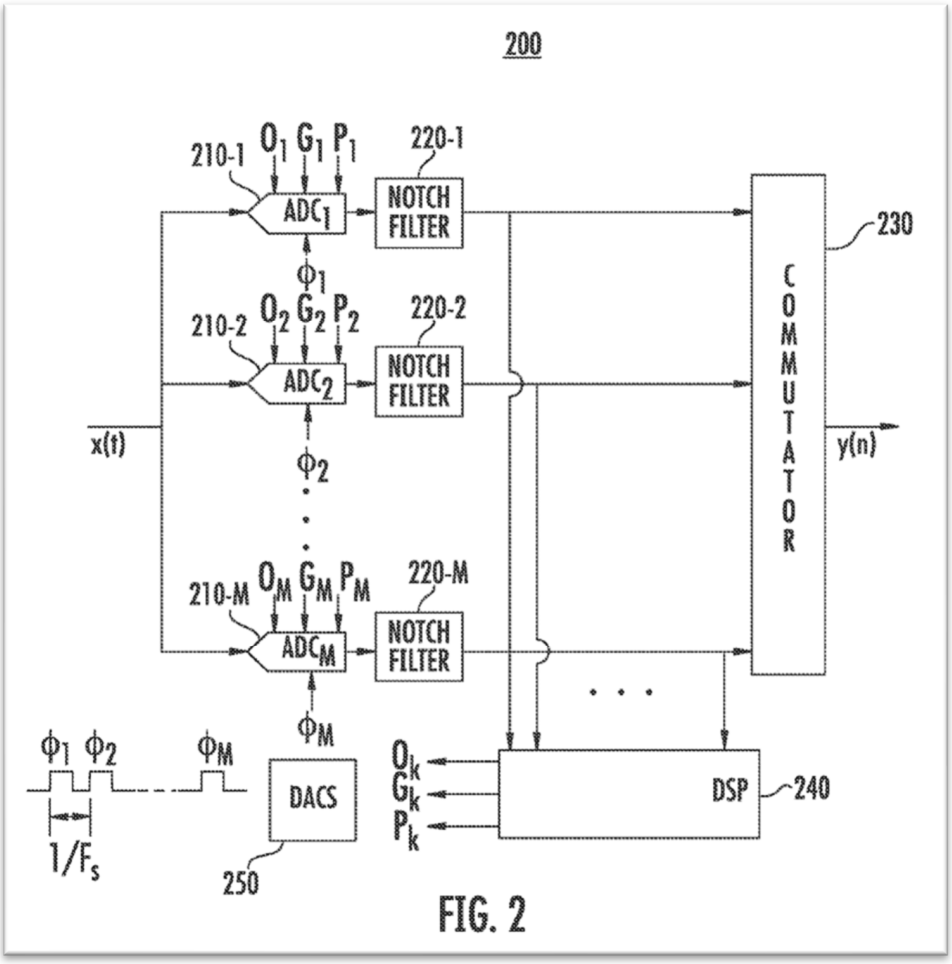
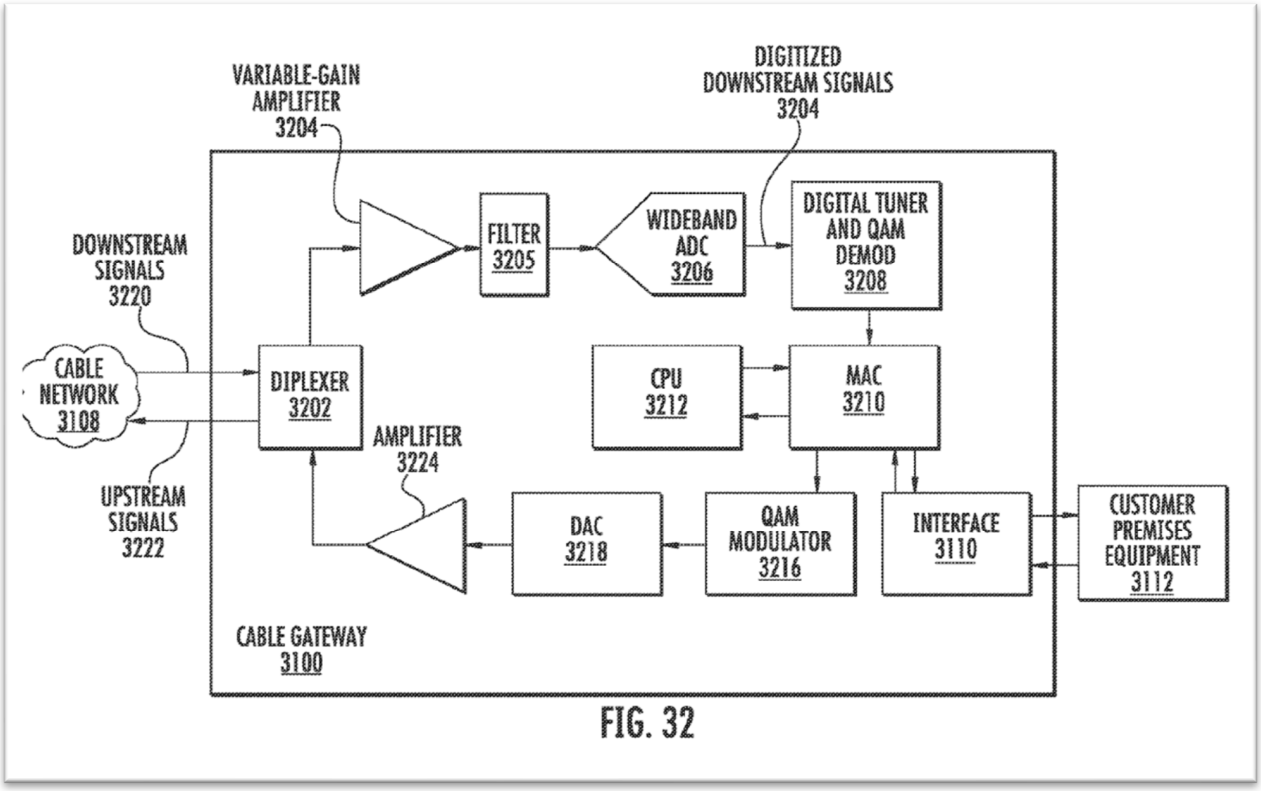


FIG. 2

Ex. 1007, Fig. 2. Further, Kidambi expressly discloses digitizing the entire bandwidth of the received signal via wideband ADC 3206. *Id*., ¶82.

97. Kidambi discloses a wideband capture technique where an "entire bandwidth of [a] cable system" is digitized at once, which provided the benefit of reducing the incremental cost of adding additional channels. Ex. 1007, ¶82. Referring to Figure 32, Kidambi discusses a cable gateway 3100 that receives television signals from a cable network 3108. Ex. 1007, ¶83. The received signals

are sent to a wideband analog-to-digital converter 3206 which "digitizes the received signal." Ex. 1007, ¶85, Figure 32. Wideband ADC 3206 digitizes the "entire bandwidth of the cable system," which is useful to tune multiple channels at the same time. Ex. 1007, ¶¶82-83.



Ex. 1007, Fig. 32.

98. Further, Maycock also discloses digitizing a received signal. For example, Figure 1 depicts signal receiver 12 that receives multiple broadband channels, spanning a "useable frequency range" from a broadband signal transmitter (*e.g.*, cable headend, etc.). Ex. 1006, 3:1-16. Signal receiver 12 is "an

optical receiver, an antenna, or any other device which enables the capture of a broadband signal." Ex. 1006, 3:5-9. Maycock further teaches that channel selection & measurement 14, also depicted in Maycock's Figure 2 as channel selector 14a, selects an individual analog channel from the multi-channel input and outputs the analog channel to analog to digital convertors (ADC) (*e.g.*, ADCs 38, 37a, 37b) for digitizing the channel. Ex. 1006, 3:60-67, 4:25-58, Fig. 2. Multiple digitized signal components are thereby created, combined into one digital signal at multiplexer 43, and transmitted to a performance monitoring unit for analysis. Ex. 1006, 5:23-35, 5:38-47, Figures 3 and 4. Maycock, therefore, teaches an ADC operable to digitize a received signal as recited in this limitation.

99. A POSITA would have understood the fundamental benefits of digital RF communications including at least: 1) reduced cost; 2) reduced power consumption; 3) greater flexibility; 4) more efficient use of the underlying physical medium; and 5) better positioned to leverage rapid advances in relevant chip technology. Therefore, a POSITA would have known to replace Maycock's ADC with Kidambi's high-speed ADC to digitize the incoming signal more efficiently. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1c obvious.

e. Claim 1d – selecting a first portion of said digitized signal;

100. Maycock describes that the monitoring unit selects a first portion of a digitized signal; demultiplexer 52 outputs "a third data bit bus [of a 10 bit output bus that] goes directly to a control computer 58 for analysis of the digitized performance information." Ex. 1006, 6:6-7.

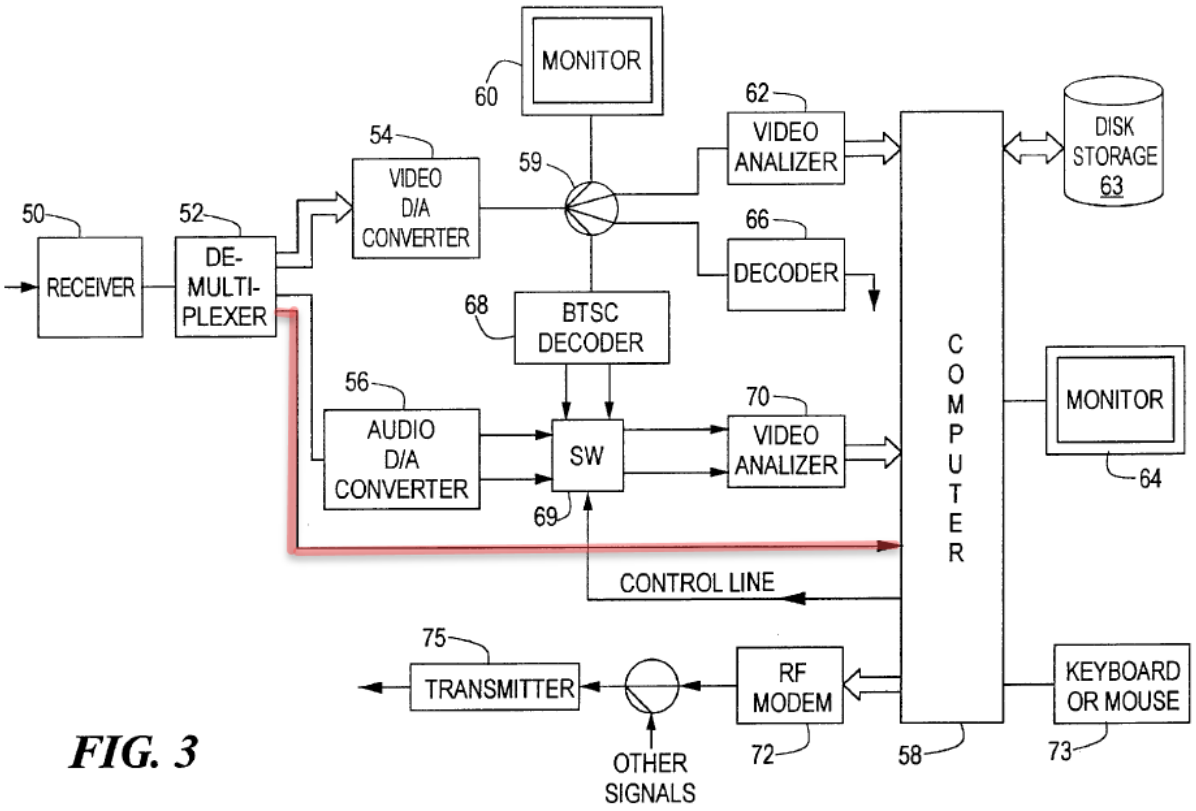


FIG. 3

Ex. 1006, Fig. 3 (annotated).

101. In claim 18, Maycock discloses various steps of this process, including "receiving the video signal. . .; employing a control signal to select a channel of the received video signal [and] digitizing and serializing the thus-selected channel as a digital video signal." Ex. 1006, 10:48-52. Further Maycock

explains that certain components, such as demultiplexer 52 and splitter 59, operate to separate portions of incoming signals into channels. Ex. 1006, 5:65-6:7, 6:12-14. In my opinion, a POSITA would understand that this is logically equivalent to and thus discloses a first portion of the received signal forwarded to components that assess that the received signals are within operating bounds. A POSITA would understand that the system described in Maycock sends a portion of the signal to a measurement node while other portions of the signal are received by receivers at end user premises.

102. Alternatively, Maycock explains that splitter 59 outputs four legs ("four paths") going to the various locations. Ex. 1006, 6:12-14, Fig. 3; *see, e.g.*, Ex. 1006, 6:49-51 (detailing that the audio bit bus traffics signal(s) comprising two audio channels),6:12-47 (discussing where each of the four legs from the splitter are fed), Fig. 3. In this case, the signal travelling to video analyzer 62 constitutes the "first portion." A POSITA would understand both demultiplexer 52 and splitter 59 operate as channelizers, as they create multiple channel outputs from a single incident signal.

103. In the event Maycock does not disclose this element, Kidambi does. Kidambi teaches that "[t]he time-interleaved ADC 3206 digitizes the received signal, then passes the digitized downstream signals 3240 [sic] to a digital tuner

and quadrature-amplitude-modulation (QAM) or other type demodulator 3208[.]" Ex. 1007, ¶85. ADC 3206 is comprised of a plurality, M, of ADCs which "convert[] an input signal to a set of M digital outputs as M values[.]" Id., claim 1. A POSITA would recognize that any of the separated M outputs, would constitute the "first portion."

104. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1d obvious.

f. Claim 1e – selecting a second portion of said digitized signal;

105. Maycock discloses "Eight bits of a 10 bit output bus of the demultiplexer 52 go to a video digital-to-analog converter 54 to reconstitute the video signal and its sub-carriers." Ex. 1006, 6:2-4. These nine bits, specifically the eight bits to video D/A converter 54 and the one bit to audio D/A converter 56, are the selected second portion of the digitized signal.

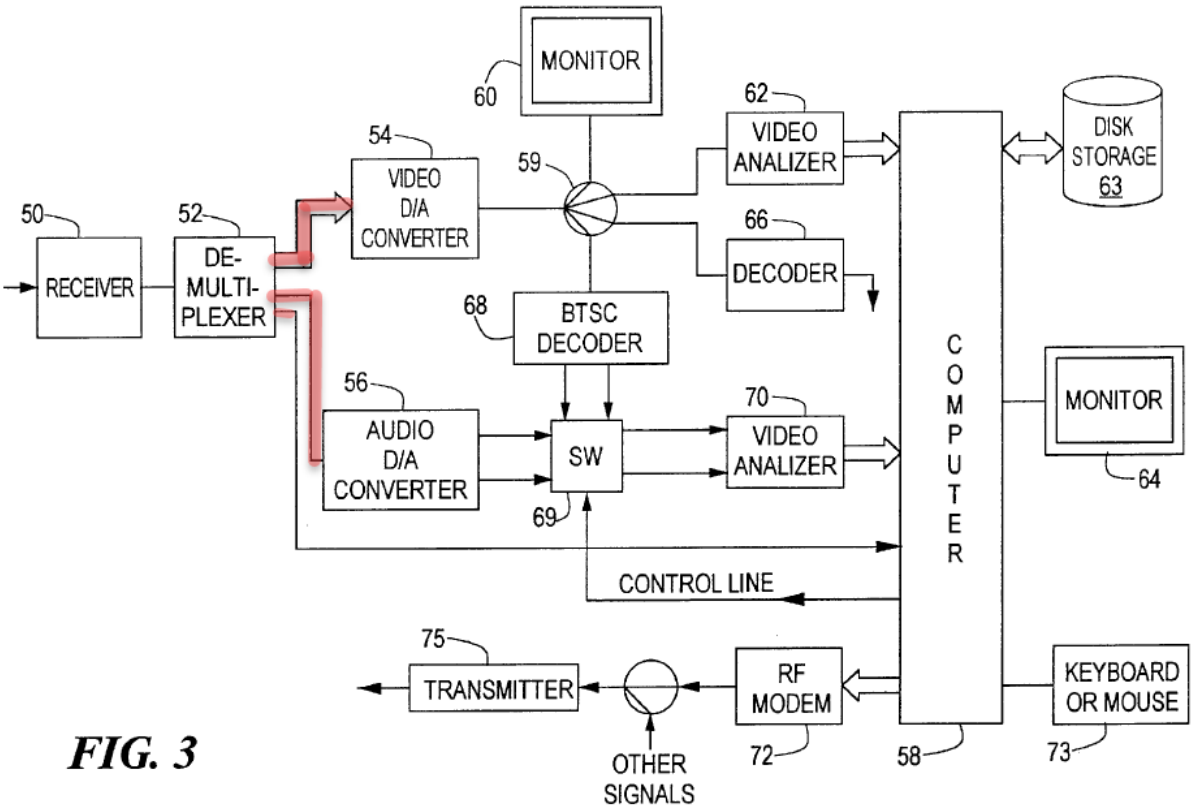


FIG. 3

Ex. 1006, Fig. 3 (annotated). Alternatively, in my opinion, selecting the second portion of the signal is met by the leg traveling to decoder 66.

106. In the event that Maycock does not disclose this element, Kidambi discloses a plurality, M, of signals wherein in my opinion any of the signals not selected as the "first portion" may be considered the "second portion." Ex. 1007, ¶¶85, 92. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1e obvious.

g. Claim 1f – processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

107. Maycock discloses "[e]ight bits of a 10 bit output bus of the demultiplexer 52 go to a video digital-to-analog converter 54 to reconstitute the video signal and its sub-carriers." Ex. 1006, 6:2-4. These nine bits, specifically the eight bits to video D/A converter 54 as well as the one bit to audio D/A converter 56, are the selected second portion of the digitized signal. Maycock explains that certain components, such as a BTSC decoder 68 and a decoder 66, process television channels to recover content, e.g., extracting the data carried on the television channels. Ex. 1006, 6:38-44, 6:45-47. A POSITA would understand that the phrase "to recover information carried in the plurality of channels" to be extracting the information carried on the television channels. At least decoder 66 extracts information carried by the signal when it "demodulate[s] information encoded in the video signal, for example channel insertion (used for advert deletion and substitution), scrambler and set top information." Ex. 1006, 6:38-41. A POSITA would read this description and understand that decoder 66 processes television channels to recover content. Additionally, regarding the BTSC decoder 68, Maycock teaches that "a baseband signal output which contains both video and audio information … is split by a splitter 59 into four paths" and that one of those paths "is fed to a BTSC stereo audio decoder 68 which recreates the left and right audio channel from the BTSC standard signal." Ex. 1006, 6:9-14, 6:45-47. From

this description, a POSITA would understand that BTSC decoder 68 processes television channels to recover content (i.e., right and left audio channel content).

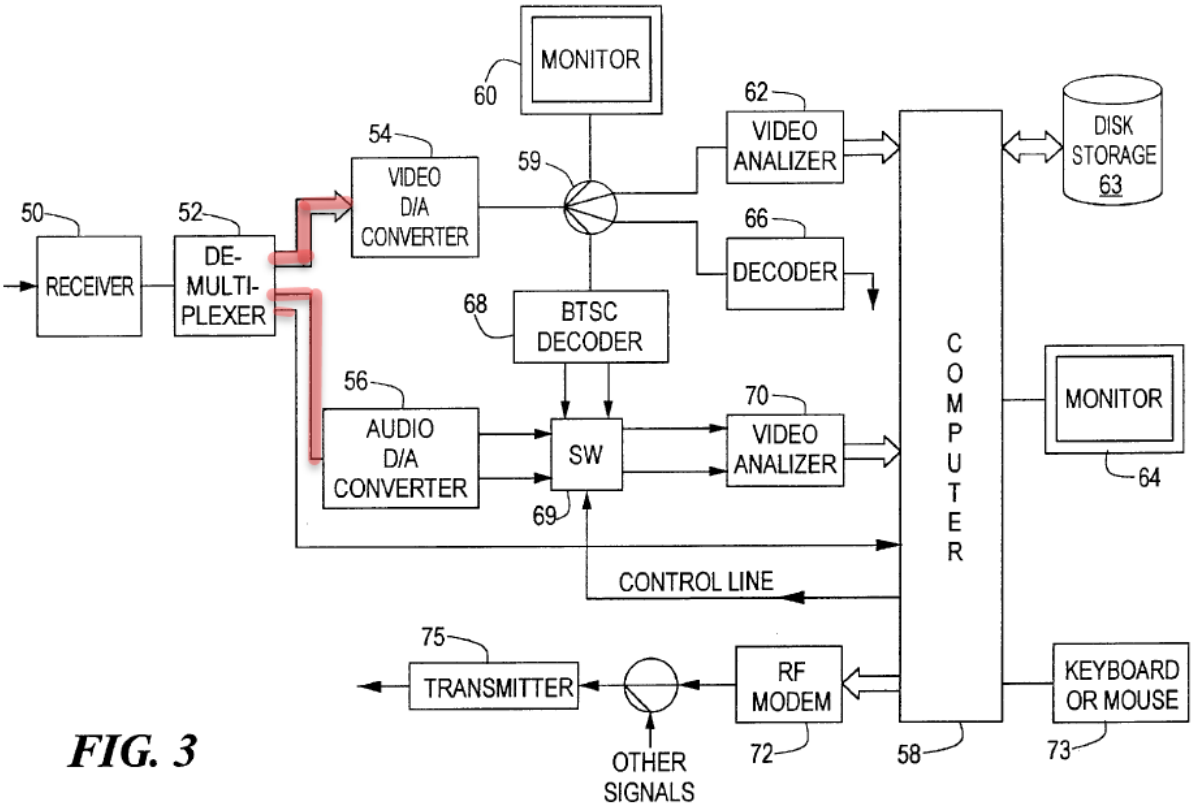


FIG. 3

Ex. 1006, Fig. 3 (annotated).

108. In the event that Maycock does not disclose this element, Kidambi discloses that "the digital tuner and QAM demodulator 3208 tunes and demodulates the amplified, filtered, and digitized downstream signals 3240 in accordance with either 64-QAM or 256-QAM techniques *to recover the underlying information*." Ex. 1007, ¶85. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1f obvious.

h. Claim 1g– analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

109. Maycock discloses measuring a characteristic of the first portion of a received signal wherein the first portion of the digitized signal is one bit (of ten) directly transmitted to control computer 58. Ex. 1006, 5:65-6:7. Maycock's Figure 3 illustrates the "components of [Maycock's] monitoring unit 20" and shows receiver 50 receiving a digitized signal and transmitting that signal to demultiplexer 52. *Id*., 5:39-42, 5:65-6:2. Demultiplexer 52 separates the 10-bit digitized signal into three different signal parts: 8 video bits are transmitted to video digital-to-analog converter 54, a single audio bit is transmitted to audio digital-to-analog converter 56, and a bit is transmitted directly to control computer 58 "for analysis of the digitized performance information." Ex. 1006, 6:2-7.

110. The 8 video bits are converted to analog by video D/A converter 54 and then analyzed by video analyzer 62, which measures various signal quality parameters that include, for example "[s]ignal-to-noise ratio, differential gain, differential phase and other video parameters …." *Id*., 6:24-29. Similarly, the audio bit is converted to analog by audio D/A converter 56 and then analyzed by audio analyzer 70, which measures "parameters such as signal-to-noise ratio and harmonic distortion," as well as "digitized performance information" Ex. 1006,

6:49-61. Maycock's signal quality parameters (e.g., SNR, differential gain, and harmonic distortion) are the same examples of "a characteristic" as the characteristics described in the '826 patent. (Compare with '826 patent, 3:45-57 (identifying "characteristics" such as SNR and various frequency functions).).

111. Claim 1g simply requires "analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal." The limitation does not impart a temporal requirement and thus the signal need not be in a digitized form when the signal analysis occurs. Rather, the claim simply requires that the signal monitor receives a digitized signal and performs signal analysis to determine a signal characteristic regardless of whether the signal varies between analog and digital form.

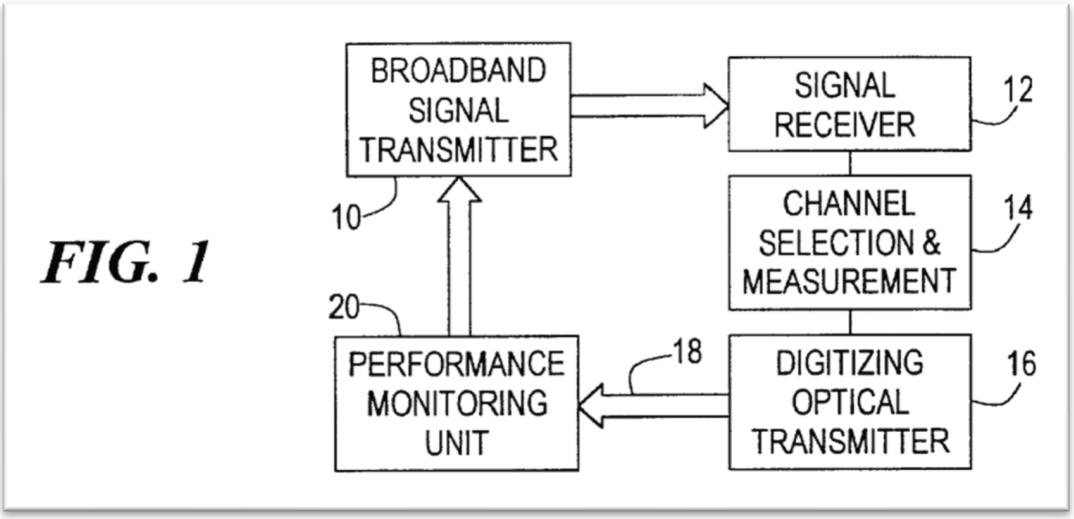
112. Maycock's performance monitoring unit 20 receives a 10-bit digitized signal, performs various processing techniques, and analyzes this digital signal. Hypothetically, if performance monitoring unit 20 was a black box, a POSITA would understand that a digitized signal is the input and that the unit outputs signal characteristics to computer 58. *See* Ex. 1006, 5:65-6:2, 7:4-13, 7:21-35. Therefore, Maycock's performance monitoring unit 20 analyzes and determines characteristics of the incoming digitized signal, as determined by the video analyzer 62, the audio analyzer 70, and/or the computer 58.

113. Alternatively, if the analysis and monitoring must be performed exclusively on a digital signal, Maycock's performance monitoring unit 20 still meets this requirement. Maycock explains that demultiplexer 52 creates a "third data bit bus" from an incoming digitized signal and transmits a third data bit bus "directly to a control computer 58 for analysis of the digitized performance information." Ex. 1006, 6:4-7. Maycock further describes that this digitized performance information includes "digital carriers derived from the microprocessor" (*e.g.*, microprocessor 30, *see* Ex. 1006, 5:13-16) that "contain information such as video level, video carrier frequency, audio carrier level, audio carrier frequency plus other digitally encoded information," corresponding to "characteristics," as claimed in limitation *1[g]*. Ex. 1006, 6:62-67. It is therefore my opinion that Maycock discloses claim 1g.

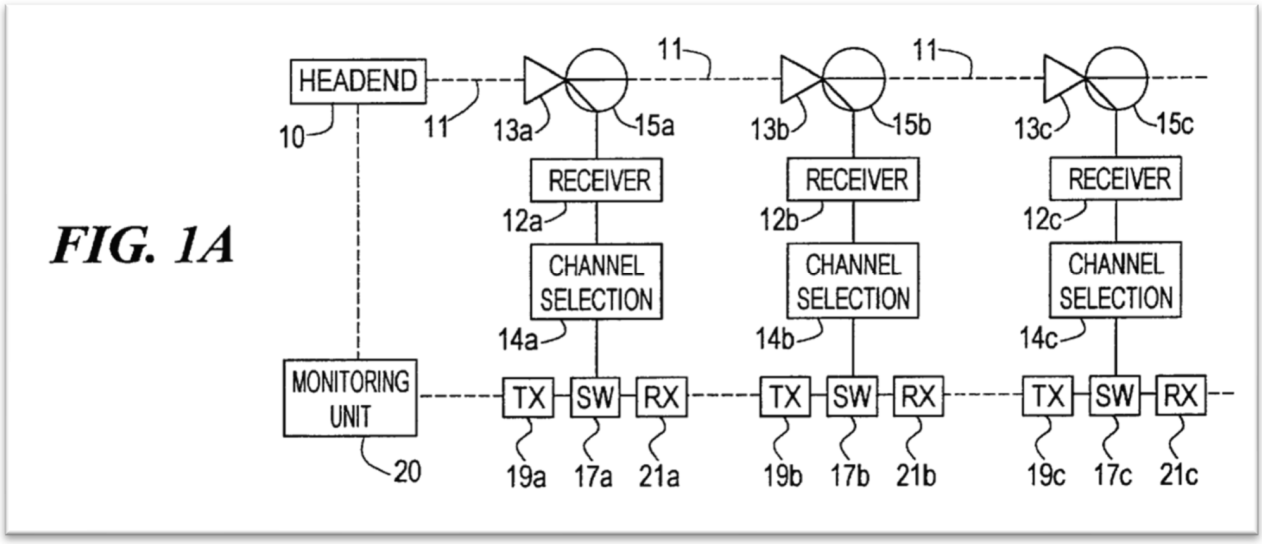
114. In the event that Maycock does not disclose this element, Kidambi discloses that "the digital tuner and QAM demodulator 3208 tunes and demodulates the amplified, filtered, and digitized downstream signals 3240 in accordance with either 64-QAM or 256-QAM techniques *to recover the underlying information*." Ex. 1007, ¶85. Kidambi thus explicitly discloses analyzing the digital signal. It is therefore my opinion that Maycock in combination with Kidambi makes claim 1g obvious.

i. Claim 1h – controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages.

115. It is my opinion that Maycock, alone or in view of the general knowledge of a POSITA, discloses controlling the transmission of network management messages from the digitizing optical transmitter 16 to performance monitoring unit 20 and transmitter 10, which are located at the headend, based on the measured characteristic of the received signal. Ex. 1006, 3:2-17, Fig. 1, *see, also,* Fig. 1A;



Ex. 1006, Fig. 1.

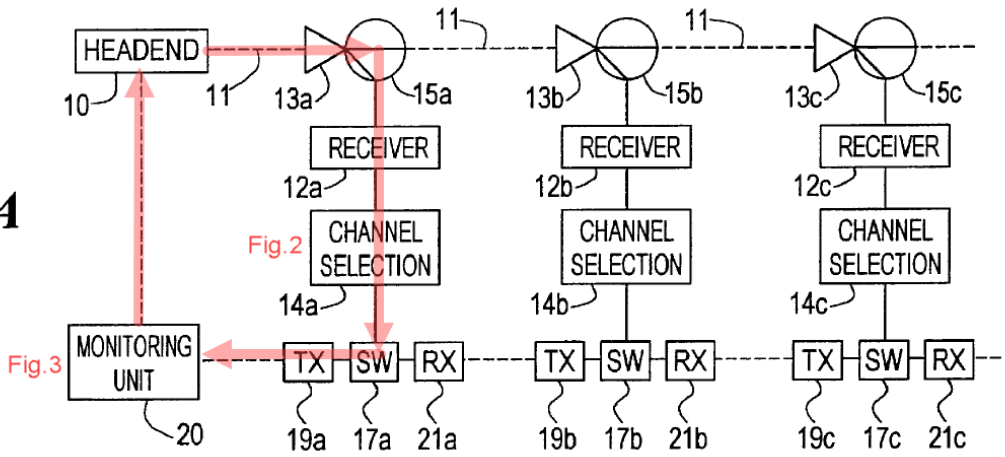


Ex. 1006, Fig. 1A

116. As Maycock describes, the goal of its system was to provide performance and signal quality monitoring as the signal passed through a single point in the system, as opposed to monitoring the status of equipment at numerous points along the signal's transmission path, which is how conventional systems at the time performed. Ex. 1006, 1:31-44. This "performance monitoring," as opposed to "status monitoring," enabled a signal operator (*e.g.*, a controller of a source broadband signal like a cable television provider) to identify whether a signal itself was of poor quality. Ex. 1006, 1:14-23. Maycock's simplified Fig. 1 shows a signal path from performance monitoring unit 20 to video head-end 10 – regardless of whether the monitoring unit is located at the headend or remote. Ex. 1006, Fig. 1, 3:14-16 ("a monitoring unit 20 at a monitoring location, which may

be at the head end or some other location"); Ex. 1006, 5:32-35 (discussing signals from channel selector transmitting to headend). A POSITA would understand that the purpose of the monitoring is to adjust the transmission based on information at least from the measures of the signal that are obtained by the channel selector 14, and that the red line shown in below in Fig. 1A (annotated) illustrates this flow of information back to the headend.

FIG. 1A



Ex. 1006, Fig. 1A (annotated).

117. Further, Maycock describes that the monitoring unit 20 controls the transmission of the measured characteristic of the received signal to the monitoring unit 20. Ex. 1006, 3:50-55 ("Upon command from the monitoring location … the switch 17a, 17b … 17n can select either this selected local signal from the respective channel selector 14a, 14b … 14n or a signal from the respective receiver 21a, 21b … 21n."), *see, also*, Fig. 4, 7:22-35. Based on Maycock, a POSITA

would understand that transmission of the characteristic would occur in a network management message where the measured characteristic would be different than the network management message. It is therefore my opinion that Maycock makes claim 1h obvious.

2. Dependent claim 2 – *The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.*

118. Maycock discloses bounds that measurements are compared with stored data to determine if the measurements are "within prescribed limits" and "outside of limits for the baseline data," or "outside of [the] range of [a] previous reading." Ex. 1006, 7:37-53. That is, a "system performance parameter to be monitored is selected by programming." The measurement is taken as previously detailed, "[i]n the monitoring unit 20 the signal is recovered …and the measurement data is compared with reference data stored for the purpose," the result is no communication, a warning, or an alarm. *Id*., 3:18-21, Fig. 5.

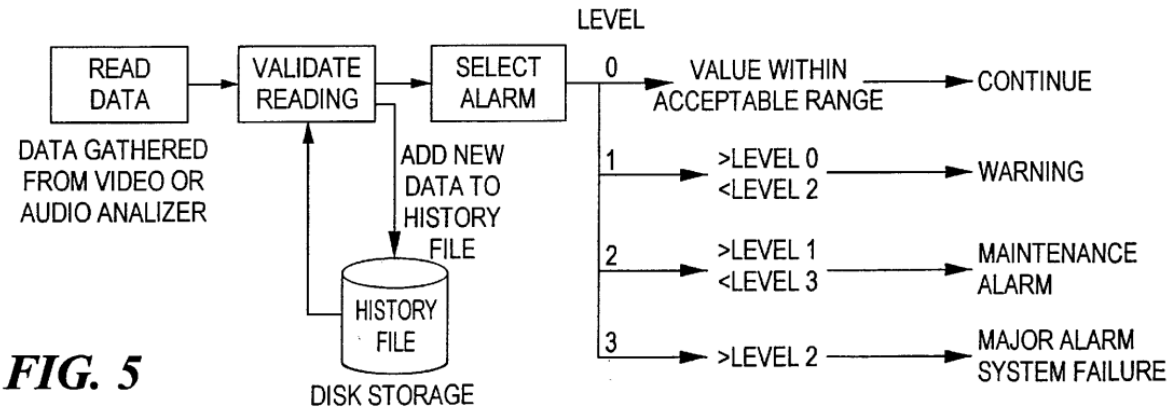


FIG. 5

Ex. 1006, Fig. 5. A POSITA would understand the validation procedure results include communicating a warning or alarm as a network management message. Ex. 1006, Table 1. It is therefore my opinion that Maycock makes claim 2 obvious.

3. Dependent claim 3 – *The method of claim 2, wherein said parameter is a modulation parameter of said received signal.*

119. Maycock discloses measurement of a modulation parameter, such as a modulation parameter identified in video specification EIA RS-250. Ex. 1006, 6:24-27. This video specification standard was decommissioned in the 2010 timeframe and was replaced by a number of equivalent standards and specifications from industry standards groups, such as ATSC and ISO/IEC, and government oversight agencies such as the FCC. These standards define all aspects of transmission, plant propagation, and signal reception, and provide a basis for determining if received signals or parameters fall outside of acceptable bounds. It is my opinion that a POSITA would be familiar with these specifications and the appropriate range of value for parameters describe in the specification and thus understand that a modulation parameter may be the parameter that is determined to be out of bounds. It is therefore my opinion that Maycock makes claim 3 obvious.

4. Dependent claim 4 – The method of claim 2, wherein said parameter is a transmit power of said received signal.

120. Maycock discloses that one measured characteristic, as detected by

Petitioner Cox Communications, Inc.
Exhibit 1003 - Page 84 of 92

the computer 58, video analyzer 62, and/or audio analyzer 70 (signal analyzer), is SNR. Ex. 1006, 6:24-29, 6:55-57. Maycock further discloses that the digital data information on the third bit line comprises information such as "signal quality information indicative of the quality of the selected channel" and that this comprises power level, frequency, temperature, and other local status information. Ex. 1006, 4:59-5:16. It is therefore my opinion that Maycock makes claim 4 obvious.

5. Dependent claim 6 – The method of claim 1, wherein said characteristic is signal power vs. frequency.

121. Although the signal quality information does not expressly include measuring power vs. frequency, in my opinion, it would have been obvious to a POSITA in view of Maycock's disclosure of measuring power and frequency to include power v. frequency data as part of the quality information in the "digital data information." In my opinion, a POSITA (and any undergraduate student at the time who had taken a basic Electrical Engineering course in digital communications) would understand the foundations of digital communications and therefore measures that are used to characterize an RF channel, including signal power and frequency. Further, in my opinion, a POSITA would understand how to calculate/derive measures in actual systems, such as signal power vs. frequency. It is therefore my opinion that Maycock makes claim 6 obvious.

6. Dependent claim 8 – The method of claim 1, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.

122. Maycock discloses determining SNR. Ex. 1006, 4:29-38; Similar to the analysis for claims 4 and 6, in my opinion a POSITA would find measuring characteristics to determine peak-to-average ration, noise levels, BER and SER as obvious. In my opinion, a POSITA (and any undergraduate student at the time who had taken a basic Electrical Engineering course in digital communications) would understand the foundations of digital communications and therefore measures that are used to characterize an RF channel, including signal-to-noise ratio (SNR), peak-to-average-ratio, noise levels, bit error rate (BER), and symbol error rate (SER). Further, in my opinion, a POSITA would understand how to calculate/derive measures in actual systems, including SNR and MER, and how to calculate/derive SER, noise levels, average signal power and MER from digital measurement capabilities. It is therefore my opinion that Maycock makes claim 8 obvious.

7. Dependent claim 9 – The method of claim 1, configuring, by said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.

123. Maycock discloses using "baseband video and audio signals for both

Petitioner Cox Communications, Inc.
Exhibit 1003 - Page 86 of 92

visual and quantitative measurement" wherein at least for the NTSC system, the relevant signal is between 0-6 MHZ. Ex. 1006, 2:37-41, 4:7-24. A POSITA would recognize that NTSC, SECAM, and PAL signals may possess different frequency ranges – thereby configuring the bandwidth of the entire digitized signal, including the first portion. See, e.g. Ex. 1006, 4:18-24. It is therefore my opinion that Maycock makes claim 9 obvious.

C. Ground 3: Claims 1, 2, 3, 4, 6, 8, and 9 are unpatentable as obvious over Maycock in view of Zhang and further in view of the knowledge of a POSITA

124. It is my opinion that the combination of Maycock's signal monitoring system and Zhang makes claims 1-4, 6, 8-9 obvious.

1. Independent claim 1

a. *Claim 1 Preamble – A method comprising:*

125. *See* Ground 2, claim 1, limitation 1 Preamble.

126. To the extent Maycock does not disclose this limitation, Zhang discloses a "method and circuitry…" Ex. 1008, Abstract.

b. C*laim 1a – performing by one or more circuits of a receiver coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network:*

127. *See* Ground 2, claim 1, limitation 1[a].

128. Zhang describes a multi-channel demodulator that receives one or

more multi-channel analog RF signals, which can be sourced from a cable system. Ex. 1008, 3:13-19. As I have explained above, in my opinion, a POSITA would understand that a cable system utilizes a hybrid fiber coaxial network to provide RF signals to a receiver in a subscriber's home. Thus, the combination of Maycock and Zhang disclose this limitation. It is therefore my opinion that the combination of Maycock and Zhang makes claim 1a obvious.

c. *Claim 1b – receiving, via said HFC network, a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels;*

129. *See* Ground 2, claim 1, limitation 1[b].

130. To the extent Maycock does not disclose this limitation, Zhang teaches using a "high-speed ADC" to digitize "an entire signal band with n channels" as depicted in Figure 2. Ex. 1008, 3:62-63. It is therefore my opinion that the combination of Maycock and Zhang makes claim 1b obvious.

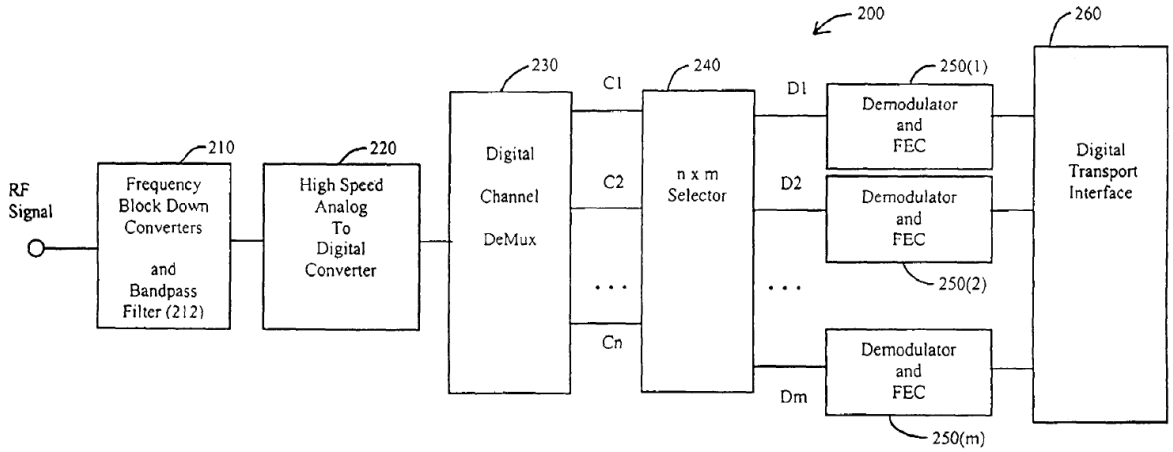


Fig. 2

d. *Claim 1c – digitizing said received signal to generate a digitized signal;*

131. *See* Ground 2, claim 1, limitation 1[c].

132. To the extent Maycock does not disclose this limitation, Zhang discusses that a single ADC could be used to digitize incoming TV signals Ex. 1008, 3:49-53. Specifically, Zhang's ADC "receives [a] multi-channel analog RF signal … and converts the multi-channel analog RF signal to a multi-channel digital RF signal." Ex. 1008, 2:14-17; see e.g. 3:13-19; 3:60-64;

133. If an incoming television signal surpasses the capabilities of a single ADC, Zhang ensures that the entirety of an incoming television signal is digitized by using multiple ADCs. Ex. 1008, 6:3-35, 6:52-61. Thus, a POSITA would understand either Zhang's High Speed Analog to Digital Converter 220 or the multiple ADCs (620a, 620b) may digitize the received network signals, resulting a

digitized signal. It is therefore my opinion that the combination of Maycock and Zhang makes claim 1c obvious.

e. Claim 1d – selecting a first portion of said digitized signal;

134. *See* Ground 2, claim 1, limitation 1[d].

f. Claim 1e – selecting a second portion of said digitized signal;

135. *See* Ground 2, limitation 1[e].

g. Claim 1f – processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

136. *See* Ground 2, claim 1, limitation 1[f].

h. Claim 1g– analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

137. *See* Ground 2, claim 1, limitation 1[g].

i. Claim 1h – controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal, wherein said measured characteristic is different than said network management messages.

138. *See* Ground 2, claim 1, limitation 1[h].

2. Dependent claim 2 – *The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.*

139. *See* Ground 2, claim 2.

3. Dependent claim 3 – *The method of claim 2, wherein said parameter is a modulation parameter of said received signal.*

140. *See* Ground 2, claim 3.

4. Dependent claim 4 – The method of claim 2, wherein said parameter is a transmit power of said received signal.

141. *See* Ground 2, claim 4.

5. Dependent claim 6 – *The method of claim 1, wherein said characteristic is signal power vs. frequency.*

142. *See* Ground 2, claim 6.

6. Dependent claim 8 – The method of claim 1, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.

143. *See* Ground 2, claim 8.

7. Dependent claim 9 – The method of claim 1, configuring, by said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.

144. *See* Ground 2, claim 9.

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



Dated: 02/15/2024

Dr. James Martin