

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case No.: IPR2024-00442
Patent No. 9,825,826
(Claims 1-18)

Before JON M. JURGOVAN, SCOTT B. HOWARD, AND AARON W. MOORE,
Administrative Patent Judges.

Petitioner's Demonstrative Exhibit

Overview of the '826 Patent

1. A method comprising:
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:

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;

digitizing said received signal to generate a digitized signal;

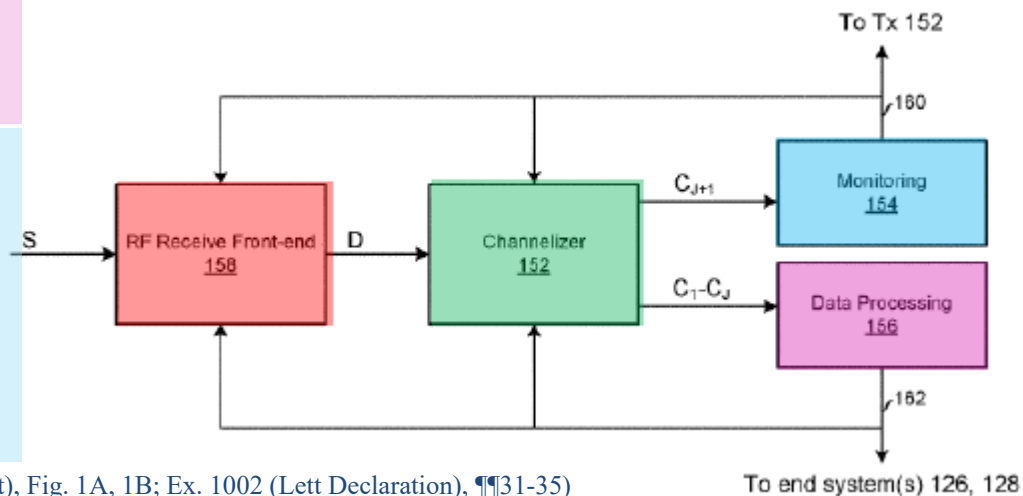
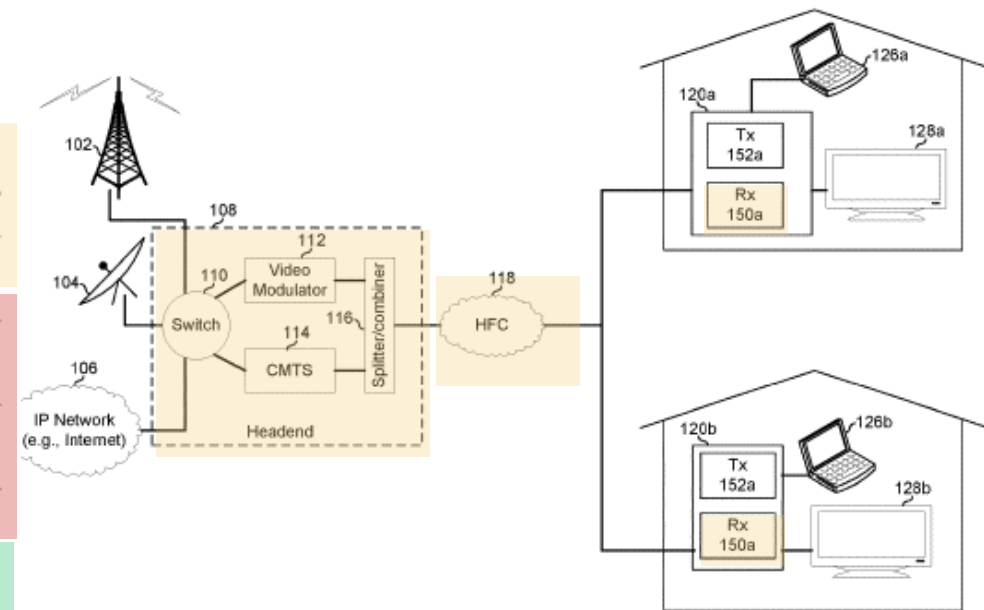
selecting a first portion of said digitized signal;

selecting a second portion of said digitized signal;

processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

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.



(Pet., pp. 2-4; Ex. 1001 ('826 Patent), Fig. 1A, 1B; Ex. 1002 (Lett Declaration), ¶¶31-35)

Grounds of Invalidity

PO Argues:

- 1) Improper Combination
- 2) Failure of Proof/Bodily Incorporation
- 3) Lack of Digital Monitoring

PO Argues:

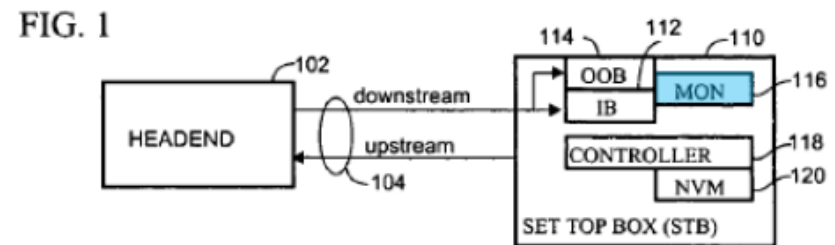
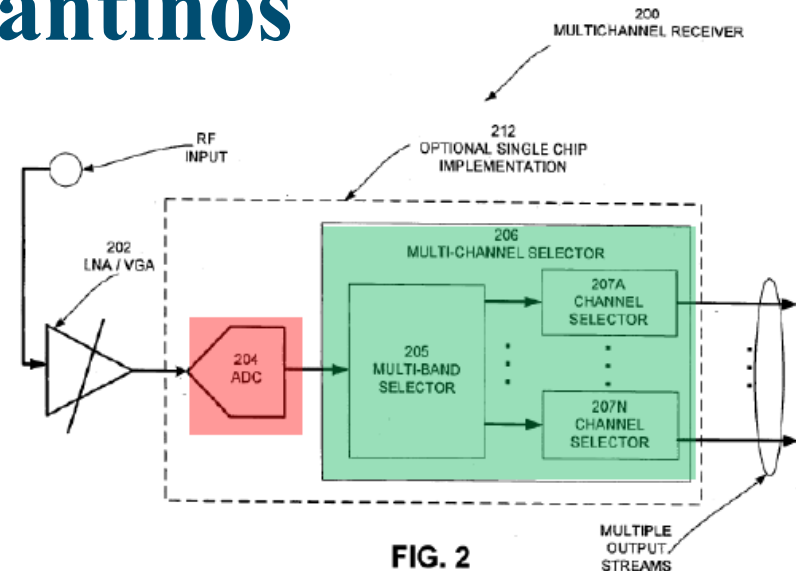
- 1) No Network Management Messages

Ground	Challenged Claims	35 U.S.C. § ³	Reference(s)
A	1–18	103(a)	Kamieniecki, Konstantinos
B	3, 12	103(a)	Kamieniecki, Konstantinos, Sadja
C	5, 14	103(a)	Kamieniecki, Konstantinos, Aggarwal
D	7, 16	103(a)	Kamieniecki, Konstantinos, Salinger
E	1–18	103(a)	Renken
F	5, 14	103(a)	Renken, Aggarwal

(ID, p. 9; Pet., p. 22; POR, pp. 1-49; Sur-reply, pp. 1-23.)

Overview of Grounds A-D: Kamieniecki + Konstantinos

1. A method comprising:
 - 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:
 - 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;
 - digitizing said received signal to generate a digitized signal;
 - selecting a first portion of said digitized signal;
 - selecting a second portion of said digitized signal;
 - processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;
 - analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and
 - 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.



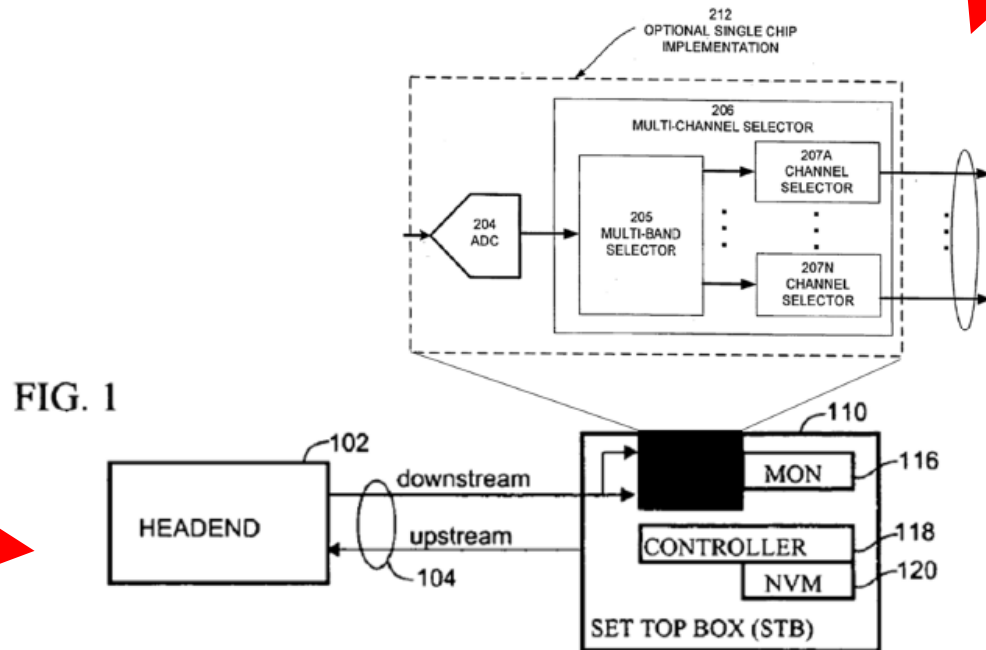
Ex. 1009, Fig. 1 (annotated)

(Pet., pp. 9, 12, 27-40; POR, p. 17; Ex. 1009 (Kamieniecki), Fig. 1; Ex. 1010 (Konstantinos), Fig. 2)

Overview of Grounds A-D: Kamieniecki + Konstantinos

Kamieniecki's
STB

Konstantinos' Multi-
Channel Receiver

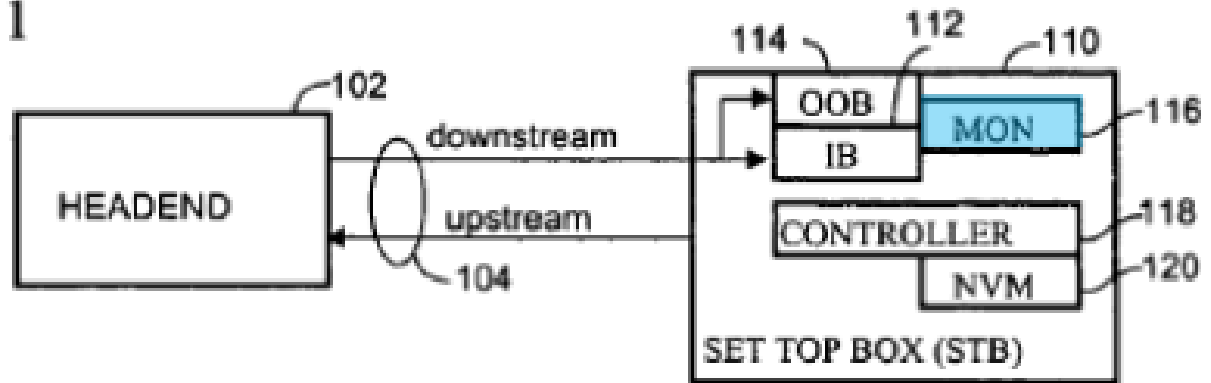


(Pet., pp. 9, 12, 27-40; POR, p. 17; Ex. 1009 (Kamieniecki), Fig. 1; Ex. 1010 (Konstantinos), Fig. 2)

Grounds A-D - Kamieniecki

Title – “Monitoring
Signal Quality on a
Cable Network”

FIG. 1



(Pet., pp. 8-10; Ex. 1009 (Kamieniecki), Fig. 1)

[0016] The invention therefore provides a method to allow a set-top box (STB) to collect statistics on plant health by monitoring the forward (downstream) and reverse (upstream, return path) transport cable signals, and reporting this information back to the cable headend.

(Pet., p. 9; Ex. 1009 (Kamieniecki), ¶[0016])

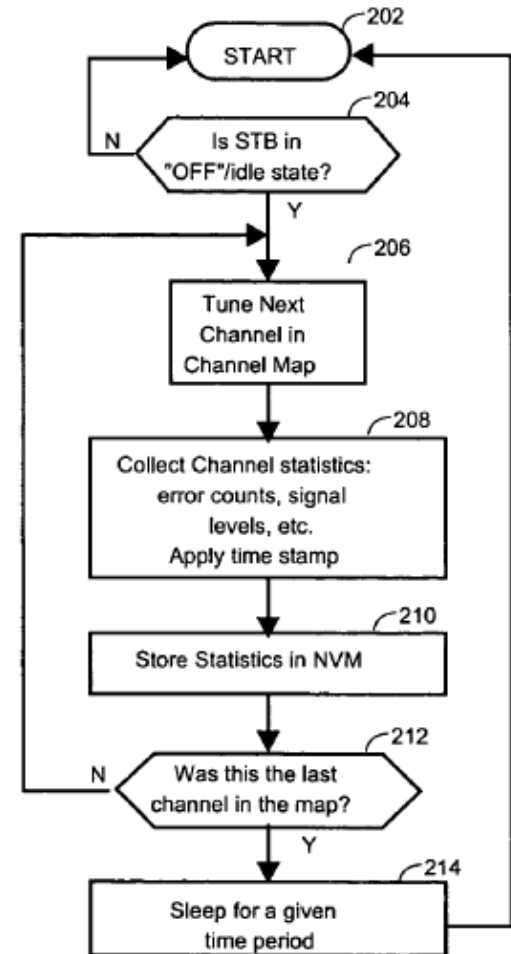
headend 102. The set-top box 110 has more than one tuner (112, 114) so that it can receive out-of-band (OOB) communications simultaneously with in-band (IB) communications. This means that subscribers can be tuned to a channel receiving audio and video content while, at the same time, the STB 110 is receiving instructions in an OOB channel.

(Pet., p. 9; Ex. 1009 (Kamieniecki), ¶[0013])

Kamieniecki Broadly Teaches Monitoring

[0017] The monitoring feature can operate automatically in the background so as not to disturb any viewer experiences; i.e., when the STB is turned “off” and in an idle state. The STB will collect statistics on plant health, as indicated by signal quality, on a channel-by-channel basis. It is within the scope of the invention that fewer than all of the channels are monitored. (The channel map can indicate which chan-

FIG. 2



[0027] For example, in systems where the network has not been upgraded to support a cable return path, a telephone modem may be included in the set-top box for sending signal quality reports from the STB to the headend. Moreover, the STB could monitor only one channel, such as the OOB channel, without tuning through the channel map.

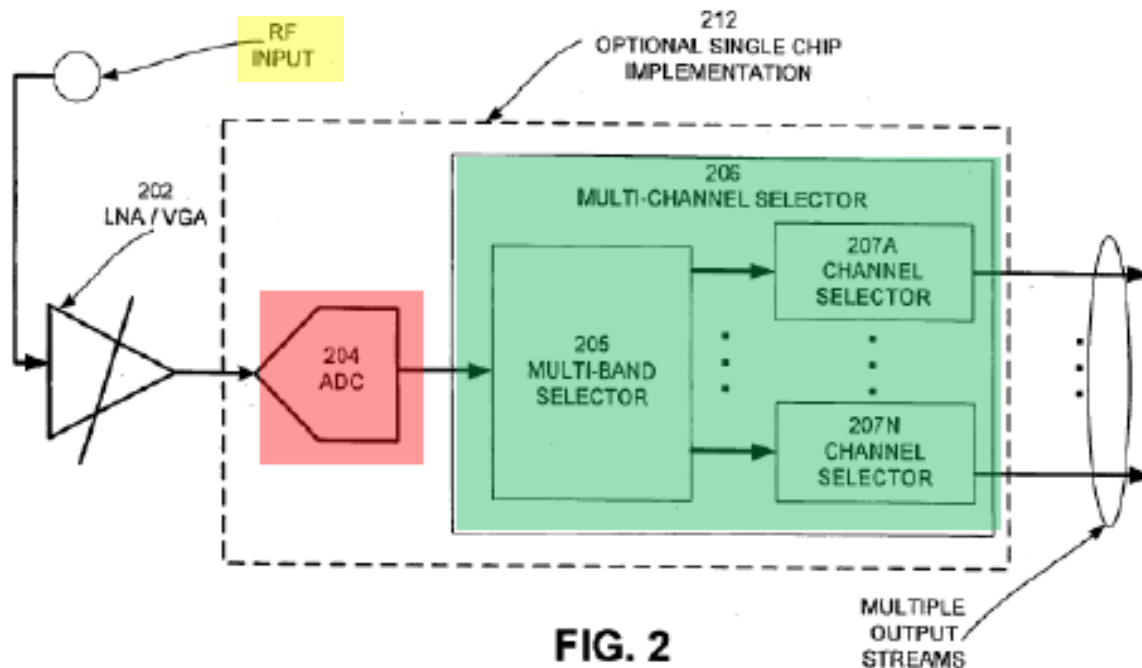
(Pet., pp. 9-10, 36-37; Ex. 1009 (Kamieniecki), ¶¶[0017], [0027], Fig. 2; Ex. 1002 (Lett Declaration), ¶73)

Kamieniecki Broadly Teaches Monitoring

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.

(Ex. 1002 (Lett Declaration), ¶73; Pet., pp. 10, 9, 36-37)

Konstantinos' Multi-Channel Receiver



[0106] The next step, after the reception and channel selection of multiple channels, is the channel decoding process. This is accomplished with a multi-channel baseband processor (not illustrated). For example, a multi-channel channel decoder **208** processes 16 TV streams simultaneously and delivers 16 transport streams for video. These can be further processed with channel and source decoders.

(Pet., pp. 11-13; Ex. 1010 (Konstantinos), Fig. 2; Ex. 1002 (Lett Declaration), ¶¶81-82)

Konstantinos Provides the Motivation to Improve Kamieniecki's STB

[0001] Current television receivers receive a single channel through a single tuner. The evolving market for data and programming services will demand that receivers have the capability of multi-channel tuning.

(Pet., pp. 11, 27-30; Ex. 1010 (Konstantinos), [0001]; Ex. 1002 (Lett Declaration), ¶¶127-129)

[0011] In August of 2006, Cable Labs, Inc. issued “Data Over Cable Service Interface Specification (DOCSIS) 3.0.” DOCSIS 3.0 data reception and channel binding, both of which require the simultaneous reception of at least 4 channels placed not further than 60 MHz apart from each other. The block tuner described above enables DOCSIS 3.0, but does not enable unrestricted multi-channel functionality. For example, the simultaneously received number of channels is small and there is no freedom from a user’s perspective to select (or combine together for faster data reception) many/any channels freely out of the full cable TV band. The latter usually consist of up to 100 channels between 50-1000 MHz.

(Pet., pp. 11, 27-30; Ex. 1010, ¶[0011]; Ex. 1002, ¶¶78-80)

Konstantinos Provides the Motivation to Improve Kamieniecki's STB

[0006] Existing receiver architectures based on the concept shown in FIG. 1 are not able to satisfy properly the need for multi-channel reception. The conventional approach would be to use many single channel tuners in parallel connected to the same input signal source to make a multi-channel tuner. This approach, however, faces major limitations related to complexity of system implementation, signal quality, and cost effectiveness. As the number of simultaneously required streams/channels goes beyond two, the conventional approach becomes completely impractical.

[0016] What is needed, therefore, is a single IC receiver able to provide unrestricted multi-channel functionality.

(Pet., pp. 11, 27-30; Ex. 1010 (Konstantinos), ¶¶ [0006], [0011], [0016]; Ex. 1002 (Lett Declaration), ¶¶ 78-80)

Konstantinos Helps Kamieniecki's STB Perform Better

- Unlimited Multi-Channel Functionality Means STB Can Receive Many Channels at Once (Pet., pp. 27-30; Ex. 1002 (Lett Declaration), ¶¶130-31, 149-50)
- Better Monitoring
 - No Longer Limited to Only Monitoring IB Channels During Idle Periods
 - Monitor Even During Heavy Usage (Pet., pp. 36-37; Ex. 1002 (Lett Declaration), ¶ 159)
- Better STB Performance
 - Simultaneously Receiving Multiple Channels Leads to Faster Channel Switching (Pet., pp. 28-29, Ex. 1002 (Lett Declaration), ¶149)

PO's Shotgun Approach to the Combination

- PO Improperly Limits the Obviousness Analysis to Only a “Physical Substitution” (POR, pp. 40-41)
- PO Argues Technical Difficulties that are Not Difficult to a POSITA (POR, pp. 18-25)
- PO Argues that, Despite the Market Demand, a POSITA Would Have Preferred to Keep Kamieniecki's STB “Basic” (POR, pp. 27-28)
- PO Argues that a Disadvantage of Kamieniecki's STB was a “Fundamental Principle” too Cherished to Alter (POR, pp. 29-33)
- PO Argues a “1:1 Ratio” Ignoring Konstantinos' Teachings (POR, pp. 32-33)
- PO Argues that Kamieniecki Already Had Multi-Channel Tuning (POR, pp. 31-32)
- PO Argues the Combination Loses the OOB Channel (POR, pp. 33-35)

Combination Not Limited to Physical Substitution

Combining Konstantinos with Kamieniecki also would be merely using known **techniques** (a multi-channel digital receiver) to improve similar devices (Kamieniecki's STB having multiple TV tuners) to yield a predictable result (converting a received RF signal into multiple digital outputs). Ex. 1002, ¶ 151. A POSITA had the skill to implement Konstantinos' **teachings** with Kamieniecki because Kamieniecki's IB and OOB tuners use the same inputs (an RF signal) and same outputs (digital signal of the desired channel) as those of Konstantinos' multi-channel receiver and the POSITA would be familiar with the design of RF receivers.

(Pet., pp. 29, 27-30)

Patent Owner Raises Technical Difficulties

Konstantinos Addresses the Technical Issues Using the Same Approach as the '826 Patent, For example, Both Use “Interleaved” ADCs, which Konstantinos Credits for its Power Savings

[0061] The partitioned architecture of ADC 204 results in relaxed bandwidth limitations of the associated front-end circuitry compared to standard Time Interleaved ADC and reduces substantially the complexity of corrections associated with timing errors (dominant limitation at high speeds). It also improves significantly on power consumption efficiency because the architecture of ADC 204 allows the use of ADC units to be interleaved that are not pushed at extremes of speed and power consumption as in the standard design. This comes without penalties on speed and timing error correction complexity that typically associate with the use of many ADC units in parallel.

[0104] First, the original high rate signal is translated into a set of sub-signals (equivalently, the sub-bands A . . . H in FIG. 3) that contain all of the TV channels of the original signal in a parallel format. Therefore no information loss takes place: for example, one signal at a rate of 2 GS/sec containing 100 6 MHz-wide TV channels between 50-1000 MHz is translated into 8 signals each containing a portion of 125 MHz of the original and running at 250 MS/sec. This translation reduces the signal rates substantially, with overall benefits in power consumption, reduced interference, etc.

Konstantinos

'826 Patent

In an example embodiment, the ADC may be as described in U.S. patent application Ser. No. 13/485,003 entitled “Multi-layer Time-Interleaved Analog-to-Digital Converter (ADC),” which is incorporated by reference herein, as set forth above.

(Reply, pp. 2-4; Ex. 1001 ('826 Patent) c6:2-6; Ex. 1010 (Konstantinos), ¶¶[0061], [0104]; Ex. 1032 (Lett Reply Declaration), ¶¶[8-9])

PO Argues Kamieniecki is a “Basic” STB, While Multi-Channel Tuning is Reserved for “Advanced” STBs

(POR, p. 27)

- PO Ignores Konstantinos’ Express Teaching of the Evolving Market Demand:

[0001] Current television receivers receive a single channel through a single tuner. The evolving market for data and programming services will demand that receivers have the capability of multi-channel tuning.

[0016] What is needed, therefore, is a single IC receiver able to provide unrestricted multi-channel functionality.

- Even if SOME Users Preferred the “Basic” STB, Others Would be Part of the Evolving Market

(Pet., pp. 11-13, 27-30; Ex. 1010 (Konstantinos), ¶¶[0001], [0016]; Reply, p. 8; Ex. 1032 (Lett Reply Declaration), ¶¶5-6)

PO Argues that Konstantinos Requires a “1:1 Ratio” of Selectors to Decoders

(POR, pp. 32-33)

- PO is Wrong.
 - Konstantinos Does not Require a Decoder for Every Selector
 - Far from Being a Required “Ratio,” Konstantinos Actually Says Channels “May” be Decoded:

207N. Depending on the number of channel selectors that are implemented in multi-channel selector 206 will determine the number of output streams that will be available. In an embodiment, each output stream represents a channel that **may** be further processed by a decoder (not illustrated). In an embodi-

(Ex. 1010 (Konstantinos), ¶[0043]; Reply, pp. 10-11; Ex. 1032 (Lett Reply Declaration), ¶7)

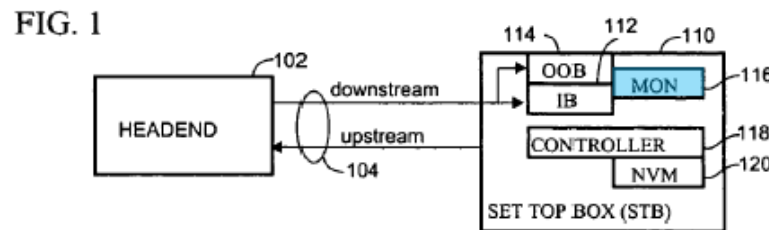
PO Argues that Kamieniecki Already had 2 Tuners (1 IB and 1 OOB), Allowing Simultaneously Monitoring OOB and Tuning to an IB Channel

(POR, p. 30)

- Kamieniecki's Single-Channel IB Tuner Can Only Tune One IB Channel at a Time

(Pet., p. 36; Ex. 1009 (Kamieniecki), [0015, 17]; Ex. 1002 (Lett Declaration), ¶ 159; Reply, pp. 9-10; Ex. 2013 (Russ Declaration), ¶84)

- The Konstantinos Multi-Channel Receiver Allows Monitoring IB Channel While Watching TV



Ex. 1009, Fig. 1 (annotated)

(Pet., pp. 9, 27-30, 36-37; Ex. 1002 (Lett Declaration), ¶¶158-60; Reply, p. 10; Ex. 1009 (Kamieniecki), Fig. 1 (annotated))

Patent Owner Argues a Strawman of a Combination that Deletes OOB Functionality

(POR, pp. 33-35)

- This Misstates the Combination

PO then argues that the combination would render Kamieniecki “inoperable,” based on an incorrect assumption that the modification would lose all functionality of the OOB channel due to “removal of the OOB tuner.” POR 33-35. The combination does not lose this OOB functionality – it simply uses the Konstantinos receiver to receive the OOB data previously received by Kamieniecki’s OOB tuner. (Reply, p. 11)

Pet. 28-30.

2. Overview of Combination

(Pet., p. 27)

The Kamieniecki-Konstantinos combination replaces the IB and OOB tuners in Kamieniecki’s STB with Konstantinos’ multi-channel receiver. This is a natural evolution of television technology specifically taught by Konstantinos. Ex. 1002,

(Reply, p. 11; Pet., pp. 27-30; Ex. 1002 (Lett Declaration), ¶¶ 127-32; Ex. 1032 (Lett Reply declaration), ¶10)

- PO’s Sur-Reply Statement that this was Unrebutted is Incorrect
 - This is Explained by Mr. Lett in His Declaration para. 131, His Reply Declaration para. 10, and the Reply pp. 5-6

(Sur-reply, pp. 14-15; Reply, pp. 5-6; Ex. 1002 (Lett Declaration), ¶131; Ex. 1032 (Lett Reply Declaration), ¶10)

PO Argues that [1F] is Not Met

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

(POR, pp. 39-42; Ex. 1001 (‘826 Patent), cl. 1)

- EACH of Kamieniecki and Konstantinos Shows Recovering Content from a Channel ...

(Pet., pp. 37-38; Ex. 1002 (Lett Declaration), ¶¶162-66)

headend 102. The set-top box 110 has more than one tuner (112, 114) so that it can receive out-of-band (OOB) communications simultaneously with in-band (IB) communications. This 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.

← Kamieniecki

(Ex. 1009 (Kamieniecki), ¶[0013])

Konstantinos →

[0030] In still another embodiment, the multi-channel receiver further comprising one more channel decoders, wherein a channel decoder receives a channel signal from the channel selector. In yet another embodiment, the multi-channel receiver further comprising one or more source decoders, wherein a source decoder receives an output from a channel decoder.

(Ex. 1010 (Konstantinos), ¶ [0030])

PO Argues that Limitation [1G] is not Met

- [1G] “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal”

(POR, pp. 36-39; Ex. 1001 ('826 Patent), cl. 1)

- PO argues Kamieniecki's Monitor would ONLY Monitor ANALOG signals

(POR, pp. 12-13)

- But Kamieniecki's **STB Can Receive Analog or DIGITAL Channels**

[0004] A basic set-top box (STB) includes a single, in-band (IB), tuner. The in-band tuner receives, e.g., MPEG-2 transport streams. These can include tables based upon standards such as the digital video broadcast (DVB) standard or the Advanced Television Systems Committee (ATSC) standard. Such a basic set-top box can receive analog or digital transmissions, on in-band (IB) channels, but cannot use the cable return path. A second tuner can be included in the STB if use of the cable return path is desired, or where out-of-band (OOB) channels will be used for communications between the headend and the set-top box.

(Ex. 1009 (Kamieniecki), ¶ [0004]); Reply, pp. 12-13; Ex. 1032 (Lett Reply Declaration), ¶18)

- PO's Expert Admits In Order to Receive MPEG-2, There Would Have to be an Analog-to-Digital Converter

15

There would have to be

16

analog-to-digital conversion in there

17

somewhere.

(Reply, p. 13; Ex. 1033 (Russ Deposition), 32:3-17; Ex. 2013 (Russ Declaration), ¶62)

Kamieniecki Teaches Monitoring Broadly

[0018] The monitoring feature can be activated any time the STB is in an idle state and not being used. In order to provide plant health monitoring, the STB can provide three main monitoring functions.

[0019] monitoring of errors/dropouts on the OOB control channel;

[0020] monitoring of errors/dropouts on the forward/downstream transport channel (mainly consisting of video services);

[0021] verification of return path health by transmission of ack/nack or “ping” messages from the STB to the headend and back

(Pet., p. 10, 30, 39, 41, 47; Ex. 1009 (Kamieniecki), ¶¶[0018-21])

PO Argued that Features of Dependent Claims 6 and 15 are Not Met Based on the ID

(POR, p. 42)

The Institution Decision Found:

We do not agree that reporting “channel presence/absence” or “signal level estimates” to the headend is equivalent to reporting “signal power vs. frequency.” Although “channel presence/absence” may reflect whether signal level is “outside of acceptable bounds” it is not per se “signal power vs. frequency.” Petitioner does not show a reasonable likelihood that claims 6 and 15 would have been obvious.

(‘826 Patent), cls. 1, 6, 15)

analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and
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.

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

15. The method of claim 1, wherein said characteristic is signal power vs. frequency.

But:

- Claim 6 Does Not Require Reporting “Signal Power v. Frequency” to the Headend.
- Claim 6 Only Requires Controlling the Message’s Transmission Based on the “Signal Power v. Frequency,” and the Message is “Different Than” the “Signal Power v. Frequency”
- The Petition states that the “Characteristic” is Signal Level (Power) for Each Channel/Frequency
- The Petition states that the “Message” is the Channel Presence/Absence for Each Channel/Frequency, and Channel Presence/Absence is Different from Signal Level (Power)

(Pet., pp. 46-47, 57; ID, p. 34; Ex. 1002 (Lett Declaration), ¶¶ 198-199, 234; Ex. 1009 (Kamieniecki), ¶[0007]; Reply, pp. 17-18; (Ex. 1001 (‘826 Patent), cls. 1, 6, 15)

Grounds E and F

E	Renken	§ 103	1-18
F	Renken in view of Aggarwal	§ 103	5, 14

PO Argues Renken Lacks “Network Management Messages”

(Pet., p. 22; POR, pp. 44-49)

Renken (Grounds E-F)

- “Cable Modem for Network Measurements”

The invention relates to measurement-capable cable modems for cable networks. Idle receivers and transmitters of a cable modem are used to perform upstream and downstream measurements on DOCSIS and non-DOCSIS digital and analog TV channels without disrupting customer services.

(Ex. 1011 (Renken), Abstract)

- Renken incorporates by reference U.S. Provisional Application 61/444,611 (“Renken Provisional” Ex. 1012).

(Pet., p. 13; Ex. 1011 (Renken), 1:7-10; POR, pp. 42-49)

Renken

'826 Patent:

1. A method comprising:
 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:
 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;
 digitizing said received signal to generate a digitized signal;
 selecting a first portion of said digitized signal;
 selecting a second portion of said digitized signal;
 processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;
 analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and
 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.

(Ex. 1001 ('826 Patent), cl. 1)

Measurement-Capable Cable Modems (MCCM)

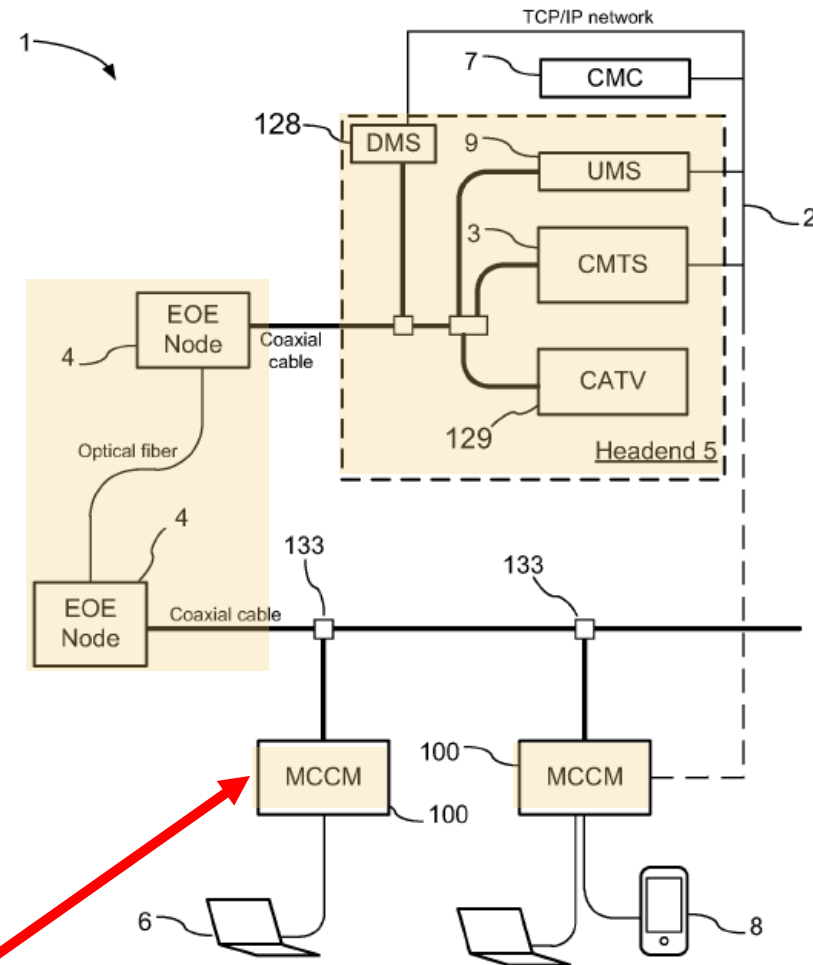


Fig. 1

(Ex. 1011 (Renken), Fig. 1; Pet., p. 59; Ex. 1002, ¶¶241-251)

Renken

1. A method comprising:

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:

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;

digitizing said received signal to generate a digitized signal;

selecting a first portion of said digitized signal;

selecting a second portion of said digitized signal;

processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

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.

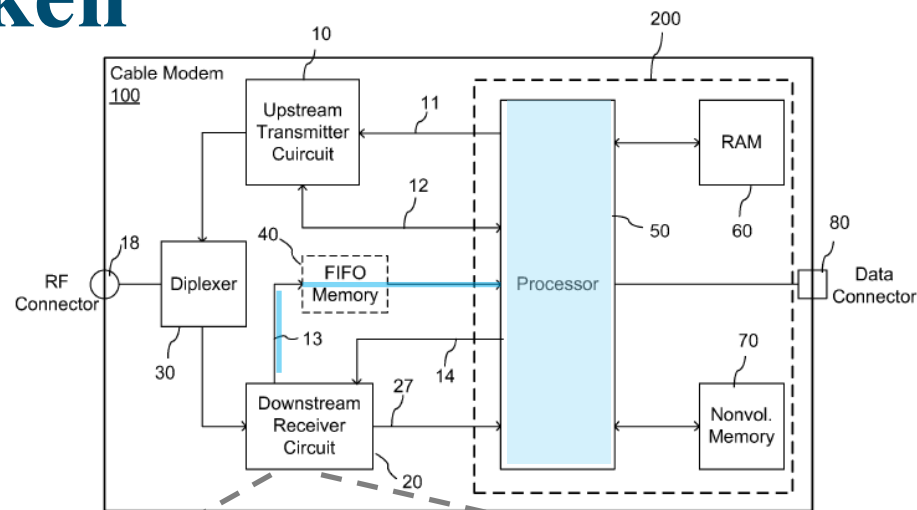


Fig. 2

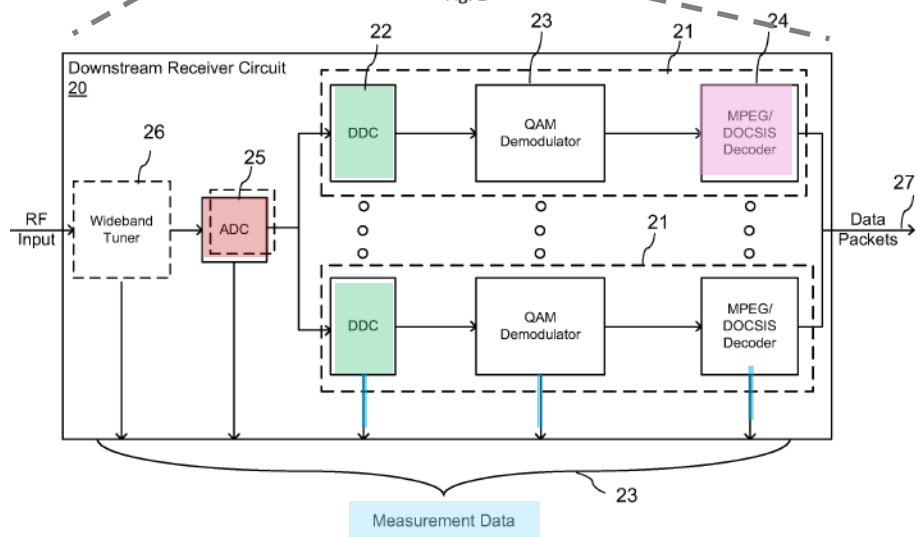


Fig. 3

(Ex. 1001 ('826 Patent), cl. 1)

(Ex. 1011 (Renken), Figs. 2-3; Pet., pp. 59-67; Ex. 1002 (Lett Declaration), ¶¶238-332)

Renken

Renken Provisional (Ex. 1012):

1. A method comprising:

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:

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;

digitizing said received signal to generate a digitized signal;

selecting a first portion of said digitized signal;

selecting a second portion of said digitized signal;

processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

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.

QAM Demodulator:

The QAM demodulator in a CM is responsible for demodulating an individual digital channel so that I/Q samples are converted into digital data. Any extra unused QAM Demodulators can be used to perform measurements such as:

- MER
- EQ Stress
- Group Delay
- In-channel frequency response

Depending on the CM hardware, the demodulator may also provide these measurements:

- I/Q Constellation plots
- Ingress under the carrier
- DQI

MPEG/DOCSIS Decoder:

After the RF signal has been transformed from wideband RF data to individual digital channel data, the data is decoded by an MPEG or DOCSIS decoder. The measurement program on the CM can be used to perform a variety of service level tests.

MPEG and DOCSIS decoders have rate counters and packet error counters that can be used to perform the following measurements on each channel:

- Pre and Post Bit Error Rate (BER)
- MPEG data stream errors.

(Ex. 1001 ('826 Patent), cl. 1)

(Pet., pp. 59-67; Ex. 1002 (Lett Declaration), ¶¶268-272; Ex. 1012 (Renken Provisional), p.7)

Renken

Renken Provisional (Ex. 1012):

1. A method comprising:

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:

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;

digitizing said received signal to generate a digitized signal;

selecting a first portion of said digitized signal;

selecting a second portion of said digitized signal;

processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;

analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and

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.

(Ex. 1001 ('826 Patent), cl. 1)

Some things enabled by this invention that do not exist in prior art:

1. An MCCM could detect that there is a problem with a non-DOCSIS channel within the customer premise. This problem could be addressed before the customer has a chance to complain about it.
2. Multiple MCCMs working together, as directed by the CMC, could detect that there is a problem with one or more non-DOCSIS channels in one part of the cable network. This would allow technicians to diagnose problems with network equipment outside a customer premise. The problem could be addressed before a customer complains about it.
3. An MCCM could use an upstream transmitter to transmit signals in the upstream frequency band to check frequency response of the upstream. Some other piece of network test equipment could reside at the headend and monitor these signals and determine if there problems in the upstream portion of the network.
4. An MCCM could detect that given the measurement results at its location, that a neighbor on the network without an MCCM might have a problem that needs to be investigated. This problem could be addressed before the customer complains about it.

Renken (Ex. 1011):

350 to construct in step 625 a measurement plan for the MCCM 100, which is then sent to the MCCM 100 in step 627. By way of example, the measurement plan may include one or more of the following: measurement identifiers for each measurement to be performed, a channel plan specifying channels to be tested, intervals at which the measurements are to be repeated, and error thresholds.

(Ex. 1011 (Renken), 22:65-23:4; Ex. 1002 (Lett Declaration), ¶277; Ex. 1012 (Renken Provisional), p. 15; Pet., pp. 59-67)

PO Failed to Address the Renken Provisional

- Neither PO nor its expert address these teachings from the Renken Provisional, even though they were cited and discussed in the Petition and Petitioner's expert declaration. Pet. 66, Ex. 1002, ¶ 279. These teachings from the Renken Provisional at least render obvious the "network management message."

(Reply, pp. 19-20)
- ## PO's Sur-reply Incorrectly Alleges that the POR Addressed the Renken Provisional

Petitioner's argument fails to address PO's argument, and Dr. Russ's testimony, that Renken's provisional and non-provisional do not disclose that an MCCM reports error reports or alarms. POR, 46. The cited page of Renken's provisional does not change this because it does not address what information is communicated between the MCCM and the CMC. See Ex. 1012, p. 15. Thus, Petitioner's "my neighbor

(Sur-reply, p. 21)
- ## POR p. 46 Does Not Cite the Renken Provisional
- ## POR p. 46 Does Not Address the Features, from the Renken Provisional, Relied on in the Petition

(Pet., pp. 13-19, 66; Ex. 1002 (Lett Declaration), ¶279; POR, pp. 42-49)

Renken

Unrebutted Testimony of Mr. Lett Regarding MCCM Reporting Problems to Headend:

1. A method comprising:
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:
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;
digitizing said received signal to generate a digitized signal;
selecting a first portion of said digitized signal;
selecting a second portion of said digitized signal;
processing said selected second portion of said digitized signal to recover information carried in said plurality of channels;
analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal; and
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.

(Ex. 1001 ('826 Patent), cl. 1)

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"). (Ex. 1002 (Lett Declaration), ¶279; Ex. 1011 (Renken), 1:7-10; Ex. 1012 (Renken Provisional), p. 15; Pet., pp. 59-67; Reply, pp. 19-20)

“controlling the transmission of network management messages”

The only claim limitation disputed by Patent Owner is whether Renken renders obvious “controlling the transmission of network management messages.”

Claim 1, [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 10, [10F]:

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.

(Ex. 1001 ('826 Patent), 7:51-55, 8:35-39)

“controlling the transmission of network management messages”

Patent Owner argues in Sur-reply:

1. The MCCM only reports measured characteristics, and nothing else based on any measured characteristics, to the CMC.
2. There is no motivation for the MCCM to report errors or alarms.
3. MCCM reporting errors or alarms would be antithetical to Renken’s centralized monitoring.

(POR, pp. 42-49; Sur-reply, pp. 20-23.)

Renken is not limited to centralized monitoring.

Renken describes:

- error thresholds being sent to the MCCMs, and
- problems being detected by the MCCMs.

By way of example, the measurement plan may include one or more of the following: measurement identifiers for each measurement to be performed, a channel plan specifying channels to be tested, intervals at which the measurements are to be repeated, and error thresholds.

Some things enabled by this invention that do not exist in prior art:

1. An MCCM could detect that there is a problem with a non-DOCSIS channel within the customer premise. This problem could be addressed before the customer has a chance to complain about it.
2. Multiple MCCMs working together, as directed by the CMC, could detect that there is a problem with one or more non-DOCSIS channels in one part of the cable network. This would allow technicians to diagnose problems with network equipment outside a customer premise. The problem could be addressed before a customer complains about it.
3. An MCCM could use an upstream transmitter to transmit signals in the upstream frequency band to check frequency response of the upstream. Some other piece of network test equipment could reside at the headend and monitor these signals and determine if there problems in the upstream portion of the network.
4. An MCCM could detect that given the measurement results at its location, that a neighbor on the network without an MCCM might have a problem that needs to be investigated. This problem could be addressed before the customer complains about it.

Both of which are inconsistent with Renken being limited to centralized monitoring.

(Petition, p. 66; Reply, pp. 18-22; Ex. 1011, 22:67-23:4; Ex. 1012, p. 15; Ex. 1002, ¶¶ 279-280)

Renken

Some things enabled by this invention that do not exist in prior art:

1. An MCCM could detect that there is a problem with a non-DOCSIS channel within the customer premise. This problem could be addressed before the customer has a chance to complain about it.
2. Multiple MCCMs working together, as directed by the CMC, could detect that there is a problem with one or more non-DOCSIS channels in one part of the cable network. This would allow technicians to diagnose problems with network equipment outside a customer premise. The problem could be addressed before a customer complains about it.
3. An MCCM could use an upstream transmitter to transmit signals in the upstream frequency band to check frequency response of the upstream. Some other piece of network test equipment could reside at the headend and monitor these signals and determine if there problems in the upstream portion of the network.
4. An MCCM could detect that given the measurement results at its location, that a neighbor on the network without an MCCM might have a problem that needs to be investigated. This problem could be addressed before the customer complains about it.

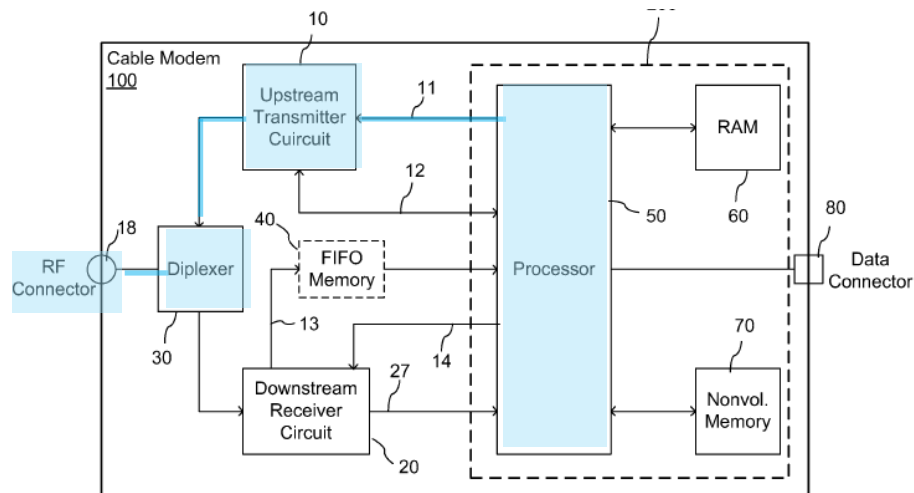


Fig. 2

(Pet. pp. 59-67; Ex. 1011 (Renken), Figs. 2-3; Ex. 1012 (Renken Prov), p. 15)

Overview - Sadja

- “Cable Diagnostic and Monitoring System”
- STB Monitors Signal Characteristics and Raises Alarms

(Pet., pp. 19-20, 41-43; Ex. 1021 (Sadja), [0018], [0049], [0059], [0081]-[0084])

- Cited for Example Parameters

(Pet., pp. 19-20, 41-43; Ex. 1021 (Sadja), [0018], [0049], [0059], [0081]-[0084])

- Not Addressed in POR



US 20050183130A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2005/0183130 A1
(43) Pub. Date: Aug. 18, 2005

(54) CABLE DIAGNOSTIC AND MONITORING SYSTEM

(52) U.S. Cl. 725/107; 348/192; 725/124; 725/125

(76) Inventors: Aran London Sadja, La Jolla, CA (US); Eric James Holcomb, San Marcos, CA (US); Leo M. Pedlow JR., Ramona, CA (US)

(57) ABSTRACT

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(21) Appl. No.: 11/037,836

(22) Filed: Jan. 18, 2005

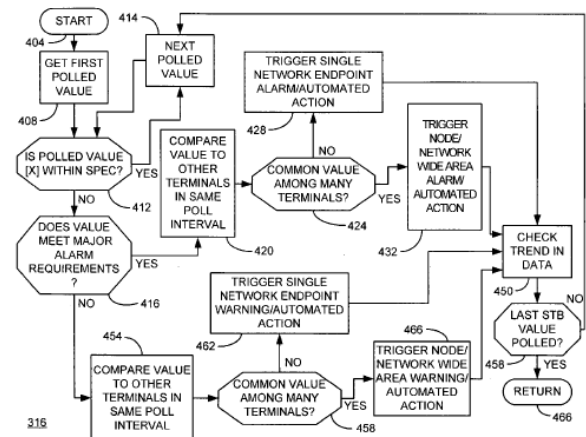
Related U.S. Application Data

(60) Provisional application No. 60/544,601, filed on Feb. 12, 2004. Provisional application No. 60/551,150, filed on Mar. 8, 2004. Provisional application No. 60/550,978, filed on Mar. 4, 2004.

Publication Classification

(51) Int. Cl.⁷ H04N 7/173; H04N 17/02; H04N 17/00; H04N 7/16

A cable television diagnostic method for a cable television network consistent with certain embodiments involves sending a polling message to a plurality of modems forming a part of a plurality of television set top boxes from a cable television headend via a cable television cable connection to the set top boxes; wherein the polling message instructs the cable television set top boxes to obtain at least one operational parameter of each of the television set top boxes; receiving a plurality of response messages from the cable television set top boxes, each containing the at least one operational parameter of the television set top boxes; determining that one of the operational parameters from one of the television set top boxes is outside of a specified range of values; and aggregating the operational parameters of the plurality of set top boxes received in the response messages to determine if the same operational parameter is outside the range of specified values for more than the one of the television set top boxes. This abstract is not to be considered limiting, since other embodiments may deviate from the features described in this abstract.



Overview - Salinger

- “Distributed Network Performance Monitoring”
- Probe Monitors Signals in Cable Network and Sends Message if Limit is Exceeded

(Pet., pp. 20-21, 47-48; Ex. 1022 (Salinger), [0005], [0049], [0064])

- Cited for Example Parameters

(Pet., pp. 20-21, 47-48; Ex. 1022 (Salinger), [0005], [0049], [0064])

- Not Addressed in POR



US 20100299713A1

(19) **United States**

(12) **Patent Application Publication**
Salinger et al.

(10) **Pub. No.:** US 2010/0299713 A1
(43) **Pub. Date:** Nov. 25, 2010

(54) **DISTRIBUTED NETWORK PERFORMANCE MONITORING**

Publication Classification

(75) **Inventors:** **Jorge Daniel Salinger**, Littleton, CO (US); **Maurice Garcia**, Levittown, PA (US)

(51) **Int. Cl.**
H04N 7/173 (2006.01)
H01R 9/05 (2006.01)
(52) **U.S. Cl.** **725/106; 439/578**
(57) **ABSTRACT**

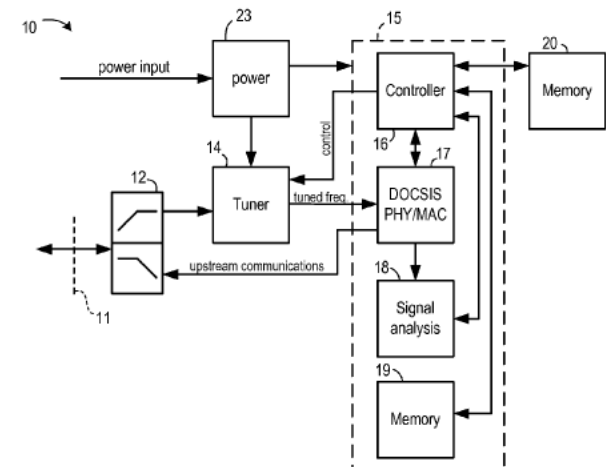
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(21) **Appl. No.:** **12/469,168**

(22) **Filed:** **May 20, 2009**

A probe is configured to monitor one or more communication parameters on one or more downstream frequency channels carried on a communication medium of an access network. Results of repeated monitoring are stored over a predetermined period. At the conclusion of the monitoring period, data reports reflecting the stored results are transmitted in upstream frequency channels carried on the same medium. The probe can also be configured to send immediate messages if a parameter exceeds predefined limits and can store a plurality of monitoring programs and can be reprogrammed remotely. The probe can be contained within a cable tap if the medium is, e.g., a coaxial cable. Numerous probes can be deployed throughout an access network so as to provide monitoring data from each of many locations over a prolonged period.



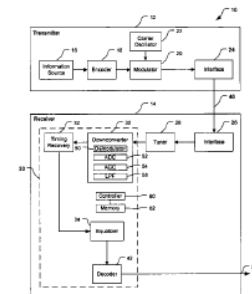
Overview - Aggarwal



- “Rapid Channel Signal Identification”
- TV Receiver Measures Signals
(Pet., pp. 21-22, 44-46; Ex. 1025 (Aggarwal))
- Also Cited for Example Parameters
(Pet., pp. 21-22, 44-46; Ex. 1025 (Aggarwal))
- Not Addressed in POR

(12) United States Patent Aggarwal et al.		(10) Patent No.: US 7,573,531 B1
		(45) Date of Patent: Aug. 11, 2009
(54) RAPID CHANNEL SIGNAL IDENTIFICATION		2002/0144290 A1 10/2002 Ovadia
(75) Inventors: Rajan Aggarwal, Bristol, PA (US); Mark Hryszko, Doylestown, PA (US); Samuel H. Reichgott, Coopersburg, PA (US); Punyabrata Ray, Langhorne, PA (US); Stephen L. Biracree, Jamison, PA (US); Binning Chen, Newtown, PA (US); Raul A. Casas, Doylestown, PA (US)		FOREIGN PATENT DOCUMENTS WO 60/70868 11/2000 WO 2004/015992 2/2004
(73) Assignee: ATI Technologies, Inc., Markham, Ontario (CA)		OTHER PUBLICATIONS Advanced Television Systems Committee, "ATSC Standard: Digital Television Standard (A/53), Revision D, Including Amendment No. 1", (Jul. 19, 2005, Amendment No. 1, Jul. 27, 2005). Society of Cable Telecommunications Engineers, "Digital Broad-band Delivery System: Out of Band transport Part 1: Mode A", ANSI/SCTE 55-1 2002 (Formerly DVS 178), (2002). Society of Cable Telecommunications Engineers, "Digital Broad-band Delivery System: Out of Band Transport Part 2: Mode B", ANSI/SCTE 55-2 2002 (Formerly DVS 167), (2002). Society of Cable Telecommunications Engineers, "Digital Video Transmission Standard for Cable Television", ANSI/SCTE 07 2000 (Formerly SCTE DVS 031), (2000). Treichler et al., "Practical Blind Demodulators for High-Order QAM Signals", Proceedings of the IEEE, vol. 86, No. 10, (Oct 1998).
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 769 days.		* cited by examiner
(21) Appl. No.: 11/251,080		<i>Primary Examiner—Sherrie Hsia</i> <i>(74) Attorney, Agent, or Firm—Volve and Koenig PC</i>
(22) Filed: Oct. 14, 2005		(57) ABSTRACT An apparatus, for use in a receiver configured to receive electronic signals, for identifying digital signals that are available for reception, includes a timing recovery device configured to receive an incoming signal, related to a transmitted signal, the incoming signal having a first symbol rate, and to re-sample the incoming signal to provide a second symbol rate, and an analyzer that is in communication with the timing recovery device and that is configured to make a determination as to whether a difference between the second symbol rate and a third symbol rate of a transmitter providing the transmitted signal is within an acceptable tolerance and to use the determination in an analysis of whether the transmitted signal is available for reception.
(51) Int. Cl. H04N 5/44 (2006.01) H04N 5/50 (2006.01)		
(52) U.S. Cl. 348/553; 348/725; 348/731		
(58) Field of Classification Search 348/725-728, 348/553-555, 558, 731-733, 735; 375/354, 375/355, 229, 232, 316, 340; H04N 5/44, H04N 5/46, 5/50		
See application file for complete search history.		
(56) References Cited U.S. PATENT DOCUMENTS		
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25 Claims, 5 Drawing Sheets



Grounds A-D: Claim 2

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

gathered by the monitor (MON) 116. This signal quality information can include information about channel absence/presence, error count and signal level estimates. As described below, the information about signal quality can be transmitted by the STB to the headend either as it is collected, or when the STB is polled by the headend. The transmitter (e.g., modem) and other details of the STB, which are well known to those skilled in the art, are omitted for illustrative clarity.

- POR Did Not Separately Dispute Claim 2

(Pet. 40-41; Ex. 1002 (Lett Declaration), ¶¶ 176-178; Ex. 1009 (Kamieniecki), ¶[0014])

Grounds A-D: Claim 3

- [3]: “The method of claim 2, wherein said parameter is a modulation parameter of said received signal.”
- Kamieniecki’s “error counts” and “errors/dropouts” would include errors in modulation.

gathered by the monitor (MON) 116. This signal quality information can include information about channel absence/presence, **error count** and signal level estimates. As

- Sadjja (Ex. 1021) alternatively shows various modulation parameters known for measuring health of a digital signal

QAM Digital Network
Health variables:

QAM Channel Status	Indicates the channel status (lock == OK) for the FAT (Forward Application Transport).
QAM Config Data	The QAM configuration (QAM mode: 64-QAM, 256-QAM).
QAM SNR/CNR (Signal To Noise Ratio, Carrier To Noise Ratio)	The running average estimate of the magnitude of the error signals
QAM MER (Modulation Error Ratio)	MER is a measure of the ratio of the error power to the average power in an ideal QAM signal.

(Pet., pp. 41-43; Ex. 1002 (Lett Declaration), ¶¶179-185; Ex. 1009 (Kamieniecki), ¶¶[0014], [0020]; Ex. 1021 (Sadjja), ¶[0081])

Grounds A-D: Claim 4

- [4]: “The method of claim 2, wherein said parameter is a transmit power of said received signal.”
- Kamieniecki discloses “Signal Level Estimates” for measured channels, which a POSITA would understand to refer to the transmit power of those channels

gathered by the monitor (MON) 116. This signal quality information can include information about channel absence/presence, error count and signal level estimates. As

- POR Did Not Separately Dispute Claim 4

(Pet., pp. 43-44; Ex. 1002 (Lett Declaration), ¶¶186-188;
Ex. 1009 (Kamieniecki), ¶¶[0014])

Grounds A-D: Claim 5

- [5]: “The method of claim 2, wherein said parameter is a frequency offset of said received signal.”
- A channel being “present” requires that channel to be at the correct frequency, so if it is OFFSET from that frequency too much, then that would be a reason for it being considered ABSENT when Kamieniecki reports “channel absence/presence”

gathered by the monitor (MON) 116. This signal quality information can include information about channel absence/presence, error count and signal level estimates. As

(Pet., pp. 44-46; Ex. 1002 (Lett Declaration), ¶¶191-197; Ex. 1009 (Kamieniecki), ¶[0014])

Grounds A-D: Claim 5

- Aggarwal (Ex. 1025) Shows that “frequency offset” Needs to be Within Acceptable Range.

make a determination as to at least one of: **determine whether the video carrier frequency offset of the incoming signal is within an acceptable frequency range;** and determine whether video sync indicators are contained in the transmitted signal at times corresponding to television signals, where the ana-

- POR Did Not Separately Dispute Claim 5

(Pet. pp. 44-46; Ex. 1002 (Lett Declaration), ¶¶191-197; Ex. 1025 (Aggarwal), 2:41-45)

Grounds A-D: Claim 7

- [7]: “The method of claim 1, wherein said characteristic is signal phase vs. frequency.”
- Konstantinos Recognized Phase Noise as a Problem ...

[0009] Conventional I/Q receiver architectures are significantly affected by the well-known image rejection problem arising from mismatches in I and Q paths and their associated mixers. Further implementation limitations in I/Q mixers are also characteristics of this approach. For example, phase noise in the frequency translation stage (the mixer) is one of the dominant noise contaminating mechanisms of the conventional receiver architecture.

- Obvious to Monitor for this Problem
- Alternatively, Salinger (Ex. 1022) Shows This ...

(Pet., pp. 47-48; Ex. 1002 (Lett Declaration), ¶¶201-206; Ex. 1010 (Konstantinos), ¶[0009])

Grounds A-D: Claim 7

- [7]: “The method of claim 1, wherein said characteristic is signal phase vs. frequency.”
- Salinger (Ex. 1022) Monitors Cable Network, and Includes Phase Noise in its Measurement of Modulation Error Ratio

[0036] Additional parameters that can be measured by probe 10 for some or all channels include modulation error ratio (MER), FEC codeword error rate, signal to noise ratio (SNR), PLL lock, quantization noise (QN), and center frequency variation. As defined by DOCSIS, MER measures cluster variance (in dB) caused by a transmit waveform. MER includes effects of intersymbol interference, phase noise other transmitter degradations. FEC codeword error rate rep-

- POR Did not Separately Dispute Claim 7

(Pet., pp. 47-48; Ex. 1002 (Lett Declaration), ¶¶201-206; Ex. 1022 (Salinger), ¶[0036])

Grounds A-D: Claim 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.”
- Kamieniecki’s Error Count Would Include Bit Error Rate and Symbol Error Rates:
gathered by the monitor (MON) 116. This signal quality information can include information about channel absence/presence, **error count** and signal level estimates. As
- Kamieniecki’s “Channel Absence/Presence” Would be Based on Any Known Signal Quality Metric

(Pet. pp. 49-50; Ex. 1002 (Lett Declaration), ¶¶207-211; Ex. 1009 (Kamieniecki), ¶[0014])

Grounds A-D: Claim 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.”
- Konstantinos Shows Bit-Error-Rate and Signal-to-Noise were Known Metrics of Signal Performance

[0109] In accordance with this embodiment, the output of the multi-channel selection processor and/or the multi-channel baseband processor can be directly used and implemented in an information extraction processor to identify the power spectral density (PSD) shape of the signal captured by the ADC. A wide range of calculations for each TV channel can be realized this way. By way of illustration and not as a limitation, the signal may be analyzed for auto- and cross-correlations, histogram analysis, Bit-Error-Rate, Signal-to-Noise, and similar metrics of signal performance per channel, or per sub-band. This information can directly be used in various ways to improve the reception quality.

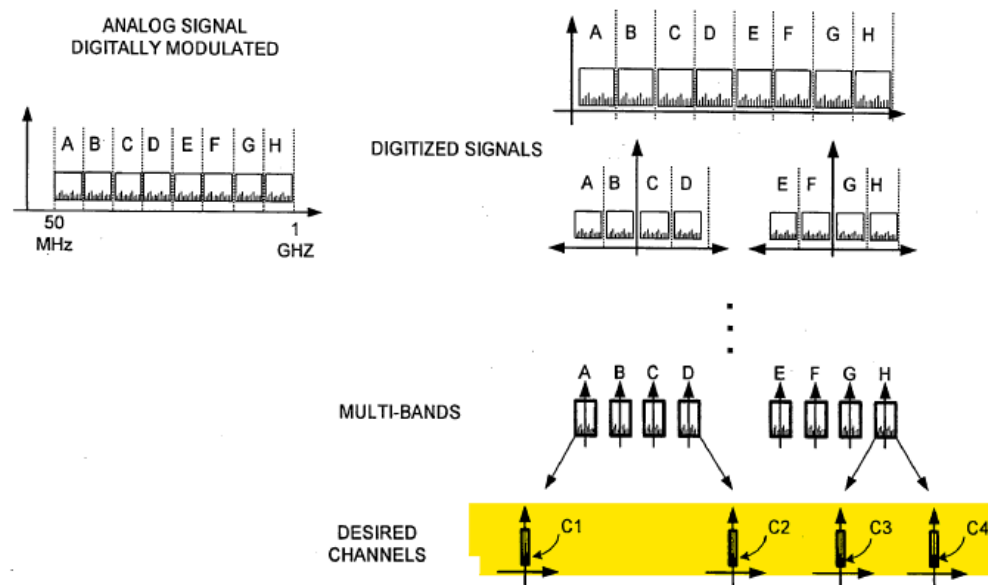
- POR Did Not Separately Dispute Claim 8

(Pet., pp. 49-50; Ex. 1002 (Lett Declaration), ¶¶207-211; Ex. 1010 (Konstantinos), ¶[0109])

Grounds A-D: Claim 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.”
- Konstantinos Shows Configuring Center Frequency to Select a Desired Channel (C1, C2, C3, C4):

FIG. 3



(Pet., pp. 49-53; Ex. 1002 (Lett Declaration), ¶¶209, 212-217; Ex. 1010 (Konstantinos), Fig. 3, ¶¶0109)

Grounds A-D: Claim 10

10. A system comprising:
a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:

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;

channelizer circuitry operable to:

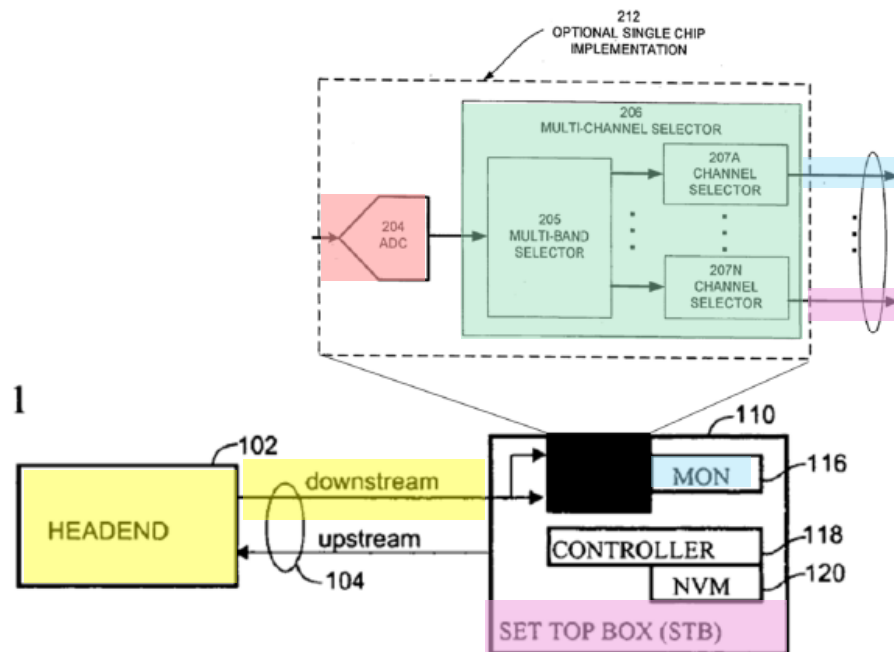
select a first portion of said digitized signal; and select a second portion of said digitized signal;

processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;

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.

FIG. 1



(Pet., pp. 37, 54-56; Ex. 1002 (Lett Declaration), ¶¶160, 218-229; Ex. 1009 (Kamieniecki) Fig. 1; Ex. 1010 (Konstantinos), Fig. 2; POR, p. 17)

Claims 11-18

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

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

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

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

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

7. The method of claim 1, wherein said characteristics is signal phase vs. frequency.

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.

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.

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

12. The system of claim 11, wherein said parameter is a modulation parameter of said received signal.

13. The system of claim 11, wherein said parameter is a transmit power of said received signal.

14. The system of claim 11, wherein said parameter is a frequency offset of said received signal.

15. The method of claim 1, wherein said characteristic is signal power vs. frequency.

16. The method of claim 1, wherein said characteristics is signal phase vs. frequency.

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.

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.

(Pet., pp. 49-58; Ex. 1002 (Lett Declaration), ¶¶212-217, 230-237; Ex. 1010 (Konstantinos), Fig. 3, ¶[0109])

Ground A: Kamieniecki and Konstantinos

- PO's Next Technical Issue:
 - Kamieniecki Receives 6 MHz and 1-2 MHz Channels
 - Konstantinos Receives 6 MHz Channels (POR, pp. 23-24; Sur-reply, pp. 4-5)
- Neither Reference Limits its Tuner/Receiver to These Ranges, or the Standards that Use Them
 - PO Relies on its Expert to Argue that Kamieniecki Uses “QPSK” Modulation While Konstantinos Uses “QAM”
 - But Petitioner's Expert Disagrees, Explaining that a POSITA Would Know that QPSK is Just One Type of QAM
 - Even if this Difference Existed in the References, a POSITA Would Not Have Been Deterred By This Alleged Difference

(POR, pp. 23-24; Ex. 2013, ¶ 95; Reply pp. 5-6; Pet., pp. 27; Ex. 1002 (Lett Declaration), ¶60; 1032 (Lett Reply Declaration), ¶10)

Ground A: Kamieniecki and Konstantinos

- PO Addresses the Market Demand by Arguing a POSITA Would not “Start” With Kamieniecki in the Combination (Sur-reply, p. 8)
- Kamieniecki Came First
 - Kamieniecki was Filed in 2003
 - Konstantinos was Filed in 2008
- Konstantinos Expressly Addresses Improving STBs that had “Single-Channel” Tuners, and Kamieniecki’s Tuners are Single-Channel

(Pet., pp. 8-13, 27-30; Ex. 1002 (Lett Declaration), ¶¶127-75, Ex. 1009 (Kamieniecki), cover page, ¶¶ [0013], [0017], Fig. 2; Ex. 1010 (Konstantinos), cover page, ¶¶ [0001], [0006], [0008], [0011], [0016-17], [0042], [0107])

Ground A: Kamieniecki and Konstantinos

- Konstantinos was Right. PO's Expert Admits that in 2007, His Company was Producing 3 MILLION "Advanced" STBs PER YEAR.

selected at a time. In contrast, Konstantinos's multi-channel receiver was designed to select multiple channels. *See* Ex. 1010, ¶ [0011]. This type of functionality would be integrated into more advanced STBs that were intended to allow simultaneous viewing or recording of different channels, such as a DVR set-top box that could display one channel while recording others simultaneously. An example is the Explorer 8300 that my group designed.

(Reply, p. 8; Ex. 2013 (Russ Declaration), ¶108)

70. During my time at S-A, one major advance in the world of set-top boxes was the advent of digital video recording, or DVR. These set-top boxes included a hard disk drive that could be used to record video for later playback, and it rapidly became extremely popular. My third set-top box, the Explorer 8300, was being produced at a rate of 3 million per year when I left the company in 2007.

(Reply, p. 8; Ex. 2013 (Russ Declaration), ¶70)

Ground A: Kamieniecki and Konstantinos

- PO Argues it Would be Expensive to Meet this Demand
(POR, pp. 27-28)
- PO Offers No Cheaper Alternative for Meeting the Market Demand
(POR, pp. 27-28; Reply, p. 7)
- Keeping up with Customer Demands is Important, and Different Models of STB Would be Offered for Different Customers
(Reply, p. 8; Ex. 1032 (Lett Reply Declaration), ¶ 5)

Ground A: Kamieniecki and Konstantinos

- [1F] “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels.”
- PO Complains About the Drawing that Petitioner’s Expert Refused to Create at his Deposition, Saying he “Cannot Figure Out the Details.”
POR, pp. 22-23
- But he DID Explain Examples of this Well-known and Unclaimed Detail ...

Ground A: Kamieniecki and Konstantinos

- [1F] “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels.”
- Mr. Lett Explained the Decoder Location:

21 Q. So what I am trying to imagine is,
22 in the processing stack, or if you want to call

Page 161

1 it the processing steps of an incoming signal,
2 where do the decoders sit, now that you have
3 replaced in-band and out-of-band tuners with
4 the multi-channel receiver of Konstantinos?
5 A. So it would be after the
6 multi-channel receiver so that you could decode
7 and display the channel selected with the
8 channel selector 207 A through N.

(Reply, pp. 4-5; Ex. 2014 (Lett Deposition), 160:21-161:8)

15 In general, the -- one of the
16 outputs, it's one or more of the outputs,
17 right, go to one or more decoders for the
18 purpose of displaying video. In that
19 functionality, if it's for the purpose of
20 displaying video, you don't have to have an
21 MPEG decoder.
22 So it's possible that one could also

Page 167

1 have an MPEG decoder in that path if you wanted
2 to measure something that had to do with the
3 video channel after decoding. But if we are
4 talking about monitoring something, like signal
5 noise ratio, or I mean, even error rate for the
6 visual stream, you don't have to have a MPEG
7 decoder.
8 So I would probably draw this a
9 little differently than what you drew.

(Reply, pp. 4-5; Ex. 2014 (Lett Deposition), 166:15-167:9)

Grounds E-F: Claim 2

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

Renken Provisional (Ex. 1012):

Some things enabled by this invention that do not exist in prior art:

1. An MCCM could detect that there is a problem with a non-DOCSIS channel within the customer premise. This problem could be addressed before the customer has a chance to complain about it.
2. Multiple MCCMs working together, as directed by the CMC, could detect that there is a problem with one or more non-DOCSIS channels in one part of the cable network. This would allow technicians to diagnose problems with network equipment outside a customer premise. The problem could be addressed before a customer complains about it.
3. An MCCM could use an upstream transmitter to transmit signals in the upstream frequency band to check frequency response of the upstream. Some other piece of network test equipment could reside at the headend and monitor these signals and determine if there problems in the upstream portion of the network.
4. An MCCM could detect that given the measurement results at its location, that a neighbor on the network without an MCCM might have a problem that needs to be investigated. This problem could be addressed before the customer complains about it.

Renken (Ex. 1011):

350 to construct in step 625 a measurement plan for the MCCM 100, which is then sent to the MCCM 100 in step 627. By way of example, the measurement plan may include one or more of the following: measurement identifiers for each measurement to be performed, a channel plan specifying channels to be tested, intervals at which the measurements are to be repeated, and error thresholds.

(Pet., p. 67; Ex. 1002 (Lett Declaration), ¶¶282-284; Ex. 1011 (Renken), 22:67-23:4; Ex. 1012 (Renken Provisional), p. 15)

Grounds E-F: Claim 3

- [3]: “The method of claim 2, wherein said parameter is a modulation parameter of said received signal.”

QAM Demodulators **23** of the currently idle receiver or receivers **21** can be queried by the measurement controller **300** to perform a number of measurements, including measuring the following parameters known in the art: MER (modulation error ratio), EQ Stress, Group Delay, in-channel frequency response. Depending on the MCCM hardware, the

(Pet., pp. 67-68; Ex. 1002 (Lett Declaration), ¶¶285-287;
Ex. 1011 (Renken), 12:53-58)

Grounds E-F: Claim 4

- [4]: “The method of claim 2, wherein said parameter is a transmit power of said received signal.”

surement controller **300**. In this embodiment, the measurement plan includes ‘Level’ measurement on an analog TV channel, i.e. the measurement of the signal power in the analog TV channel. As in the process of FIG. **9**, the measurement starts with tuning the idle receiver to the target digital channel, for example as described hereinabove with reference to FIG. **9**, step **531**, by sending the control signal **14** to the DDC **22** of the idle receiver to tune to the central frequency of the target analog TV channel. After the tuning is completed,

(Pet., p. 68; Ex. 1002 (Lett Declaration), ¶¶288-291; Ex. 1011 (Renken), 19:21-29)

Grounds E-F: Claim 5

- [5]: “The method of claim 2, wherein said parameter is a frequency offset of said received signal.”

- Aggarwal (Ex. 1025):

At stage **168**, the timing frequency offset is measured multiple times. The offset is measured N times, preferably at a fixed interval of M seconds between the measurements. An exemplary, although not limiting, example of the interval M is 1 ms.

At stage **170**, an inquiry is made as to whether all of the N timing frequency offsets measured is within acceptable limits. Preferably each and every measurement is checked to verify that it has an acceptable value, although alternative embodiments may allow for some measurements to be out of bounds. If all the measured offsets are not within acceptable

(Pet., pp. 69-70; Ex. 1002 (Lett Declaration), ¶¶292-298;
Ex. 1025 (Aggarwal), 10:4-14)

Grounds E-F: Claim 6

- [6]: “The method of claim 1, wherein said parameter is characteristic is signal power vs. frequency.”

QAM Demodulators **23** of the currently idle receiver or receivers **21** can be queried by the measurement controller **300** to perform a number of measurements, including measuring the following parameters known in the art: MER (modulation error ratio), EQ Stress, Group Delay, in-channel frequency response. Depending on the MCCM hardware, the

(Pet., pp. 70-71; Ex. 1002 (Lett Declaration), ¶¶299-302; Ex. 1011 (Renken), 12:53-58)

Grounds E-F: Claim 7

- [7]: “The method of claim 1, wherein said characteristic is signal phase vs. frequency.”

QAM Demodulators **23** of the currently idle receiver or receivers **21** can be queried by the measurement controller **300** to perform a number of measurements, including measuring the following parameters known in the art: MER (modulation error ratio), EQ Stress, Group Delay, in-channel frequency response. Depending on the MCCM hardware, the

(Pet., pp. 71-72; Ex. 1002 (Lett Declaration), ¶¶303-306; Ex. 1011 (Renken), 12:53-58)

Grounds E-F: Claim 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.”

art. The controller **200** may be used to read various performance-related data from the MPEG/DOCSIS decoder **24** to perform a variety of service level tests. For example, conventional MPEG and DOCSIS decoders typically have rate counters and packet error counters that can be read by the controller **200** to measure the following parameters for a corresponding channel: pre-FEC and post-FEC Bit Error Rate (BER), and MPEG data stream errors or error rates.

(Pet., p. 72; Ex. 1002 (Lett Declaration), ¶¶307-309; Ex. 1011 (Renken), 13:8-15)

Grounds E-F: Claim 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.”

100. With reference to FIG. 6, this step may include the RC control logic **220**, following a corresponding command from the DML **324**, sending an RC control signal **14** to the idle receiver **21** to tune its operation parameters as required. This may also include setting the central frequency and the sampling rate of the DDC **22** of the idle receiver **21** to the target channel’s central frequency and a desired sampling rate, for example in accordance with the bandwidth of the target channel to be measured. The target channel to be measured may be

(Pet., pp. 72-73; Ex. 1002 (Lett Declaration), ¶¶310-12;
Ex. 1011 (Renken), 18:30-38)

Grounds E-F: Claim 10

'826 Patent:

10. A system comprising:
a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:

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;

channelizer circuitry operable to:

select a first portion of said digitized signal; and select a second portion of said digitized signal;

processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;

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.

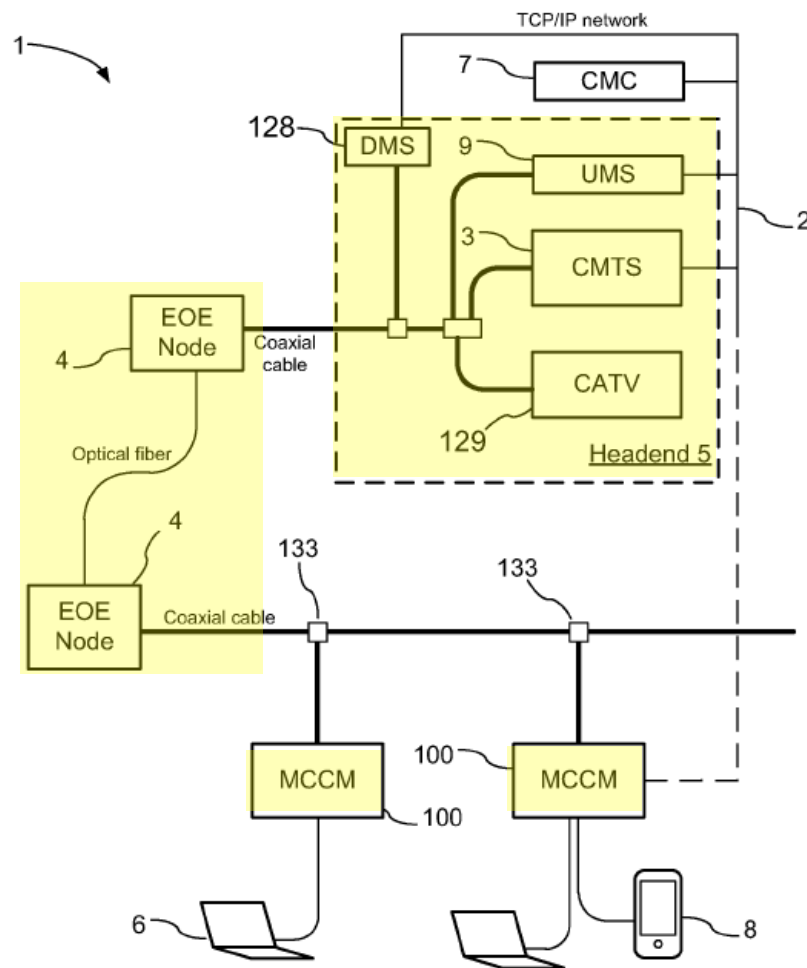


Fig. 1

(Ex. 1011 (Renken), Fig. 1; Pet., pp. 59, 73-74)

Grounds E-F: Claim 10

'826 Patent:

10. A system comprising:

a receiver configured to be coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network, the receiver comprising:

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;

channelizer circuitry operable to:

select a first portion of said digitized signal; and select a second portion of said digitized signal;

processing circuitry operable to process said selected second portion of said digitized signal to recover information carried in said plurality of channels;

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.

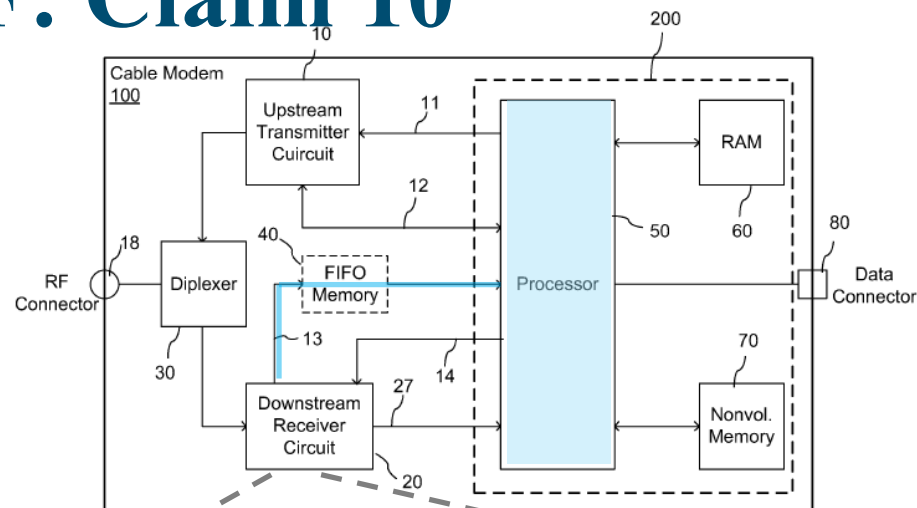


Fig. 2

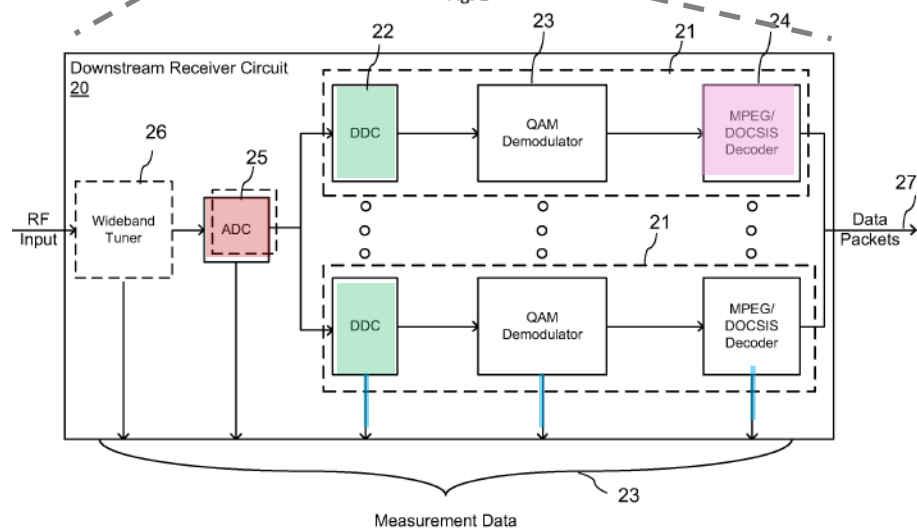


Fig. 3

(Ex. 1011 (Renken), Figs. 2-3; Pet., pp. 13-15, 73-75)

PO Argues “Fundamental Differences” Between DOCSIS and OOB

(POR; pp. 24-25; Sur-reply, pp. 14-15)

- PO’s Expert Admits that the Explorer 4200, a “Basic” STB from 2002, Already Included a DOCSIS Tuner

(Reply, p. 12)

77. For example, around the priority date, industry participants would offer a “basic” set-top box with the most basic of functionality available. This would serve as a low-cost option to customers that only need the most basic tier of cable services. The Explorer 4200 is as an example of a basic set-top box. Because it was basic, it was one the less expensive items on the market and it sold very well.

(Ex. 2013 (Russ Declaration), ¶77)

Q. Now, one of the boxes you worked on was the Explorer 4200 set-top box; is that correct?

A. That is correct.

Q. And that was released in 2002?

A. That's my recollection, yes.

(Ex. 1033 (Russ Deposition), 51:7-12)

Q. But the 4200 included a DOCSIS tuner?

A. Yes.

(Ex. 1033 (Russ Deposition), 53:24-54:2)