

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COX COMMUNICATIONS, INC.,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

CASE: IPR2024-00578

U.S. PATENT NO. 9,825,826

PATENT OWNER'S PRELIMINARY RESPONSE

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Ex. 2001	Joint Claim Construction and Pre-Hearing Statement (Case 2:23-cv-01049-JWH-KES)
Ex. 2002	Kishore Seendripu, <i>At MaxLinear, our drive towards excellence shows in all that we do</i> , The Silicon Review
Ex. 2003	U.S. Patent No. 9,210,362 to Reddy et al.
Ex. 2004	K. Scott Helms, et al., Leveraging Wideband and Full Spectrum Receiver Capabilities to Develop and Utilize Software-based Tools for Remote Spectrum Analysis and Troubleshooting
Ex. 2005	Excerpts from Deposition of Timothy Gallagher, held on July 19, 2023 in <i>Entropic Communications, LLC v. Charter Communications, Inc.</i> , Case 2:22-cv-00125-JRG
Ex. 2006	Broadcom Corporation, “Full-Band Capture Cable Digital Tuning” White Paper, June 2011
Ex. 2007	DOCSIS® Best Practices and Guidelines: PNM Best Practices: HFC Networks (DOCSIS 3.0)
Ex. 2008	DOCSIS® Best Practices and Guidelines: Proactive Network Maintenance Using Pre-equalization (Ver. 2)
Ex. 2009	U.S. Patent No. 8,792,008 to Gallagher et al.
Ex. 2010	Jim Walsh, et al., The Full (Band) Story: How Smart CPE Will Change HFC Maintenance Forever

I. INTRODUCTION

Patent Owner, Entropic Communications, LLC (“Entropic”), submits this Patent Owner Preliminary Response (“POPR”) pursuant to 37 C.F.R. § 42.107(a) to the *Inter Partes* Review (“IPR”) petition (“Petition”) filed by Cox Communications, Inc. (“Petitioner”) for claims 1-4, 6, 8, and 9 of U.S. Patent 9,825,826 (the “’826 Patent”). The Board should deny institution.

To ensure network services operate within acceptable bounds, network service providers need to understand the quality of signals as they are received at customer premises. Traditionally, service providers had to send a technician to the customer’s premises to investigate any issues on site. But this has several disadvantages. *First*, there is a limited window of time when technicians are working and/or customers will permit access to their premises, leaving a limited window of time to assess and monitor problems. *Second*, a customer already frustrated with service issues will be doubly frustrated by having to plan for the technician’s visit. *Third*, service providers and their technicians usually only become aware of a problem in the network when a customer calls to complain after having already experienced unacceptable quality or complete failure of their service. Given these and other problems, there was a need prior to the ’826 Patent for service providers to obtain an indication of the status of the network based on a measurement

performed in the receiver located at the customer's premises that reduced or eliminated the need for technicians to perform on-site diagnostics.

As relevant here, the '826 Patent discloses systems and methods that enable cable providers to remotely monitor signal characteristics at a customer's premises and to make adjustments in the operation of the network to resolve any issues without having to wait for a customer complaint and without having to send a technician to perform on-site diagnostics. Specifically, the '826 Patent discloses methods of digitizing "the entire cable downstream (e.g., from ~55 MHz to ~1002 MHz)" (also known as "full-spectrum capture" or "FSC") and incorporating monitoring and network maintenance functionality over that signal spectrum into the receiver deployed at the customer premises. This novel receiver of the '826 Patent can measure a characteristic of the received signal, and then based on that measured characteristic, transmit a message that indicates the status of the network and if any adjustments are necessary.

The prior art references of the Petition take different approaches to monitoring, resulting in fundamentally different architectures. The Petition therefore must recast the references using the challenged claims of the '826 Patent as a roadmap to argue the claims are merely "obvious." Not only is this impermissible hindsight, objective indicia evidence, contemporaneous with the invention of the '826 Patent, proves that the challenged claims are decidedly ***not***

obvious. The cable industry, including competitors of the original assignee of the '826 Patent (MaxLinear, Inc.) possessed every incentive to address the very problem MaxLinear solved with its '826 patent, but they failed to identify a viable solution. It was only after MaxLinear's invention in the '826 Patent that the industry saw the way. After that, the claimed invention received significant industry praise and recognition, and it fundamentally changed how network service providers remotely monitored their networks. The industry's pre-invention failure and its post-invention praise underscores the non-obvious nature of the claimed invention and critically, the extent to which the Petition has to alter the prior art in its failed attempt to support its claims of obviousness. For example:

- Ground 1 fails because, not only does Renken disclose a different architecture for signal monitoring, it is not even prior art. Renken, which was published on August 23, 2012, can only qualify as prior art to the '826 Patent if its provisional application (filed February 18, 2011) supports the cited disclosures in the later-published Renken. The Petition, however, relies on several portions of Renken that lack such written-description support in its provisional application and therefore are not prior art to the '826 Patent.
- Grounds 2 and 3 both fail because they rely upon a reference—Maycock—that discloses a fundamentally different architecture than

that of the '826 Patent. The components of Maycock that the Petition attempts to map to the challenged claims do not disclose anything resembling the digitization and subsequent sequence of selection and transmitting recited in the challenged claims. Maycock discloses an architecture that relies upon digitizing signals solely to transport them to a remote monitoring location, where they are converted back to analog for analysis by hardware and viewing by a human operator to ensure quality. This is fundamentally different than '826 Patent, and therefore the Petition fails to render obvious the challenged claims.

Overall, each Ground fails to render obvious every claim element—especially the claimed “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” (independent claim 1). Accordingly, the Petition fails to articulate a *prima facie* case of obviousness for all challenged claims of the '826 Patent.

Because all Grounds fail to render obvious the challenged independent claim of the '826 Patent, the entirety of the Petition should be rejected. *See Hartness Int'l Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108 (Fed. Cir. 1987) (prior art that fails to demonstrate an independent claim as unpatentable similarly fails to demonstrate a dependent claim as unpatentable).

II. SUMMARY OF THE '826 PATENT

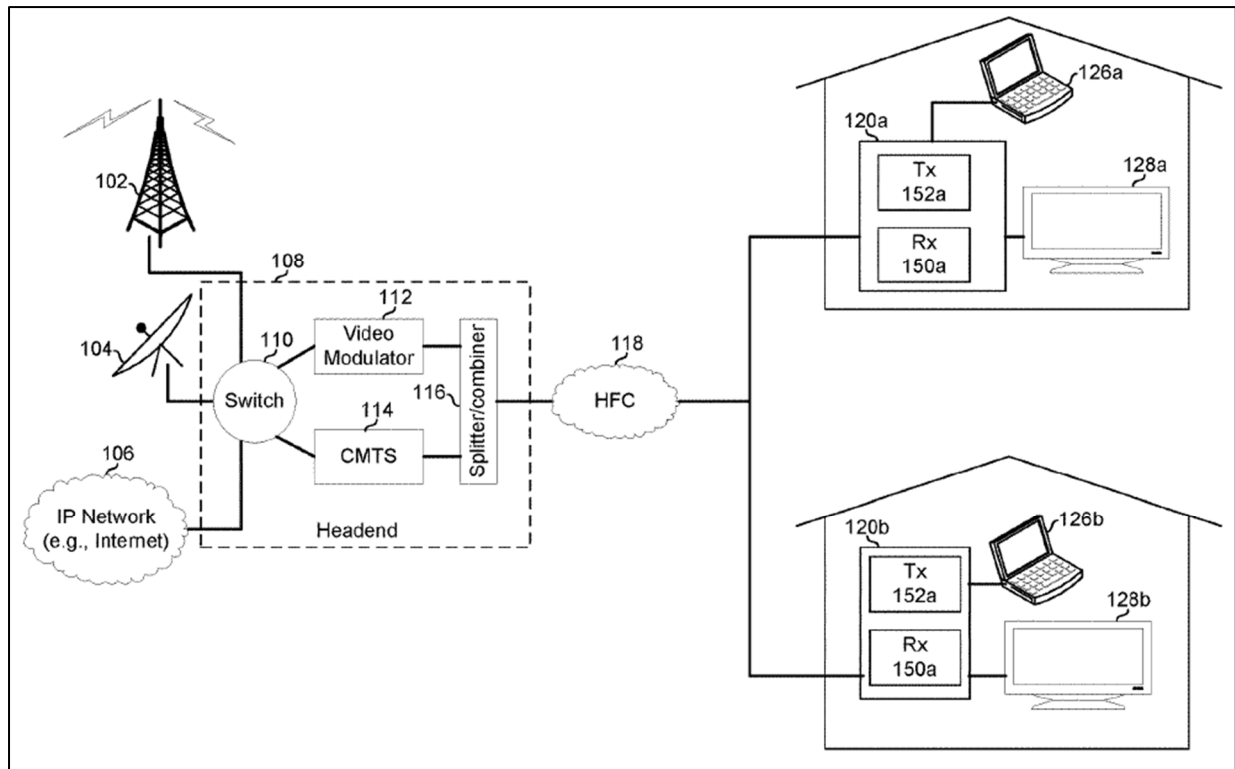
A. Background of the '826 Patent

The '826 Patent describes systems and methods for spectrum monitoring of a network-based service, such as cable or satellite television, using equipment located at the customer's premises. Ex. 1001, 1:44-2:27, 2:45-3:15, 4:65-5:25.

Traditionally, network-based service providers had limited options to provide support to customers and troubleshoot quality-of-service and other issues at a customer's location. *See id.*, 1:53-55. For example, when network parameters fell outside acceptable ranges such that the quality of service suffered, a provider would need to both investigate and fix the issue. *See id.*, 1:46-52. Unfortunately, conventional methods of monitoring were "too costly and impractical for use in customer-premises equipment ('CPE')," so providers instead sent technicians to customer premises to investigate the issue on site. *See id.*, 1:44-46, 1:53-55. On-site visits are not only expensive and time consuming, they are intrusive and disruptive because the technician is inside the premises and service is interrupted while the technician diagnoses and fixes the problem. Accordingly, there was a need for a less expensive method by which network service providers could monitor the quality of service provided to a customer's premises without interrupting service. *See id.* ("Conventional methods and apparatuses for monitoring network parameters are too costly. . . .").

The '826 Patent met this need. The '826 Patent disclosed systems and methods for monitoring signals that can be implemented in a receiver deployed by the provider at the customer's premises. *Id.*, Abstract. These systems and methods allow service providers to remotely monitor the condition of the signal that is received by the customer equipment, without the need for a disruptive and costly service visit to the premises. *See id.* The receiver's front-end circuitry is designed to receive and digitize a received signal, measure a characteristic of the digitized signal, and control the transmission of a network management message back to the headend based on the measured characteristic. *Id.*

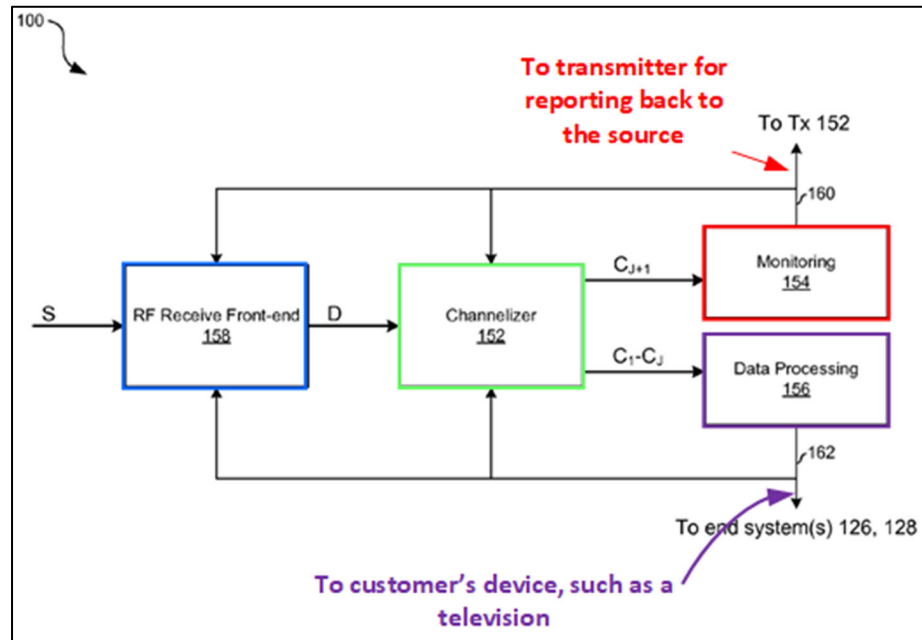
As depicted in Fig. 1A, the receiver can be implemented in a wide area network (e.g., a hybrid fiber-coaxial (HFC) network **118**) that connects equipment maintained by the provider, typically located at a headend **108**, and the receiver **150**, which is located at the customer's premises. *Id.*, 2:45-54, 3:1-15.



Id., Fig. 1A.

The receiver of the '826 Patent can perform spectrum monitoring to support the maintenance of the provider's network. *See, e.g., id.*, Abstract, 2:9-13, 3:16-21, Figs. 1A-1B. Among other things, the receiver's circuitry (1) receives and digitizes a signal containing TV and/or data channels inside an RF front-end **158** (*id.*, 3:22-31); (2) selects and outputs specific portions of the digitized signal in the front-end **158**, using (for example) a channelizer **152** (*id.*, 3:32-44); (3) analyzes one portion of the digitized signal to measure a characteristic using for example a monitoring device **154** (*id.*, 3:45-4:5); and (4) processes another portion of the digitized signal to recover information carried in the TV and/or data channels, using a data

processing device **156**. *Id.*, 4:6-18. An example of this is illustrated in Figure 1B, below:



Id., Fig. 1B (annotated).

The '826 Patent's receiver is also capable of controlling the transmission of "network management/maintenance messages." *Id.*, 3:4-15, 3:60-4:2; *also id.*, cls. 1 & 10. These network management messages play a role in maintaining the network as these messages may provide, for example, network status updates that indicate whether the network is operating correctly. *Id.*, 3:60-4:2. In response to the status updates, equipment at the headend may take actions to address any issues in the network, for example, by adjusting transmission parameters. *Id.*, 3:11-15. By having the receiver provide regular status updates via network management messages, the provider can monitor network parameters remotely to ensure that they

do not fall outside acceptable bounds, thereby addressing the problems of prior art solutions. *See id.*, 1:44-55.

Claim 1 recites:

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, cl. 1. Broadly, this claim recites a method performed by a receiver, wherein the receiver receives a signal that carries television and/or data channels, *id.*, cl. [1pre]-[1b], digitizes the received signal, *id.*, cl. [1c], and then portions of this digitized signal are selected. *Id.*, cl. [1d]-[1e]. The selected portions of the digitized signal are processed, with a portion being analyzed to measure a characteristic of the received signal and a portion being processed to recover information carried in the channels. *Id.*, [1f]-[1g]. The receiver controls the transmission of network

management messages back to the headend with the transmission being based on the measured characteristic. *Id.*, [1h]. Finally, claim 1 recites that the measured characteristic is different than the network management message. *Id.*

B. Claim Construction

The proper claim construction standard here is the *Phillips* standard. 37 C.F.R. § 42.100(b); *Apple Inc. v. Firstface Co.*, No. 2021-1001, 2021 WL 4156323, at *1 n.1 (Fed. Cir. Sept. 13, 2021).

The district court in the *Charter* case (2:22-cv-00125) construed “network management messages” as used in the ’826 Patent to mean “messages which report on the network based on the measured characteristics.” Petition, 10. In the *Cox* case (2:23-cv-01049), the parties agreed that “network management messages” should be given its plain and ordinary meaning. Ex. 2001, 2.

Nevertheless, Patent Owner’s arguments below do not turn on a specific construction of “network management messages” so there is no need to construe that, or any other, term of the ’826 Patent claims at this stage of the proceeding.

III. THE PETITION RELIES ON ART THAT IS FUNDAMENTALLY DIFFERENT FROM THE CLAIMED INVENTION AND THUS FAILS TO MEET ITS BURDEN

Each of Petitioner’s Grounds (1 through 3) rely on references with different approaches and different architectures for remote network monitoring and maintenance than those disclosed and claimed in the ’826 Patent. The Petition and

Petitioner’s expert gloss over those fundamental differences in an effort to recreate the ’826 Patent because objective indicia clearly demonstrate that the claimed invention is a non-obvious advance over the prior art. Ultimately, each Ground fails to disclose each and every element of the challenged claims as shown in detail below.

A. Contemporaneous Evidence Underscores that the Petition’s Grounds are Guided by Hindsight

The common theme running through each Ground in the Petition is the impermissible use of hindsight, labeling what is missing from the prior art as “obvious,” when it is instead the point of novelty and invention. Far from “obvious,” the invention described in the ’826 Patent family, which includes U.S. Patent No. 8,792,008 (the “’008 Patent”), fundamentally changed how network service providers remotely monitored the signal traveling through their network. Contemporaneous, *objective* evidence—not present-day subjective evidence from paid expert witnesses—proves this out.

The claimed invention in the ’826 Patent is built on a technology referred to as “Full-Spectrum Capture” (or “FSC”), which the original assignee of the ’826 Patent (MaxLinear) developed by at least 2010. *See* Ex. 1001, 5:56-62 (specifically referencing “Full-Spectrum Capture”); *see also* Ex. 2002 (describing by at least 2010 MaxLinear was using Full-Spectrum Capture technology to improve internet speeds) & Ex. 2003, Cover (displaying a priority date of April 17, 2009). Full-Spectrum

Capture refers to the ability to process, or “capture,” the entire usable frequency range—typically around 1 GHz—of the signal that is received at the customer’s premises. Ex. 2004, p. 2; *also* Ex. 2005, 20:20-21:3.

After developing Full-Spectrum Capture, MaxLinear engineers had an elegant, but simple, “Eureka!” moment when they realized that Full-Spectrum Capture could be leveraged “to capture and report local (end-user) cable-plant spectra” thereby “providing Cable and Multi-System Operators (MSO) new freedom in remotely monitoring, managing, and troubleshooting their networks.” Ex. 2004, p. 2. This was the invention of the ’826 Patent, and the related U.S. Patent No. 8,792,008. According to Tim Gallagher, the first-named inventor on the ’826 and ’008 Patents, the inventors realized that with the digital data already in an FSC-capable integrated circuit (IC) incorporated into equipment located at the customer’s premises, that they could use a “channelizer” and have a dedicated path from the channelizer to “circuits to measure power” and “to do things like monitor the spectrum, power, you know, basically the quality of a particular channel.” Ex. 2005, 18:25-20:2.

The invention’s dedicated path to the “monitoring circuit” uniquely permitted signal analysis to happen in parallel with a user watching a particular television channel. *Id.*, 20:6-13. In addition to monitoring the signal, the inventors realized that, if signal processing was happening in parallel, the customer premises

equipment “could be sending information to the network all the time. And if you have this deployed in many cable modems then the network would get information about their, you know, distributed cable systems in real-time” *Id.*, 20:14-19. Benefits abound from this real-time remote spectrum monitoring. For example, use of remote spectrum monitoring reduces the costs associated with network maintenance by reducing equipment costs and the number of “truck rolls,” which is sending technicians to investigate network issues. Ex. 2004, pp. 1-3. MaxLinear generally referred to this inventive use of Full-Spectrum Capture as Remote Spectrum Analysis. *Id.*

While the Petition would have the Board believe that the ’826 Patent was no more than an obvious extension of known technology, the objective, contemporaneous evidence proves the opposite. Even though Full-Spectrum Capture had been around since at least 2010 (maybe as early as April 2009), the industry *still* had not come to understand that FSC could support proactive network maintenance by June 2011 (which is around the priority date of the ’826 Patent). For example, well-known industry participant Broadcom Corporation had developed its own version of Full-Spectrum Capture, which it referred to as “Full-Band Capture.” Ex. 2006, p. 3 (“Full-Band Capture converts the entire analog 1 GHz cable signal to a digital signal.”); *also* Ex. 2007, p. 17, n. 1 (“Generically speaking, the industry calls CPE spectrum capture full-band capture (FBC). MaxLinear calls it Full

Spectrum Capture™ (FSC).”). Broadcom in this 2011 paper, however, makes no mention of using its Full-Band Capture technology to support network maintenance, even though there is an entire section titled “Benefits to Operators”—which would be the place, if anywhere, such operator benefits would be discussed. *See* Ex. 2006, p. 5 (making no mention of network maintenance or spectrum monitoring). If the invention were so “obvious,” surely smart Broadcom engineers would have made the “obvious” connection and proposed what is claimed in the ’826 Patent. They, of course, did not.

Documents from Cable Television Laboratories, Inc. (“CableLabs”), the same research group that puts out the industry’s DOCSIS standards, also prove the non-obviousness of the challenged claims. In addition to DOCSIS standards, CableLabs puts out industry “best-practices” documents for various technical topics, including proactive network maintenance (also known as “PNM”). The June 2011 version of that document (Ex. 2008), fully two years after MaxLinear’s Full-Spectrum Capture has been available, tells the industry that the then-best practice was to use “pre-equalization coefficients” to potentially isolate network issues. *See* Ex. 2008, p. 1. CableLabs clearly had not understood that FSC could be used, nor was it telling the industry to do so.

It was only *after* MaxLinear engineers made the novel and non-obvious invention of the ’826 and ’008 Patents that CableLabs and the rest of the cable

industry caught up and made a fundamental shift in how network service providers maintained their networks. The very next version of the CableLabs “proactive network maintenance” best-practices document (released in 2016 (Ex. 2007), after the ’826 and ’008 Patents), lauded the importance of using Full-Spectrum Capture to support remote spectrum monitoring and that by using remote spectrum monitoring, it had “resulted in significant operational advantages not to mention operational cost savings” to network service providers. Ex. 2007, p. 18.

Although the Petition desires to characterize the challenged claims and their differences from the Petition’s cited art as simple now, that is only because “[m]any things . . . seem obvious after they have been done.” *Diamond Rubber Co. of New York v. Consol. Rubber Tire Co.*, 220 U.S. 428, 434–35 (1911). The objective evidence above proves that out. And, ultimately, the Petition fails to meet its burden because it fails to understand that the reasons the prior art and the challenged claims are different is not because of an obvious extension, but because of invention. The Petition’s hindsight cannot overcome that fact.

B. Ground 1: Renken in View of the General Knowledge of a POSITA Fails to Render Obvious the Challenged Claims

Ground 1 of the Petition fails because Renken is not prior art. For the “controlling the transmission of network management messages” element of claim 1, the Petition relies on Renken’s disclosure that the Central Measurement Controller

(CMC)—which receives the measured characteristic from the cable modems—can be located at the headend. This disclosure, however, is not supported by the Renken Provisional. That means Renken as relied on by Petitioner cannot be afforded the priority date of its Provisional. Therefore, Renken is not prior art and Ground 1 fails.

1. Overview of U.S. Patent 8,649,421 (Renken)

Renken discloses measurement-capable cable modems (MCCMs) for use in a cable network that seeks to leverage receivers **21** that are not processing data (“idle receivers”) in the MCCMs to perform network measurements and then send those measurements to a central point (e.g., a central measurement controller (CMC)). Ex. 1005, 8:35-40, 11:6-18. At this central point, information received from the MCCMs is processed and compared to detect errors in the network. *See* Ex. 1005, 22:22-39.

Renken uses a downstream receiver circuit **20** as shown in Figure 3 below to both process and measure the digitized signal.

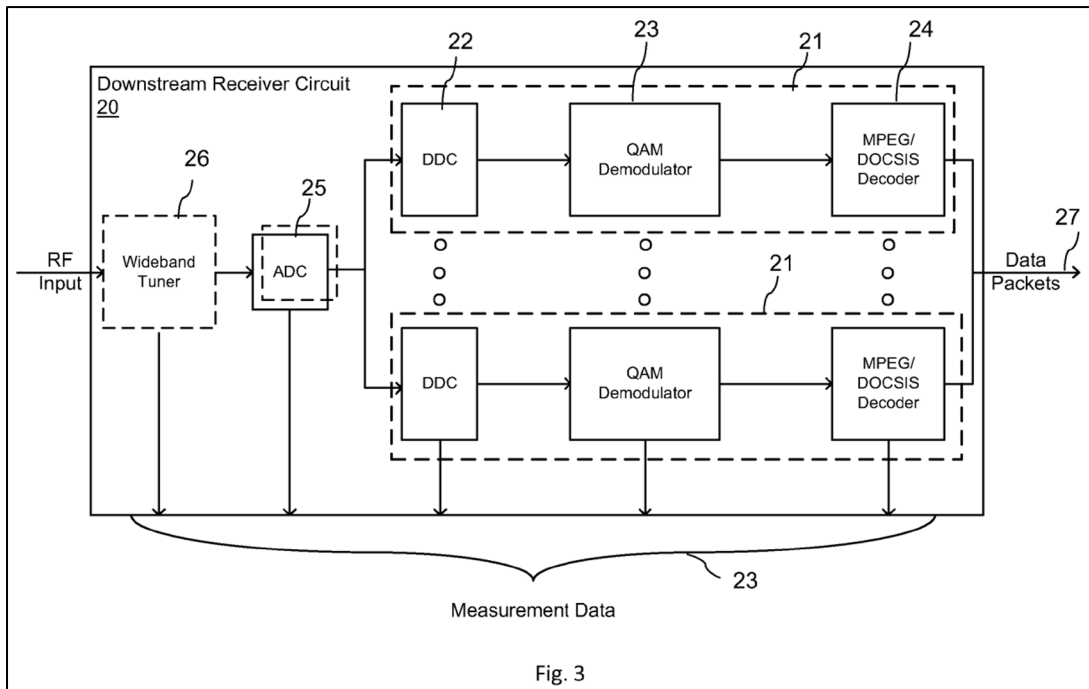
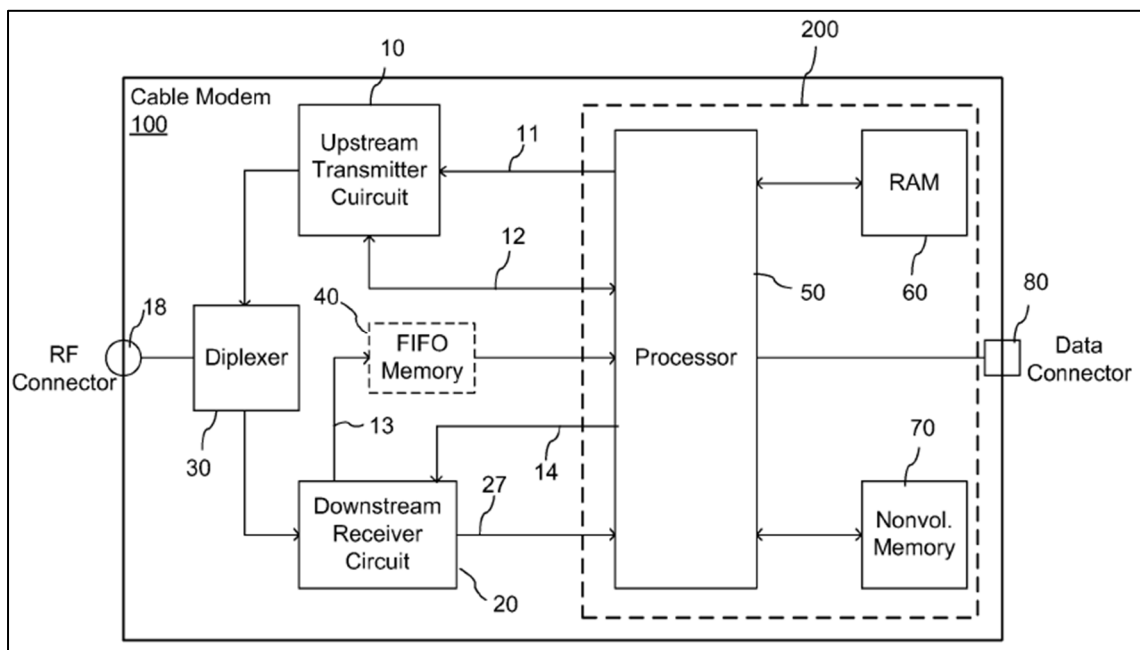


Fig. 3

Id., Fig. 3. This downstream receiver circuit **20** outputs to processor **50**, which is a component of controller **200**, as shown in Figure 2:



Id., Fig. 2 (displaying downstream receiver circuit **20** communicating demodulated downstream data **27** to processor **50**).

2. Renken is Not Prior Art to the '826 Patent

To show that the relied-upon subject matter contained in Renken is prior art to the '826 Patent, the Petitioner must carry two burdens. First, under *Dynamic Drinkware LLC v. Nat'l Graphics, Inc.*, the Petitioner bears the burden of demonstrating that a pre-AIA 35 U.S.C. § 102(e) reference—as is Renken—is entitled to the benefits of its provisional application's filing date. 800 F.3d 1375, 1378-82 (Fed. Cir. 2015). To do this, the Petitioner must show two conditions are satisfied: (1) the provisional application must provide sufficient support for at least one claim in the reference patent or published patent application; and (2) the provisional application must provide sufficient support for the subject matter relied upon for prior art purposes in the reference patent or published patent application. *Id.*, 1381-82.

Second, in the context of an *inter partes* review, Petitioner bears the burden of challenging whether the '826 Patent is entitled to an earlier effective filing date “by identifying, specifically, the features, claims, and ancestral applications allegedly lacking § 112, first paragraph, written description and enabling disclosure support for the claims based on the identified features.” *Unified Patents, LLC v. MasterObjects, Inc.*, IPR2020-01201, Paper 26 at 9 (PTAB Jan. 11, 2021) (quoting

Polaris Wireless, Inc. v. TruePosition, Inc., IPR2013-00323, Paper 9 at 29 (PTAB Nov. 15, 2013) (collecting decisions). If and only if the Petitioner meets that burden, does the burden of production shift to the patent owner “to make a sufficient showing of entitlement to earlier filing date or dates, in a manner that is commensurate in scope with the specific points and contentions raised by Petitioner.” *Id.*

Here, Petitioner has failed to carry both of its burdens.

As to the Petitioner’s first burden, the Renken Provisional does not support all of the subject matter from the later-published Renken that Petitioner relies upon in the Petition. Petitioner relies upon Renken’s disclosure that the MCCMs transmit an alleged measured characteristics to the CMC to render obvious the claim element “the transmission of network management messages back to said headend.” *See* Petition, 40-42. The Renken Provisional, however, fails to disclose that the CMC is or can be located at the headend. Petitioner concedes as much by providing a wide-ranging citation to the Renken Provisional for support with no accompanying explanation. *See id.*, 40 (citing Ex. 1010, pp. 8-11). This is not enough to meet Petitioner’s burden.

Citations to a provisional application with no accompanying explanation, like that done by Petitioner here, is not sufficient to demonstrate that a later-filed disclosure is entitled to the provisional application’s priority date. *See Google LLC v. Ikorongo Tech. LLC*, IPR2021-00058, Paper 14 at 15 (PTAB May 10, 2021)

(denying institution because the Board found “the relationship between the cited portions of the two documents [was] unclear” because the petition did “not explain sufficiently the significance of the citations to the ’187 provisional”). The Petition also cites to the Martin Declaration for support, but, like the Petition, the Martin Declaration is silent on substance and fails to offer any additional explanation or reasoning. Petition, 40 (citing Ex. 1003, ¶ 75); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 16-17 (PTAB Aug. 24, 2022) (precedential).

Even if Petitioner’s bare citation was procedurally sufficient, the substance of the Renken Provisional still cannot afford Renken an earlier priority date. Across the four pages cited by Petitioner and Dr. Martin, the Renken Provisional describes only that the MCCM is capable of sending measurements to the CMC and that upon receiving the measurements, the CMC can store or analyze the received measurements. *See* Ex. 1010, pp. 8-11. There is no discussion of sending messages to the headend, any relationship between the CMC and the headend, or any suggestion for the CMC to be located at the headend. The Renken Provisional is silent on that matter, and that disclosure—which exists only in the later-published Renken—appears to be no more than subject matter conceived *after* the Renken Provisional was filed, reinforcing the fact that Renken *is not prior art*.

As to the Petitioner’s second burden, Petitioner has failed to identify any basis under which the claims of the ’826 Patent are not entitled to the September 8, 2011,

filing date of U.S. Provisional Application No. 61/532,098 (the “’826 Provisional”), to which the ’826 Patent claims priority. Specifically, Petitioner does not identify any features, claims, or other information contained within the ’826 Patent that it asserts is not entitled to the priority date of the ’826 Provisional.

Because Petitioner has failed to carry its burden to both show that the Renken Provisional discloses the subject matter being relied upon and challenge the priority date of the ’826 Patent, the Petitioner has failed to show Renken’s disclosure of the CMC being located at the headend is prior art to the ’826 Patent. Therefore, the Petition fails to carry its burden to demonstrate a likelihood of prevailing on claim 1 because the Petitioner has failed to show Renken renders obvious “controlling the transmission of network management messages back to the headend.”

3. Renken Fails to Render Obvious the Other Challenged Claims
Because It Fails to Render Obvious Claim 1

Given the failure to render obvious independent claim 1, it is axiomatic that the Petition has failed to render obvious the other challenged claims—claims 2-4, 6, 8, 9—all of which ultimately depend on claim 1.

C. Ground 2: The Combination of Maycock with Kidambi Fails to
Render Obvious the Challenged Claims

Each of the next Grounds (2 and 3) also fail because of their reliance on Maycock, which discloses an architecture that is fundamentally different than the ’826 Patent. Specifically, Grounds 2 and 3 fail for at least three reasons.

First, claim 1 recites “digitizing said received signal to generate a digitized signal” because the “received signal” “carries a **plurality** of channels.” Ex. 1001, cl. [1b]-[1c]. Thus, in the “digitizing” step, a plurality of channels must be digitized. The proposed combination, however, is not capable of digitizing a plurality of channels because Maycock’s architecture is designed to select a **single** television channel and digitize that channel for transport. *See* Ex. 1006, 1:52-2:8. Given this, the proposed combination—either with Kidambi or Zhang—does not disclose or render obvious “digitizing said received signal to generate a digitized signal.”

Second, claim 1 recites “selecting a first portion of said digitized signal.” The Petition however maps this element to two components—demultiplexer **52** or splitter **59**—that do not perform the claimed element. Petition, 56-58. Demultiplexer **52** is arranged to distribute bits, not to select channels. Additionally, the Petition relies on a single bit of data that is not part of the received signal, but rather is generated at a remote channel selection site. *Id.*, 4:50-63, 6:2-7. As for splitter **59**, this component does not select anything and does not even deal with **digital** signals given it is located after a digital-to-analog converter. *Id.*, 6:12-14, Fig. 3. In sum, neither demultiplexer **52** nor splitter **59** (nor any amalgamation of them) meet this claim element.

Third, claim 1 recites “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, cl. [1h]. The Petition’s sole reliance on Maycock for this element is misplaced. Petition, 64-67. As an initial matter, claim 1 recites that all of the steps are performed by “one or more circuits of a receiver coupled to a television and data service provider headend via a hybrid fiber coaxial (HFC) network.” Ex. 1001, cl. [1a]. When analyzing element 1a, the Petition maps this element to “signal receiver **12**.” Petition, 50 (“Figure 1 of Maycock illustrates ‘video signal transmission headend **10** . . . provides analog video signals which are received . . . by a signal receiver **12**.’”) (alterations in original). But, when analyzing element 1h, the Petition maps this element to the “performance monitoring unit **20**” which is physically separate from signal receiver **12**. Ex. 1006, 3:2-16. The Petition fails to explain how functions performed by two physically separate units render obvious claim 1, where the claimed receiver is a single piece of equipment located at the customer premises. See Ex. 1001, Abstract, 1:44-55, 3:16-21. Therefore, the Petition fails to render obvious element 1h for this reason alone.

Additionally, Maycock does not disclose transmitting a measured characteristic, let alone a network management message, *back to the headend*. Maycock discloses transmitting only the selected, digitized *channel* to a *monitoring location*. See Ex. 1006, 1:31-44, 7:4-20. This is significantly different than the claimed invention of the ’826 Patent, and given this significant difference, the

Petition fails to demonstrate a likelihood that Maycock when combined with Kidambi (or Zhang) renders obvious the challenged claims of the '826 Patent.

1. Overview of the Asserted Prior Art

a. Overview of U.S. Patent 5,808,671 (Maycock)

According to Maycock, cable operators previously monitored the quality of their transmission by gathering data on amplifiers and other devices. Ex. 1006, 1:14-18. The data from those observations was returned to the cable operator along the same signal path as the outgoing signals, in the reverse direction. *Id.*, 1:18-23. Problematically, as cable systems switched to fiber optic delivery, the distances over which television signals were provided increased greatly, to 200 km or more. *Id.*, 1:45-50. This presented a significant problem because the return path, used to carry the prior art monitoring information, would have to be longer as well. *Id.*, 1:52-55. This additional length of the return path would lead to signal loss and degradation, especially for the analog signals used. *Id.*, 1:55-2:5. Thus, to make the conventional return path workable over long distances would be impractical: “[t]he cost to build a return path system . . . would equal that of the forward path, making the system prohibitively expensive.” *Id.*, 2:5-8.

Therefore, Maycock proposes a new two-location architecture—a channel selector location and a separate “monitoring location.” *Id.*, Fig. 1 and Figs. 2 and 3, respectively. Maycock intends to grab the signal at one location and transport it

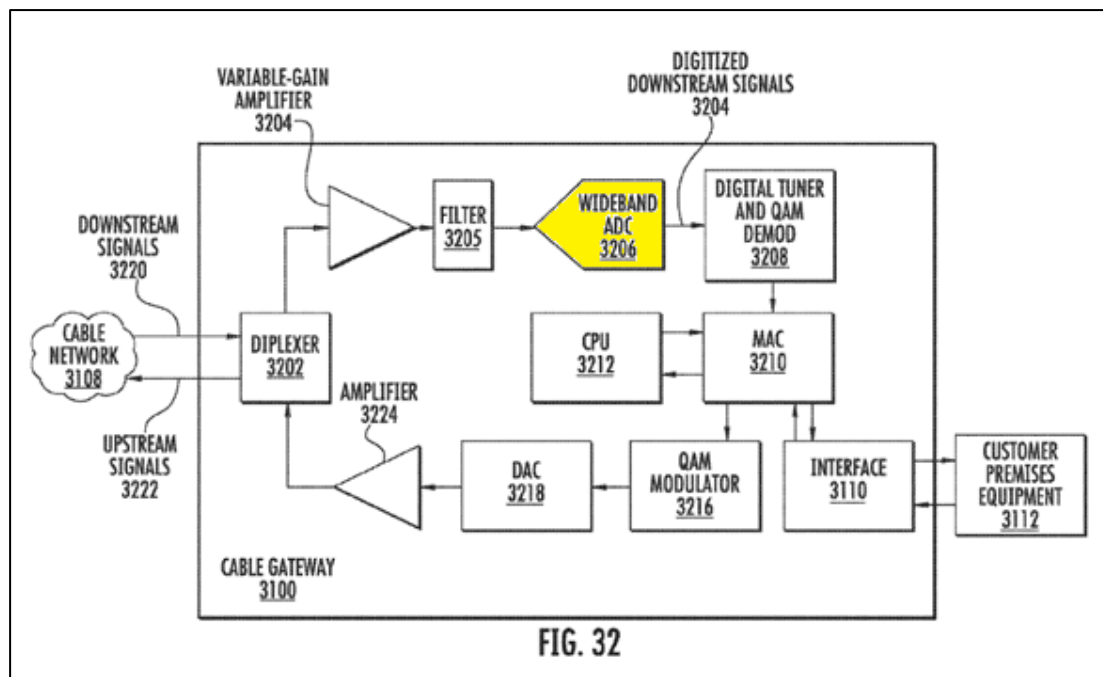
successfully to another location for monitoring. *Id.*, 3:9-16, Fig.1. Thus, Maycock's first location, somewhere remote from the cable headend, comprises a channel selector **14** with several functions, including selecting and repackaging of the received analog signal. *Id.*, 3:28-59. The channel selector chooses a television channel, processes, and digitizes that channel, and ultimately outputs the channel in digital form. *Id.*, 2:20-29. Maycock presumes that, unlike analog signals, the digital form will be amenable to long-distance transport. *Id.*, 3:57-59. The digitized channel is then transported to the second location, which is the "monitoring location." *Id.*, 3:14-16. At the monitoring location, the channel is converted back to its original analog form so it can be analyzed as if it is the original signal by hardware (*e.g.*, video analyzer **62**) displayed for visual observation on a video monitor by a human and tested as if it were the original. *Id.*, 2:25-30, 3:17-20, 7:4-20.

Thus, the premise of Maycock is how best to conduct signal analysis in a network over which signals are traveling great distances. *See* Ex. 1006, 1:52-2:8. To this end, Maycock discloses performing all signal monitoring in a centralized monitoring location that receives a single television channel that has been digitized for transport because Maycock discloses that digital signals are more amenable to transport over large distances. *Id.*, 3:17-23, 3:57-59. It is only upon arrival at the

monitoring location that the digitized channel is converted back to an analog channel so it can be viewed by humans and measured. *Id.*, 2:25-30, 3:17-23, 7:4-20.

b. Overview of U.S. Patent Publication 2010/0253557 (Kidambi)

Kidambi discloses a cable gateway that receives signals from a cable network and uses a wideband ADC **3206** to digitize the entire bandwidth of the cable system (the received signal). Ex. 1007, ¶¶ [0082]-[0084].

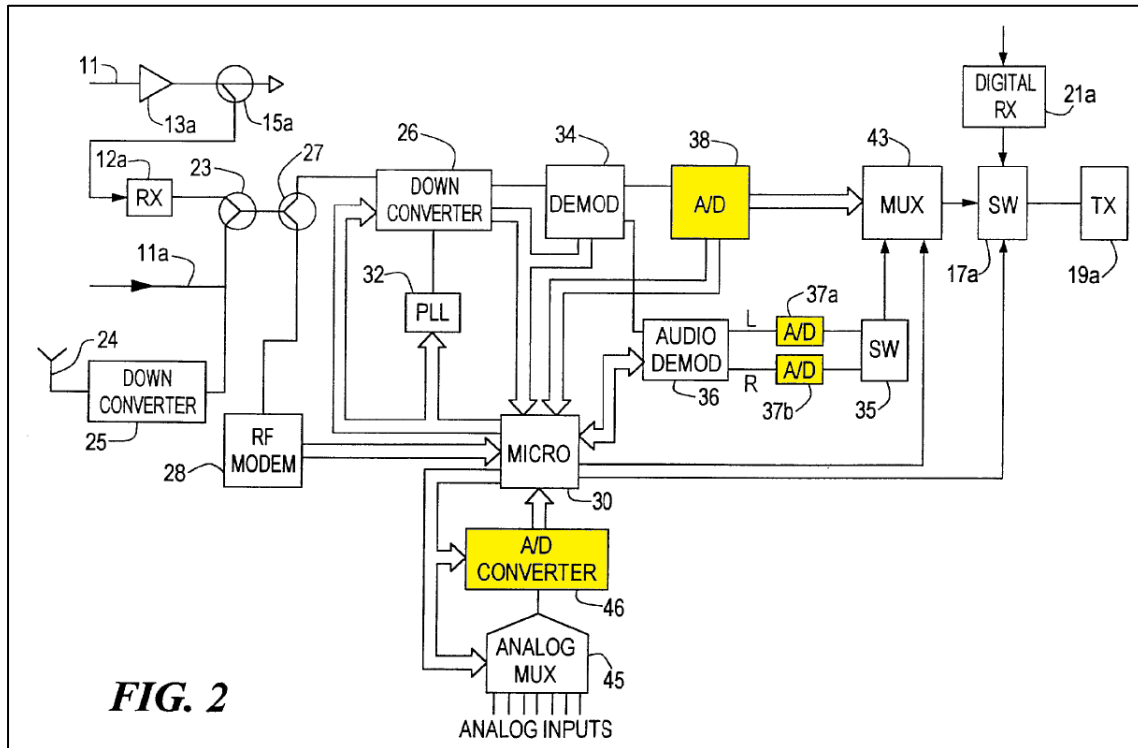


Ex. 1007, Fig. 32 (colorized).

c. Proposed Combinations

The Petition proposes a physical substitution of elements which “replace[s] Maycock’s ADC with Kidambi’s high-speed ADC to digitize the incoming signal more efficiently.” Petition, 56. The Petition, however, is not entirely clear which of

Maycock's ADCs will be replaced as Maycock discloses multiple ADCs as shown in Figure 2 below:



Ex. 1006, Fig. 2 (colorized). Additionally, even if all of Maycock's ADCs were replaced, the Petition fails to address the other components of Maycock that would need to be modified to accommodate Kidambi's high-speed ADC.

2. The Proposed Combination Fails to Render Obvious “Digitizing Said Received Signal to Generate a Digitized Signal”

The proposed combination does not disclose or render obvious “digitizing said received signal to generate a digitized signal.”

As required by element 1b, the “said received signal” is received “via said HFC network” and “carries *a plurality* of channels, wherein said channels comprise

one or both of television channels and data channels.” Petition, 51 (emphasis added). The Petition acknowledges that Maycock selects and digitizes a single channel at a time, not “a plurality of channels.” See Petition, 55-56 (“Maycock further teaches that channel selection & measurement **14**, also depicted in Maycock’s Figure 2 as channel selector **14a**, *selects an individual analog channel from the multi-channel input and outputs the analog channel to analog to digital convertors (ADC)* (e.g., ADCs **38**, **37a**, **37b**) for digitizing the channel.”) (emphasis added). Indeed, according to Maycock, “[t]he channel selection is made manually by an operator or automatically by a control computer (not shown) at the monitoring location.” Ex. 1006, 3:20-23. Channel selection in the remote location (as seen in Figure 2) is controlled by commands supplied to modem **28**. *Id.*, 4:9-12. The channel selection is performed by means of downconverter **26** controlled by a phase-locked loop, PLL **32**, which in turn determines the selected channel. *Id.*, 4:12-24. Accordingly, the output of down converter **26** is always a *single television channel*. This single channel output is digitized by Maycock at the A/D converter (“ADC”) **38** shown in Figure 2. Thus, Maycock fails to disclose digitizing a received signal comprising more than a single channel.

The Petition attempts to address this failure by alleging that a POSITA would find it obvious to simply replace the ADC of Maycock with an ADC capable of digitizing multiple channels from Kidambi. Petition, 56. Adding a “more capable”

ADC, however, does not automatically mean Maycock can digitize multiple channels when Maycock's architecture is designed to provide only a single selected channel to the ADC. Thus, Kidambi's ADC—although theoretically capable of digitizing multiple channel in the abstract—would not be able to digitize a plurality of channels of the received signal, as required by the '826 Patent, in the Petition's proposed combination because it would not receive a plurality of channels given that Maycock's architecture is intentionally designed to select and digitize a *single* channel at a time.

Furthermore, forcing the Maycock-Kidambi combination to be capable of selecting multiple channels for digitization would require extensive modifications to Maycock's existing working architecture. To begin, all of the disclosure in Maycock concerning the channel selector apparatus would have to be discarded and replaced (*e.g.*, PLL **32**, downconverter **26**, etc.) with an apparatus fit for a multi-channel system. Further, Maycock's entire channel control system (RF modems **28** and **72** and the channel selector) would need to be rearchitected into a multiple-channel system. Then, demodulator **34** would also have to be replaced with some new apparatus capable of performing demodulation on multiple channels simultaneously. Maycock is already concerned about properly matching the capabilities of the demodulator to the ADC, further dissuading the POSITA from radically altering the

architecture of Maycock with a new ADC and multiple channels. *See* Ex. 1006, 4:28-38.

The Petition deals with none of these details, waving its proverbial hands at the problem and concluding it would all be obvious. Accordingly, Petitioner's proposed modifications of Maycock are unsupported by any evidence, and the Petition fails to establish *prima facie* obviousness of the claims because of its failure to explain why a POSITA would go through extensive restructuring of Maycock to accommodate Kidambi's ADC. Moreover, the extensive modifications would change the principle of operation of the system disclosed in Maycock, which is a strong indication that there would be no motivation to combine the references as proposed in the Petition. *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App'x 755, 758–59 (Fed. Cir. 2015) (citing *In re Mouttet*, 686 F.3d 1322; *In re Ratti*, 270 F.2d 810). Therefore, the Petition has failed to demonstrate that this element is rendered obvious by the proposed combination.

3. The Proposed Combinations Fails to Render Obvious “Selecting a First Portion of Said Digitized Signal” Element

The proposed combination does not disclose “selecting a first portion of said digitized signal.” The Petition identifies two components that potentially select portions of the digitized channel: demultiplexer **52** and splitter **59**. Petition, 56-58.

Neither demultiplexer **52** nor splitter **59** (shown in Figure 3), however, are capable of selecting portions of a digitized signal that has multiple channels.

In Maycock, only a single television channel is disclosed as being provided to demultiplexer **52** and splitter **59**. Ex. 1006, 2:23-27. The demultiplexer breaks this digitized television channel into its video, audio and metadata components for separate analysis or usage. Specifically, the demultiplexer **52** operates on 10 bits of an input signal: it sends eight bits to the video digital-to-analog converter **54**, one bit to the audio digital-to-analog converter **56**, and one bit to the computer **58**. *Id.*, 6:2-7. The demultiplexer **52** does not operate at the level of selecting or demultiplexing channels because there is only one channel. *Id.*, 2:23-27.

Furthermore, the one bit sent to the computer is not part of the signal as received at the user equipment. It is metadata *about* the signal, specifically a 1-bit data stream that is generated at the remote channel selection site by microprocessor **30**. *Id.*, 4:50-63, 6:4-7. The microprocessor **30** creates this 1-bit of data based upon information it obtains during operation from the down converter **26**, PLL **32**, demodulator **34**, audio demodulator **36**. *Id.*, 4:50-5:03. This data bit is only provided to control computer **58** by the demultiplexer **52** while the video and audio bits are routed elsewhere to digital-to-analog converters to “reconstitute” the video signal. *Id.*, 6:2-7. Thus, this data bit is about the selected channel, but it is not the channel as received at the user equipment site.

Splitter **59** is even simpler to distinguish—it does not select anything because a splitter simply provides a mirror of the input on each output. Ex. 1006, 6:12-14. The splitter **59** sends its full analog input signal to each of four components shown in Figure 3, monitor **60** (*id.*, 6:14-15), video analyzer **62** (*id.*, 6:20-23), decoder **66** (*id.*, 6:38-41) and BTSC audio decoder **68** (*id.*, 6:45-47).

Moreover, splitter **59** does not deal in *digital* signals, as claimed. It is located in the signal path after the digital-to-analog converter **54**. *Id.*, Fig. 3. Therefore, it receives and operates entirely on *analog* signals; it simply has no digitized signal available to it. *See id.*, Fig. 3 (displaying splitter **59** after video D/A converter **54**). The claims of the '826 Patent recite the selection of channels from a *digitized* signal for monitoring and analysis. In contrast, splitter **59** is providing an *analog* signal, not a digitized one as in the claims. *Id.*, 6:9-14. In sum, neither demultiplexer **52** nor splitter **59** (nor any amalgamation of them) meet this claim element.

Finally, Kidambi cannot fix these problems with Maycock. First, as described above, the Petition is not clear what ADC in Maycock is being replaced by Kidambi's ADC. *See* Section III.C.1.c *supra*. Maycock only discloses ADCs as a part of the channel selector **14**. *See* Ex. 1006, Fig. 2, 2:60-65, 4:25-37. Therefore, if Kidambi is incorporated into the channel selector **14**, a POSITA would have to reconstruct everything after the ADC (in addition to everything before as described above in Section III.C.2 *supra*) because, again, Maycock's entire architecture is

designed to digitize and transmit a *single* channel, not an “M” number of channels as generated by Kidambi’s ADC. The Petition fails to address the significant changes that would have to occur in order for Maycock to digitize, transmit to the monitoring unit location, demultiplex, demodulate, and display multiple channels. Furthermore, the Petition fails to offer any motivation for a POSITA to make these significant changes to Maycock in order to accommodate the ADC of Kidambi.

Second, Kidambi does not disclose selecting individual channels for further processing. The Petition argues that Kidambi discloses this element because a “POSITA would recognize” that ADC 3206 “convert[s] an input signal to a set of M digital outputs as M values.” Petition, 58 (citing Ex. 1007, ¶ [0085], cl. 1). But the Petition is simply citing to Kidambi’s ability to digitize a received signal (*see* Ex. 1007, ¶ [0085]) using a plurality of ADCs. Ex. 1007, cl. 1. The Petition fails to explain (1) how the disclosure at Paragraph [0085] relates to claim 1 when it appears these are different embodiments, and (2) how simply digitizing a signal is a form of selection. Accordingly, the proposed combination as described in the Petition fails to disclose or render obvious this element.

4. The Proposed Combination Fails to Render Obvious the “Controlling the Transmission of Network Management Messages” Element

Claim 1 recites “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, cl. [1h]. The Petition’s sole reliance on Maycock for this element is misplaced. Petition, 64-67. Maycock—and thus the proposed combination—fails to render this element obvious for two reasons.

First, the Petition disregards that the claims require that the *receiver* controls the transmission of network management messages. Ex. 1001, cl. [1a], [1h]. The Petition identifies signal receiver **12** as the claimed receiver. Petition, 50. However, for element 1h, the Petition maps this element to components located at Maycock’s monitoring location. Petition, 64-67. According to Maycock, the signal receiver and monitoring location are physically separate. Ex. 1006, 3:2-16. Thus, the Petition has failed to demonstrate that the “controlling the transmission of network management messages” step of the method is performed by the claimed receiver.

Second, the Petition fails to identify any disclosure of Maycock where a measured characteristic, let alone a network management message, is transmitted *back to the headend*. The Petition attempts to rely on language from Maycock that the monitoring unit location can be at the headend to infer that the network management message is transmitted to the headend. See Petition, 66 (citing Ex. 1006, 3:14-16). As an initial matter, regardless of whether the monitoring unit location is at the headend or elsewhere, Maycock does not disclose transmitting a

network management message, rather Maycock discloses transmitting the selected channel for it to be monitored by human operators at the monitoring location.

If the monitoring location is not at the headend, Maycock fails to disclose this element because the monitoring location only sends channel select information, not a network management message. Maycock clearly discloses that human operators are at the monitoring location that are responsible for monitoring the signal and for channel selection. *See* Ex. 1006, 1:31-44 (“To obtain a true representation of the quality of a video signal, specific measurements must be undertaken on the baseband signal and ***confirmed by observation of an actual picture***”) (emphasis added). As a human is observing the actual picture, there is no need for network management messages to be sent to the headend because the human will take the necessary management action. Further reinforcing that a human is present at the monitoring unit location, Maycock discloses that “computer **58** has an input device **73** in the form of a keyboard or mouse, ***by which an operator can input instruction*** with the computer **58** identifying the video signal channel which is to be selected and the location at which the selection is to be effected.” *Id.*, 7:4-8 (emphasis added). The computer **58** then transmits a “channel selector control signal,” not a measured characteristic or a network management message, to the headend and, from the headend, the channel selector control signal is transmitted to channel selectors **14**. *Id.*, 7:8-20.

If the monitoring location is at the headend, Maycock would still fail to render obvious this claim element. It is impossible to transmit a network management message back to the headend if the monitoring unit—which according to the Petition generates the network management message—is also located at the headend. Furthermore, this reading of Maycock also conflicts with Maycock’s disclosures, which describes sending a multiplexed data stream, which is the single channel plus encoded information (the 10-bit stream), to the monitoring unit when it is located at the headend. *Id.*, 5:23-41, Fig. 2. Thus, Maycock does not transmit a network management message to the headend but rather the single digitized channel that is to be monitored.

In sum, the proposed combination as described in the Petition fails to render obvious claim 1 given the Petition’s reliance on the fundamentally different architecture of Maycock.

5. The Proposed Combination Fails to Render Obvious the Other Challenged Claims Because It Fails to Render Obvious Claim 1

Because the Petition fails to render obvious claim 1, the Petition’s analysis likewise fails to render obvious the other challenged claims as all of these claims ultimately depend from claim 1.

Therefore, the Petition has failed to demonstrate a likelihood of success that the proposed combination of Ground 2 would render obvious the challenged claims.

D. Ground 3: The Combination of Maycock with Zhang Fails to Render Obvious the Challenged Claims

For Ground 3, the Petition effectively treats Kidambi and Zhang as interchangeable because the Petition cites to its analysis in Ground 2, often with no adjustments specific to Zhang. *See* Petition, 70-74. Therefore, Ground 3 fails to demonstrate a likelihood of success for the same reasons as Ground 2. *See* Section C *supra*.

E. Objective Indicia in the Form of Failure of Others and Industry Praise Demonstrate the Non-Obvious Nature of the '826 Patent

There are objective indicia that the challenged claims of the '826 Patent are not obvious. That evidence includes the failure of others and industry praise for the claimed inventions. Specifically, the evidence shows that MaxLinear's competitors and standard-setting organizations failed initially to understand that they could leverage digitizing the entire received spectrum to support remote monitoring but then, after MaxLinear's invention, they uniformly adopted the inventive technology.

Near the date of invention, Broadcom had developed its version of Full-Spectrum Capture, which it called Full-Band Capture. *See, generally*, Ex. 2006. But it was only after the publication of the non-provisional application to which the '826 Patent claims priority that Broadcom understood it could leverage Full-Band Capture data to remotely monitor the downstream spectrum. *Compare* Ex. 2009, Cover (displaying a publication date of Mar. 14, 2013), *with* Ex. 2010, pp. 1, 6-7

(explaining in an October 2013 article authored in part by a Broadcom director that Full-Band Capture can turn a downstream device into a spectrum measurement tool). The fact that Broadcom failed to initially realize the possibility of remote spectrum monitoring only to later adopt the technology itself underscores the non-obvious nature of the claimed invention. *Apple Inc. v. Samsung Elec. Co., Ltd.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016) (en banc) (“Industry participants, especially competitors, are not likely to praise an obvious advance over the known art.”); *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1285 (Fed. Cir. 2000) (“when evidence in the record fully supports a finding that others in the industry failed to solve the problem, then objective considerations ‘may ... establish that an invention appearing to have been obvious in light of the prior art was not.’” (quoting *Alco Standard Corp. v. Tennessee Valley Auth.*, 808 F.2d 1490, 1500–01 (Fed. Cir. 1986))).

CableLabs followed a similar path, at first failing like Broadcom to recognize the possibility of remote spectrum monitoring, but then, after MaxLinear’s invention, adopting it as an industry best practice. As discussed above, in June 2011, CableLabs recommended a different method of proactive network maintenance, but five years later in 2016, CableLabs recommended using remote spectrum monitoring as a best practice. *Compare* Ex. 2008, *with* Ex. 2007. When the cable industry praised remote spectrum monitoring in this way, the cable industry was praising the

claimed invention, which is evidence that the claimed invention was non-obvious. *Apple*, 839 F.3d at 1053 (“Evidence that the industry praised a claimed invention . . . weighs against an assertion that the same claimed inventor would have been obvious.”).

These industry failures before the invention and industry praise afterward are “the direct result of the unique characteristics of the claimed invention.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373–74 (Fed. Cir. 2019). Here, there is a clear nexus between the characteristics of the claimed invention and the industry-recognized benefits of remote spectrum monitoring using Full-Spectrum Capture. An analysis, with reference to challenged Claim 10, follows.

As described in Section III.A, the inventors of the claimed invention of the ’826 Patent realized that Full-Spectrum Capture creates digital data when the received 1GHz downstream spectrum—which contained television and data channels—is digitized. Ex. 2005, 19:12-17, 20:23-21:3. Claim 1 recites that a method, in which, the steps are performed by a “receiver” that receives “a signal that carries a plurality of channels, wherein said channels comprise one or both of television channels and data channels” and digitizes “said received signal to generate a digitized signal.” Ex. 1001, cl. [1pre]-[1c].

Next, the inventors used the concept of a channelizer to select particular channels. Ex. 2005, 20:20-22:1. This concept is claimed as the receiver “select[s]

a first portion of said digitized signal” and “select[s] a second portion of said digitized signal.” Ex. 1001, cl. [1d]-[1e].

The inventors described that the channelizer can output a channel to a processor to recover the information carried in that signal, and then on a separate “channelizer path,” output a channel to a “monitoring function” that can measure the spectrum, power, or quality of the channel. Ex. 2005, 19:18-20:2, 20:20-22:14. This is claimed in the next two elements: “processing said selected second portion of said digitized signal to recover information carried in said plurality of channels” and “analyzing said selected first portion of said digitized signal to measure a characteristic of said received signal.” Ex. 1001, cl. [1f]-[1g].

For the final element, the inventors wanted “to provide information to the network about the quality of the signal that’s coming into the cable modem.” Ex. 2005, 19:15-17. This is how the specification of the ’826 Patent describes the “network management message” recited in claims 1 and 10. Ex. 1001, 3:60-4:2 (describing generally that the “monitoring module may control the transmission mission of network management/maintenance messages . . . [that] may comprise, for example, network status updates” regarding the signal received by the device **150**, i.e., the receiver). Thus, the way the claimed invention provides information about the quality of the signal being received at the receiver is through “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, cl. [1h]. Thus, the claimed invention of the ’826 Patent shares a nexus with remote spectrum monitoring that leverages Full-Spectrum Capture, which was the subject of failures by others and, later, industry praise.

IV. CONCLUSION

At bottom, there is clear objective indicia that the claimed invention is a non-obvious improvement over the prior art. When this evidence is weighed against the fundamentally flawed obviousness arguments advanced by the Petition, it is clear that the Petition has failed to demonstrate a reasonable likelihood that the Petition will prevail on a single claim. Therefore, institution should be denied under 35 U.S.C. § 314(a).

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Certification of Word Count Under 37 C.F.R. § 42.24(d)

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CERTIFICATE OF SERVICE

I hereby certify that on May 28, 2024, a true and correct copy of the foregoing was caused to be served on the following counsel of record for Petitioner by electronic mail at the following addresses:

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