

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

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

Title: METHOD AND APPARATUS FOR SPECTRUM MONITORING

Inter Partes Review No.: IPR2024-00442

DECLARATION OF DAVID B. LETT

**IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.***

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

1. INTRODUCTION

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

2. I have been asked to provide a declaration regarding certain matters pertaining to U.S. Patent No. 9,825,826 (“the ’826 Patent”) (Ex. 1001) and the unpatentability grounds set forth in the Petition for this proceeding. My experience with television distribution systems, Set-Top-Boxes (STBs), and content delivery systems provides me with an understanding of the subject matter described and claimed in the ’826 Patent.

3. I am being compensated at my usual consulting rate or testimony rate of \$385 per hour. My compensation is in no way dependent upon my opinions or testimony or the outcome of this proceeding. I have no financial interest in the party or in the outcome of this proceeding.

2. PROFESSIONAL BACKGROUND AND QUALIFICATIONS

4. I am a technical consultant and product development industry veteran with expertise in electronics, software, hardware, video, audio, and data communications, having led product development organizations in cable, satellite,

consumer electronics, home automation, asset tracking, remote tank logistics, and alarm industries. My current curriculum vitae is attached as Ex. 1003 and some highlights follow.

5. I earned my B.S. in Electrical Engineering (1982) with high honors from the University of Tennessee in Knoxville, Tennessee. I also attended the Georgia Institute of Technology from 1986 to 1987, completing 40% of the required degree hours for the M.S. Electrical Engineering program.

6. From 1982 to 1985, I worked at Scientific Atlanta as an Electrical Engineer designing video, audio, and data communications equipment for the cable television industry. I designed software and hardware including addressable data transmitters, video sync suppression scramblers, transaction format converters, and data channel monitors for addressable Cable Television systems and Set-Top-Boxes.

7. From 1983 to 1985, while working at Scientific Atlanta, I also worked as an Assistant Professor at DeVry Institute of Technology, teaching courses in electronics and microprocessor hardware/software.

8. From 1985 to 1990, I worked at Wegener Communications as a Senior Electrical engineer, designing satellite communications equipment including forward error correction (FEC) coding systems, PSK modems, and analog control systems for RF modulators and PSK demodulators. I was promoted to the Hardware Engineering Manager, where I managed product development of video, audio, and

data satellite receivers, modulators, graphics display systems, DSP-based companders, FSK and PSK satellite modems, multiplexers, forward error correction (FEC) codecs, RF upconverters and downconverters, and baseband analog and digital processing components.

9. In 1990, I returned to Scientific Atlanta, which was acquired by Cisco in 2006. I worked as Engineering Manager running the set-top-box engineering group where I was promoted to Director and Vice President during my tenure until 2011. I led the design of many cable set-top-boxes and systems through the evolution of analog video, addressability, downloadable software, electronic program guides, digital video, VOD, software applications, high-definition TV, DVR, DOCSIS, full spectrum tuners, and multiroom DVR. These systems implemented various technologies including DOCSIS 1/2/3 and hybrid gateways, IEEE 802.11, IPTV, DVR, cable modems, ADSL, VDSL, DVB-T/C/S, bootloaders, factory diagnostics, application frameworks, Nagra, DRMs, conditional access, secure microprocessors, device management, Android, Adobe Flash, Linux, DVD play/record, MPEG-4, MPEG-2, H.264, NTSC, PAL, DAVIC, MoCA, high-performance CPUs, cablecards, network processors, HDMI, multiple video/audio display interfaces, 2D/3D graphics, multiple RF tuners, and full spectrum tuners.

10. From 2011 to 2016, I worked for EchoStar Technologies, which served as the product development organization for sister company DISH Network. I served

as Vice President of Engineering and was the Head of the Atlanta research and development center. I led the development of satellite set-top-boxes, consumer electronic equipment, and a home automation and security system. Technologies used included video/audio, IoT, H.265, HEVC, 3D, Satellite, wireless, MoCA, transcoding, embedded C Linux applications, mobile applications (IOS and Android), SaaS, web applications (JavaScript, HTML), BSS/OSS, AWS cloud storage, 2-way video/audio streaming, authentication, and VoIP.

11. In 2016, I started an independent consulting business in technology and intellectual property projects. I have consulted in various technology areas and industries including consumer electronics, Internet of Things (IoT), cable, satellite, television, media, and cryptocurrency.

12. From 2019 to 2022, I worked as Chief Technology Officer for Telular, an Ametek company. I was responsible for the development of Industrial Internet of Things (IIoT) recurring revenue solutions, combining wireless technologies, purpose-built hardware, and SaaS in the commercial telematics, security and home automation markets and sold under the SkyBitz and Telguard brands.

13. My record of professional service includes awards on products I designed and developed from several organizations in my field of expertise, including Best of Show, Technology Emmy, and Best of Innovations.

14. I am a named inventor on at least 87 patents and published patent applications corresponding to the areas of my professional work. The patents and published applications involving video and audio technologies include:

- U.S. Patent No. 9,882,736 titled “Remote Sound Generation for a Home Automation System”
- U.S. Patent No. 9,615,139 titled “Determining Device That Performs Processing of Output Pictures”
- U.S. Patent No. 8,549,567 titled “Media Content Sharing Over a Home Network”
- U.S. Patent No. 8,161,388 titled “Interactive Discovery of Display Device Characteristics”
- U.S. Patent Nos. 8,120,924, 7,240,217, 6,785,817, 6,564,324, 6,212,278, and 5,440,632 titled “Reprogrammable Subscriber Terminal”
- U.S. Patent No. 7,908,625 titled “Networked Multimedia System”
- U.S. Patent Nos. 7,861,272 and 7,849,486 titled “Networked Subscriber Television Distribution”
- U.S. Patent Nos. 7,774,820 and 7,069,578 titled “Settop Cable Television Control Device and Method Including Bootloader Software and Code Version Table for Maintaining and Updating Settop Receiver Operating System Software”
- U.S. Patent No. 5,771,064 titled “Home Communications Terminal Having an Applications Module”
- U.S. Patent No. 5,715,515 titled “Method and Apparatus for Downloading On-Screen Graphics and Captions to a Television Terminal”
- U.S. Patent No. 5,657,414 titled “Auxiliary Device Control for a Subscriber Terminal”

- U.S. Patent No. 5,592,551 titled “Method and Apparatus for Providing Interactive Electronic Programming Guide”
- U.S. Patent No. 5,539,822 titled “System and Method for Subscriber Interactivity in a Television System”
- U.S. Patent No. 5,357,276 titled “Method of Providing Video On Demand with VCR Like Functions”
- U.S. Patent Application Publication Nos. 2004/0068753 and 2008/0072272 titled “Video Transmission Systems and Methods for a Home Network”
- U.S. Patent Application Publication No. 2004/0133911 titled “Subscriber Network in a Satellite System”

15. I have a general understanding of the U.S. patent prosecution process and of the novelty and non-obviousness requirements for patentability.

16. I believe that my extensive industry experience and educational background qualify me as an expert in the relevant field of television signal processing and communication systems. I am knowledgeable of the relevant skill set that would have been possessed by a hypothetical person of ordinary skill in the art at the time of the invention of the '826 Patent.

3. MATERIALS CONSIDERED

17. In formulating my opinion, I reviewed and considered U.S. Patent No. 9,825,826 to Gallagher et al. (Ex. 1001), as to which I am offering my opinion regarding the validity of certain claims, as discussed herein.

18. In preparing this declaration, I also reviewed and considered the Petition and the file history of the '826 Patent (included in Ex. 1004) as well as the following references:

Ex. 1001:	U.S. Patent No. 9,825,826 (“the ’826 Patent”)
Ex. 1003:	Curriculum Vitae of David B. Lett
Ex. 1004:	Certified Prosecution History of the ’826 Patent
Ex. 1005	Certified Copy of U.S. Provisional Application No. 61/532,098 (“the ’826 Provisional”)
Ex. 1006	U.S. Patent No. 8,792,008 (“the ’008 Patent”)
Ex. 1007-1008:	Reserved
Ex. 1009:	U.S. Pub. No. 2005/0114879 (“Kamieniecki”)
Ex. 1010:	U.S. Pub. No. 2010/0120386 (“Konstantinos”)
Ex. 1011:	U.S. Patent No. 8,649,421 (“Renken”)
Ex. 1012:	U.S. Provisional Application No. 61/444,611 (“Renken Provisional”)
Ex. 1013-1014:	Reserved
Ex. 1015:	U.S. Pub. No. 2004/0181813 (“Ota”)
Ex. 1016-1019:	Reserved
Ex. 1020:	Claim Construction Memorandum Opinion and Order dated June 26, 2023, <i>Entropic Comms., LLC v. Charter Comms., Inc.</i> , 2:22-CV-00125-JRG (E.D. Tex.)
Ex. 1021:	U.S. Pub. No. 2005/0183130 (“Sadjja”)
Ex. 1022:	U.S. Pub. No. 2010/0299713 (“Salinger”)
Ex. 1023:	Excerpts of IEEE 100, “The Authoritative Dictionary of IEEE Standard Terms” (7 th ed. 2000)

Ex. 1024:	U.S. Pub. No. 2008/0089402 (“Massey”)
Ex. 1025:	U.S. Patent No. 7,573,531 (“Aggarwal”)
Ex. 1026:	Excerpts of W. Ciciora, J. Farmer, D. Large, and M. Adams, “Modern Cable Television Technology Video, Voice, and Data Communications” (2 nd ed. 2004) (“Ciciora”)
Ex. 1027:	U.S. Patent No. 7,340,230 (“Khoini-Poorfard”)
Ex. 1028:	U.S. Pub. No. 2003/0217362 (“Summers”)
Ex. 1029:	U.S. Pub. No. 2006/0256799 (“Eng”)

4. UNDERSTANDING OF APPLICABLE LEGAL STANDARDS

19. Although I am not an attorney, I have a general understanding of the applicable legal standards pertaining to the patentability issues presented in this proceeding. I understand that the Petitioner is challenging the patentability of the claims of the ’826 Patent based on the following grounds:

- Ground A: Claims 1-18 as obvious under pre-AIA 35 U.S.C. § 103(a) based on Kamieniecki in view of Konstantinos.
- Ground B: Claims 3 and 12 as obvious under pre-AIA 35 U.S.C. § 103(a) based on Kamieniecki in view of Konstantinos and Sadjja.
- Ground C: Claims 5 and 14 as obvious under pre-AIA 35 U.S.C. § 103(a) based on Kamieniecki in view of Konstantinos and Aggarwal.
- Ground D: Claims 7 and 16 as obvious under pre-AIA 35 U.S.C. § 103(a) based on Kamieniecki in view of Konstantinos and Salinger.

- Ground E: Claims 1-18 as obvious under pre-AIA 35 U.S.C. § 103(a) based on Renken.
- Ground F: Claims 5 and 14 as obvious under pre-AIA 35 U.S.C. § 103(a) based on Renken in view of Aggarwal.

20. I understand that, in this *inter partes* review, Petitioner has the burden of proving that each challenged claim is unpatentable by a preponderance of the evidence.

21. I understand that to be valid, a patent claim must be “novel,” and is invalid if “anticipated” by a single prior art reference. I further understand a reference anticipates if it discloses each and every element as arranged in the claim so as to enable a person of ordinary skill in the art to make and use the claimed invention without undue experimentation.

22. I understand that a patent claim is unpatentable if, at the time of the invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of the prior art to yield the patent claim. It is my understanding that this determination is made after weighing the following factors: (1) the level of ordinary skill in the pertinent art; (2) the scope and content of the prior art; (3) the differences between the prior art as a whole and the claim at issue; and (4) as appropriate, other objective considerations identified below.

23. It is my understanding that the prior art and claimed invention should be viewed through the knowledge and understanding of a person of ordinary skill in the art – one should not use his or her own insight or hindsight in deciding whether a claim is obvious. I further understand that a claim may be rendered obvious if a person of ordinary skill in the art can implement the claimed invention as a predictable variation of a known product. I further understand that a person of ordinary skill in the art is presumed to have knowledge of the relevant prior art at the time of the claimed invention, which comprises any prior art that was reasonably pertinent to the particular problems the inventor faced.

24. I understand that a showing of obviousness requires some articulated reasoning with a rational underpinning to support the combination of the references. I understand that in consideration of the issue of obviousness it is important to identify whether a reason existed at the time of the invention that would have led a person of ordinary skill in the pertinent art to combine elements of the references in a way that yields the claimed invention.

25. I understand that a claim may be considered unpatentable for obviousness for various reasons. I have been informed that the following exemplary rationales may support a finding of obviousness:

- (A) combining prior art elements according to known methods to yield predictable results;

- (B) substituting one known element for another to obtain predictable results;
- (C) use of a known technique to improve similar devices in the same way;
- (D) applying a known technique to a known device ready for improvement to yield predictable results;
- (E) choosing from a finite number of identified, predictable solutions with a reasonable expectation of success;
- (F) known work in a field that prompts variations in the work in the same or a different field that leads to predictable results; and
- (G) some teaching, suggestion, or motivation in the prior art that would have led a person of ordinary skill in the art to modify a prior art reference or combine multiple prior art references or teachings to arrive at the claimed invention.

26. I understand that various objective or “real world” factors may be indicative of non-obviousness. I understand that such factors include:

- (A) the commercial success of the claimed invention;
- (B) the existence of a long-felt, unresolved need for a solution to the problem solved by the claimed invention;
- (C) failed attempts to solve the problem solved by the claimed invention;
- (D) copying of the claimed invention;
- (E) unexpected results of the claimed invention;

- (F) praise for the claimed invention by others in the relevant field; and
- (G) willingness of others to accept a license under the patent because of the merits of the claimed invention.

27. It is my understanding that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times the link may be based on the common sense of the person of ordinary skill in the pertinent art. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and market demand is sufficient motivation to combine references.

28. It is my understanding that a particular combination may be proven obvious merely by showing that it was obvious to try the combination. For example, common sense is a good reason for a person of ordinary skill to pursue known options when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions.

29. I further understand that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, it is my understanding that any need or problem known in the field at the time of invention and addressed by the patent can provide a reason for combining the limitations in the manner claimed.

30. It is my understanding that a patent or printed publication is entitled to claim the benefit of the filing date of an earlier-filed application if the disclosure of the earlier-filed application provides support for the claims in the patent or printed publication. It is my understanding that in order for the earlier-filed application to provide such support, it must describe the claimed invention in sufficient detail that a POSITA can reasonably conclude that the inventor was in possession of the claimed invention, and that it must provide sufficient detail to enable a POSITA to make and use the claimed invention without resorting to undue experimentation.

5. OVERVIEW OF THE '826 PATENT

31. The '826 Patent is entitled "Method and Apparatus for Spectrum Monitoring," and generally relates to a receiver that can receive a signal comprising television and data channels, measure a characteristic of a portion of the signal, and report those characteristics or related information back to a source of the signal. Ex. 1001, 1:37-40, 1:64-67, 2:45-3:15, 3:45-4:5.

32. Figure 1A of the '826 Patent shows an example of its overall architecture. A headend 108 receives television signals via antenna 102 and/or satellite dish 104, and data via an Internet Protocol (IP) Network (e.g., Internet) 106, and transmits them as downstream signals to various customer gateways 120a, 102b via hybrid fiber-coaxial (HFC) network 118. Ex. 1001, 2:45-3:3.

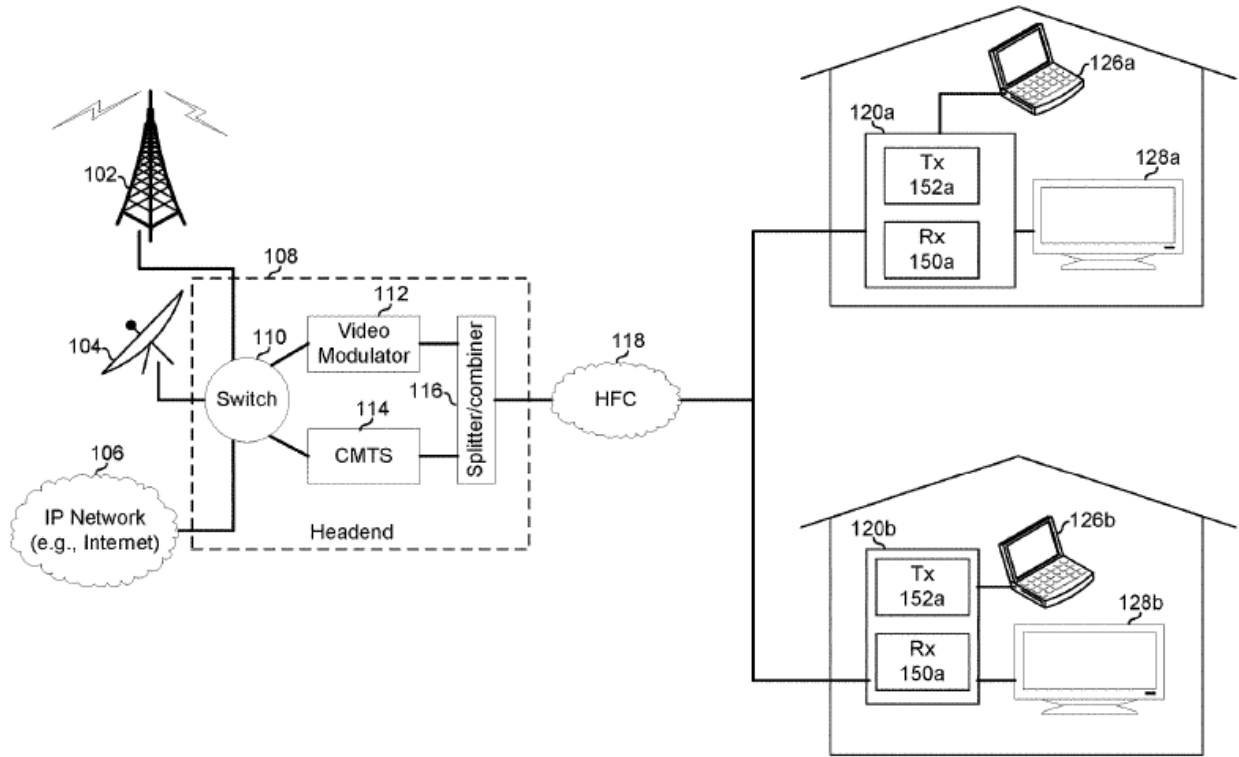


FIG. 1A

Ex. 1001, Fig. 1A

33. Signal monitoring is performed by a receiver circuit 100, an example of which is shown in Figure 1B, that resides within the gateways 120a, 120b. Ex. 1001, 3:16-4:5. Within the receiver 100, there is a radio frequency (RF) front end 158 (**red**) that receives an RF signal S and generates a corresponding digital signal

D; a channelizer 152¹ (green) that selects frequency bands within the signal S and outputs them to a monitoring module 154 (blue) and/or a data processing module 156 (purple). Ex. 1001, 3:27-4:64, 6:54-7:6.

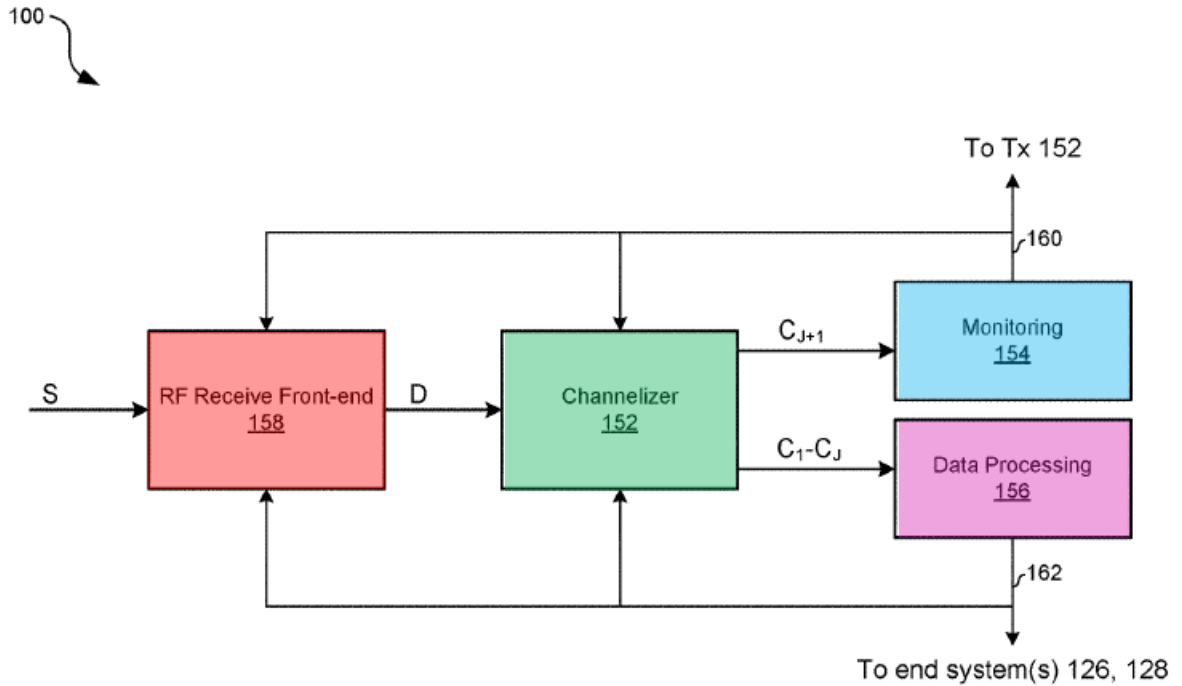


FIG. 1B

Ex. 1001, Fig. 1B (annotated)

¹ In the figures and text, the channelizer is sometimes referred to as element 102 and other times as element 152.

34. The monitoring module 154 (**blue**) analyzes the band it receives to measure/determine various signal characteristics such as power level vs. frequency and signal-to-noise ratio, and can control transmission of network management/maintenance messages that can comprise the measured/determined characteristics and/or indicate whether a communication parameter of a channel is outside acceptable bounds. Ex. 1001, 3:45-4:5. These messages may be sent to a source of the signal S – e.g., the headend 108. Ex. 1001, 3:4-15, 3:57-4:5. The '826 Patent describes the monitoring module 154 largely in functional terms, and does not provide any details or examples of the structure of the monitoring module 154, other than a general statement that the term “module” in the '826 Patent refers to “functions that can be implemented in hardware, software, firmware, or any combination of one or more thereof.” Ex. 1001, 2:33-44, 3:45-4:5.

35. The data processing module 156 (**purple**) processes the bands it receives to recover the data on the television channel(s) that was (are) within the band(s). Ex. 1001, 4:6-27. The data processing module 156 can then output corresponding data to an interface, such as HDMI (High Definition Multimedia Interface) and/or Ethernet. Ex. 1001, 4:6-18.

5.1. Prosecution History

36. U.S. Application No. 14/948,947, which led to the '826 Patent, was filed on November 23, 2015. Ex. 1004, p. 103. This application was a continuation of U.S. Application No. 14/341,880 (now U.S. Patent No. 9,203,653, “'653 Patent”),

which in turn was a continuation of the '008 Patent, and ultimately claimed priority to U.S. Provisional Application No. 61/532,098 (hereinafter, "'826 Provisional," Exhibit 1005). *Id.*

37. In an Office Action dated September 23, 2016, all claims were rejected on the ground of nonstatutory double-patenting in view of claims from the '653 Patent, and also as being obvious over a combination of Krafft et al. (U.S. 2012/0163290) and Sasaki (U.S. 2005/0152557). Ex. 1004, pp. 111-120. Krafft, entitled "Internet Protocol Low Noise Block Front End Architecture," was cited for most features, but the Office conceded that Krafft did not "control the transmission of network management messages back to said headend based on said measured characteristic of said received signal." Ex. 1004, pp. 116-119. To address this, the Office alleged that it would have been obvious to send feedback for the purpose of generating adjustments, and cited Sasaki to show a multi-speaker audio system adjusting speaker output based on calculated transfer characteristics (e.g., propagation delay) of sounds from various speakers. Ex. 1004, p. 119.

38. In an Amendment dated December 19, 2016, Applicant filed a Terminal Disclaimer, and argued that Sasaki's transfer characteristics are not actually transmitted anywhere. Ex. 1004, pp. 135-144. However, the Office maintained the rejection, noting that since Sasaki showed that a server could determine the transfer

characteristics of the sounds, then the server must be receiving some sort of “measured/determined characteristics” of that sound. Ex. 1004, pp. 155-157.

39. In an After-Final Response dated May 17, 2017, Applicant again argued against Sasaki, this time asserting that Sasaki did not “control the transmission” of a message based on the cited transfer characteristic. Ex. 1004, pp. 168-176. In an Advisory Action, the Office maintained its position, explaining that it would have been obvious to modify Krafft to use feedback as taught by Sasaki. Ex. 1004, pp. 181-182.

40. In an amendment dated June 14, 2017, Applicant added, without detailed discussion, the limitation “wherein said measured characteristic is different than said network management messages.” Ex. 1004, pp. 187-193. This resulted in allowance. Ex. 1004, p. 200.

5.2. Earliest Priority Date for the Claims

41. The ’826 Patent claims priority to September 8, 2011, the filing date of U.S. Provisional Application No. 61/532,098 (hereinafter, “’826 Provisional,” Exhibit 1005). However, the ’826 Patent claims are not entitled to that priority date, as the claims recite features that were not found in the provisional application. In particular, both independent claims recite features involving a “hybrid fiber coaxial (HFC) network,” but nowhere in the provisional is there any disclosure of a hybrid fiber coaxial network. Ex. 1001, claims 1 and 10; Ex. 1005, pp. 2-20. The contents of the ’826 Provisional do not describe an HFC or its associated features as recited

in claims 1 and 10 of the '826 Patent, nor do they demonstrate that the inventor of the '826 Patent was contemplating those features. The HFC first appears in the '008 Patent, which was the first non-provisional application claiming priority to the '826 Provisional, and thus the claims of the '826 Patent are only entitled to the September 10, 2012, filing date of the '008 Patent. Ex. 1001, Fig. 1A; Ex. 1006, Fig. 1A.

42. As another example, both independent claims recite “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.” Ex. 1001, claims 1 and 10. There is no mention of a “network management message” in the '826 Provisional. Ex. 1005, *passim*. At best, there is one mention that it would be desirable to “report back parameters such as power levels over frequency to the transmitting equipment to allow statistical analysis and/or adjustments in the transmission to the receiving equipment.” Ex. 1005, p. 13. While “power levels over frequency” may be a “measured characteristic”, there is no discussion of transmitting, to the headend and based on that measured characteristic, a “network management message” wherein “said measured characteristic is different than said network management messages.” Ex. 1005, *passim*. Furthermore, claims 2 and 11 elaborate on these “network management messages” by reciting that they indicate whether a parameter is outside of acceptable bounds. The '826 Patent refers to these “acceptable bounds” at column

3, lines 62-67, but there is no such disclosure in the '826 Provisional. The contents of the '826 Provisional do not describe these features as recited in claims 1, 2, 10, or 11. Because claims 1, 2, 10, and 11 recite features not found in the '826 Provisional, these claims are not entitled the priority date of the '826 Provisional. Claims 3-9 and 13-18 depend from one or more of these claims, and are also not entitled to the priority date of the '826 Provisional.

43. The references below are prior art regardless of whether the '826 Patent claims are entitled to the provisional application's filing date.

6. THE RELEVANT ART AND LEVEL OF ORDINARY SKILL IN THE RELEVANT ART

44. I understand that obviousness is determined from the vantage point of a person of ordinary skill in the relevant art at the time of the alleged invention ("POSITA"). The '826 Patent is directed to monitoring signal quality in a television receiver, and I agree that this represents the relevant field of art. *See* Ex. 1001, Abstract. I understand that a person of ordinary skill in the art is one who is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity.

45. A person of ordinary skill in the art (a "POSITA") at the time of the alleged invention would have had a degree in electrical engineering or a similar discipline, and three-to-four years of experience working with television signal processing and communication systems. Additional education may substitute for

professional experience and significant work experience may substitute for formal education.

46. Unless otherwise noted, my statements in this declaration regarding what a POSITA would have known, understood, appreciated, considered obvious, been motivated to do, etc., regarding prior art refer to what the POSITA would have known before the earliest claimed priority date of the '826 Patent (which, as I discuss above, is September 8, 2011).

7. CLAIM CONSTRUCTION

47. I understand that my analysis requires an understanding of the scope of the claims of the '826 Patent. I understand that claim terms subject to *inter partes* review, absent some other definition provided in the patent, are given their ordinary meaning to a person of ordinary skill in the art in light of the patent specification. Therefore, in my analyses given below, I have assumed that all claim terms are given their ordinary interpretation as would have been understood by a POSITA reading the patent specification as of the priority date.

48. I understand that some claim elements may be recited using so-called “means-plus-function” language, in which an element is recited as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and that such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

49. I believe that the claims in the '826 Patent recite sufficient structure, material, or acts in support of any element that is arguably means-plus-function.

50. Claim 10 of the '826 Patent recites “processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels.” The recited function is “process said selected second portion of said digitized signal to recover information carried in said plurality of channels,” and the '826 Patent describes the data processing module 156 as performing that recited function. Ex. 1001, 4:6-9. The '826 Patent also defines its “module” to refer to “functions that can be implemented in hardware, software, firmware, or any combination of one or more thereof,” and accordingly, the corresponding structure is hardware, software, firmware, or any combination of one or more thereof, that carries out the recited function. Ex. 1001, 2:32-36, 3:16-21, 4:6-18, 4:65-5:9, Figs. 1B-1C.

51. Claim 10 of the '826 Patent recites “monitoring circuitry operable to: analyze said selected first portion of said digitized signal to measure a characteristic of said received signal; and control 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.” The recited functions are “analyze said selected first portion of said digitized signal to measure a characteristic of said received signal;

and control 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,” and the ’826 Patent describes the monitoring module 154 as performing these recited functions. Ex. 1001, 3:45-4:5. The ’826 Patent also defines its “module” to refer to “functions that can be implemented in hardware, software, firmware, or any combination of one or more thereof,” and accordingly, the corresponding structure is physical electronic hardware components and associated software/firmware that carries out the recited functions. Ex. 1001, 2:32-36, 3:16-21, 3:45-4:5, 4:65-5:9, Figs. 1B-1C.

52. It is my understanding that the ’826 Patent was previously asserted in another lawsuit, *Entropic Comms., LLC v. Charter Comms., Inc.*, 2:22-CV-00125-JRG (E.D. Tex.), and in June 2023, the District Court entered an Order construing “network management messages” to mean “messages which report on the network based on the measured characteristics.” Ex. 1020, pp. 26-29. The District Court also found that since the claim requires the measured characteristic to be different than the network management messages, merely sending the measured characteristic is insufficient. Ex. 1020, pp. 28-29. The Court’s construction and remarks are consistent with the ordinary and customary meaning of the claim language. The District Court did not construe any other terms from the ’826 Patent.

53. I have considered these constructions when applying my opinions herein.

8. OVERVIEW OF THE PRIOR ART

8.1. Cable and Satellite Television Networks

54. The origins of the cable and satellite television networks long predate the earliest claimed priority date of the '826 Patent. Ex. 1026, pp. 22-23. Cable television networks are entertainment distribution systems that allow consumers to access and enjoy various television channels. *Id.* A basic cable television network includes a headend that serves as the origination point for downstream signals in the cable network, trunk cables leading from the headend, distribution cables that connect to a trunk cable and distribute signals through a neighborhood, drop cables that connect a home to a distribution cable, and terminal equipment in the user's home. *Id.* These elements are generally illustrated in Figure 1.1 of Ex. 1026 below.

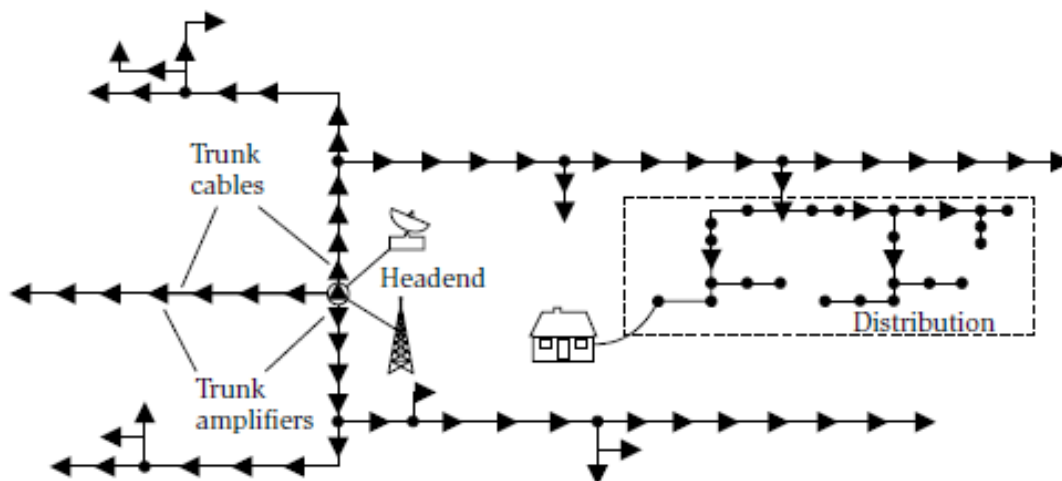


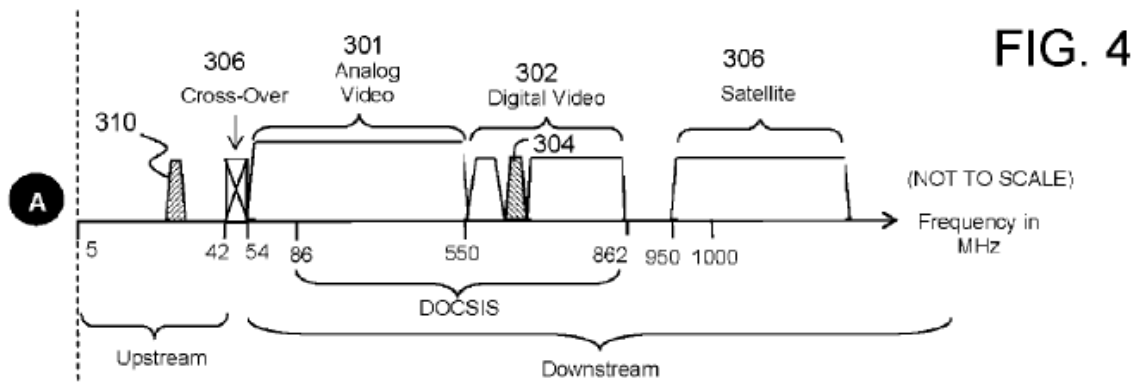
Figure 1.1 Tree-and-branch cable topology.

The headend is designed to broadcast and distribute, via coaxial cables, the data for the television channels as modulated radio frequency (RF) signals to multiple terminal equipment belonging to the consumers (e.g., television receivers, set-top boxes, data modems, digital video recorders, personal video recorders, and other terminal equipment). *Id.*, pp. 22, 30, 34, 40, 200-224, 352, 467-469. The transmissions between the headend and the terminal equipment are governed by various well-known industry standards, including Data Over Cable Systems Interface Specification (DOCSIS). Ex. 1026, pp. 27, 211-212.

55. In the 1990s, many cable networks began to be updated to use fiber optic cables, since fiber optic cables offer better performance than coaxial cables. Ex. 1026, pp. 37-38. As it is costly to dig up and replace cables, cable companies typically prioritized replacing the trunk cables with fiber, while leaving intact the distribution coaxial cables that were in consumers' neighborhoods. Networks that use both fiber and coaxial cables are known as "hybrid fiber/coax networks," or "HFC" networks.

56. Consumers can also access television channels from satellites via conventional home satellite television systems. Ex. 1027, 1:30-31; Ex. 1028, [0006]. Such home satellite television systems typically include a fixed dish antenna that receives television channels in modulated RF signals, as well as a satellite receiver or set-top box designed to process and demodulate the modulated RF signals. Ex.

1027, 1:30-35; Ex. 1028, [0013]. Satellites may also be used to distribute the television channels to headends of cable television networks, which are then redistributed to the consumers. Ex. 1026, pp. 262, 280-282; Ex. 1028, [0009].



Ex. 1029, Fig. 4 (Excerpted)

57. Figure 4 of Exhibit 1029 (partially reproduced above) illustrates the RF spectrum usage on a cable network, as it is used to carry different types of upstream and downstream data. Ex. 1029, [0079]-[0080]. In North America, downstream television channels from cable television networks occupy the RF spectrum from 54 to 864 MHz, with digital channels occupying the RF spectrum above 550 MHz. Ex. 1026, pp. 413, 503; Ex. 1029, [0079]-[0080]. Upstream channels on a cable television network occupy the lower frequency range from 5 to 42 MHz. Ex. 1029, [0080]. In 1941, the National Television System Committee, established by the United States Federal Communications Commission, set a standard that each television channel should be allocated 6 MHz of RF bandwidth and that the set of

allocated television channels should occupy the RF spectrum in a contiguous manner. Ex. 1026, pp. 45, 413, 515-520.

8.2. Baseband and Modulation

58. Video and audio captured by a camera produces what is known as a “baseband” signal, and in order to transmit multiple video or audio signals on a common transmission line, different baseband signals may be modulated onto different carrier signals, to avoid interfering with one another. Ex. 1026, p. 58. Modulation generally entails starting with a carrier signal, and varying one of its characteristics (e.g., its frequency, amplitude, or phase), based on the information in the baseband signal, such that the baseband signal’s data is impressed upon the carrier signal. *Id.* The act of “demodulation” refers to the reverse – taking a received carrier signal and determining the varied characteristic to recover the data.

8.3. Consumer Demands for Signal Quality

59. Cable television customers expect good picture quality, and picture quality was commonly measured in terms of signal to noise ratio (SNR). Ex. 1026, pp. 82-83. As its name implies, SNR is a ratio of the strength of a desired signal to the amount of background noise. The ratio is typically expressed in decibels, and Table 2.1 from Ex. 1026, shown below, illustrates the degree to which customers objected to differing degrees of SNR due to different types of impairment:

Table 2.1 Suppression of Impairments for Various Subjective Reactions

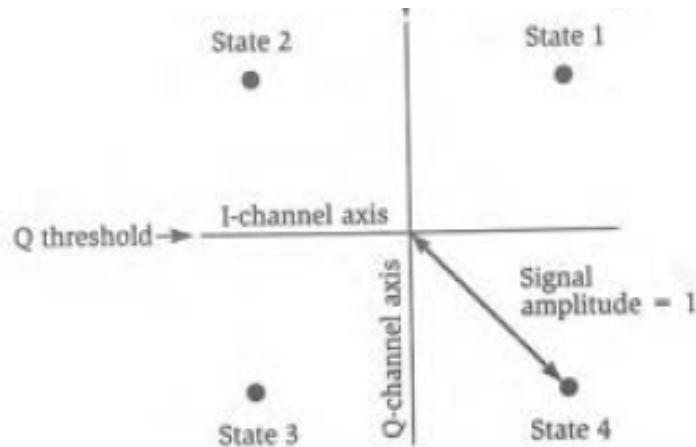
<i>Impairment</i>	<i>Imperceptible</i>	<i>Perceptible, but not annoying</i>	<i>Slightly annoying</i>	<i>Annoying</i>
Random noise	53 dB	48–51 dB	45 dB	40 dB
Phase noise		90 dB	85 dB	
CTB		50 dB	40 dB	30 dB
Chroma/luma delay			300 ns	400 ns

Ex. 1026, Table 2.1 (p. 82)

While SNR was a useful indicator for quality of analog signals, it was less so for digital signals because digital transmissions tended to have a flat power transmission level. Ex. 1026, p. 194. Accordingly, other metrics such as Bit Error Rate (BER) and Modulation Error Ratio (MER) were used to measure signal quality of digital signals. Ex. 1026, pp. 195-198. BER is simply the average number of bits that are received in error, divided by the total number of bits received. *Id.* MER is a bit more complicated, and will need a bit of understanding regarding how digital data is modulated, as I explain next.

60. Digital cable television signals have traditionally been modulated using Quadrature Phase Shift Keying (QPSK), also called 4-Quadrature Amplitude Modulation (QAM). Ex. 1026, pp. 163-166. In QAM, a single carrier frequency will actually have two channels that are 90° apart in phase (a.k.a. in quadrature) to avoid interfering with each other, and these two channels are called the “I” channel (in-phase) and the “Q” channel (quadrature). *Id.* A data value can be modulated onto the I channel, and another data value can be modulated onto the Q channel, and

these values can then be mapped to a 2-dimensional graph (called a “constellation plot”), where the I channel data indicates a position on the X-axis, the Q channel data indicates a position on the Y-axis, as illustrated in an excerpt of Figure 4.4 of Exhibit 1026 below:

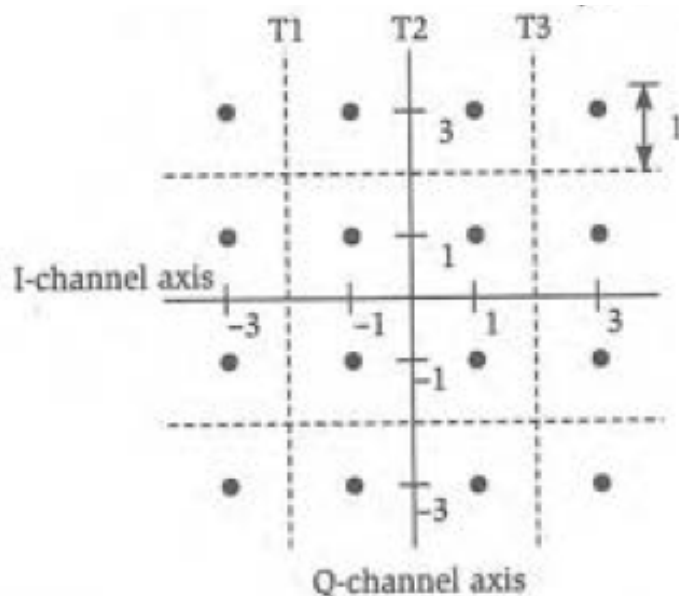


Ex. 1026, Fig. 4.4 (Excerpted, p. 164)

Id. In 4-QAM, the constellation plot is divided into 4 quadrants, resulting in 4 possible states that can represent two bits of data (e.g., symbol in State 1’s quadrant = “11”, symbol in State 2’s quadrant = “01”, symbol in State 3’s quadrant = “00”, and symbol in State 4’s quadrant = “10”). *Id.* So, for example, if a pair of I- and Q-channel data results in a symbol in the State 1 quadrant, then that will be interpreted as having a bit value of “11.” Each time a pair of I- and Q-channel values is mapped to a position in the constellation plot, that will result in a symbol that indicates the corresponding bit value. *Id.*

61. The above example divided the constellation plot into only 4 quadrants, resulting in an ability to transmit 2 bits per symbol. To fit more data, the

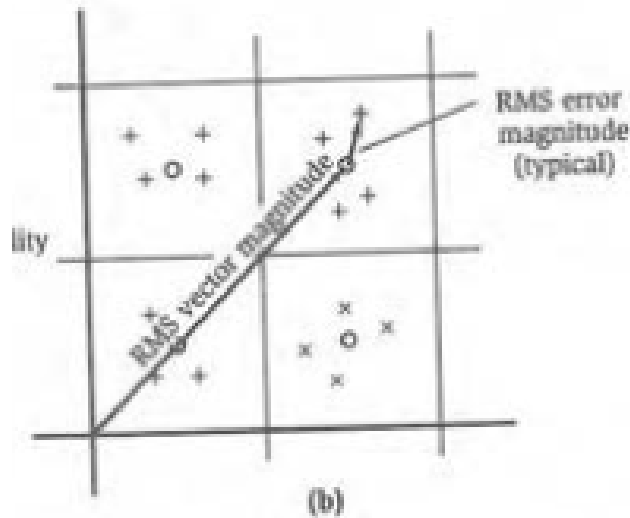
constellation plot can be divided into even more sections. For example, Figure 4.5 of Ex. 1026 (excerpted below) divides the constellation into sixteen (16) different sections and corresponding states:



Ex. 1026, Fig. 4.5 (Excerpted, p. 167)

The sixteen (16) possible states means each symbol can represent 4 bits of data (e.g., a symbol appearing in the section for State 1 = “0000”, State 2 = “0001”, ... State 16 = “1111”). *Id.*, p. 167.

62. Returning to the discussion of MER, MER is based on how accurate the received symbols are, relative to their ideal positions in the constellation plot. *Id.*, pp. 196-197. For example, Figure 4.22(b) of Exhibit 1026, excerpted below, shows an example quadrant:



Ex. 1026, Fig. 4.22(b) (Excerpted, p. 196)

63. In this illustrated quadrant, the open circles represent the ideal symbol positions for a particular state (e.g., the exact center of the corresponding section), and the pluses ('+') indicate positions of received symbols (e.g., the X- and Y-positions based on the received I- and Q-channel signals). *Id.* The illustrated quadrant also shows two vectors: 1) an RMS vector to an ideal symbol position, and 2) an RMS error vector showing how far off the received symbol was from the ideal symbol position. *Id.* MER is a ratio of the magnitudes of these vectors. *Id.* SNR and MER are both ratios indicating the quality of a signal transmission, and the terms SNR and MER were often used interchangeably by POSITA, depending on whether analog or digital video was being addressed. For example, Exhibit 1024 is U.S. Patent Publication 2008/0089402 ("Massey"), which states that the MER is "an estimate of the signal to noise ratio (SNR) of the digital signal." Ex. 1024, [0051].

8.4. Kamieniecki - U.S. Publication No. 2005/0114879 (Ex. 1009)

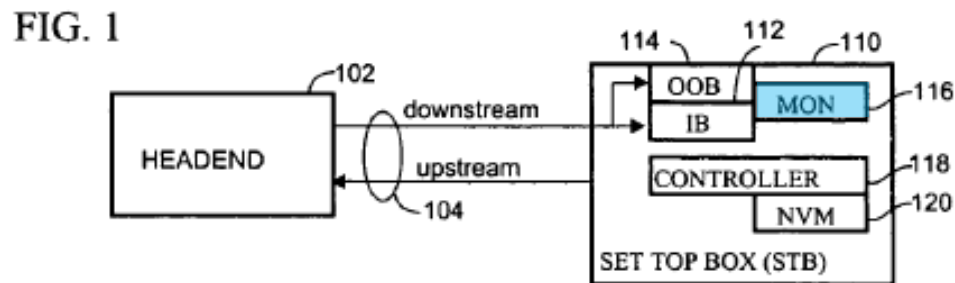
64. U.S. Publication No. 2005/0114879 (“Kamieniecki”) (Ex. 1009) was published on May 26, 2005, from U.S. Application No. 10/718,074, which was filed on November 20, 2003. As Kamieniecki was published more than one year before the September 8, 2011, priority date of the ’826 Patent, Kamieniecki is prior art to the ’826 Patent under Pre-AIA 35 U.S.C. § 102(b). I understand Kamieniecki was not considered during the prosecution of the ’826 Patent. Ex. 1001, cover.

65. Entitled “Monitoring Signal Quality on a Cable Network,” Kamieniecki identifies the same technical problem that the ’826 Patent identifies – that signals in a cable network can become degraded by the time they reach the end user, and that it was important for service providers to monitor such signals at the end user’s location, but it had previously been too expensive to do so. Ex. 1001, 1:38-45. Kamieniecki states the following:

The signals transmitted over the cable network (e.g., coaxial cable, fiber optic cable, a combination of coax and fiber, or the like) to the users may be degraded by various factors, not the least of which is faulty equipment. It is therefore important for the service operator to monitor signal quality and channel health (the characteristics of one channel may be different than those of another channel). Typically, this is done with dedicated, expensive equipment at various nodes in the cable network, and therefore cannot detect problems which may be as far down the network as at the subscriber level.

Ex. 1009, [0005].

66. Kamieniecki offers the same solution that the '826 Patent offers – monitoring cable television network signal quality at the end user's location. Ex. 1001, 2:60-3:60; Ex. 1009, [0006]-[0009], [0013]-[0025]. Kamieniecki does this by placing a monitor 116 (blue) in a subscriber's set-top box (STB) 110, so that signal quality may be monitored at subscriber locations. Ex. 1009, [0007]-[0008], [0013]-[0017], Fig. 1.



Ex. 1009, Fig. 1 (annotated)

67. Kamieniecki's Figure 1 shows its general cable network architecture comprising a headend 102 communicating with a set-top box (STB) 110 via a cable network 104. The headend 102 transmits downstream signals to the STB 110, and receives upstream signals from the STB 110. Ex. 1009, [0013]-[0014], Fig. 1.

68. Kamieniecki describes the communications between the headend 102 and STB 110 as using channels that are either in-band (IB) or out-of-band (OOB). The IB channels are in the downstream direction, and carry content such as the audio, video, and other data of a television channel that the user is watching. Ex. 1009, [0002]-[0004], [0013]-[0014]. Kamieniecki describes STBs as having IB tuners for

receiving analog or digital transmissions such as MPEG-2 transport streams and tables according to the Digital Video Broadcast (DVB) or Advanced Television Systems Committee (ATSC) standards. Ex. 1009, [0004].

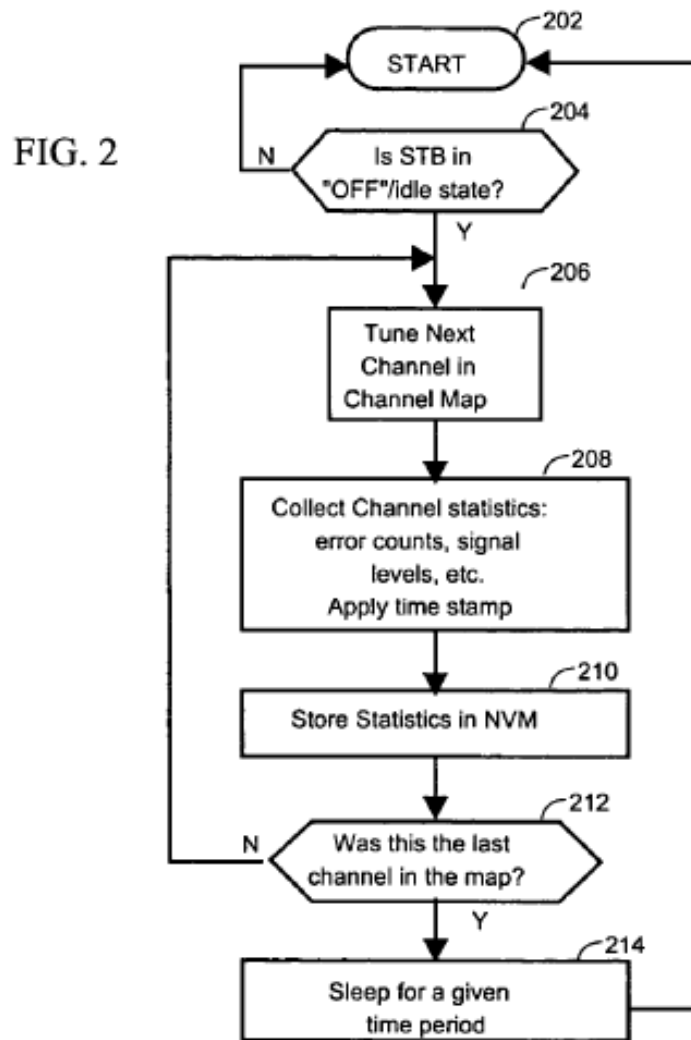
69. In contrast with the downstream IB channels, Kamieniecki describes the OOB channels and a return path used to carry various kinds of information, such as for a STB to contact the headend when a user purchases a pay-per-view event; for interactive applications; or for sending program guide tuning data and other information to the STB. Ex. 1009, [0002], [0013]. Kamieniecki also notes that the cable return path can be used for reporting information back (“reportbacks”) from the STB to the headend. Ex. 1009, [0002]-[0004].

70. Kamieniecki states that having the IB tuner 112 and OOB tuner 114 allows the STB 110 to simultaneously receive IB communications and OOB communications, and states that “[t]his means that subscribers can be tuned to a channel receiving audio and video content while, at the same time, the STB 110 is receiving instructions in an OOB channel.” Ex. 1009, [0013]. Accordingly, the Kamieniecki STB 110 allows the user to watch a television channel being tuned by the IB tuner 112 while the STB 110 is also using the OOB tuner 114 to receive instructions.

71. Kamieniecki’s monitor 116 gathers various types of information about signal quality of channels received by the STB 110. Ex. 1009, [0007], [0014]-

[0016], [0018]-[0023]. Kamieniecki gives various examples of signal quality information, such as channel absence/presence, error count, signal level estimate, errors/dropouts on an OOB control channel, errors/dropouts on a forward/downstream transport channel (mainly consisting of video services), and verification of return path health by transmission of ack/nack (positive or negative acknowledgement messages) from the STB to the headend and back. Ex. 1009, [0007], [00014]-[0016], [0018]-[0023].

72. Kamieniecki describes a channel map identifying the IB and OOB channels that are available to the STB 110, and uses this channel map for its example monitoring process. Ex. 1009, [0013], [0015], [0017]. In that monitoring process (shown in Figure 2, reproduced below), Kamieniecki describes a loop in which the STB 110 tunes (step 206) to each channel in the channel map, gathers (step 208) signal quality information and time stamps for that channel, and stores (step 210) the results in a memory, and then waits (or “sleeps”) a given time period before conducting the monitoring process again. Ex. 1009, [0015]-[0017], [0022], Fig. 2:



Ex. 1009, Fig. 2

73. Kamieniecki describes its looping process as providing coverage and health check for all channels, but Kamieniecki also notes that if desired, fewer than all channels may be monitored, and that in some embodiments only a single channel may be monitored. Ex. 1009, [0013], [0015]-[0017], [0027], Fig. 2.

74. Kamieniecki describes its looping process as handling one channel at a time, and this makes sense as the STB 110 is described as having only one IB tuner

and only one OOB tuner. Ex. 1009, [0004], [0013]-[0017]. This would also be the reason why Kamieniecki's Figure 2 process begins with a determination (step 204) of whether the STB 110 is in an off/idle state – Kamieniecki allows its monitoring to occur automatically in the background so as not to disturb any viewer experiences, so waiting for an off/idle state helps avoid interfering with a viewer experience. Ex. 1009, [0014]-[0017], Fig. 2. For example, if the IB tuner 112 were being used to step through the various channels in the channel map to perform the monitoring, then IB tuner 112 would not be available if a user wanted to watch a particular television channel.

75. Kamieniecki also describes monitoring of upstream/reverse transport capabilities. In that example, the STB can transmit a “ping” type signal upstream to the headend, and the headend can respond by sending a return ping message to the STB via the OOB channel. That return ping message can contain signal quality statistics (e.g., signal level, error count, etc.) about the ping signal that the headend received from the STB 110, and the STB 110 can use the return ping message to verify functionality and record any appropriate signal statistics in its records. Ex. 1009, [0009], [0023].

76. Kamieniecki describes storing its signal quality information in a non-volatile memory 120 of the STB 110. Ex. 1009, [0007], [0013]-[0017]. This signal quality information can be reported by the STB 110 to the headend either as it is

collected or when the STB is polled by the headend. Ex. 1009, [0008], [0014], [0016]-[0017], [0024].

8.5. Konstantinos - U.S. Publication No. 20100120386 (Ex. 1010)

77. U.S. Publication No. 2010/0120386 (“Konstantinos”) (Ex. 1010) was published on May 13, 2010, from U.S. Application No. 12/269,302, which was filed on November 12, 2008. As Konstantinos was published more than one year before the September 8, 2011, priority date of the ’826 Patent, Konstantinos is prior art to the ’826 Patent under Pre-AIA 35 U.S.C. § 102(b). I understand Konstantinos was not considered during the prosecution of the ’826 Patent. Ex. 1001, cover.

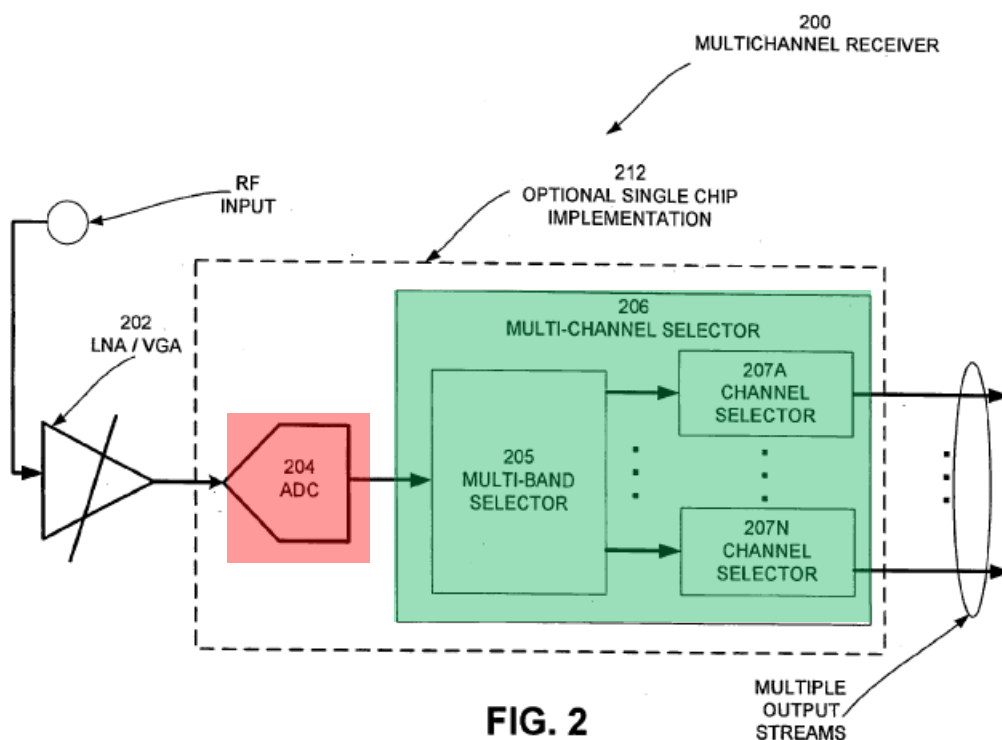
78. Entitled “Multi-Channel Receiver Architecture and Reception Method,” Konstantinos recognized that the market for data and television services was evolving, and that there was a growing need for receivers to have unrestricted multi-channel functionality to allow users to select many/any channels freely out of the full cable TV band. Ex. 1010, [0001], [0011], [0016].

79. As an example of this evolving market and demand for simultaneous channels, Konstantinos refers to the August 2006, issuance of version 3.0 of the “Data Over Cable Service Interface Specification (DOCSIS)” standard, and how this standard would require the simultaneous reception of at least four channels. Ex. 1010, [0011-12]. As a general note, DOCSIS is a standard that uses existing cable television networks to carry more than just television channels, and allowed cable

modems in the U.S. to access the Internet prior to the earliest priority date of the '826 Patent. Ex. 1026, pp. 211-213.

80. Konstantinos notes that conventional approaches to multi-channel tuning would use multiple single-channel tuners in parallel, but that this approach faces limitations related to complexity and cost effectiveness, and becomes “completely impractical” as the number of simultaneously required streams/channels increases beyond two. Ex. 1010, [0006], [0008].

81. To address these demands of the evolving market, Konstantinos discloses a multi-channel receiver (MCR) 200, shown in its Figure 2 (reproduced below):

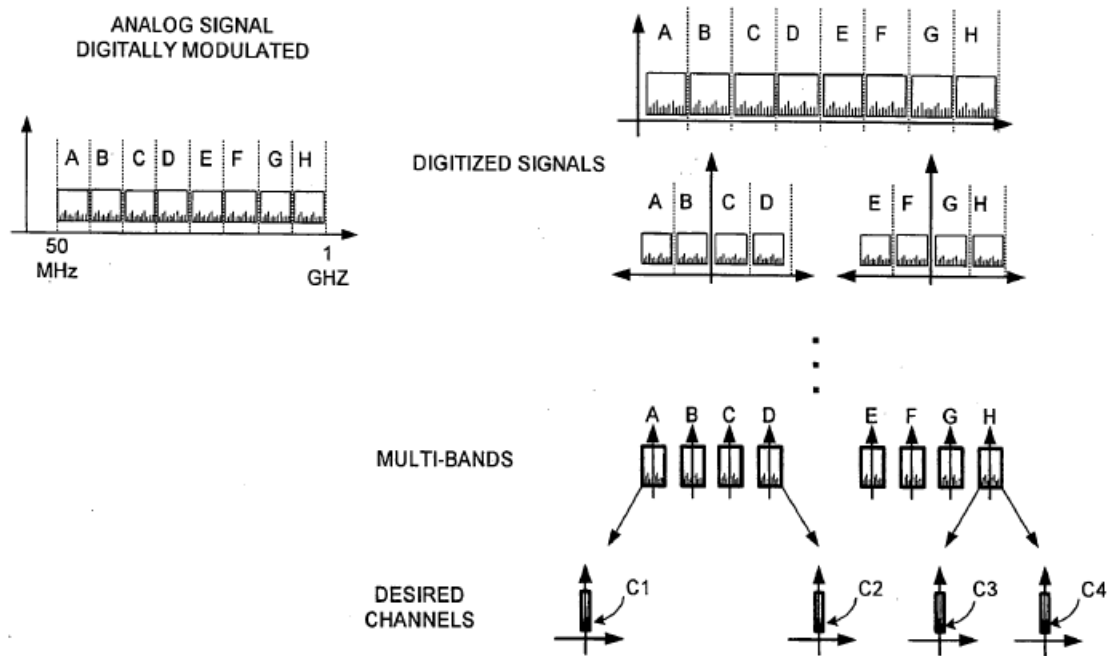


Ex. 1010, Fig. 2 (annotated)

82. The MCR 200 comprises a low-noise amplifier and variable gain amplifier (LNA/VGA) 202, which receives a “composite broadband RF input signal (e.g., a cable TV signal consisting of multiple channels bundled together between 50-1000 MHz).” Ex. 1010, [0043], [0114]-[0115], Fig. 2. The output of LNA/VGA 202 is “digitized in its entirety with an ADC [Analog-to-Digital Converter] 204” (**red**). Ex. 1010, [0043], [0116], Fig. 2. “The output of ADC 204 comprises a multi-channel digital signal,” which may then be provided to a Multi-Channel Selector 206 (**green**), which selects channels of interest and outputs them as corresponding output streams. Ex. 1010, [0044]-[0046], [0117]-[0118], Fig. 2. As an example, Konstantinos’ multi-channel decoder may process and deliver 16 TV streams simultaneously. Ex. 1010, [0046], [0106], [0119].

83. The Konstantinos Multi-Channel Selector 206 is illustrated as a two-part selector, with a Multi-Band Selector 205 and then multiple Channel Selectors 207A-N. Konstantinos refers to this as a two-step selection process, and described in more detail with reference to Figure 3 shown below:

FIG. 3



Ex. 1010, Fig. 3

The received RF input is shown on the left, and comprises composite broadband RF signal, having sub-bands A-H spanning the entire frequency range from 50MHz to 1GHz. Ex. 1010, [0048]. This RF signal is then digitized in its entirety by the ADC 204, creating a digital multi-channel signal that is a digital equivalent of the received RF signal, with digital equivalents of the sub-bands A-H and containing all of the channels that were in the original signal. Ex. 1010, [0043]-[0049], [0116].

84. Konstantinos' two-step selection process involves a "coarse" selection performed by the Multi-Band Selector 205, and then "fine" channel selection performed by the Channel Selectors 207A-N. Ex. 1010, [0043]-[0049], [0100]-[0102]. The first step, the coarse selection, is performed by the Multi-Band Selector

205, which splits the digital multi-channel signal from the ADC 204 into the sub-bands A-H. Ex. 1010, [0045], [0100]. This is shown as the “Multi-Bands” A-H, shown in Figure 3 as separate bands.

85. The second step, the fine selection, is performed by the Channel Selectors 207A-N, in which each Channel Selector 207 will select one channel and deliver it at its output stream. Ex. 1010, [0046], [0101]. Konstantinos states that the number of simultaneous channels that can be received will be determined by the number of channel selectors, and that by replicating the fine selector (Channel Selectors 207A-N), “one can realize a multiplicity of digital tuners very efficiently.” Ex. 1010, [0043], [0105]. Konstantinos gives examples in which sixteen (16) channels are simultaneously selected, and does not indicate this is a limit. Ex. 1010, [0046], [0106].

86. The channels selected by the fine selectors (Channel Selectors 207A-N) are output as multiple output streams, as shown in Figure 2, and would be used however channels would be normally used (e.g., television channels may be viewed). Konstantinos notes that after channel selection, the channels may be sent to a channel decoding process using, for example, a multi-channel baseband processor or multi-channel channel decoder, and may be further processed by channel and source decoders. Ex. 1010, [0106]. Using its example of sixteen (16)

channels, Konstantinos notes that 16 TV streams may be simultaneously delivered. Ex. 1010, [0106].

8.6. Renken - U.S. Patent No. 8,649,421 (Ex. 1011)

87. U.S. Patent No. 8,649,421 (“Renken”) (Ex. 1011) issued on February 11, 2014, from U.S. Application No. 13/399,797, which was filed on February 17, 2012, and which claims priority to, and incorporates by reference, U.S. Provisional Application No. 61/444,611 (Exhibit 1012, “Renken Provisional”), filed on February 18, 2011. Ex. 1011, cover, 1:7-10.

88. As I show further below in Section 8.6.1, it is my opinion that the Renken Provisional provides written description support for at least independent claims 1 and 10 of Renken, and provides written description support for the disclosure relied on herein. Thus, I understand that Renken constitutes prior art to the ’826 Patent under pre-AIA 35 U.S.C. § 102(e) for at least the material included in the Renken Provisional, because its priority date (February 18, 2011) is before the earliest priority date of the ’826 Patent (September 8, 2011). I also understand that neither Renken nor the Renken Provisional were considered during prosecution of the ’826 Patent. Ex. 1001, cover.

89. Entitled “Cable Modem for Network Measurements,” Renken addresses the same problem that the ’826 Patent addresses – monitoring signal degradation in a cable network. In particular, Renken discusses how noise and physical defects such as faulty equipment or corrosion can impair the performance

of the cable network, and Renken teaches that it is important to monitor the performance of the cable network. Ex. 1011, 2:36-3:20, 4:4-17. Renken also notes that it was known to send a technician with a portable network tester to perform network measurements at customer premises, and to install dedicated end-of-line equipment for network monitoring, but that there remained a need for more economical approaches for performing network-wide monitoring. Ex. 1011, 3:21-4:17.

90. Renken also offers a similar solution as the one in the '826 Patent – performing signal measurements at the end user's location. Ex. 1011, 4:4-5:27. Renken notes that DOCSIS 3.0 introduced a concept of “channel bonding,” in which multiple independent channels are combined into one larger data stream, and that this calls for cable modems to be able to simultaneously receive at least 4 downstream channels and transmit on at least 4 upstream channels. Ex. 1011, 2:4-35. Renken also expects that future cable modems will need to handle even more bonded downstream and upstream channels. Ex. 1011, 2:33-35. Accordingly, Renken notes that cable modems will have multiple receivers and transmitters, and that sometimes one or more of them will be idle, so Renken suggests using one or more idle receivers or transmitters to perform network measurements. Ex. 1011, 4:21-5:27. The Renken Provisional, entitled “Using Cable Modems for CATV Network Monitoring,” discusses the same - it discusses the fact that DOCSIS 3.0

cable modems will have the ability to bond multiple upstream and downstream channels; that future versions will increase this number of channels, and that idle receivers in such modems can be used for performing tests to measure the connection. Ex. 1012, p. 3, 2nd full paragraph² (e.g., “Subscriber data services do not need to use all the transmitters or receivers at all times. ... These modems can perform these tests while continuing to provide data services for the subscriber with the remaining transmitters and receivers.”).

91. Renken Figure 2 is a block diagram of an example of its measurement-capable cable modem (MCCM) 100:

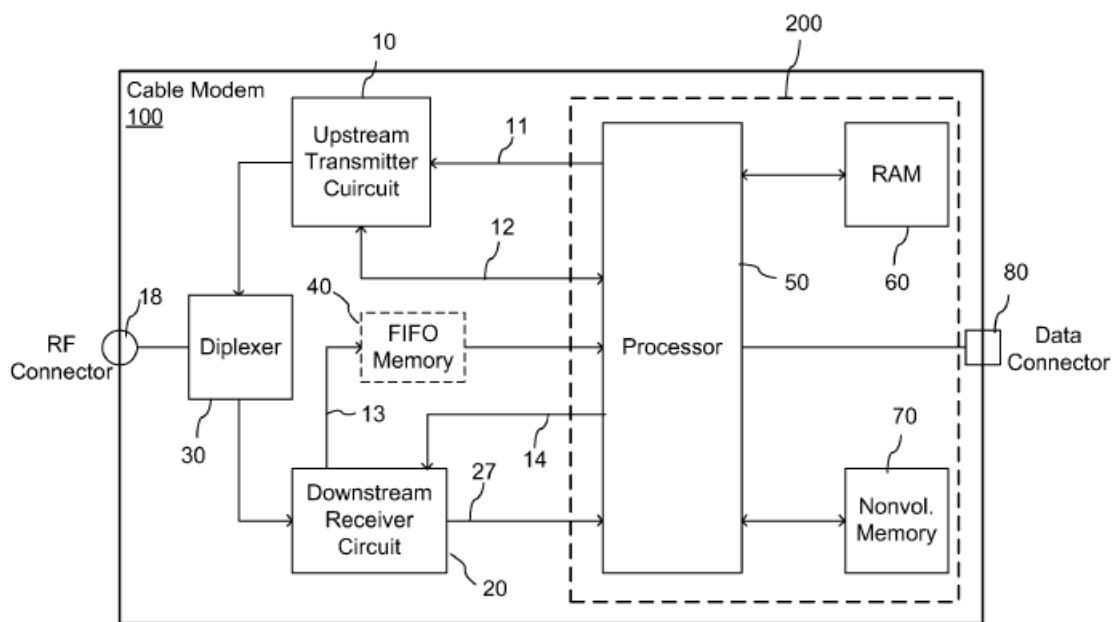
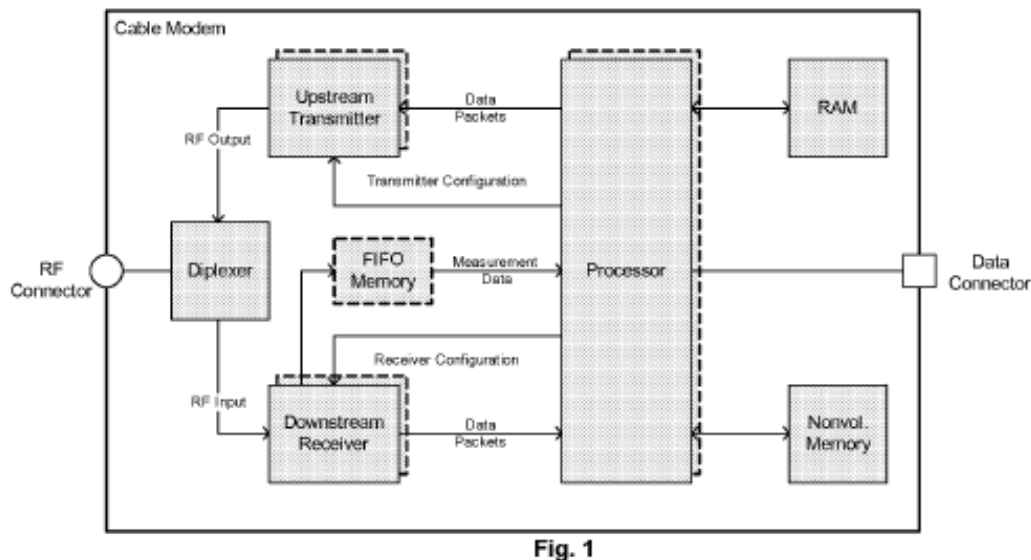


Fig. 2

² Note that the page citations refer to the superimposed exhibit page numbers, and not the original numbers appearing at the bottom of some of the pages.

Ex. 1011, Fig. 2

92. The MCCM 100 operates under the control of processor 50, executing a measurement program stored in non-volatile memory 70, and using RAM 60. Renken collectively labels the processor 50, non-volatile memory 70, and RAM 60 as a controller 200. The MCCM 100 also includes an upstream transmitter circuit 10 and downstream receiver circuit 20. Ex. 1011, 9:19-10:11, Fig. 2. The Renken Provisional shows the same elements in its Figure 1:



Cable Modem Block Diagram Description

Ex. 1012, Fig. 1 (p. 5)³

³ The Renken Provisional repeats its figure numbering, with “Fig. 1” appearing on page 5 and a different “Figure 1” appearing on page 9 of Exhibit 1012.

93. The Renken Provisional also explains that the modem operates under control of the processor executing a measurement program in the non-volatile memory, and includes the upstream transmitter circuit and downstream transmitter circuit. Ex. 1012, pp. 3-6.

94. Renken Figure 3 shows an example of the downstream receiver circuit 20 in greater detail:

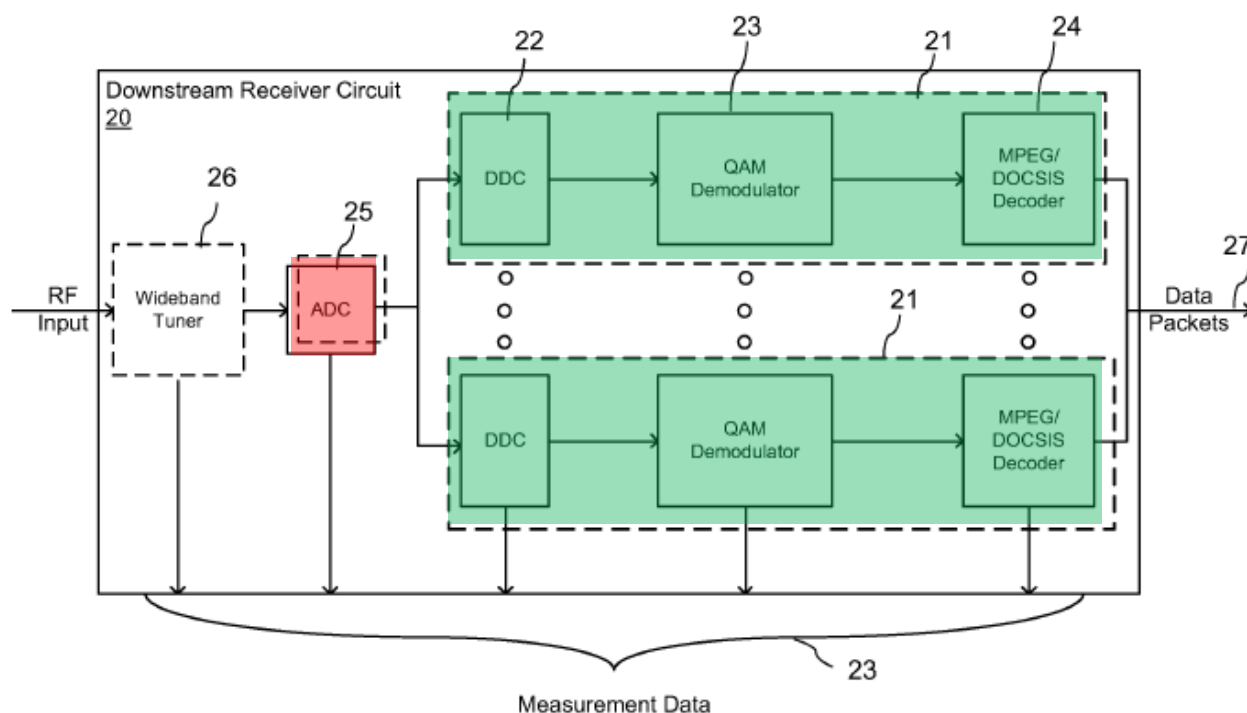


Fig. 3

Ex. 1011, Fig. 3 (annotated)

95. As illustrated, the downstream receiver circuit 20 includes a wideband tuner 26 for tuning to a selected group of downstream RF channels, an analog-to-digital converter (ADC) 25 (**red**) for converting the RF channels into digitized

intermediate frequency (IF) signals, and a plurality of receivers 21 (**green**), each comprising a digital down converter 22, QAM demodulator 23, and MPEG/DOCSIS decoder 24, that are each capable of selecting, demodulating, and decoding a single downstream channel. Ex. 1011, 10:56-62, 11:22-32, 11:39-40, 12:22-13:21. Renken states that the receivers 21 may be used to perform measurements on DOCSIS channels as well as analog and digital TV channels. Ex. 1011, 11:12-18. The Renken Provisional discloses the same features – it shows the downstream receiver circuit in its Figure 2, including the wideband tuner and ADC, as well as the DDC, QAM Demodulator, and MPEG/DOCSIS decoder that Renken labels as receivers 21. Ex. 1012, pp. 3-8. The Renken Provisional also states that the cable modem can make measurements for both DOCSIS and non-DOCSIS downstream channels, specifically including digital and analog television channels. Ex. 1012, pp. 7-8, 14.

96. Renken describes that the MCCM 100 may receive a request, from a central measurement controller (CMC) 7, to perform measurements using one or more idle receivers, and the MCCM 100 may send its measurement results back to the CMC 7. Ex. 1011, 9:5-18. The MCCM 100 may obtain, from its various components, various types of measurement data, such as spectrum-style measurements, signal level, carrier-to-noise ratio, frequency response and modulation error ratio. Ex. 1011, 11:39-12:5, 12:38-44, 12:56-67. Similarly, the

Renken Provisional also describes the CMC directing the MCCMs to perform measurements, that the CMC monitors the measurement results from the MCCMs, that the CMC can query the measurement results from RAM or non-volatile memory, and that the MCCM will send its measurement results to the CMC. Ex. 1012, pp. 3-4, 6, 10, 13 (“Upon measurement plan completion, the MCCM sends results to the CMC ...”). The Renken Provisional also discusses the various kinds of measurement data that the MCCM may obtain, including spectrum style measurements, signal level, carrier-to-noise ratio, frequency response and modulation error ratio. Ex. 1012, pp. 3-8, 14. Renken also includes signal-to-noise ratio, which for digital signals a POSITA would understand is used similarly to modulation error ratio. Ex. 1011, 12:63-13:5. A POSITA would understand that signal-to-noise ratio (SNR) was a typical measurement of the quality of an analog video signal, but for digital video signals, the corresponding measurement of quality is the modulation error ratio (MER), and that the terms SNR and MER were often used interchangeably, depending on whether analog or digital video was being addressed. For example, U.S. Patent Publication 2008/0089402, mentioned in Renken, states that the MER is “an estimate of the signal to noise ratio (SNR) of the digital signal.” Ex. 1011, 13:3; Ex. 1024, [0051]. Indeed, SNR has long been used as a measure of picture quality and customer satisfaction in cable television networks. Ex. 1026, p. 82.

8.6.1. Renken is Entitled to a Priority date of February 18, 2011

97. It is my understanding that a prior art patent or published application is entitled to claim the benefit of the filing date of an earlier-filed provisional application if the disclosure of the earlier-filed provisional application provides support for at least one claim in the patent or published application.

98. Accordingly, if Renken is to be treated as a prior art reference under pre-AIA 35 U.S.C. § 102(e) as of February 18, 2011, the filing date of the Renken Provisional, there will need to be at least one claim in Renken that is supported by the Renken Provisional. As I explain below, I believe that at least independent claims 1 and 10 of Renken are supported by the Renken Provisional. I walk through the elements in these claims below.

99. Renken claim 1 begins with a preamble stating the following “A measurement-capable cable modem (MCCM) comprising.” Ex. 1011, claim 1. To the extent this preamble is considered limiting, the Renken Provisional describes its MCCM throughout the document. Ex. 1012, pp. 3-9, 13-14, Fig. 1 (p. 5), Fig. 2 (p. 6). For example, the MCCM acronym is introduced on the very first page of the specification (Ex. 1012, p. 3, 5th paragraph), and an example block diagram is illustrated in the figure appearing on page 5:

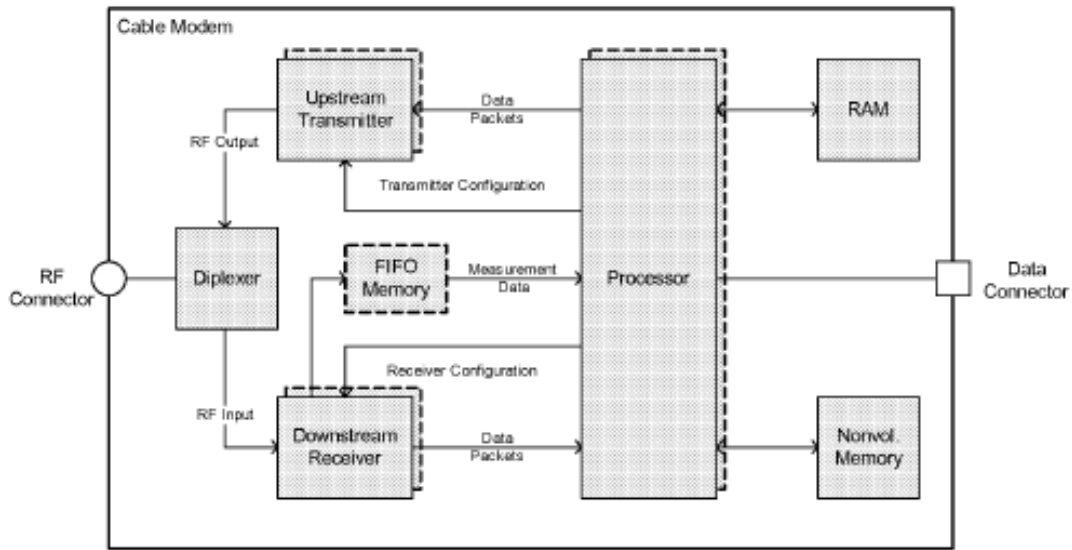


Fig. 1

Cable Modem Block Diagram Description

Ex. 1012, Fig. 1 (p. 5)

100. Renken claim 1 then recites “a cable port for connecting to a cable network.” Ex. 1011, claim 1. This feature is shown in Figure 1 above as the “RF Connector” on the left-hand side of the figure. Ex. 1012, p. 5. Indeed, the title of the Renken Provisional refers to “CATV Network Monitoring,” and its discussion of cable modems, headends, and associated network show that the RF connector is for connecting to a cable network. Ex. 1012, pp. 3-6, 9, 13-14.

101. Renken claim 1 then recites “a data port for connecting to a customer premises equipment (CPE) for providing customer services.” Ex. 1011, claim 1. The “data port” is shown by the “Data Connector” on the right-hand side of Figure 1 above. Ex. 1012, p. 5. The Renken Provisional notes that its modem can perform its tests “while continuing to provide data services for the subscriber with the

remaining transmitters and receivers,” and the “CPE” is the subscriber equipment used to receive those data services. Ex. 1012, pp. 3 (2nd paragraph), 4-5. A POSITA would understand that there necessarily must be a piece of equipment that uses those data services at the subscriber’s location. For example, the Renken Provisional discusses DOCSIS connections as an example of the data services that customers use, and DOCSIS connections are necessarily used by a piece of equipment, such as a personal computer seeking to connect to the Internet. Ex. 1012, pp. 3-9, 13-15.

102. Renken claim 1 then recites “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.” Ex. 1011, claim 1. The Renken Provisional shows the Upstream Transmitters coupled to the RF Connector in Figure 1 above. Ex. 1012, p. 5. The Renken Provisional also discusses use of the upstream channels for subscriber data services. Ex. 1012, pp. 3-8.

103. Renken claim 1 then recites “a plurality of receivers coupled to the cable port for receiving downstream digital communication signals over one or more downstream channels of the cable network for communicating to the CPE.” Ex. 1011, claim 1. The Renken Provisional shows the Downstream Receivers coupled to the RF Connector in Figure 1 above. Ex. 1012, p. 5. The Renken Provisional shows a more detailed diagram in Figure 2:

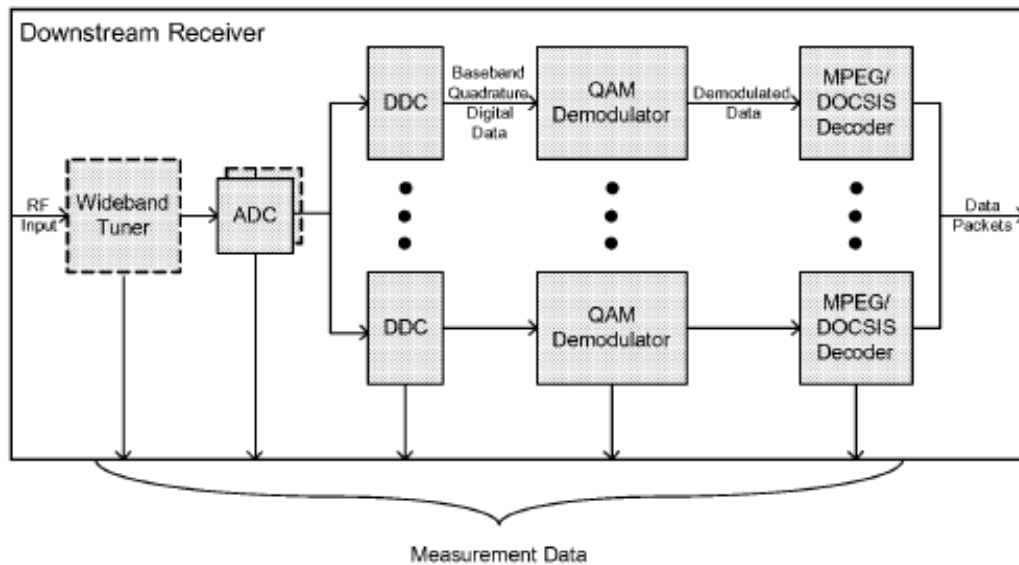


Fig. 2

Ex. 1012, Fig. 2 (p. 6)

The Renken Provisional also discusses use of the downstream channels for subscriber data services. Ex. 1012, pp. 3-8.

104. Renken claim 1 then recites “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.” Ex. 1011, claim 1. The Renken Provisional shows the processor, RAM, and non-volatile memory, which Renken refers to as its controller 200, in Figure 1 appearing on page 5. Ex. 1012, pp. 3-8.

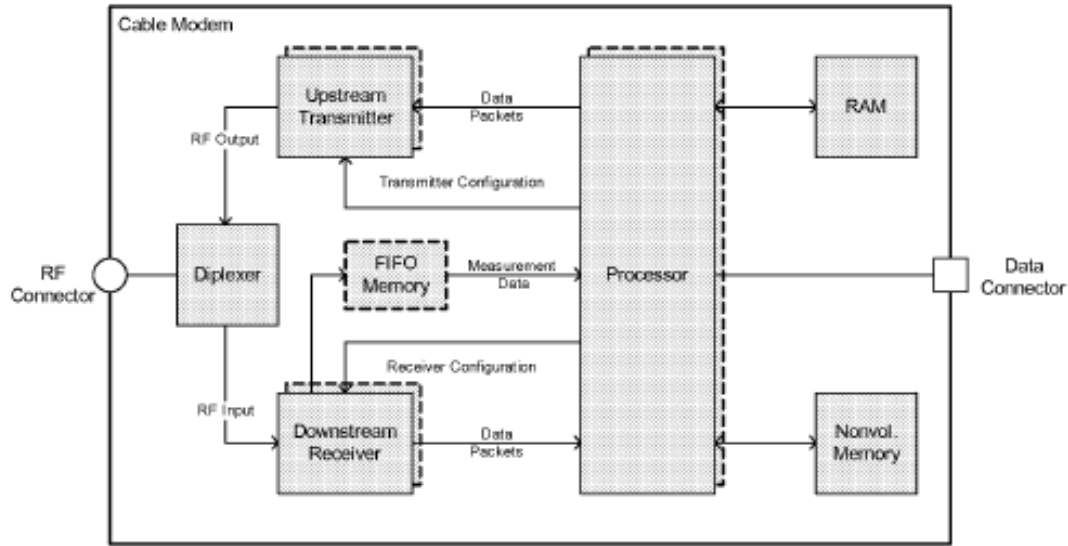


Fig. 1

Cable Modem Block Diagram Description

Ex. 1012, Fig. 1 (p. 5)

The Renken Provisional refers to the fact that DOCSIS 3.0 compliant cable modems will have multiple receivers and transmitters, and that “[s]ubscriber data services do not need to use all the transmitters or receivers at all times,” so “[t]hese modems can perform these tests while continuing to provide data services for the subscriber with the remaining transmitters and receivers.” Ex. 1012, p. 3. Accordingly, one receiver may be idle and used for measurements, while another receiver may be used for data communications for the subscriber data services, and this reflects the recited “tunably allocated.” Additionally, the Renken Provisional discusses how certain receivers or transmitters can be excluded from DOCSIS channel bonding, and that would result in unused receivers or transmitters that can be used for performing measurements. Ex. 1012, p. 3 (“... the CMC communicates with the Cable Modem

Termination System (CMTS) to request that it exclude one or more receivers and/or transmitters from DOCSIS channel bonding. Then the CMC signals the MCCM via internet protocol messaging to perform specific measurements with the unused receivers and/or transmitters.”). As for the “CPE,” or customer-premises equipment, this simply reads on whatever user device that ultimately uses the subscriber data services, such as the DOCSIS connections, discussed in the Renken Provisional. Ex. 1012, p. 3.

105. Renken claim 1 concludes with “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.” Ex. 1011, claim 1. The Renken Provisional shows this “modem controller” in several ways. First, the Renken Provisional discloses a local measurement controller (LMC) which can locally control the MCCM to perform the various signal measurements. Ex. 1012, pp. 3, 6, 9-11, 13-15. Second, the Renken Provisional discloses the processor executing a measurement program to perform the various measurements, and the claimed modem controller can read on this processor with the measurement program. Ex. 1012, pp. 3, 5-6, 9-11, 13-15. As for the actual use of an idle receiver or transmitter to perform a network measurement, this is discussed throughout the Renken Provisional. Ex. 1012, pp. 3-15. For example, the Renken Provisional states that “subscriber modems are configured with software providing these extra

measurement capabilities,” and that “[t]his invention consists of one or more of these measurement-capable cable modems (MCCM) being directed by remote control from a central measurement controller (CMC) or a local measurement controller (LMC) to perform a variety of signal-level measurements ...” Ex. 1012, p. 3. The Renken Provisional gives a wide variety of examples of measurements, such as “[d]igital measurements such as Level, MER, Pre- and Post-Forward Error Correction (FEC) Bit Error Rate (BER), ...” Ex. 1012, pp. 3-4. The Renken Provisional lists various examples in a measurement capability list, which the MCCM prepares based on its current capacity. Ex. 1012, pp. 9 (Fig. 1 - “CM builds measurement capability list and waits for further instruction”), 14-15.

106. The Renken Provisional also provides support for Renken independent claim 10. The preamble of that claim recites “[a] method for monitoring a cable network comprising a network node.” Ex. 1011, claim 10. The Renken Provisional describes its CATV network monitoring method throughout, referring to a cable plant and CATV network. Ex. 1012, pp. 3-8. The Renken Provisional shows example monitoring flows. Ex. 1012, pp. 9-11. The Renken Provisional explains that a central measurement controller (CMC) may communicate with the MCCM via a cable modem termination system (CMTS), and the claimed “network node” would simply read on the location of that CMTS. Ex. 1012, pp. 3 (e.g., 5th paragraph), 5, 9, 13-15.

107. Renken claim 10 then recites “a cable modem termination system (CMTS) disposed at least in part at the network node.” Ex. 1011, claim 10. The Renken Provisional discusses the CMTS. Ex. 1012, p. 3. Additionally, a POSITA would understand that a CMTS is simply a well-known part of a DOCSIS cable television network.

108. Renken claim 10 then recites “a cable modem (CM) disposed at a customer location for connecting to a customer premises equipment (CPE).” Ex. 1011, claim 10. This cable modem is supported by the discussion of the MCCM/cable modem found throughout the Renken Provisional. Ex. 1012, pp. 3-15. The Renken Provisional shows a block diagram of its cable modem in Figure 1 above. Ex. 1012, p. 5. To the extent the CPE is limiting in this claim, the Renken Provisional shows a Data Connector that would be connected to the user’s equipment for using the DOCSIS connection. Ex. 1012, p. 5:

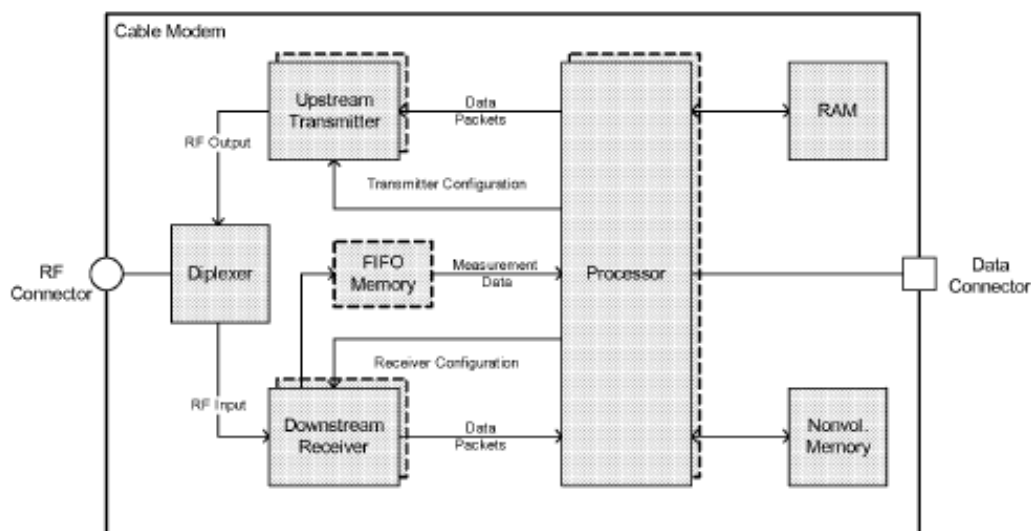


Fig. 1

Cable Modem Block Diagram Description

Ex. 1012, Fig. 1 (p. 5)

109. Renken claim 10 then recites “a cable link for connecting the CMTS to the CM for providing customer services.” Ex. 1011, claim 10. This “cable link” is described as the “cable plant” in the Renken Provisional. Ex. 1012, p. 3 (“... digital quality measurements on any or all downstream channels of the cable plant ...”). Indeed, the Renken Provisional refers to the “CATV Network” in its title, and the “network” variously throughout its disclosure, and these disclosures provide support for the claimed “cable link.” Ex. 1012, pp. 2-4, 8, 9, 12-15. A POSITA would also have understood that cable television networks necessarily used cables to connect headends to cable subscribers.

110. Renken claim 10 then recites “wherein the CM comprises a plurality of receivers for receiving downstream data communication signals from the CMTS over one or more downstream channels and a plurality of transmitters for transmitting upstream data communication signals over one or more upstream channels to the CMTS.” Ex. 1011, claim 10. These “receivers” and “transmitters” are shown as discussed above with respect to the “receivers” and “transmitters” in claim 1.

111. Renken claim 10 then recites “the method comprising: a) allocating at least one of the receivers and at least one of the transmitters to data communications between the CMTS and the CPE, leaving at least another one receiver or at least

another one transmitter as a currently idle receiver or transmitter, respectively, that is not allocated to the data communications.” Ex. 1011, claim 10. This step of “allocating” is supported as discussed above with respect to the “tunably allocating” feature of claim 1.

112. Renken claim 10 concludes with “b) performing a network measurement using the currently idle receiver or the currently idle transmitter.” Ex. 1011, claim 10. This measurement performance is supported as discussed above regarding the “modem controller” feature of claim 1, discussed above.

113. In view of the above, I believe that at least independent claims 1 and 10 of Renken are supported by the Renken Provisional, and I understand that this permits the Renken patent to be a prior art reference under Pre-AIA 35 U.S.C. § 102(e) as of the February 18, 2011, filing date of the Renken Provisional.

8.7. Sadjja - U.S. Publication No. 2005/0183130 (Ex. 1021)

114. U.S. Publication No. 2005/0183130 (“Sadjja”) (Ex. 1021) was published on August 18, 2005, from U.S. Application No. 11/037,836, which was filed on January 18, 2005, and is prior art pursuant to pre-AIA 35 U.S.C. § 102(b) because Sadjja was published more than one year before the earliest filing date of the ‘826 Patent. Sadjja was not considered during prosecution of the ‘826 Patent. Ex. 1001, cover.

115. Entitled “Cable Diagnostic and Monitoring System,” Sadjja deals with the same problem addressed in the ‘826 Patent – the need for cable operators to

gather performance metrics of a cable network, “all the way from the headend to each subscriber device.” Ex. 1021, [0018]. Sadja discusses cable networks, headends, and set-top-boxes (STBs), and notes that existing STBs can contain DOCSIS cable modems usable for two-way communication with the headend. Ex. 1021, [0038]. Sadja notes that cable modems can provide operators with live reports on signal health, and that cable modems can be remotely polled for this information. Ex. 1021, [0042]. Sadja seeks to add this capability to the STB, to treat the STB as a “debug tool embedded in the customers’ home.” Ex. 1021, [0049].

116. Sadja discloses a cable television diagnostic system where STBs monitor various performance aspects of the digital signal that they are receiving including Signal-to-Noise Ratio, Carrier-to-Noise Ratio, Bit Error Rate, power level, Modulation Error Ratio, and Quadrature Amplitude Modulation data. Ex. 1021, Abstract, [0049], [0073], [0081], [0084]. When polled by the headend, the STB responds to the headend by providing requested performance data for analysis and diagnosis of problems. Ex. 1021, Abstract, [0059], [0082]-[0084], [0087], [0090]. Sadja discloses that alarms may be raised if a value falls outside of specified limits. Ex. 1021, [0075].

8.8. Salinger - U.S. Publication No. 2010/0299713 (Ex. 1022)

117. U.S. Publication No. 2010/0299713 (“Salinger”) (Ex. 1022) was published on November 25, 2010, from U.S. Application No. 12/469,168, which was filed on May 20, 2009, and is prior art pursuant to at least pre-AIA 35 U.S.C. §

102(a) because it was published before the earliest priority date of the '826 Patent and (e) because it was filed before the earliest priority date of the '826 Patent. Salinger was not considered during prosecution of the '826 Patent. Ex. 1001, cover.

118. Salinger, entitled “Distributed Network Performance Monitoring,” also addressed the problem of signal degradation in a cable network, by installing probes at various locations in the network to monitor communication parameters of cable channels, and to send an alert if a parameter exceeds predefined limits. Ex. 1022, [0003], [0005]. Salinger discloses probes that can be installed throughout a coaxial cable plant, including at a cable tap leading to a subscriber premises, to monitor one or more communication parameters on some or all downstream channels. Ex. 1022, Abstract, [0005], [0018], [0031], [0043], [0063]. The parameters monitored by the probe include signal level, Modulation Error Ratio, phase noise, Signal to Noise Ratio, Bit Error Rate, and Carrier to Noise Ratio. Ex. 1022, [0018], [0035]-[0037]. The probe reports monitoring data back to a central point (e.g., a Cable Modem Termination System) on a periodic basis or may send an immediate message if a parameter exceeds predefined limits. Ex. 1022, [0005], [0049], [0064].

119. Salinger Figure 9 (shown below) shows an example cable network diagram, showing how its probes may be implemented at various tap locations (e.g., “tap with probe”) on the cable network. Ex. 1022, Fig. 9, [0063].

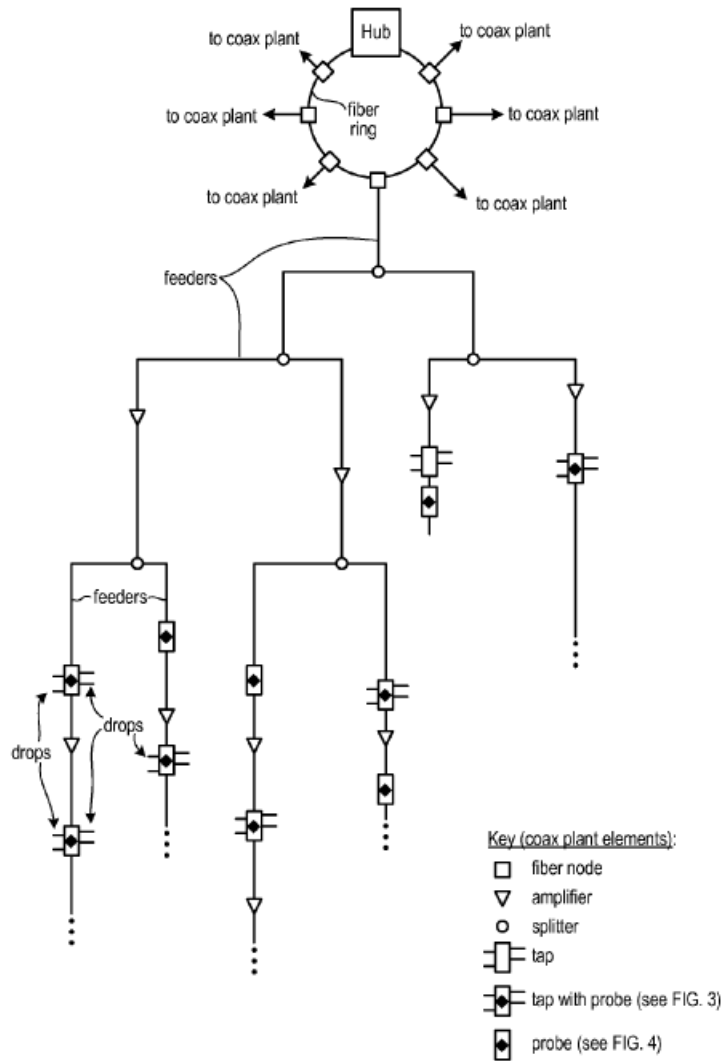


FIG. 9

Ex. 1022, Fig. 9

120. Salinger Figure 3 (shown below) shows an example of a tap 50 having a probe 10, and drop connectors 54, 55, 56, 57 to connect to subscriber premises.

Ex. 1022, Fig. 3, [0031].

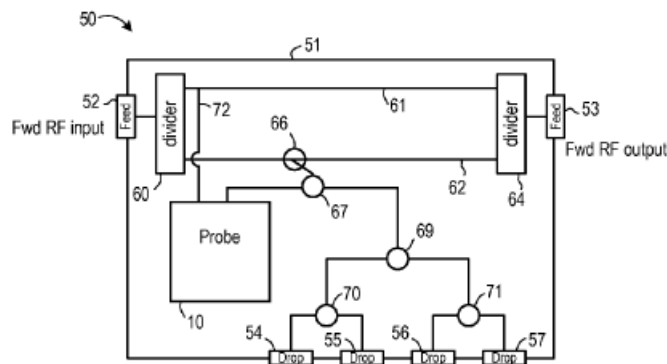


FIG. 3

Ex. 1022, Fig. 3

8.9. Aggarwal - U.S. Patent No. 7,573,531 (Ex. 1025)

121. U.S. Patent No. 7,573,531 (“Aggarwal”) (Ex. 1025) issued on August 11, 2009, from U.S. Application No. 11/251,080, filed October 14, 2005, and is prior art pursuant to at least pre-AIA 35 U.S.C. § 102(b) because it was patented more than one year before the earliest filing date of the ‘826 Patent. Aggarwal was not considered during prosecution of the ‘826 Patent. Ex. 1001, cover.

122. Aggarwal, entitled “Rapid Channel Signal Identification,” addresses reception of digital and analog television channels in a cable television network. Ex. 1025, 4:53-5:24, 7:28-45. Its Figure 2 shows the general components of its receiver 14, including an interface 26 (e.g., for cable), a tuner 28, downconverter 30, demodulator 50, and analog-to-digital converter 52. Ex. 1025, 5:15-36.

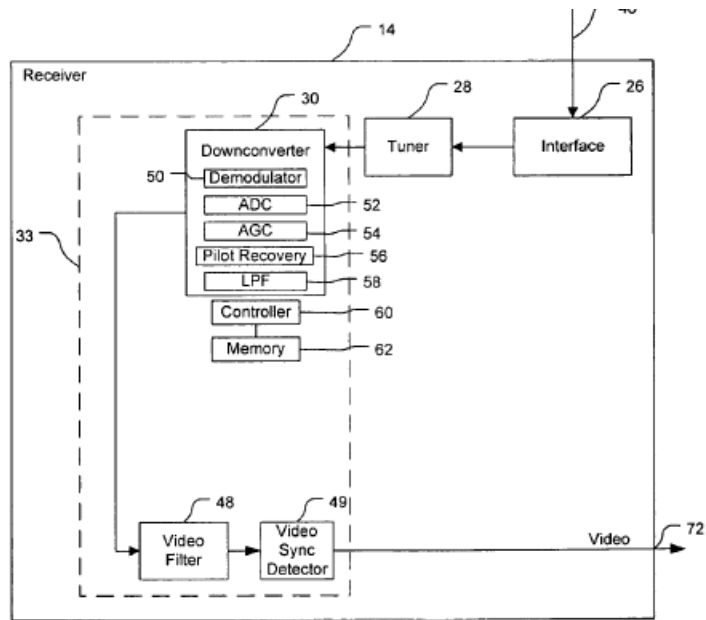


FIG. 2

Ex. 1025, Fig. 2 (Excerpted)

123. Aggarwal discloses an algorithm that checks for usable signals on channels within a frequency range, and Figure 3 illustrates its example algorithm

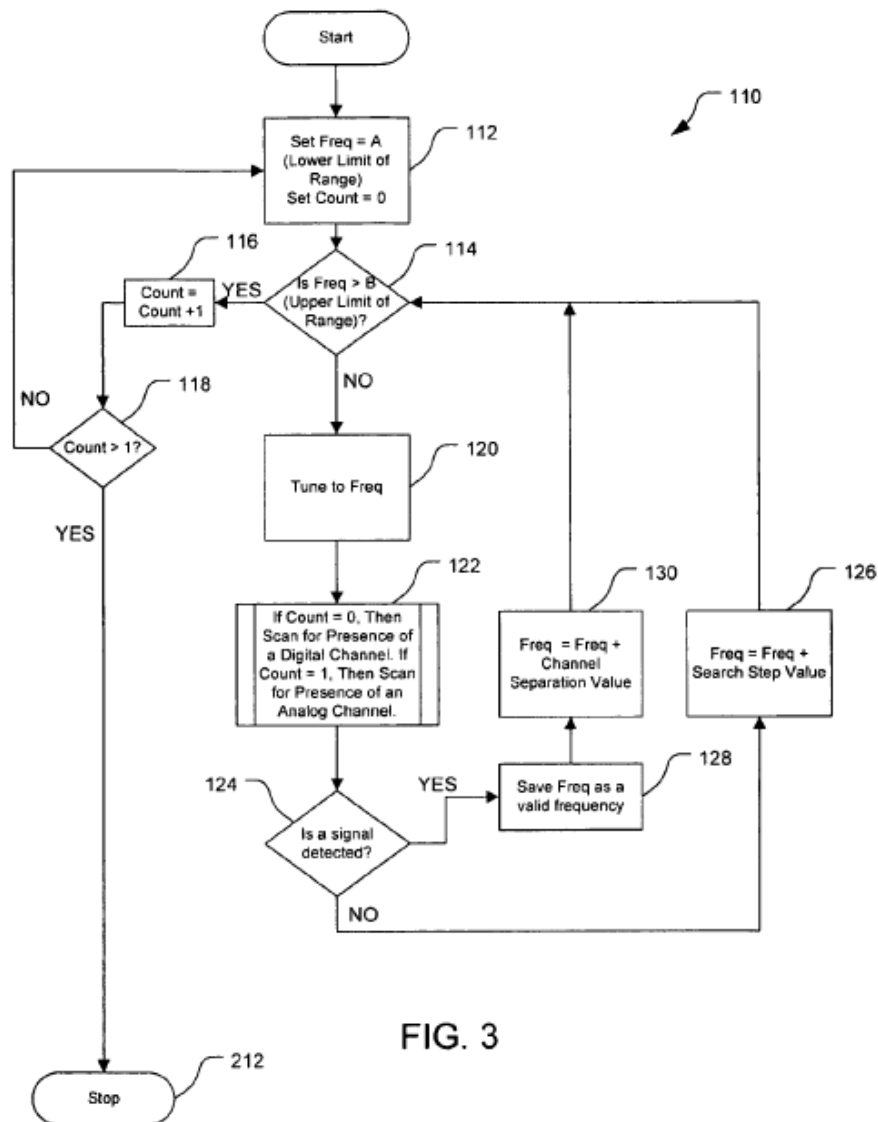


FIG. 3

Ex. 1025, Fig. 3

124. In the algorithm, stage 112 involves setting the lower and upper limits of the frequency range to be checked – Aggarwal gives examples of 50MHz as the lower limit, and 1,000MHz as the upper limit. Ex. 1025, 7:42-56. The algorithm then loops through each frequency in the range, checking (stage 124) whether a valid signal is detected at that frequency, and if a valid signal is detected, information is stored to indicate that the frequency has a valid signal. Ex. 1025, 8:18-33.

125. For a signal to be valid, it must satisfy various conditions, such as whether automatic gain control (AGC) is within acceptable bounds (stage 156), and whether frequency offset is within acceptable bounds (stages 158-160). Ex. 1025, Fig. 4, 9:11-10:41. Accordingly, Aggarwal discloses a television receiver that measures whether the frequency offset is within an acceptable range in order to determine if a signal is available for reception. Ex. 1025, 2:32-47, 3:6-14, 4:53-5:14.

9. OPINIONS WITH RESPECT TO THE '826 PATENT

9.1. Grounds A-D: Claims 1-18 are Rendered Obvious by Kamieniecki in View of Konstantinos, Claims 3 and 12 are Rendered Obvious by Kamieniecki in View of Konstantinos and Sadja, Claims 5 and 14 are Rendered Obvious by Kamieniecki in View of Konstantinos and Aggarwal, and Claims 7 and 16 are Rendered Obvious by Kamieniecki in View of Konstantinos and Salinger

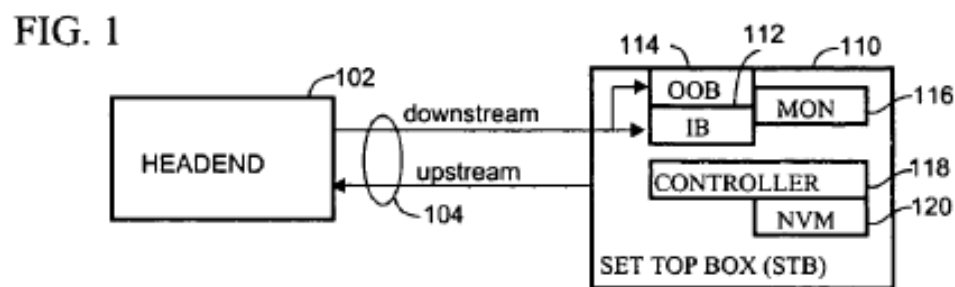
126. The following section provides a limitation by limitation analysis showing how claims 1-18 would have been obvious to a POSITA in view of Kamieniecki combined with Konstantinos, claims 3 and 12 would have further been obvious to a POSITA in view of Kamieniecki combined with Konstantinos and Sadja, claims 5 and 14 would have further been obvious to a POSITA in view of Kamieniecki combined with Konstantinos and Aggarwal, and claims 7 and 16 would have further been obvious to a POSITA in view of Kamieniecki combined with Konstantinos and Salinger. To help illustrate how the disclosures of these references map to the claim limitations, I have color coded some of my remarks and some

figures in the noted art below. My above discussions about these references is incorporated by reference in the discussion of Grounds A-D. However, before addressing the limitations in detail, I will first offer a general discussion about the rationale for the combination of Kamieniecki and Konstantinos.

9.1.1. Rationale for the Combination

127. In general, I believe a POSITA would have considered it obvious to modify Kamieniecki's STB 110 to use the Konstantinos multi-channel receiver in place of Kamieniecki's separate IB and OOB tuners, as this was a natural evolution of television technology, and is specifically taught by Konstantinos. Ex. 1009, [0007]-[0008], [0013]-[0017]; Ex. 1010, [0001], [0011], [0016].

128. Kamieniecki, filed in 2003, illustrates a STB 110 in Figure 1 (below) that has two separate tuners for receiving separate channels – an IB tuner 112 for in-band channels, and an OOB tuner 114 for out-of-band channels:



Ex. 1009, Fig. 1

129. Kamieniecki states that the IB tuner 112 and OOB tuner 114 allow STB 110 to simultaneously receive IB communications and OOB communications,

and states that “[t]his means that subscribers can be tuned to a channel receiving audio and video content while, at the same time, the STB 110 is receiving instructions in an OOB channel.” Ex. 1009, [0013].

130. In 2008, five years after Kamieniecki was filed, Konstantinos recognized that the evolving market for data and programming services will demand the capability of multi-channel tuning, and that the conventional approach of using multiple single-channel tuners in parallel becomes impractical as the number of simultaneously required channels increases beyond two. Ex. 1010, [0001], [0006], [0008], [0011], [0016]. Konstantinos further describes that the DOCSIS 3.0 standard, released in August of 2006, requires the simultaneous reception of at least 4 channels (e.g., for the transmission of Internet data) and that the full cable TV band can have up to 100 channels between 50-1000 MHz. Ex. 1010, [0011]. Konstantinos offers the solution of a single IC (integrated circuit) receiver able to provide improved multi-channel functionality. Ex. 1010, [0016]-[0017].

131. A POSITA would have recognized that Konstantinos suggests an improvement to systems like that of Kamieniecki, as Kamieniecki’s separate tuners become impractical in view of the increased demand for multi-channel tuning. A POSITA would have recognized that using Konstantinos’ multi-channel receiver in place of the Kamieniecki IB and OOB tuners would offer savings in terms of cost and component complexity. This would also address the growing need for multi-

channel functionality, as identified in Konstantinos, as it would allow for the simultaneous reception of many channels. Ex. 1010, [0001], [0011], [0016]. Accordingly, it would have been obvious to a POSITA to use Konstantinos' multi-channel receiver in place of the IB and OOB tuners in Kamieniecki's STB 110, as doing so merely combines prior art elements according to known methods to yield predictable results.

132. A POSITA would also have recognized that if Kamieniecki's STB 110 were updated to use the Konstantinos digital multi-channel receiver, the problem addressed by Kamieniecki's remote monitoring solution would still remain. Signals would still suffer degradation due to transmission distance and faulty equipment, and it would still be important, as stated in Kamieniecki, for service providers to monitor the signal quality and channel health of what their customers are receiving. Ex. 1009, [0005]. Accordingly, the modification of Kamieniecki's STB with Konstantinos' multi-channel receiver would not have removed the need for Kamieniecki's signal monitoring.

9.1.2. Independent Claim 1

133. As I explain below, it is my opinion that claim 1 of the '826 Patent would have been obvious to a POSITA in view of Kamieniecki combined with Konstantinos. The elements of claim 1 appear in the Claims Listing Appendix, labeled as elements [1A]-[1H], and I refer to these elements by their labels below.

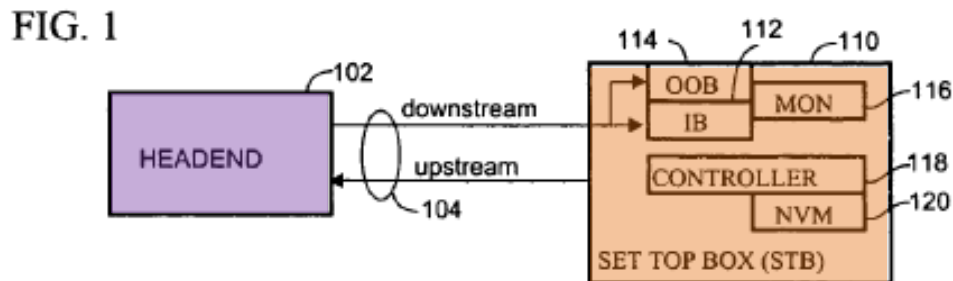
a. [1A]: “A method comprising:”

134. To the extent the preamble is limiting, it is my opinion that Kamieniecki-Konstantinos renders obvious the method recited in claim 1, as discussed below.

b. [1B] “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:”

135. It is my opinion that Kamieniecki-Konstantinos discloses “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:” as claimed.

136. Kamieniecki describes a set-top box (STB) 110 (“receiver”) (orange) receiving a plurality of IB and one or more OOB channels from a headend 102 (“headend”) (purple) over a cable network 104 that includes a combination of coaxial cable and fiber optic cable (“hybrid fiber coaxial (HFC) network”). Ex. 1009, [0002], [0005], [0013]-[0022], Fig. 1.



Ex. 1009, Fig. 1 (annotated)

137. Kamieniecki explicitly refers to signal degradation on cable networks that comprise “coaxial cable, fiber optic cable, a combination of coax and fiber, or the like,” and a POSITA would have understood that the Kamieniecki network 104 refers to such HFC networks, and that the Kamieniecki solution should be applied to such networks. Ex. 1009, [0005].

138. A POSITA would understand that set-top-boxes are (“coupled to a television and data service provider headend”) so that television channels may be watched and data may be received. Kamieniecki describes various television and data services offered by a cable operator’s headend, such as video programs and pay-per-view events (“television” services), and interactive applications and program guide tuning data (“data” services). Ex. 1009, [0001]-[0002], [0013].

139. As will be discussed below, the various steps in claim 1 are performed by the STB 110 in the Kamieniecki-Konstantinos combination.

140. It is, therefore, my opinion that Kamieniecki-Konstantinos discloses “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,” as claimed.

- c. [1C] 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;**

141. It is my opinion that Kamieniecki-Konstantinos discloses “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,” as claimed.

142. As discussed above in regard to limitation [1B], Kamieniecki’s STB receives IB and OOB channels (“signal”) from headend 102. Ex. 1009, Fig. 1. The IB channels comprise audio and video content of television programs (“television channels”), and the OOB channels comprise program guide tuning data and polling instructions (“data channels”). Ex. 1009, [0001]-[0005], [0008]-[0009], [0013]-[0014], [0017], [0023]-[0025].

143. It is, therefore, my opinion that Kamieniecki-Konstantinos discloses “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,” as claimed.

- d. [1D] “digitizing said received signal to generate a digitized signal;”**

144. It is my opinion that Kamieniecki-Konstantinos discloses “digitizing said received signal to generate a digitized signal,” as claimed.

multiple channels, and that the digitization samples “the whole RF signal”, such that no channel information is lost, to thereby allow “any combination of the available channels of the original composite signal” to be selected. Ex. 1010, [0043], [0048]-[0049], [0104]-[0105], [0114]-[0116]. Konstantinos also refers to both TV and DOCSIS (data) channels when describing the problem it is addressing, and discusses receiving both TV and DOCSIS channels. Ex. 1010, [0011].

148. In the Kamieniecki-Konstantinos combination, the IB and OOB channels of Kamieniecki would be the RF Input that is received by Konstantinos’ multi-channel receiver 200. The digitization of the Kamieniecki IB and OOB channels by the Konstantinos ADC 204 results in a multi-channel digital signal (“digitized signal”) that is a digitized equivalent of the input RF signal. Ex. 1010, [0043], [0048]-[0049], [0116]; Ex. 1009, [0013].

149. A POSITA would have been motivated to apply Konstantinos’ teaching of a multi-channel receiver to the monitoring system of Kamieniecki in order to enable simultaneous tuning and monitoring of larger numbers of channels (e.g., four or more) as required by new cable technologies such as DOCSIS 3.0 and the advent of cable offerings with up to 100 TV channels. Ex. 1010, [0011]; Ex. 1009, [0017]. Having multiple channels be digitized simultaneously also provides a benefit to the viewer by allowing for faster channel switching (with multiple decoders) because

there would be reduced delay while the tuner is switching to the new channel's frequency.

150. A POSITA would further have been motivated because Konstantinos' capture and digitization of the entire RF signal would provide the benefit of having a more efficient digital processing system by avoiding multiple individual tuners. A POSITA would have understood that the IB and OOB tuners of Kamieniecki would be replaced by Konstantinos' multi-channel receiver providing enhanced capabilities as well as reducing cost and complexity through a single chip solution. Ex. 1010, [0044]; Ex. 1009, [0013].

151. Combining Konstantinos with Kamieniecki would be merely using known techniques (a single chip multi-channel digital receiver) to improve similar devices (devices with multiple TV tuners) to yield a predictable result (converting a received RF signal into multiple digital outputs). A POSITA would have had the skill to implement Konstantinos' teachings in the system of Kamieniecki because Kamieniecki's IB and OOB tuners use the same inputs (an RF signal) and same outputs (digital signal of the desired channels) as those of Konstantinos' multi-channel receiver chip. In particular, a POSITA would have known how to incorporate Konstantinos' ADC 204 and multi-channel selector 206 (in place of Kamieniecki's IB and OOB tuners) to receive Kamieniecki's downstream IB and OOB channels and output digital signals of the selected channels. A POSITA would

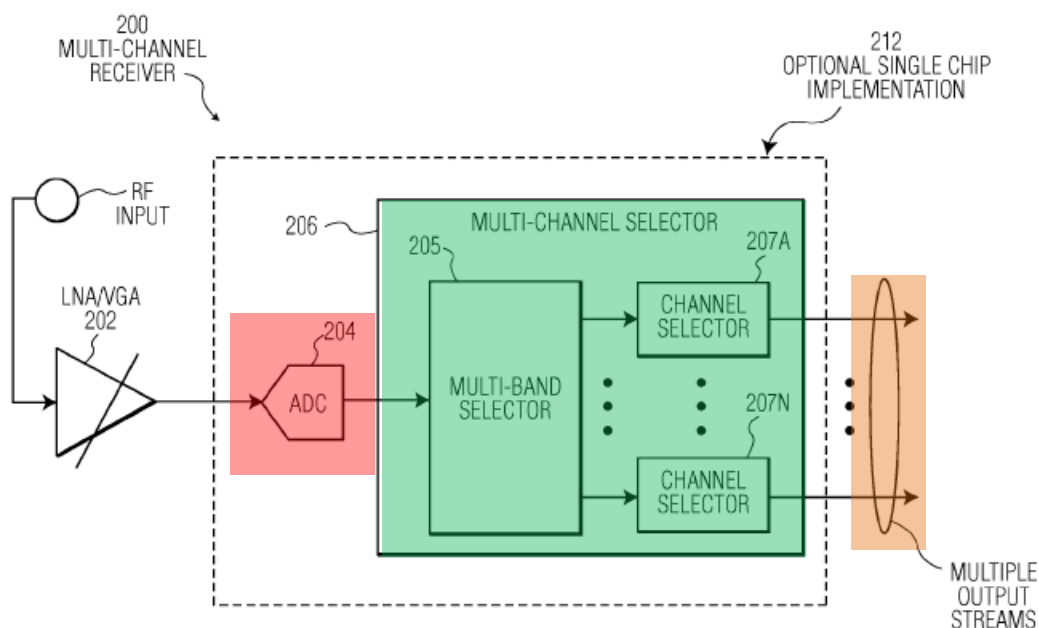
thus have been able to implement Konstantinos' multi-channel receiver into Kamieniecki's STB with expectation of success and without undue experimentation.

152. Therefore, it is my opinion that Kamieniecki-Konstantinos discloses “digitizing said received signal to generate a digitized signal,” as claimed.

e. [1E]: “selecting a first portion of said digitized signal; selecting a second portion of said digitized signal;”

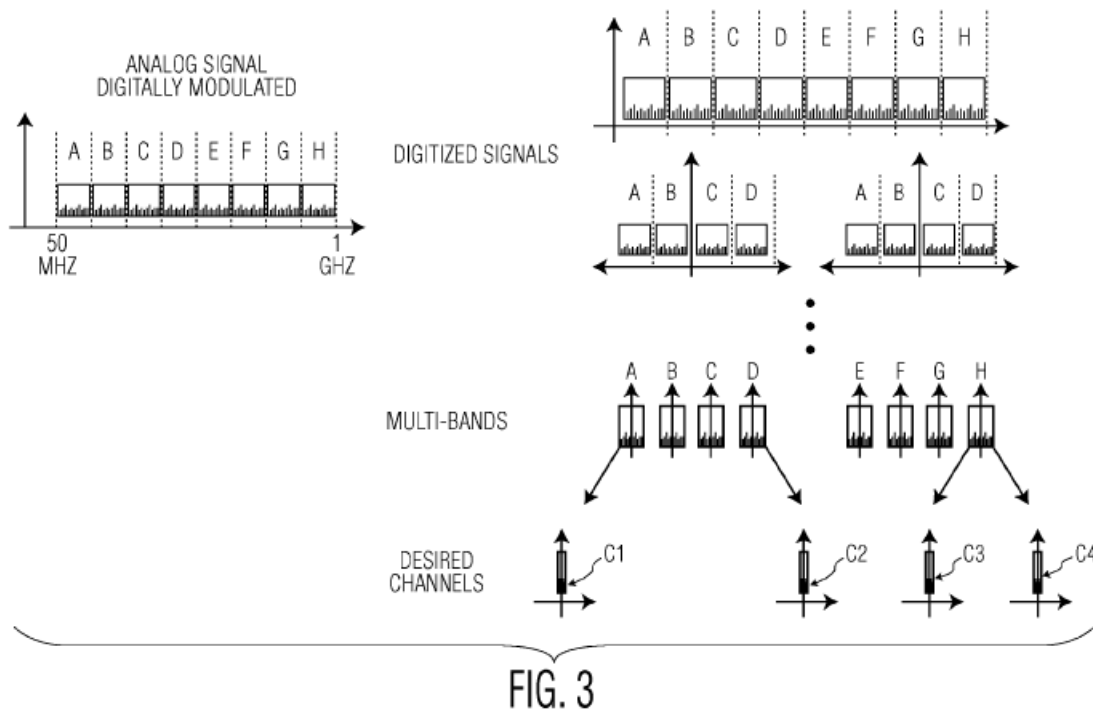
153. It is my opinion that Kamieniecki-Konstantinos describes “selecting a first portion of said digitized signal; selecting a second portion of said digitized signal.”

154. The Konstantinos multi-channel receiver 200 includes a multi-channel selector 206 (green) that selects various channels from the digitized signal from the ADC 204 (red), and outputs them concurrently as different output streams (orange). Ex. 1010, [0044]-[0046], [0117], Fig. 2.



Ex. 1010, Fig. 2 (annotated)

155. Konstantinos describes its channel selector 206 as a two-step process, with reference to Figure 3. Ex. 1010, [0047]-[0051].



Ex. 1010, Fig. 3

156. Figure 3 shows the original analog RF input spanning 50 MHz to 1 GHz and comprising frequency sub-bands A-H. Ex. 1010, [0045], [0048]. That entire signal, with all of the sub-bands A-H, is then digitized by the ADC 204, and the first stage of the channel selector 206 is handled by the multi-band selector 205, which performs a “coarse” selection of a “multi-band” subset of the sub-bands A-H. Ex. 1010, [0045], [0048]. Figure 3 shows an example of this coarse cut, in which sub-bands A-D are selected as multi-bands.

157. This coarse selection can have overlapping sub-bands, as evidenced by the fact that the two multi-bands shown in Figure 3 both have the same sub-bands A-D in them. Ex. 1010, [0045]. Since the multi-band selector 205 is working on digital versions of the RF input signal, those digital versions can be duplicated multiple times without loss of quality. Konstantinos notes that its coarse selection can be performed “without any information loss.” Ex. 1010, [0045].

158. For the second step in its channel selection, each of the multi-bands selected by the coarse selection is then passed to a corresponding channel selector 207A-N for “fine” channel selection, to select and output a desired channel from the multi-band. Ex. 1010, [0046]. The Figure 3 example shows the result of four channel selectors 207, resulting in selecting and outputting four desired channels C1, C2, C3, C4. The Figure 3 example shows that multiple desired channels (e.g., C1 and C2) can be selected out of the same multi-band (e.g., sub-bands A-D), and that multiple desired channels (e.g., C3 and C4) can be selected out of the same sub-band (e.g., sub-band H). Konstantinos notes that the number of channel selectors 207A-N will determine the number of channels that can be simultaneously selected and output, and gives an example in which sixteen channels in the original TV band are selected simultaneously. Ex. 1010, [0046], [0106]. Konstantinos also notes that by replicating the fine selectors, one can realize a multiplicity of digital tuners very efficiently. Ex. 1010, [0105]. From this, it would have been obvious to a POSITA

that any number of channel selectors 207A...N may be implemented to output as many channels as is desired for simultaneous operation. In the combination, some channels (“first portion”) are selected for monitoring, while some channels (“second portion”) are selected for viewing by a user.

159. Kamieniecki describes a desire to monitor some or all channels in the channel map, and does so by waiting for an idle time and then looping through the channels one at a time. Ex. 1009, [0015], [0017], Fig. 2. This is due to: 1) the fact that Kamieniecki’s STB only has a single IB tuner, and 2) Kamieniecki wishes to do its monitoring without disturbing user experience. Ex. 1009, [0013], [0017]. Once combined with Konstantinos’ multi-channel receiver, a POSITA would have recognized that Kamieniecki’s measurements can be made without waiting for an idle time, and can be done in parallel so as to not disturb users, and that this would have been advantageous since network errors are not limited to user idle times, and it would have been desirable to monitor signal quality at times of heavy network use as well. The channel(s) to be monitored (“first portion of said digitized signal”), and the channel(s) desired for normal operation (“second portion of said digitized signal”), e.g., a TV channel a user is watching, would be output via parallel Channel Selectors 207A-N.

160. A POSITA would also have recognized that Konstantinos’ description of an interface circuit would allow for outputs from the multi-band selector to be

sent to a monitor, such as the Kamieniecki monitor 116, that was not part of Konstantinos' single chip implementation. Ex. 1010, [0121]; Ex. 1009, Fig. 1.

161. Therefore, it is my opinion that Kamieniecki-Konstantinos describes “selecting a first portion of said digitized signal; selecting a second portion of said digitized signal,” as claimed.

f. [1F] “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;”

162. It is my opinion that Kamieniecki-Konstantinos discloses “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels,” as claimed.

163. Television channels need to be processed so that their content can be recovered and viewed. For example, a television channel typically contains audio and video, and there are various encoding standards for representing that audio and video in a digital format. An industry group, the Moving Picture Experts Group (MPEG), provides one such standard, and both Kamieniecki and Konstantinos refer to MPEG streams as examples of television streams. Ex. 1009, [0004]; Ex. 1010, [0107]. After an MPEG stream is received, it will need to be decoded (“process[ed]”) to recover the audio and video so that it can be displayed for a user. MPEG decoders were well-known to a POSITA, and would have been necessary for decoding the MPEG stream that Kamieniecki and Konstantinos describe. For example, U.S. Patent Publication No. 2004/0181813 (“Ota”) generally describes a

system in which multiple decoders may be used to support rapid channel changes, and makes reference to having additional MPEG decoders for this purpose. Ex. 1015, [0026]-[0029].

164. Kamieniecki describes that the IB channels include MPEG-2 transport streams which contain content of the television channel. Ex. 1009, [0004]. Kamieniecki's STB 110 obviously would have a decoder to process the MPEG-2 stream ("recover information carried in said plurality of channels") in order for the subscriber to view the content. Ex. 1009, [0013]. Kamieniecki further describes processing OOB communications to receive instructions ("recover information carried in said plurality of channels"). Ex. 1009, [0013].

165. Konstantinos also describes channel and source decoders that are used to process a TV channel, such as an MPEG stream, and recover its content for viewing by a user ("recover information carried in said plurality of channels"). Ex. 1010, [0030], [0042], [0106]-[0107], [0117]-[0119]. Konstantinos further describes an "information extraction digital signal processor (IEP)" which processes information from received channel(s) to improve reception quality ("recover information carried in said plurality of channels"). Ex. 1010, [0108]-[0111], [0120].

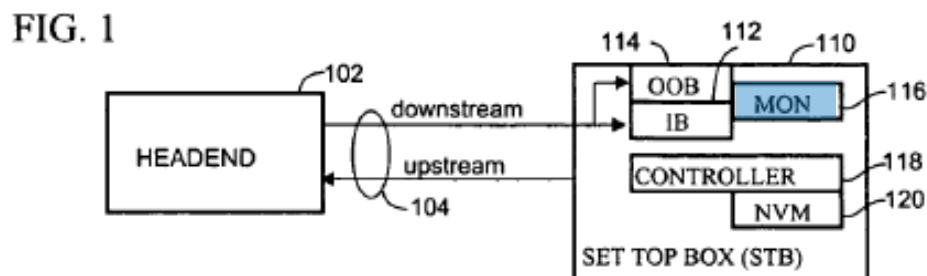
166. Therefore, it is my opinion that Kamieniecki-Konstantinos discloses "processing said selected second portion of said digitized signal to recover information carried in said plurality of channels," as claimed.

g. [1G] “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and”

167. It is my opinion that Kamieniecki-Konstantinos discloses “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal,” as claimed.

168. Kamieniecki describes a monitor 116, which monitors signal quality of the channels it receives (“analyzing said selected first portion of said digitized signal”). Ex. 1009, [0006]-[0007], [0014]-[0016], [0024]. Monitor 116 analyzes the digital signal it receives from the IB and/or OOB tuners and determines signal quality information (“measure a characteristic of said received signal”) such as “error count, signal level estimates, etc.” Ex. 1009, [0007], [0014], [0022].

169. This monitor 116 (**blue**) is illustrated in Kamieniecki Figure 1:



Ex. 1009, Fig. 1 (annotated)

170. In the combination with Konstantinos, the Kamieniecki monitor 116 would receive one or more selected IB and/or OOB channel(s) as a digital output stream (**orange**) from the Konstantinos receiver 200:

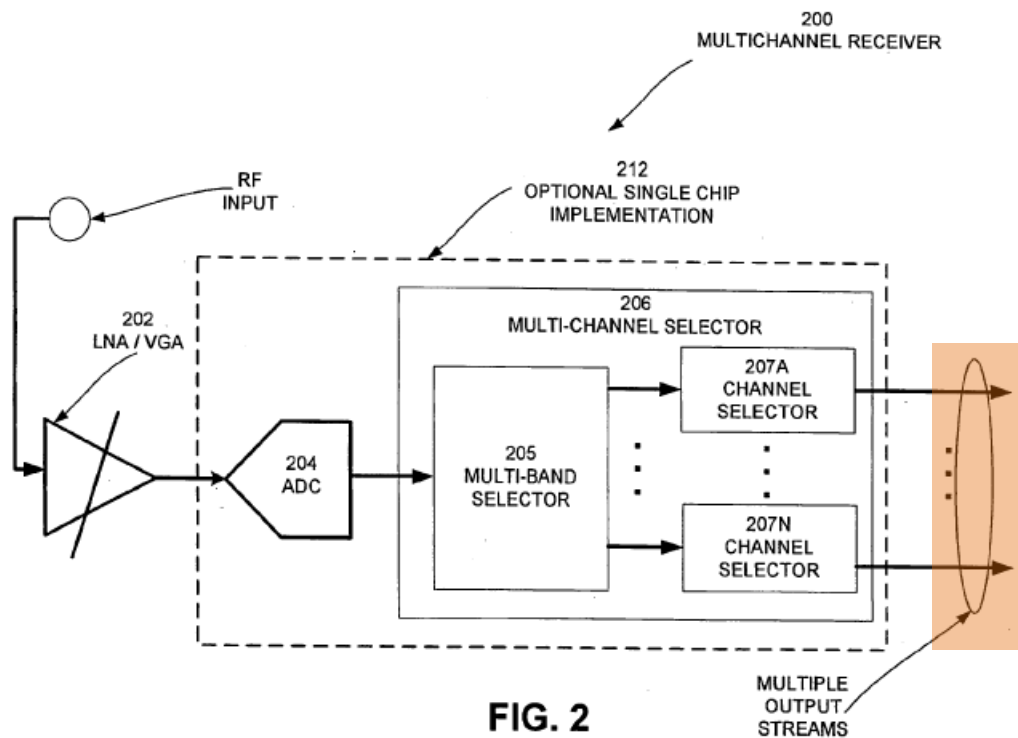


FIG. 2

Ex. 1010, Fig. 2 (annotated)

171. It is, therefore, my opinion that Kamieniecki-Konstantinos discloses “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal,” as claimed.

h. [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.”

172. It is my opinion that Kamieniecki-Konstantinos discloses “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,” as claimed.

173. Kamieniecki describes that its system is intended to efficiently detect and diagnose plant faults and issues, and that it may send information back to the headend as it is collected. Ex. 1009, [0006]-[0008], [0014], [0017]. Among the information that Kamieniecki describes sending back to the headend is “channel absence/presence” information (“network management messages”). Ex. 1009, [0014]-[0024]. A POSITA would have considered it obvious to determine the presence (or absence) of a channel by determining whether the channel can be detected – e.g., whether its signal level is high enough, or error count is low enough, for the channel to be considered present. Kamieniecki already discloses measurement of “signal level” and “error count”, and it would have been obvious to a POSITA to use these measured characteristics as a basis for Kamieniecki’s “channel absence/presence.” Ex. 1009, [0007], [0014], [0022]. This simply uses Kamieniecki’s features in a predictable way to achieve predictable results. As discussed above, Aggarwal (Ex. 1025) discloses an algorithm that checks a channel’s characteristics, such as frequency offset, to make sure that the channel is a valid, usable channel. A POSITA also would have understood that the “channel absence/presence” information is different from the measured characteristic that led to the conclusion that a channel was absent/present – e.g., “channel

absence/presence” is different from the signal level that was too low, or the frequency offset that was out of bounds.

174. Kamieniecki states that the signal quality information may be transmitted to the headend “as it is collected,” and a POSITA would have understood that in order to efficiently address a fault like the absence of a channel, it would be obvious to send that information as it is collected (“controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal”), rather than waiting for the STB to be polled by the headend. Ex. 1009, [0014]. A POSITA would have considered it obvious for the Kamieniecki STB to send a “channel absence/presence” message (“network management message”) whenever a channel’s signal level or error level (“measured characteristic”) is unacceptable (e.g., the channel cannot be displayed at all or only with severely degraded signal quality).

175. It is, therefore, my opinion that Kamieniecki-Konstantinos discloses “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,” as claimed.

9.1.3. Dependent Claim 2

- a. **“The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.”**

176. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds,” as recited in claim 2.

177. As discussed in limitation [1H], Kamieniecki reports “channel presence/absence” for a monitored channel to the headend, and a POSITA would have understood that this would include whether a channel’s signal level or error count was outside acceptable bounds (e.g., signal level too low, or error count too high, for a channel to be considered “present”). For example, as discussed above, Aggarwal discloses determining that a channel is valid and usable based on whether various parameters, such as AGC and frequency offset, are within acceptable bounds. Ex. 1025, 9:11-10:41, Fig. 4.

178. Therefore, it is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds,” as recited in claim 2.

9.1.4. Dependent Claim 3

- a. “The method of claim 2, wherein said parameter is a modulation parameter of said received signal.”**

179. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 2, wherein said parameter is a modulation parameter of said received signal,” as recited. It is also my opinion that Kamieniecki-Konstantinos, in view of Sadja as discussed below, also discloses the claim 3 feature.

180. The only description of “modulation parameter” in the ’826 Patent is determining “type and/or amount of modulation.” Ex. 1001, 3:45-49. A POSITA would have understood that in order to process digital television content, Kamieniecki (or Konstantinos) would necessarily need to determine the type of modulation in the channel. Ex. 1009, [0013]-[0014]. A POSITA would further have understood that the Kamieniecki’s “error count” and “errors/dropouts” would include errors occurring in the modulation (or demodulation) of that channel. Ex. 1009, [0014]-[0015], [0020], [0022].

181. Kamieniecki lists several examples of its channel health information and signal quality information that it can monitor, such as the error count and signal level discussed above, but Kamieniecki does not exhaustively list all signal quality parameters that were known to a POSITA. Ex. 1009, [0007], [0014]-[0015], [0017], [0022]. To the extent it is determined that Kamieniecki does not disclose that the parameter is a modulation parameter, it is disclosed by Sadja. Sadja describes a

system where a set top box may be instructed by a headend to monitor various aspects of a received signal, and Sadja provides additional examples of known signal characteristics that a STB can monitor, including Quadrature Amplitude Modulation (QAM) modulation error ratio (MER), QAM Automatic Gain Control, QAM SNR (Signal-to-Noise Ratio), and QAM CNR (Carrier to Noise Ratio), and report them when polled by the headend. Ex. 1021, Abstract, [0049], [0059], [0081]-[0084]. A POSITA would have understood any of these to be a modulation parameter.

182. A POSITA would have been motivated to include Sadja's STB monitoring modulation parameters in the STB monitoring system of Kamieniecki-Konstantinos because Sadja's parameters were well-known channel quality parameters that would improve the ability of Kamieniecki-Konstantinos to monitor signal quality and diagnose problems with the cable plant. Ex. 1009, [0006]-[0007]; Ex. 1021, [0084]. A POSITA would have supplemented Kamieniecki's monitoring capabilities with Sadja's parameters because it would enhance the ability to monitor the channel health that Kamieniecki seeks to monitor.

183. Combining Sadja with Kamieniecki-Konstantinos would be merely using known techniques (Sadja's monitoring of modulation parameters) to improve similar devices (Kamieniecki's monitoring STB) to yield a predictable result (a device capable of monitoring additional signal quality parameters). A POSITA would have had the skill to implement Sadja's teachings in the system of

Kamieniecki-Konstantinos because implementing monitoring of Sadjá's signal quality characteristics (Sadjá's modulation parameter monitoring) would merely require similar programming already used by Kamieniecki-Konstantinos' monitor 116 and controller 118 to monitor the signal quality characteristics discussed in Kamieniecki. A POSITA would thus have been able to implement Sadjá's modulation monitoring into Kamieniecki-Konstantinos' STB without undue experimentation.

184. As discussed in limitation [1H] and claim 2, Kamieniecki reports "channel presence/absence" for a monitored channel to the headend, and a POSITA would have understood that this would include whether a channel's modulation parameters were outside acceptable bounds such that the channel cannot be displayed properly (e.g., the channel cannot be displayed at all or only with severely degraded signal quality).

185. It is my opinion that Kamieniecki-Konstantinos or Kamieniecki-Konstantinos-Sadjá renders obvious "[t]he method of claim 2, wherein said parameter is a modulation parameter of said received signal," as claimed.

9.1.5. Dependent Claim 4

- a. “The method of claim 2, wherein said parameter is a transmit power of said received signal.”**

186. It is my opinion that Kamieniecki-Konstantinos describes “[t]he method of claim 2, wherein said parameter is a transmit power of said received signal.”

187. As an initial matter, I note that the ’826 Patent specification only mentions “transmit power” in one place – in discussing what a CMTS 114 may adjust. Ex. 1001, 3:4-15. There is no discussion in the specification of a “network management message” indicating that the “transmit power” is outside of acceptable bounds, as is required by claim 4 in view of claim 2. Nevertheless, it is my opinion that the claim 4 feature is shown by Kamieniecki-Konstantinos.

188. As discussed above with respect to [1H], Kamieniecki describes sending information about “channel absence/presence” to the headend based on measuring signal level at monitor 116. Ex. 1009, [0014], [0022]-[0023]. A POSITA would have understood that signal level of a received signal being too low is a known symptom of the transmit power of the signal (i.e. power at the transmitter) being outside of acceptable bounds, as it would indicate that the transmission power level of the signal was insufficient to reach the receiver with an acceptable signal level. As discussed in limitation [1H] and claim 2, Kamieniecki reports “channel presence/absence” for a monitored channel to the headend, and a POSITA would

have understood that this would include whether a channel's power level was outside acceptable bounds such that the channel cannot be displayed properly.

189. Therefore, it is my opinion that Kamieniecki-Konstantinos renders obvious “[t]he method of claim 2, wherein said parameter is a transmit power of said received signal,” as claimed.

9.1.6. Dependent Claim 5

a. “The method of claim 2, wherein said parameter is a frequency offset of said received signal.”

190. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 2, wherein said parameter is a frequency offset of said received signal,” as claimed.

191. As an initial matter, I note that there is no description in the '826 Patent of measuring frequency offset, or of a “network management message” that would indicate whether a “frequency offset” is outside of acceptable bounds, as is required by claim 5 in view of claim 2. Ex. 1001, 3:4-15. Instead, the '826 Patent specification only mentions the “frequency offset” when describing what the CMTS may adjust. Ex. 1001, 3:11-15.

192. A POSITA would have found it obvious that in receiving and processing the signal, Kamieniecki-Konstantinos would determine the frequency offset, and that this would be an example of an underlying signal parameter that would lead to a channel being deemed “present” as described in Kamieniecki – for

example, the channel signal is at the correct carrier frequency such that it could be properly received. Ex. 1009, [0013]-[0014]; Ex. 1010, [0042]-[0046].

193. To the extent it is determined that Kamieniecki-Konstantinos does not disclose said parameter is frequency offset, it is disclosed by Aggarwal (Ex. 1025). Aggarwal describes a system where a television receiver may measure whether the frequency offset is within an acceptable range in order to determine if a signal is available for reception (e.g., valid and usable). Ex. 1025, 2:32-47, 3:6-14, 4:53-5:14, 9:33-10:41.

194. A POSITA would have been motivated to apply Aggarwal's use of frequency offset to the "channel absent/present" determination of Kamieniecki-Konstantinos because it would improve the ability of Kamieniecki-Konstantinos to monitor signal quality and diagnose problems with the cable plant by determining whether a channel is missing (by not being available for reception). Ex. 1009, [0006]-[0007]. A POSITA would have supplemented Kamieniecki-Konstantinos' monitoring capabilities with Aggarwal's monitoring of frequency offset because it would provide enhanced capabilities.

195. Combining Aggarwal with Kamieniecki-Konstantinos would be merely using known techniques (monitoring frequency offset to determine whether a channel is valid and usable) to improve similar devices (a device capable of monitoring additional signal quality parameters) to yield a predictable result (a

device capable of monitoring additional signal quality parameters, and using frequency offset to determine presence or absence of a channel). A POSITA would have had the skill to implement Aggarwal's teachings in the system of Kamieniecki-Konstantinos because implementing monitoring of additional signal quality characteristics (Aggarwal's frequency offset monitoring) would merely require similar programming already being used in Kamieniecki-Konstantinos' monitor 116 and controller 118. A POSITA would thus have been able to implement Aggarwal's monitoring into Kamieniecki-Konstantinos' STB without undue experimentation.

196. As discussed in limitation [1H] and claim 2, Kamieniecki reports "channel presence/absence" for a monitored channel to the headend, and a POSITA would have understood that this would include whether a channel's frequency offset was outside acceptable bounds such that the channel cannot be displayed properly (e.g., the channel cannot be displayed at all or only with severely degraded signal quality). Accordingly, Kamieniecki-Konstantinos and Kamieniecki-Konstantinos-Aggarwal render obvious the limitations of claim 5.

197. It is therefore my opinion that Kamieniecki-Konstantinos and Kamieniecki-Konstantinos-Aggarwal renders obvious the limitations of claim 5.

9.1.7. Dependent Claim 6

- a. “The method of claim 1, wherein said characteristic is signal power vs. frequency.”**

198. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 1, wherein said characteristic is signal power vs. frequency,” as claimed.

199. As discussed above with respect to [1G], Kamieniecki describes measuring the signal level (“signal power”) of the channels it monitors. Ex. 1009, [0014]-[0015], [0022]-[0023]. A POSITA would have understood that each channel has its own frequency, so the signal power of a particular channel would be a signal power for that channel’s frequency (“signal power vs. frequency”). As discussed in limitation [1H], Kamieniecki reports “channel absence/presence” for a monitored channel to the headend, and a POSITA would have understood that this would include whether a channel’s signal power was outside acceptable bounds such that the channel cannot be displayed properly. Ex. 1009, [0007], [0014].

200. Therefore, it is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 1, wherein said characteristic is signal power vs. frequency,” as claimed.

9.1.8. Dependent Claim 7

- a. **“The method of claim 1, wherein said characteristics is signal phase vs. frequency.”**

201. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he method of claim 1, wherein said characteristics is signal phase vs. frequency,” as claimed.

202. Kamieniecki’s STB measures signal quality information, and gives some examples, but doesn’t explicitly list “signal phase.” Ex. 1009, [0005], [0014]-[0023]. However, Kamieniecki and Konstantinos both discuss digital signals, and Konstantinos acknowledges that in conventional I/Q receiver architectures (as discussed above, “I” and “Q” refer to the in-phase and quadrature phase components of a digital QAM signal), phase noise is one of the “dominant noise contaminating mechanisms.” Ex. 1009, [0004]; Ex. 1010, [0009]; Section 8.3, *supra*. It would have been obvious to a POSITA to use the Kamieniecki monitor to measure and report on this dominant source of noise, as Kamieniecki’s goal is to monitor and report on impairments to signal quality. A POSITA would also understand that reception quality in the transmission channel in a QAM modulated cable system, such as those implemented using the Digital Video Broadcast (DVB) standard (expressly mentioned in Kamieniecki), is susceptible to phase noise impairments and thus increasing error counts. Ex. 1009, [0004]. As discussed in claim 6, a POSITA would also have understood that each channel has its own frequency, so the phase

noise of a particular channel would be a phase noise of that channel's frequency ("signal phase vs. frequency").

203. To the extent it is determined that Kamieniecki-Konstantinos does not disclose signal phase, it would have been obvious in view of Salinger (Ex. 1022). Salinger uses probes to monitor performance in a cable network, sending alerts if a parameter exceeds predefined limits. Ex. 1022, [0003], [0005]. Salinger lists a variety of parameters monitored by its probe, and describes modulation error ratio (MER) as including effects of phase noise, and identifies phase noise as one example of signal degradation. Ex. 1022, [0036]. A POSITA would understand that MER is a value that is based on in-phase (I) and quadrature (Q) components of a QAM signal, and would have considered it obvious to have the Kamieniecki monitor include MER and phase noise as among its measured signal quality parameters. See, e.g., discussion of QAM and MER above in Section 8.3.

204. This modification would have involved using a known technique (measuring phase noise via MER) to improve a similar device (Kamieniecki's signal quality monitor) to achieve predictable results, and would have been obvious to a POSITA. The modification also would not have required undue experimentation, as the measurement of MER and signal phase would simply use similar components and/or programming as those already used by the Kamieniecki monitor.

205. As discussed in limitation [1H], Kamieniecki reports “channel absence/presence” for a monitored channel to the headend, and a POSITA would have understood that this would include whether a channel’s MER or error count (due to phase noise) was outside acceptable bounds such that the channel cannot be displayed properly.

206. Therefore, it is my opinion that Kamieniecki-Konstantinos and Kamieniecki-Konstantinos-Salinger disclose “[t]he method of claim 1, wherein said characteristics is signal phase vs. frequency,” as claimed.

9.1.9. Dependent Claim 8

- a. “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.”**

207. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he 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,” as claimed.

208. Kamieniecki monitors various signal qualities, including “error count,” of each monitored channel, and a POSITA would have understood that bit error rate and symbol error rate were well-known examples of error counts. Ex. 1009, [0014], [0022]-[0023].

209. Konstantinos also discloses monitoring various signal characteristics using its information extraction processor, including Bit-Error-Rate and Signal-to-

Noise Ratio. Ex. 1010, [0109]. A POSITA would also have known that in order to calculate Signal-to-Noise Ratio, the noise level of the signal must be measured. A POSITA would also have recognized that each of these are common ways of measuring signal quality and that when Konstantinos' receiver is added to Kamieniecki's STB, these additional characteristics would be obvious to add to those signal quality measurements obtained by Kamieniecki's monitor 116, as that is the simple combination of a known feature (the signal quality parameters of Konstantinos) to a known method (the signal quality monitoring of Kamieniecki) to yield predictable results (reporting signal quality information).

210. As discussed in limitation [1H], Kamieniecki reports "channel absence/presence" for a monitored channel to the headend, and a POSITA would have understood that this would include whether a channel's error rate, noise level, or Signal-to-Noise Ratio was outside acceptable bounds such that the channel cannot be displayed properly.

211. Therefore, is my opinion that Kamieniecki-Konstantinos discloses "[t]he 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," as claimed.

9.1.10. Dependent Claim 9

- a. **“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.”**

212. It is my opinion that Kamieniecki-Konstantinos discloses “[t]he 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,” as claimed.

213. The '826 Patent describes this “configuring” as informing the channelizer 102 (illustrated as element 152 in Figures 1B and 1C) of the “center frequency” and “bandwidth” of the desired bands (C) that should be selected and output for monitoring or data processing. Ex. 1001, 6:25-35. This is illustrated in Figure 3 of the '826 Patent, which shows the channelizer having separate selector filters 302 (**green**), each of which is provided with a center frequency (k) and bandwidth (Δ) of a band that it is to select. *Id.*

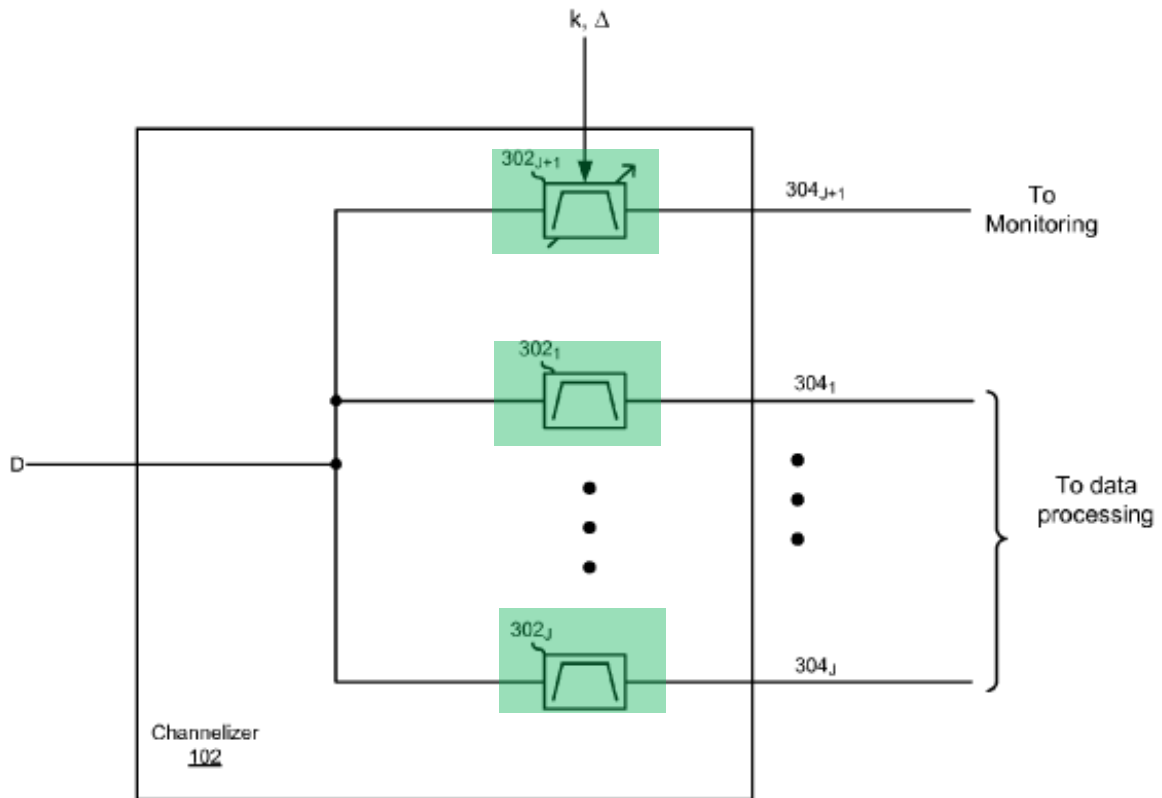
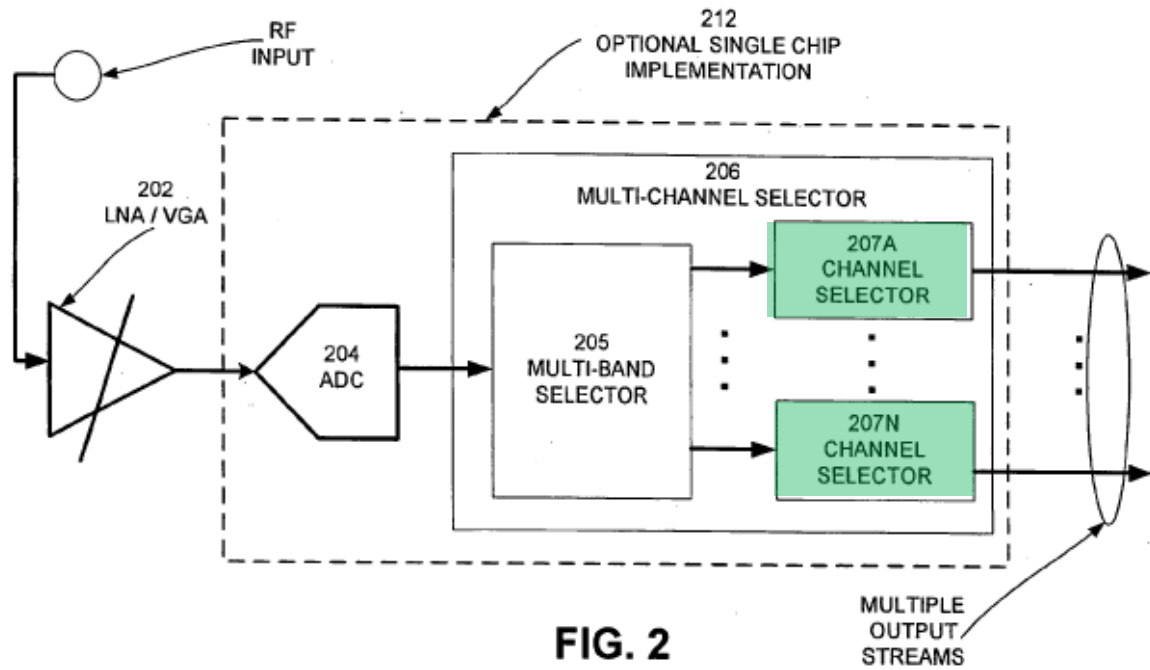


FIG. 3

Ex. 1001, Fig. 3

214. Similarly, the Konstantinos multi-channel receiver 200 also includes a multi-channel selector 206 with separate channel selectors 207A-N (**green**), each being configured to select a corresponding band (channel):

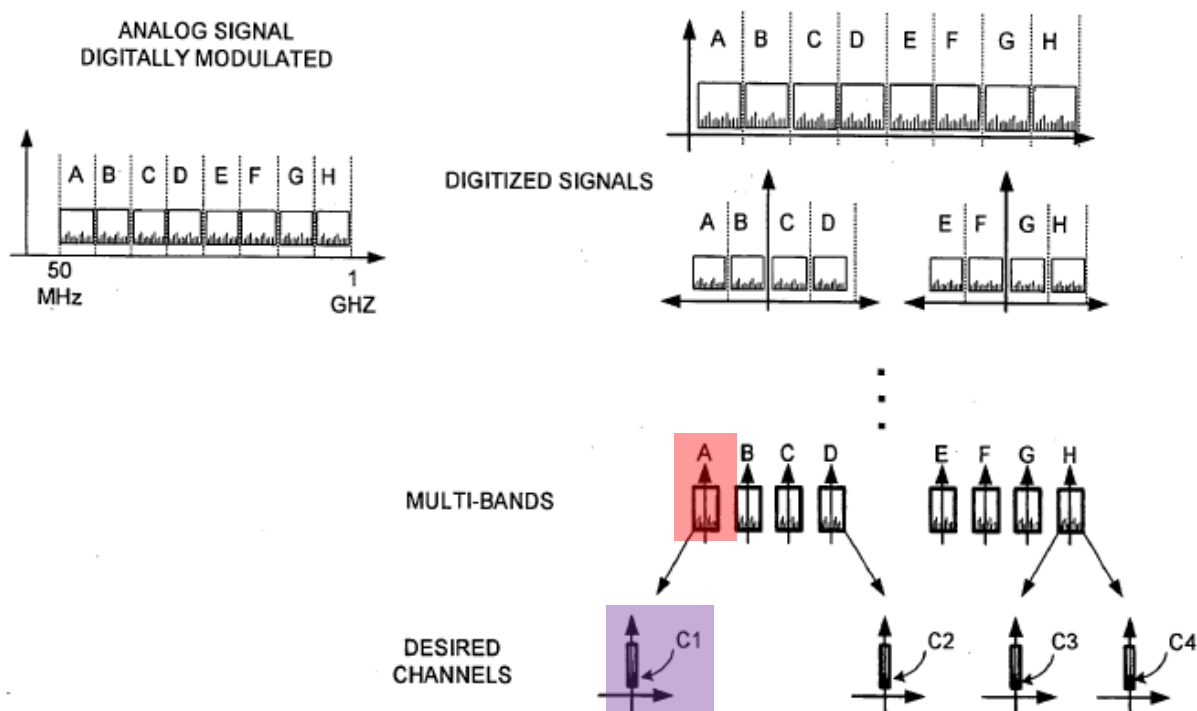


Ex. 1010, Fig. 2

Ex. 1010, [0045]-[0046], [0048], [0062], [0105], Fig. 3.

215. Konstantinos' Figure 3 further provides a visualization of the bands that are selected.

FIG. 3



Ex. 1010, Fig. 3

216. As illustrated, the original analog frequency range (spanning 50 MHz to 1 GHz) comprises sub-bands (A-H) and desired channels (C1-C4). Each of these sub-bands and channels is identified by its center frequency. For example, the sub-band A (**red**) is shown as having a small horizontal portion of the frequency band – this is the “bandwidth” of the sub-band A; and the sub-band is identified by its center frequency, labeled ‘A’ with a vertical arrow in the center of that bandwidth. The same is true for the desired channel – channel C1 has a smaller horizontal portion (**purple**) of the frequency band (this is the channel’s bandwidth), and is also identified by its center frequency as indicated by the vertical arrow in the middle of

that channel's bandwidth. Ex. 1010, [0045]-[0046], [0048], [0062], [0105]. When the channel selectors 207A-N are configured to select desired channels C1-C4, they are configured with the center frequency of those desired channels – this is how the channels are identified in both Konstantinos and the '826 Patent. *Id.* Similarly, the multi-band selectors 205 are configured with the center frequencies of the sub-bands (A-H) that they are to select. *Id.* For each channel to be monitored, a bandwidth and/or center frequency of that channel is selected by its channel selector, and thus is configured during operation of the Konstantinos multi-channel selector 206. *Id.*

217. Therefore, it is my opinion that Kamieniecki-Konstantinos discloses “[t]he 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,” as claimed.

9.1.11. Independent Claim 10

218. It is my opinion that claim 10 appears to be a system claim counterpart to method claim 1, and its various elements are mapped below.

a. [10A]: “A system comprising:”

219. It is my opinion that the elements of the claim 10 system are rendered obvious by Kamieniecki-Konstantinos as discussed below.

- b. [10B]: “a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:”**

220. It is my opinion that Kamieniecki-Konstantinos discloses “a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:” as claimed.

221. The “receiver” reads on Kamieniecki’s set-top box 110, performing as discussed above regarding limitation [1B].

- c. [10C]: “front-end circuitry operable to: receive a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels; and digitize said received signal to generate a digitized signal;”**

222. It is my opinion that Kamieniecki-Konstantinos renders obvious “front-end circuitry operable to: receive a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels; and digitize said received signal to generate a digitized signal;” as claimed.

223. The “receive” and “digitize” limitations are shown by Kamieniecki-Konstantinos as discussed above regarding limitations [1C] and [1D], and the “front-end circuitry” reads on Konstantinos’ LNA/VGA 202 and ADC 204, which when used in the Kamieniecki STB, perform the recited operations. Ex. 1010, [0043], [0116], Fig. 2.

d. [10D]: “channelizer circuitry operable to: select a first portion of said digitized signal; and select a second portion of said digitized signal;”

224. It is my opinion that Kamieniecki-Konstantinos renders obvious “channelizer circuitry operable to: select a first portion of said digitized signal; and select a second portion of said digitized signal;” as claimed.

225. The “select” limitations are shown by Kamieniecki-Konstantinos as discussed above regarding limitation [1E], and the “channelizer circuitry” reads on Konstantinos’ multi-channel selector 206, which performs the recited operations. Ex. 1010, [0044]-[0046], [0117].

e. [10E]: “processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;”

226. It is my opinion that Kamieniecki-Konstantinos renders obvious “processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;” as claimed.

227. The “process” limitation is shown by Kamieniecki-Konstantinos as discussed above regarding limitation [1F], and the “processing circuitry” reads on Kamieniecki’s decoders, Konstantinos’ channel and source decoders, or Konstantinos’ IEP, which perform the recited operations as discussed above regarding limitation [1F].

- f. [10F]: “monitoring circuitry operable to: analyze said selected first portion of said digitized signal to measure a characteristic of said received signal; and control 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.”**

228. It is my opinion that Kamieniecki-Konstantinos renders obvious “monitoring circuitry operable to: analyze said selected first portion of said digitized signal to measure a characteristic of said received signal; and control 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;” as claimed.

229. The “analyze” limitation is shown by Kamieniecki-Konstantinos as discussed above regarding limitation [1G], and the “control transmission” limitation is shown as discussed above regarding limitation [1H]. The “monitoring circuitry” reads on Kamieniecki’s monitor 116 and controller 118, which perform those operations. Ex. 1009, [0006]-[0008], [0014]-[0016], [0024].

9.1.12. Dependent Claim 11

- a. “The system of claim 10, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.”**

230. It is my opinion that Kamieniecki-Konstantinos renders obvious the limitations of claim 11 as discussed above regarding claim 2.

9.1.13. Dependent Claim 12

- a. “The system of claim 11, wherein said parameter is a modulation parameter of said received signal.”**

231. It is my opinion that Kamieniecki-Konstantinos and Kamieniecki-Konstantinos-Sadja renders obvious the limitations of claim 12 as discussed above regarding claim 3.

9.1.14. Dependent Claim 13

- a. “The system of claim 11, wherein said parameter is a transmit power of said received signal.”**

232. It is my opinion that Kamieniecki-Konstantinos renders obvious the limitations of claim 13 as discussed above regarding claim 4.

9.1.15. Dependent Claim 14

- a. “The system of claim 11, wherein said parameter is a frequency offset of said received signal.”**

233. It is my opinion that Kamieniecki-Konstantinos and Kamieniecki-Konstantinos-Aggarwal renders obvious the limitations of claim 14 as discussed above regarding claim 5.

9.1.16. Dependent Claim 15

- a. “The method of claim 1, wherein said characteristic is signal power vs. frequency.”**

234. It is my opinion that Kamieniecki-Konstantinos renders obvious the limitations of claim 15 as discussed above regarding claim 6.

9.1.17. Dependent Claim 16

- a. “The method of claim 1, wherein said characteristics is signal phase vs. frequency.”**

235. It is my opinion that Kamieniecki-Konstantinos and Kamieniecki-Konstantinos-Salinger renders obvious the limitations of claim 16 as discussed above regarding claim 7.

9.1.18. Dependent Claim 17

- a. “The system of claim 10, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.”**

236. It is my opinion that Kamieniecki-Konstantinos renders obvious the limitations of claim 17 as discussed above regarding claim 8.

9.1.19. Dependent Claim 18

- a. “The system of claim 10, comprising configuring, by said monitoring circuitry during operation of said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.”**

237. It is my opinion that Kamieniecki-Konstantinos renders obvious the limitations of claim 18 as discussed above regarding claim 9.

9.2. Grounds E and F: Claims 1-18 are Rendered Obvious by Renken and Claims 5 and 14 are rendered obvious by Renken in view of Aggarwal

238. As set forth below, claims 1-18 would have been obvious to a POSITA in view of Renken and claims 5 and 14 would have further been obvious to a POSITA in view of Renken combined with Aggarwal. Citations below include citations to Renken (Ex. 1011) and its provisional (Ex. 1012, which is incorporated by reference into Renken). However, as noted above, the '826 Patent claims are not entitled to their earliest priority, so the Renken provisional priority date is not needed in order to qualify as prior art. To help illustrate how the disclosures of these

references map to the claim limitations, I have color coded some of my remarks and some figures in the noted art below. My above discussions about Renken and its provisional are incorporated by reference in the discussion of this Ground.

9.2.1. Independent Claim 1

239. As I explain below, it is my opinion that claim 1 of the '826 Patent would have been obvious to a POSITA in view of Renken.

a. [1A]: “A method comprising:”

240. To the extent the preamble [1A] is limiting, it is my opinion that Renken renders obvious the method recited in claim 1, as discussed below.

b. [1B] “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:”

241. It is my opinion that Renken discloses “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:” as claimed.

242. Renken describes a measurement-capable cable modem (MCCM) (“receiver”) receiving DOCSIS (i.e., data) and CATV (i.e., television) signals from a headend (“a television and data service provider headend”) via a hybrid fiber-coaxial network. Ex. 1011, Abstract, 7:42-8:12, 15:24-26, 16:32-36, 18:38-42, 20:31-45, Figs. 1-2; Ex. 1012, pp. 3-8, 14-15, Fig. 1 (p. 5). The various steps performed by the MCCM are under the control of a processor executing software

including a measurement program stored in the non-volatile memory. Ex. 1011, 10:15-31; Ex. 1012, pp. 5-6.

243. Renken Figure 1 shows an example cable network, with headend 5 coupled to MCCM 100 via a network of coaxial cables and optical fibers:

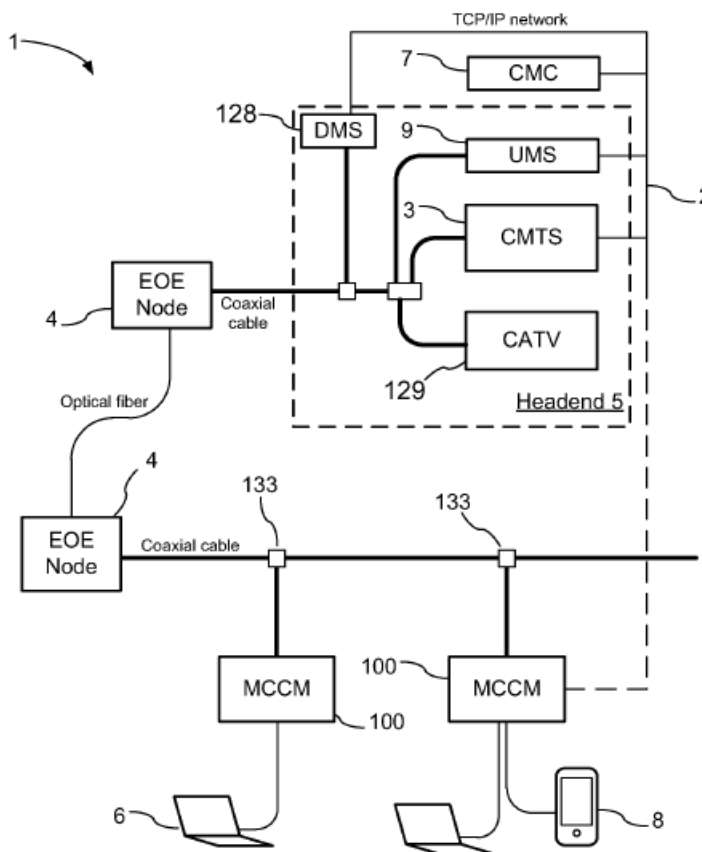


Fig. 1

Ex. 1011, Fig. 1

244. The Renken Provisional does not illustrate Renken Figure 1, but the MCCM receiving downstream DOCSIS and CATV signals via a cable plant, and communicating with a headend, are all discussed. Ex. 1012, pp. 3-8, 14-15, Fig. 1 (p. 5). A POSITA would have understood that the cable plant identified in the

Renken Provisional would couple the MCCM and the headend, as was typical of cable television networks. Ex. 1012, pp. 3 (“cable plant”, “MCCM”), 5 (“headend”), 15 (“headend”); Ex. 1026, pp. 34, 38. The Renken Provisional does not explicitly state that the cable plant comprises an HFC network, but a POSITA would have considered this to be obvious since cable television networks were well-known to use HFC networks. For example, Figure 1.4, shows an example of a cable system with hybrid fiber-coax topology. Ex. 1026, p. 38.

245. Renken Figure 2 shows an example block diagram of its MCCM 100:

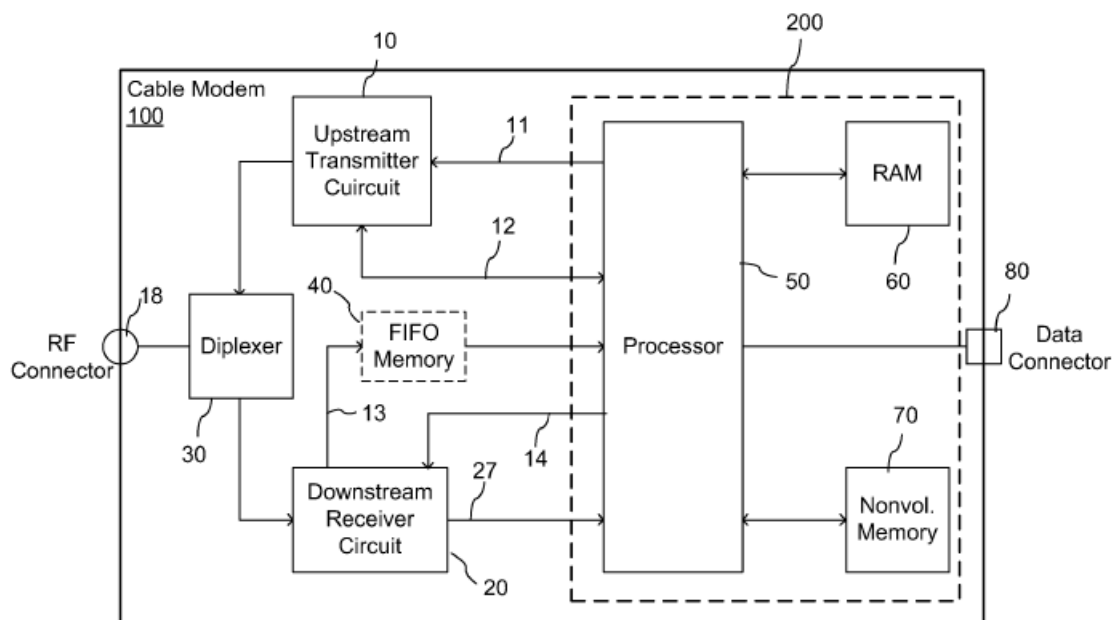


Fig. 2

Ex. 1011, Fig. 2

246. Virtually the same figure is shown as Figure 1 on page 5 of the Renken Provisional:

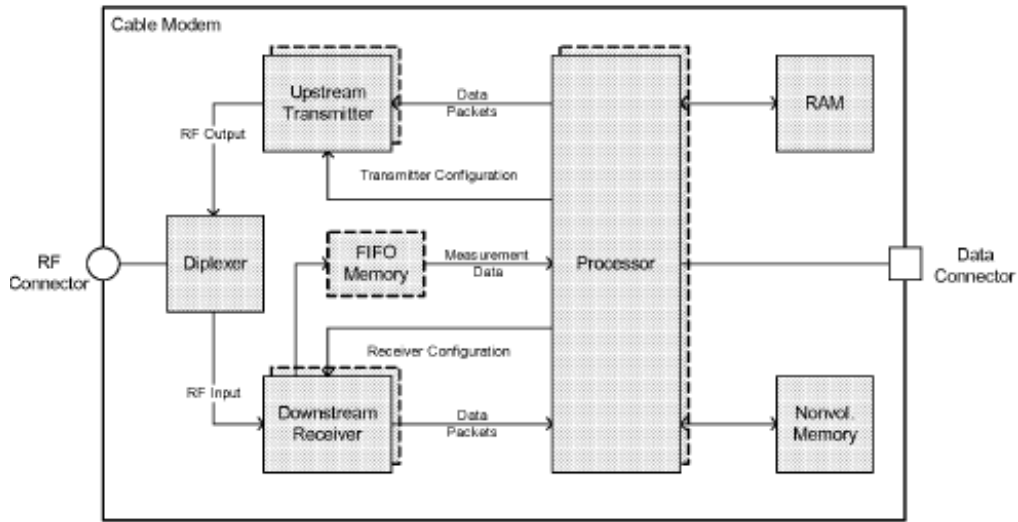


Fig. 1

Ex. 1012, Fig. 1 (p. 5)

247. Renken Figure 3 shows a more detailed view of the downstream receiver circuit 20 shown in Renken Figure 2:

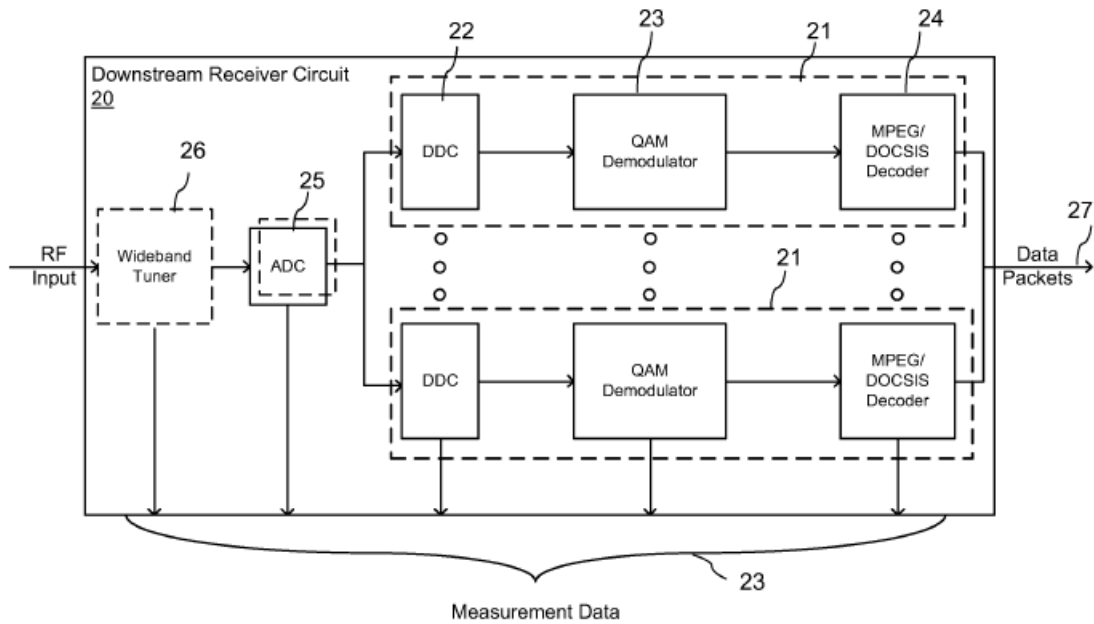


Fig. 3

Ex. 1011, Fig. 3

248. Virtually the same figure is shown as Figure 2 on page 6 of the Renken Provisional:

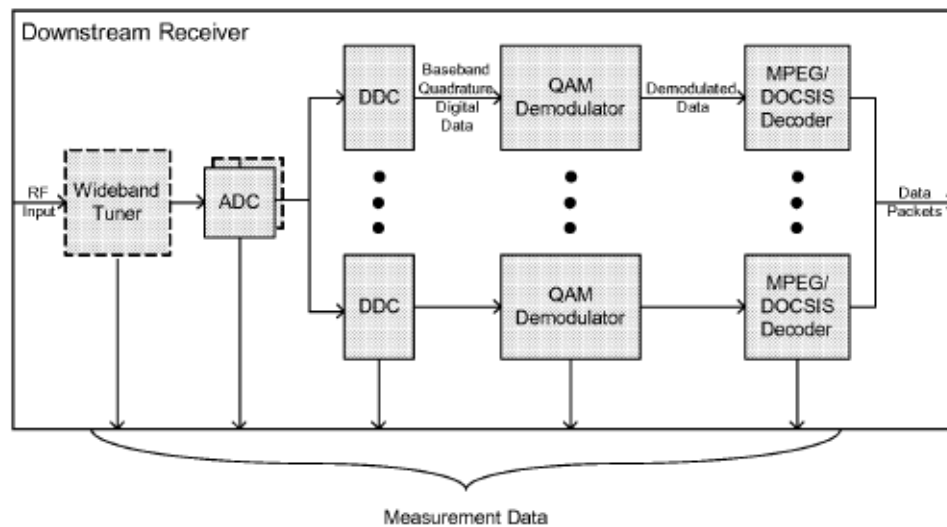


Fig. 2

Ex. 1012, Fig. 2.

249. My discussion herein will generally refer to the figures from the Renken Provisional, but it should be understood that virtually the same versions of these figures are found in Renken.

250. Renken discloses that the MCCM receives both DOCSIS signals and CATV signals. Ex. 1011, 7:43-8:34. This is also evident from the fact that Renken discusses performing measurements on both DOCSIS channels as well as TV channels. Ex. 1011, 11:12-18, 15:21-26, 16:34-36, 18:38-42, 20:38-42. This is also evident from the fact that the MCCM is shown as having an MPEG/DOCSIS decoder. A POSITA would have understood that MPEG was a standard used for encoding digital video such as television channels, and that DOCSIS was a standard

used for transmitting data, such as Internet data. Ex. 1026, pp. 120-124, 211-213. Similarly, the Renken Provisional also includes the MPEG/DOCSIS decoders, and also discusses its MCCM measuring both DOCSIS and CATV signals. Ex. 1012, pp. 3, 5-8, 14-15.

251. It is therefore my opinion that Renken discloses and renders obvious “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:” as claimed.

c. [1C] 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;

252. It is my opinion that Renken discloses “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,” as claimed.

253. As discussed above in regard to limitation [1B], Renken’s MCCM receives, via an HFC network, “DOCSIS and non-DOCSIS digital and analog TV channels.” Ex. 1011, Abstract, 7:42-8:34, 9:41-60, 10:56-11:18, Fig. 2; Ex. 1012, pp. 3-4, 6-8, 14-15. These channels appear as the “RF Input” in Renken Figure 3 and Renken Provisional Figure 2, and are received by the wideband tuner. Ex. 1011, Fig. 3; Ex. 1012, Fig. 2 (p. 6).

254. It is, therefore, my opinion that Renken discloses “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,” as claimed.

d. [1D] “digitizing said received signal to generate a digitized signal;”

255. It is my opinion that Renken discloses “digitizing said received signal to generate a digitized signal,” as claimed.

256. Renken describes an analog-to-digital converter (ADC) 25 (red), which is part of the downstream receiver circuit of the MCCM, and shown in the Renken Provisional Figure 2 and in Renken Figure 3. Ex. 1011, 11:39-44, Fig. 3; Ex. 1012, pp. 6-7, Fig. 2:

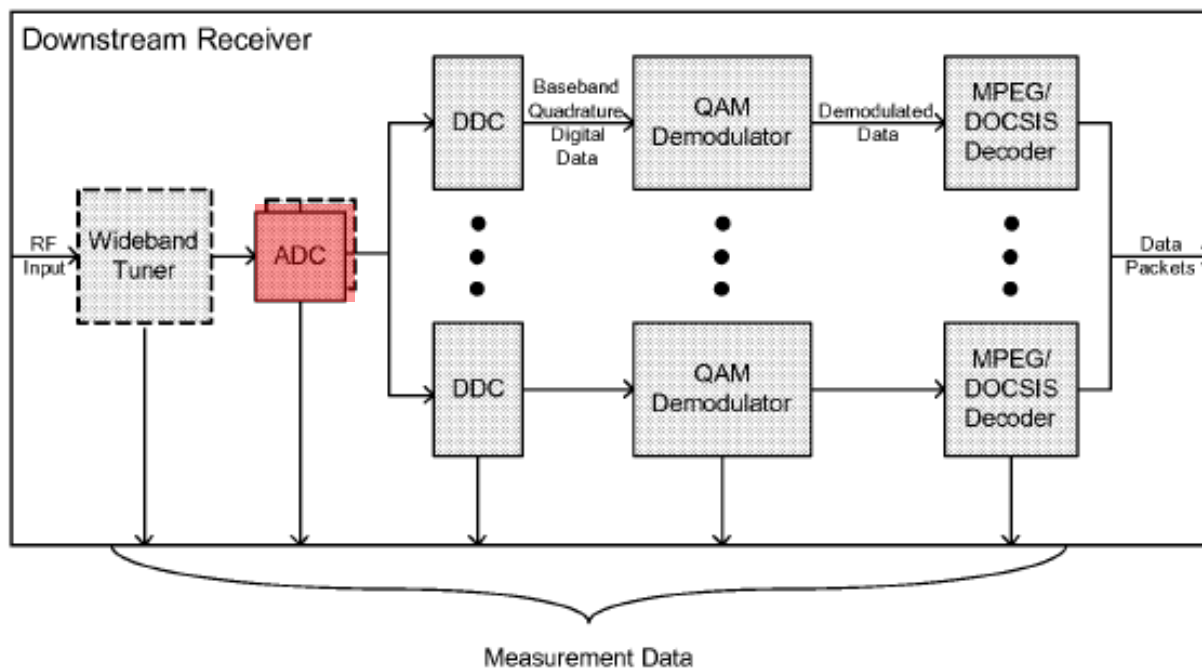


Fig. 2

Ex. 1012, Fig. 2 (annotated)

257. The ADC converts the RF input (“received signal”) into digitized data. Ex. 1011, 7:42-63, 11:39-40, Fig. 1, 3; Ex. 1012, pp. 6-7, Fig. 2. For example, Renken states that “[t]he ADC 25 converts the analog IF output from the wideband tuner 26 into a digitized IF signal.” Ex. 1011, 11:39-40. Similarly, the Renken Provisional states that “[t]he ADC is responsible for transforming the analog intermediate frequency (IF) output from the wideband tuner and converting it into digitized IF data.” Ex. 1012, p. 7. The reference to “intermediate frequency” (IF) does not alter my opinion. As Renken describes, the tuner 26 receives downstream RF signals and converts them to an intermediate frequency (IF). Ex. 1011, 11:28-38; Ex. 1012, pp. 6-7. As a POSITA would have known, the RF (radio frequency) is a carrier frequency used for transmission, which will be different for different channels, while the IF is a fixed frequency that circuit components can be configured to expect and use. The conversion from RF to IF just means the received signal is centered around the IF instead of the carrier RF, without changing the substantive content of the signal. The ADC, as its name implies, simply converts this IF signal into an equivalent digital format. Ex. 1011, 11:39-40; Ex. 1012, pp. 6-7. Renken also notes that the tuner is optional, since the tuning process can be performed purely digitally using the ADC and/or DDC. Ex. 1011, 11:36-38; Ex. 1012, pp. 6-7. A POSITA would understand that in either case, tuner or optional no tuner, Renken discloses that the channels are digitized by an ADC into a digitized signal.

258. Therefore, it is my opinion that Renken discloses “digitizing said received signal to generate a digitized signal,” as claimed.

e. [1E]: “selecting a first portion of said digitized signal; selecting a second portion of said digitized signal;”

259. It is my opinion that Renken describes “selecting a first portion of said digitized signal; selecting a second portion of said digitized signal.”

260. Renken describes a number of parallel digital down converters (DDC) (green), each responsible for filtering out, or selecting, a particular downstream channel. Ex. 1011, 12:22-23, Fig. 3; Ex. 1012, p. 7, Fig. 2.

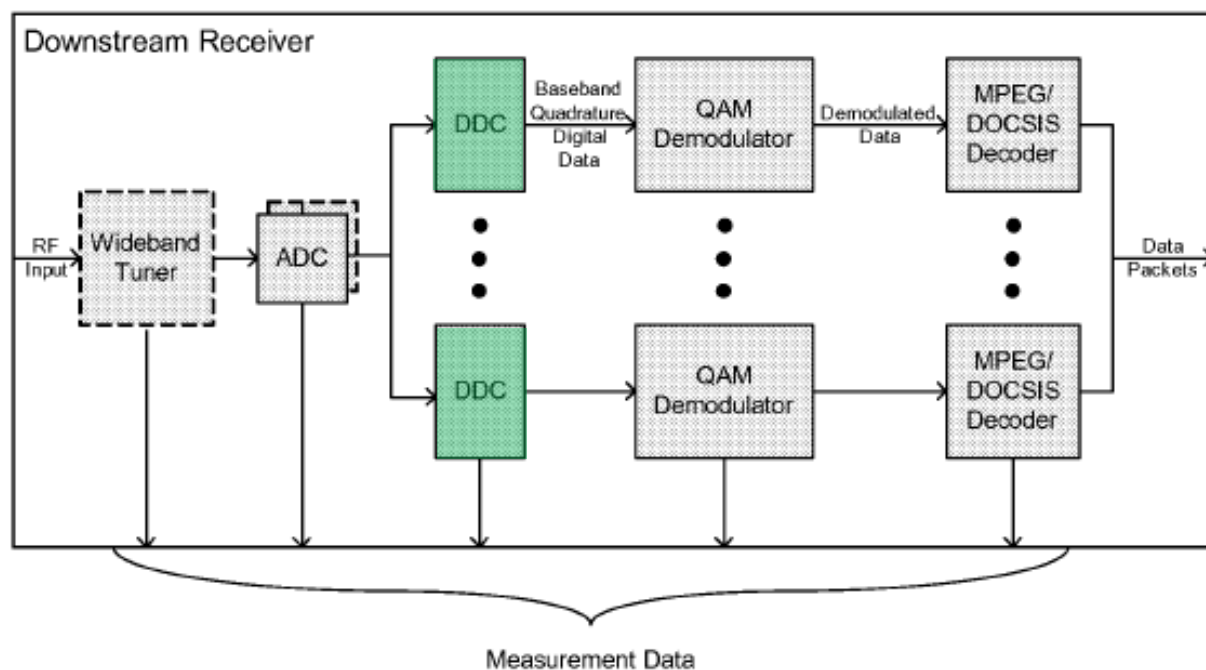


Fig. 2

Ex. 1012, Fig. 2 (annotated)

261. The MCCM 100 determines which DDC (and its associated QAM demodulator and MPEG/DOCSIS decoder) to use for channels/signals to be

measured/monitored (“selecting a first portion of said digitized signal”) and which to use for channels to decode for viewing by a subscriber (“selecting a second portion of said digitized signal”) using the MPEG/DOCSIS Decoder. Ex. 1011, 4:34-44, 4:60-67, 10:5-48, 16:32-36, 20:41-43; Ex. 1012, pp. 3, 9, 13. In operation, a first DDC may select a channel to be measured and either the DDC or other downstream components (e.g., QAM Demodulator or MPEG/DOCSIS Decoder) perform the monitoring as directed by the measurement program, while a second DDC may concurrently select a channel (e.g., a television channel) to be decoded by MPEG/DOCSIS Decoder for viewing.

262. Therefore, it is my opinion that Renken discloses “selecting a first portion of said digitized signal; selecting a second portion of said digitized signal,” as claimed.

f. [1F] “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;”

263. It is my opinion that Renken discloses “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels,” as claimed.

264. Television channels need to be processed so that their content can be recovered and viewed. For example, a television channel typically contains audio and video, and there are various encoding standards for representing that audio and video in a digital format. An industry group, the Moving Picture Experts Group

(MPEG), provides one such standard, referenced in both Renken and the Renken Provisional. Ex. 1011, 6:38-39, 11:21, 13:6-21, 17:36-38; Ex. 1012, pp. 7-8. After an MPEG stream is received, it will need to be decoded (“processed”) to recover the audio and video so that it can be displayed for a user. MPEG decoders were well-known to a POSITA, and would have been necessary for decoding MPEG streams. For example, U.S. Patent Publication No. 2004/0181813 (“Ota”), published in 2004, describes use of multiple MPEG decoders to support rapid channel changes. Ex. 1015, [0004]-[0007], [0020], [0023], [0026]-[0029].

265. Renken describes a MPEG/DOCSIS Decoder (purple), which is found in each of the Receivers in the MCCM. Ex. 1011, 11:19-22, 13:6-8, Fig. 3; Ex. 1012, pp. 6-8 (Fig. 2).

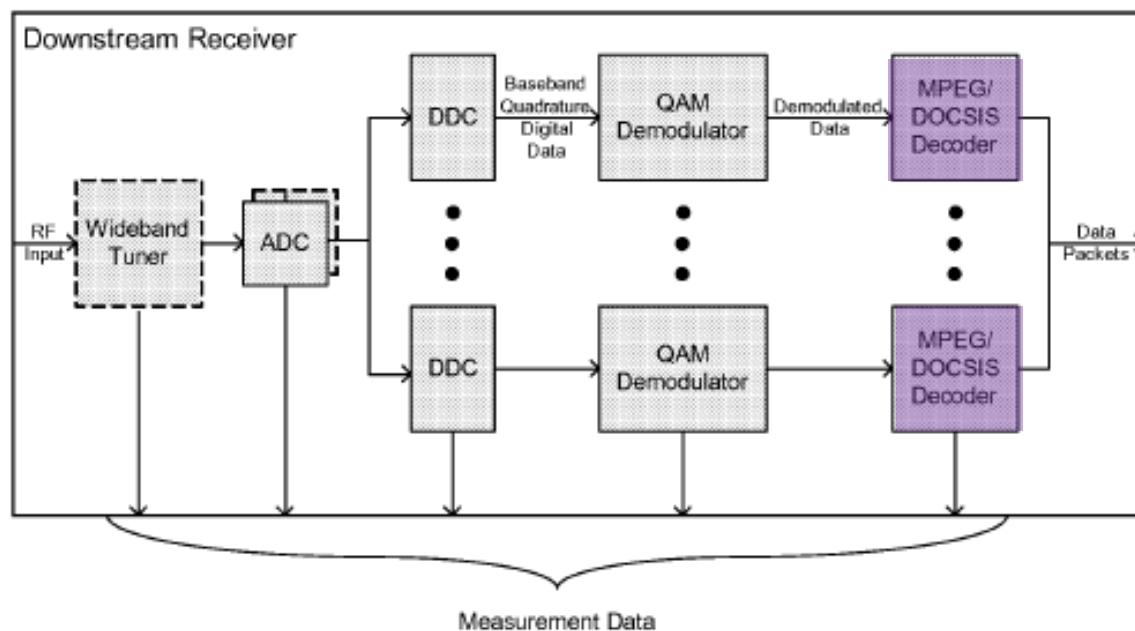


Fig. 2

Ex. 1012, Fig. 2 (annotated)

266. As their name implies, the MPEG/DOCSIS decoders decode data from the digital channels (“recover information carried in said plurality of channels”). Ex. 1011, 13:6-21; Ex. 1012, 7-8. Renken notes that such decoders were known in the art, while the Renken Provisional refers to them decoding data - a POSITA would have understood that their purpose is to decode, or recover, MPEG TV channels or DOCSIS data from the selected channels. *Id.*

267. Therefore, it is my opinion that Renken discloses “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels,” as claimed.

g. [1G] “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and”

268. It is my opinion that Renken discloses “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal,” as claimed.

269. Renken describes an MCCM processor executing a measurement program to obtain signal measurements. Ex. 1011, 10:15-31, Fig. 2; Ex. 1012, pp. 5-6, Fig. 2. For example, the measurement program can obtain measurements using the ADC, and can analyze data from the ADC to determine characteristics, such as Bit Error Rate (BER), Signal-to-Noise Ratio (SNR), and Carrier-to-Noise Ratio (CNR). Ex. 1011, 3:12-20, 10:15-31, 11:39-61, 13:6-15, 16:17-17:17; Ex. 1012, pp. 5-7, 14. As another example, the program analyzes data from the MPEG/DOCSIS

Decoder to determine characteristics such as Bit Error Rate. Ex. 1011, 13:8-21; Ex. 1012, pp. 7-8, 14. The processor may also take signal measurements using other components, including the DDC 22 and QAM Demodulator 23. Ex. 1011, 12:6-13:38; Ex. 1012, pp. 3-8, 13-15.

270. While Renken expressly refers to Signal-to-Noise Ratio (SNR), the Renken Provisional does not. Ex. 1011, 3:17-18, 13:1. However, the Renken Provisional refers to Carrier-to-Noise Ratio (CNR), and a POSITA would have understood that SNR is analogous to CNR, and that Renken's disclosure of CNR would at least have rendered obvious measuring SNR. Ex. 1012, p. 4. A POSITA would understand that both the CNR and SNR are a ratio relative to noise, and that the difference depends on when the measurement is taken. A baseband video signal is modulated onto an RF carrier frequency for transmission, and after reception it is demodulated and the baseband video is recovered. The CNR is a measurement done on the RF signal before that demodulation, while the SNR is a measurement on the baseband signal after demodulation.

271. Renken includes signal-to-noise ratio (SNR), which a POSITA would understand is used similarly to modulation error ratio. Ex. 1011, 12:62-13:5. A POSITA would understand that signal-to-noise ratio was a typical measurement of the quality of an analog video signal, but for digital video signals, the corresponding measurement of quality is the modulation error ratio (MER), and that the terms SNR

and MER were often used interchangeably, depending on whether analog or digital video was being addressed. For example, U.S. Patent Publication 2008/0089402, mentioned in Renken, states that the MER is “an estimate of the signal to noise ratio (SNR) of the digital signal.” Ex. 1011, 13:3; Ex. 1024, [0051].

272. It is, therefore, my opinion that Renken discloses “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal,” as claimed.

h. [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.”

273. It is my opinion that Renken discloses “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,” as claimed.

274. Renken discloses that based on its measurements, the MCCM will send results to the central management controller (CMC). Ex. 1011, 8:45-50, 9:15-18, 10:45-48, 18:46-52; Ex. 1012, pp. 3-4, 10, 13, 15. Renken states that the CMC may be at the headend. Ex. 1011, Abstract. The Renken Provisional does not explicitly say that the CMC is located at the headend, but it states it does not know where *else* the results would be sent. Ex. 1012, p. 4 (“... sending the results somewhere other

than the head end (where, I don't know ...)"). A POSITA would at least have known that the headend is the most logical place for the CMC, since the Renken Provisional discusses using results to evaluate results of multiple MCCMs, and since in a cable network, upstream communications from a cable modem arrive at the headend anyway. Ex. 1012, pp. 4, 9, 13, 15.

275. In a cable network as described in Renken and the Renken Provisional, and as discussed in Section 8.1 above, a headend is on one end of the network of cables (the "upstream" end) and the various subscriber modems/set-top boxes are on the other end (the "downstream" end). The subscriber devices communicate with the headend. The headend transmits downstream signals onto the network of cables, for receipt by the subscriber modems/set-top boxes, and the subscriber modems/set-top boxes transmit upstream signals onto the network of cables, and they would be received by the headend. This is the general structure illustrated in Figure 1 of Renken, and a POSITA seeing the reference to headend, cable modem, CATV network, and cable plant in the Renken Provisional would have understood those to be referring to the same structure.

276. A POSITA would have at least considered it obvious to place the CMC at the headend, since the CMC coordinates measurements across a plurality of MCCMs. Ex. 1012, pp. 4, 12-15. The upstream transmissions from the cable modems in a cable network traverse upstream, through the intervening network of

cables, to arrive at the headend. Since the upstream signals are arriving at the headend anyway, it would be logical to place the CMC at the headend, for ease of access to the measurement results being reported by the MCCMs.

277. At least some of these results would be “network management messages” that are transmitted based on a measured characteristic that is different from the network management message. For example, Renken describes that the MCCM’s measurement plan could include error thresholds, and it would have been obvious to a POSITA that the MCCM would use those thresholds to detect, based on an underlying measurement, that an error has occurred in a channel, and to send a message to the CMC indicating the error. Ex. 1011, 22:67-23:4. A POSITA would understand that the purpose for the MCCM having the error threshold is so that a measured characteristic can be compared to the threshold, and an alert can be raised if the threshold is exceeded.

278. Renken also discloses the CMC analyzing measurement results and generating error reports or alarms if measurement results fall outside of acceptable limits, and a POSITA would have considered it obvious for the MCCM to do the same using the error threshold that it receives as part of its measurement plan. Ex. 1011, 22:22-39, 23:29-33; Ex. 1012, pp. 4, 12-13.

279. The Renken Provisional (incorporated by reference in Renken) also discloses that the MCCM could detect that there is a problem with a non-DOCSIS

channel (i.e., TV channel) within the customer premise and/or that the MCCM could detect, based on the measurement results at its location, that a neighbor on the network has a problem. Ex. 1011, 1:7-10; Ex. 1012, p. 15. In both situations, Renken describes that the problem could be addressed before the customer complains about it. *Id.* A POSITA would have understood that the determination that a problem exists is based on a measured characteristic and it was obvious the message to the CMC would report the existence of the problem (“network management messages”) and not merely the measured characteristic. This is particularly the case in the situation of detecting a problem of a network neighbor where the message to the CMC would need to indicate that it was a problem at the neighbor, not at the customer premise where the MCCM was located. A POSITA would further have understood that addressing the problem before the customer has a chance to complain about it (particularly in the case of a network neighbor) would require the MCCM to alert the CMC (“headend” as discussed above) as soon as the problem was identified (“controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal”).

280. Even without the disclosure of the error threshold, a POSITA still would have found it obvious that such error reports or alarms (“network management messages”) could just as easily be generated at the MCCM and would also need to

be sent promptly (“controlling the transmission of network management messages back to said headend based on said measured characteristic of said received signal”) in order to be effective. A POSITA would understand that the purpose of the network monitoring features in Renken and the Renken Provisional are for detecting problems, and having the MCCM generate an error report or alarm is simply using the known features (measuring characteristics) in a predictable way (evaluating the characteristics) to achieve a desirable purpose (detecting problems). Whether this is done at the CMC, or at the MCCM, is simply selecting from two finite possibilities, either of which would have been obvious to a POSITA.

281. It is, therefore, my opinion that Renken renders obvious “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,” as claimed.

9.2.2. 9.1.2 Dependent Claim 2

- a. “The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.”**

282. It is my opinion that Renken discloses “[t]he method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds,” as recited in claim 2.

283. As discussed above in limitation [1H], Renken renders obvious detecting and reporting problems to the CMC based on measurement results at its location. Ex. 1011, 22:22-39, 22:67-23:4, 23:29-33; Ex. 1012, p. 4, 12-13, 15. A POSITA would have understood that making a determination that a problem exists based on a measurement result would require determining that the measurement result is abnormal (“outside of acceptable bounds”) and that reporting the problem to the CMC would obviously include identifying the abnormal measurement result.

284. Therefore, it is my opinion that Renken renders obvious “[t]he method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds,” as recited in claim 2.

9.2.3. Dependent Claim 3

a. “The method of claim 2, wherein said parameter is a modulation parameter of said received signal.”

285. It is my opinion that Renken discloses “[t]he method of claim 2, wherein said parameter is a modulation parameter of said received signal,” as recited.

286. Renken’s MCCM determines a modulation error ratio (MER) (“modulation parameter”) and, as discussed above in limitation [1H] and claim 2, a POSITA would have recognized that MER is a measurement result that the MCCM could determine is abnormal (e.g., by being too high) and thus that a problem exists to be reported to the CMC. Ex. 1011, 6:40, 12:4, 12:55-59, 17:16; Ex. 1012, pp. 4,

7, 14. A POSITA would have known that the MER is a “modulation parameter” at least because of its name – modulation error ratio – and as discussed above in Section 8.3, this was a well-known parameter for measuring signal quality in a quadrature amplitude modulated (QAM) digital signal. Both Renken and the Renken Provisional discuss QAM modulation for its digital channels, evidenced at least by the QAM demodulator found in the MCCM. Ex. 1011, 12:49-13:5; Ex. 1012, p. 7.

287. Therefore, it is my opinion that Renken discloses “[t]he method of claim 2, wherein said parameter is a modulation parameter of said received signal,” as claimed.

9.2.4. Dependent Claim 4

a. “The method of claim 2, wherein said parameter is a transmit power of said received signal.”

288. It is my opinion that Renken discloses “[t]he method of claim 2, wherein said parameter is a transmit power of said received signal.”

289. As an initial matter, I note that the ’826 Patent specification only mentions “transmit power” in one place – in discussing what a CMTS 114 may adjust. Ex. 1001, 3:4-15. There is no discussion in the specification of a “network management message” indicating that the “transmit power” is outside of acceptable bounds, as is required by claim 4 in view of claim 2. Nevertheless, it is my opinion that the claim 4 feature is shown by Renken.

290. Renken describes the MCCM measuring channel power and level of the received digital signal. Ex. 1011, 19:18-20:26, 20:27-51; Ex. 1012, pp. 3-4, 7, 14. A POSITA would have understood that channel level is indicative of the power level of the received signal, and Renken even uses the terms “level” and “signal power” interchangeably. Ex. 1011, 19:22-23. A POSITA would have understood that signal level of a received signal being too low is a known symptom of the transmit power of the signal (i.e. power at the transmitter) being outside of acceptable bounds, as it would indicate that the transmission power level of the signal was insufficient to reach the receiver with an acceptable signal level. As discussed above in limitation [1H] and claim 2, a POSITA would have recognized that measurement of the channel level as being too low is an indicator that the transmit power at the transmitter of the signal could be outside of acceptable bounds - a result that the MCCM would determine is abnormal and thus that a problem exists to be reported to the CMC.

291. Therefore, it is my opinion that Renken renders obvious “[t]he method of claim 2, wherein said parameter is a transmit power of said received signal,” as claimed.

9.2.5. Dependent Claim 5

- a. “The method of claim 2, wherein said parameter is a frequency offset of said received signal.”**

292. It is my opinion that Renken discloses “[t]he method of claim 2, wherein said parameter is a frequency offset of said received signal,” as claimed.

293. As an initial matter, I note that there is no description in the ’826 Patent of measuring frequency offset, or of a “network management message” that would indicate whether a “frequency offset” is outside of acceptable bounds, as is required by claim 5 in view of claim 2. Ex. 1001, 3:4-15. Instead, the ’826 Patent specification only mentions the “frequency offset” when describing what the CMTS may adjust. Ex. 1001, 3:11-15.

294. A POSITA would have found it obvious that in receiving and processing the signal, Renken would determine the frequency offset. Ex. 1011, 10:56-12:52; Ex. 1012, pp. 5-7. A POSITA would have understood that “frequency offset” was a known type of signal degradation.

295. To the extent is determined that Renken does not disclose said parameter is frequency offset, it is disclosed by Aggarwal. Aggarwal describes a system where a television receiver may measure whether the frequency offset is within an acceptable range in order to determine if a signal is available for reception. Ex. 1025, 2:32-47, 3:5-14, 4:53-5:14.

296. A POSITA would have been motivated to apply Aggarwal's teaching of monitoring frequency offset to the system of Renken because it would improve the ability of Renken to monitor signal quality and diagnose problems with the cable plant. Ex. 1011, 4:44-5:21; Ex. 1012, pp. 3-4, 15. A POSITA would have supplemented Renken's monitoring capabilities with Aggarwal's monitoring of frequency offset because it would provide enhanced capabilities.

297. Combining Aggarwal with Renken would be merely using known techniques (monitoring frequency offset) to improve similar devices (devices with signal quality monitoring capability) to yield a predictable result (a device capable of monitoring additional signal quality parameters). A POSITA would have had the skill to implement Aggarwal's teachings in the system of Renken because implementing monitoring of additional signal quality characteristics (Aggarwal's frequency offset monitoring) would merely require similar programming of Renken's MCCM processor and measurement program to do what it already does – gather measurements. A POSITA would thus have been able to implement Aggarwal's monitoring into Renken's MCCM. A POSITA would thus have been able to implement Aggarwal's monitoring into Renken's MCCM without undue experimentation.

298. As discussed above in limitation [1H] and claim 2, a POSITA would have recognized that measurement of the frequency offset as being outside of

acceptable bounds is a result that the MCCM would determine indicates a problem exists to be reported to the CMC. Accordingly, Renken and Renken-Aggarwal render obvious the limitations of claim 5.

9.2.6. Dependent Claim 6

- a. “The method of claim 1, wherein said characteristic is signal power vs. frequency.”**

299. It is my opinion that Renken discloses “[t]he method of claim 1, wherein said characteristic is signal power vs. frequency,” as claimed.

300. Renken describes that its measurements include in-channel frequency response which a POSITA would have recognized as a measurement of signal power vs. frequency. Ex. 1011, 12:53-58; Ex. 1012, p. 7. The IEEE defines “frequency-response characteristic”, for signal transmissions, as “[t]he frequency-dependent relation, in both gain and phase difference, between steady-state sinusoidal outputs.” Ex. 1023, p. 4. The “frequency-dependent” aspect shows that it is “vs. frequency,” and the “gain” would be understood to refer to signal power.

301. Also, as discussed above with respect to claim 4, Renken describes the MCCM measuring channel level (“signal power”) and those measurements are made on a channel-by-channel basis and a POSITA would have understood each channel to have its own frequency. Ex. 1011, 19:21-20:26, 20:27-51; Ex. 1012, pp. 3-4, 7, 14. As discussed above in limitation [1H] and claim 2, a POSITA would have recognized that measurement of the signal power as being outside of acceptable

bounds within a channel or for a channel (“frequency”) is a result that the MCCM would determine indicates a problem exists to be reported to the CMC.

302. Therefore, it is my opinion that Renken discloses “[t]he method of claim 1, wherein said characteristic is signal power vs. frequency,” as claimed.

9.2.7. Dependent Claim 7

a. “The method of claim 1, wherein said characteristics is signal phase vs. frequency.”

303. It is my opinion that Renken discloses “[t]he method of claim 1, wherein said characteristics is signal phase vs. frequency,” as claimed.

304. As explained in dependent claim 6, Renken measures frequency response. Ex. 1011, 12:53-58; Ex. 1012, p. 7. A POSITA understands that frequency response indicates both the magnitude and phase of a signal vs. frequency. As discussed above, the IEEE defines “frequency-response characteristic”, for signal transmissions, as “[t]he frequency-dependent relation, in both gain and phase difference, between steady-state sinusoidal outputs.” Ex. 1023, p. 4. The “frequency-dependent” aspect shows that it is “vs. frequency,” and the “phase” would be understood to refer to signal phase. Renken also discloses that its channel measurements can include MER. Ex. 1011, 12:1-5, 17:8-25; Ex. 1012, pp. 4, 7, 14. A POSITA would understand that MER is a value that is based on in-phase (I) and quadrature (Q) components of a QAM signal, and indicates phase noise. See, e.g., discussion of QAM and MER above in Section 8.3. The MER measurements, taken

for different channels having different frequencies, would be another example of “signal phase v. frequency.”

305. As discussed above in limitation [1H] and claim 2, a POSITA would have recognized that measurement of the signal phase as being outside of acceptable bounds for a channel (“frequency”) is a result that the MCCM would determine indicates a problem exists to be reported to the CMC.

306. Therefore, it is my opinion that Renken discloses “[t]he method of claim 1, wherein said characteristics is signal phase vs. frequency,” as claimed.

9.2.8. Dependent Claim 8

- a. “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.”**

307. It is my opinion that Renken discloses “[t]he 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,” as claimed.

308. Renken describes the MCCM measuring Bit Error Rate (BER) and Signal-to-Noise ratio (SNR) of the digital signal. Ex. 1011, 3:12-20, 13:6-15, 16:17-17:17; Ex. 1012, pp. 4, 7, 14. As discussed above in limitation [1H], a POSITA would have recognized that measurement of SNR as being too low or BER as being too high is a result that the MCCM would determine indicates a problem exists to be reported to the CMC.

309. Therefore, is my opinion that Renken discloses “[t]he 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,” as claimed.

9.2.9. Dependent Claim 9

- a. “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.”**

310. It is my opinion that Renken discloses “[t]he 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,” as claimed.

311. The '826 Patent describes this configuring as simply using control signals to configure a channelizer to select a desired band by specifying the band's center frequency. Ex. 1001, 6:25-35. As discussed in the prior discussion of claim 9, this language simply describes selecting a channel by selecting a center frequency and/or bandwidth, as described in the '826 Patent. A POSITA would have understood that channels are selected specifying their center frequency as is discussed by Renken. Ex. 1011, 12:22-34, 13:48-57, 14:59-64, 18:18-38, 19:24-29; Ex. 1012, pp. 6-7.

312. Therefore, it is my opinion that Renken discloses “[t]he 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,” as claimed.

9.2.10. Independent Claim 10

313. It is my opinion that claim 10 appears to be a system claim counterpart to method claim 1, and its various elements are mapped below.

a. [10A]: “A system comprising:”

314. It is my opinion that the elements of the claim 10 system are rendered obvious by Renken as discussed below.

b. [10B]: “a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:”

315. It is my opinion that Renken discloses “a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:” as claimed.

316. The “receiver” reads on Renken’s MCCM 100, performing as discussed above regarding limitation [1B].

c. [10C]: “front-end circuitry operable to: receive a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels; and digitize said received signal to generate a digitized signal;”

317. It is my opinion that Renken renders obvious “front-end circuitry operable to: receive a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels; and digitize said received signal to generate a digitized signal;” as claimed.

318. The “receive” and “digitize” limitations are shown by Renken as discussed above regarding limitations [1C] and [1D], and the “front-end circuitry” reads on the wideband tuner 26 and ADC 25, configured to perform those operations.

d. [10D]: “channelizer circuitry operable to: select a first portion of said digitized signal; and select a second portion of said digitized signal;”

319. It is my opinion that Renken renders obvious “channelizer circuitry operable to: select a first portion of said digitized signal; and select a second portion of said digitized signal;” as claimed.

320. The “select” limitation is shown by Renken as discussed above regarding limitation [1E], and the “channelizer circuitry” reads on the DDC 22, configured to perform those operations.

e. [10E]: “processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;”

321. It is my opinion that Renken renders obvious “processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;” as claimed.

322. The “process” limitation is shown by Renken as discussed above regarding limitation [1F], and the “processing circuitry” reads on the MPEG/DOCSIS decoder 24, as discussed above regarding limitation [1F].

- f. [10F]: “monitoring circuitry operable to: analyze said selected first portion of said digitized signal to measure a characteristic of said received signal; and control 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.”**

323. It is my opinion that Renken renders obvious “monitoring circuitry operable to: analyze said selected first portion of said digitized signal to measure a characteristic of said received signal; and control 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” as claimed.

324. The “analyze” limitation is shown by Renken as discussed above regarding limitation [1G], and the “control the transmission” limitation is shown as discussed above regarding limitation [1H]. The “monitoring circuitry” reads on the processor, which executes the measurement program to cause the MCCM to perform the operations discussed above. Ex. 1011, 9:61-10:48; Ex. 1012, pp. 5-6.

9.2.11. Dependent Claim 11

- a. “The system of claim 10, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.”**

325. It is my opinion that Renken renders obvious the limitations of claim 11 as discussed above regarding claim 2.

9.2.12. Dependent Claim 12

- a. “The system of claim 11, wherein said parameter is a modulation parameter of said received signal.”**

326. It is my opinion that Renken renders obvious the limitations of claim 12 as discussed above regarding claim 3.

9.2.13. Dependent Claim 13

- a. “The system of claim 11, wherein said parameter is a transmit power of said received signal.”**

327. It is my opinion that Renken renders obvious the limitations of claim 13 as discussed above regarding claim 4.

9.2.14. Dependent Claim 14

- a. “The system of claim 11, wherein said parameter is a frequency offset of said received signal.”**

328. It is my opinion that Renken and Renken in view of Aggarwal renders obvious the limitations of claim 14 as discussed above regarding claim 5.

9.2.15. Dependent Claim 15

- a. “The method of claim 1, wherein said characteristic is signal power vs. frequency.”**

329. It is my opinion that Renken renders obvious the limitations of claim 15 as discussed above regarding claim 6.

9.2.16. Dependent Claim 16

- a. “The method of claim 1, wherein said characteristics is signal phase vs. frequency.”**

330. It is my opinion that Renken renders obvious the limitations of claim 16 as discussed above regarding claim 7.

9.2.17. Dependent Claim 17

- a. “The system of claim 10, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.”**

331. It is my opinion that Renken renders obvious the limitations of claim 17 as discussed above regarding claim 8.

9.2.18. Dependent Claim 18

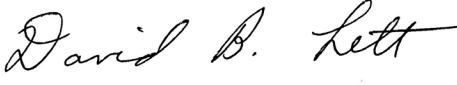
- a. “The system of claim 10, comprising configuring, by said monitoring circuitry during operation of said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.”**

332. It is my opinion that Renken renders obvious the limitations of claim 18 as discussed above regarding claim 9.

10. CONCLUSION

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

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

Dated: 2/15/2024 By: 
David B. Lett

CLAIM LISTING APPENDIX

U.S. Pat. No. 9,825,826

Designation	Claim Language
Claim 1	
[1A]	1. A method comprising:
[1B]	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:
[1C]	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;
[1D]	digitizing said received signal to generate a digitized signal;
[1E]	selecting a first portion of said digitized signal; selecting a second portion of said digitized signal;
[1F]	processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;
[1G]	analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and
[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.
Claim 2	
2	2. The method of claim 1, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.
Claim 3	
3	3. The method of claim 2, wherein said parameter is a modulation parameter of said received signal.
Claim 4	
4	4. The method of claim 2, wherein said parameter is a transmit power of said received signal.
Claim 5	
5	5. The method of claim 2, wherein said parameter is a frequency offset of said received signal.
Claim 6	

Designation	Claim Language
6	6. The method of claim 1, wherein said characteristic is signal power vs. frequency.
Claim 7	
7	7. The method of claim 1, wherein said characteristics is signal phase vs. frequency.
Claim 8	
8	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.
Claim 9	
9	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.
Claim 10	
[10A]	10. A system comprising:
[10B]	a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:
[10C]	front-end circuitry operable to: receive a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels; and digitize said received signal to generate a digitized signal;
[10D]	channelizer circuitry operable to: select a first portion of said digitized signal; and select a second portion of said digitized signal;
[10E]	processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;
[10F]	monitoring circuitry operable to: analyze said selected first portion of said digitized signal to measure a characteristic of said received signal; and control 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.
Claim 11	

Designation	Claim Language
11	11. The system of claim 10, wherein said network management messages indicate whether a parameter is outside of acceptable bounds.
Claim 12	
12	12. The system of claim 11, wherein said parameter is a modulation parameter of said received signal.
Claim 13	
13	13. The system of claim 11, wherein said parameter is a transmit power of said received signal.
Claim 14	
14	14. The system of claim 11, wherein said parameter is a frequency offset of said received signal.
Claim 15	
15	15. The method of claim 1, wherein said characteristic is signal power vs. frequency.
Claim 16	
16	16. The method of claim 1, wherein said characteristics is signal phase vs. frequency.
Claim 17	
17	17. The system of claim 10, wherein said characteristic is one of: signal-to-noise ratio, peak-to-average ratio, noise levels, bit error rate, and symbol error rate.
Claim 18	
18	18. The system of claim 10, comprising configuring, by said monitoring circuitry during operation of said one or more circuits, a bandwidth and/or center frequency of said selected first portion of said digitized signal.