

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

CASE: IPR2024-00444
U.S. PATENT NO. 10,135,682

PATENT OWNER'S PRELIMINARY RESPONSE

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TABLE OF PATENT OWNER'S EXHIBITS

Exhibit No.	Description
2001	Defendants' Joint Responsive Claim Construction Brief (Dkt. 332) <i>Entropic Communication, LLC. v. Comcast Corporation, et al.</i> , Case 2:23-cv-01050-JWH-KES (C.D. Cal.)
2002	Declaration of Dr. Sandeep Chatterjee Regarding Claim Construction, <i>Entropic Communication, LLC. v. Comcast Corporation, et al.</i> 2:23-cv-01050-JWH-KES (C.D. Cal.)
2003	Post-SAS-Office-Guidance

I. INTRODUCTION

Patent Owner, Entropic Communications, LLC (“Entropic” or “PO”), submits this Patent Owner Preliminary Response pursuant to 37 C.F.R. § 42.107(a) to the *Inter Partes* Review petition (“Petition”) filed by Comcast Cable Communications, LLC (“Comcast” or “Petitioner”) for claims 1-18 (the “Challenged Claims”) of U.S. Patent 10,135,682 (the “’682 Patent”). The Board should deny institution.

Cable operators are faced with a number of issues and goals in managing cable modems across a given section of a network. Optimal utilization of cable television networks is one of those goals, yet cable networks are not uniform in their capacity at any given time. *E.g.*, ’682 Patent, 1:56-57. A cable modem termination system (“CMTS”) is part of a cable operator’s network infrastructure, serving cable modems at customer premises to provide connections to the network and on to the internet. A CMTS may manage hundreds or even thousands of cable modems located at subscribers’ premises, all of which would experience unique and varying signal/channel strengths and network conditions. Prior art systems were simple in their approach to physical layer parameters: they assigned parameters to a group of modems that could be supported by the worst-performing modem in the group (the “lowest common denominator”). *See* ’682 Patent, 5:46-57.

The ’682 Patent discloses systems and methods to avoid the “lowest common denominator” problem that prevented service providers from achieving faster and

more reliable network performance in the past. Specifically, the patent teaches a way of grouping cable modems according to SNR-related metrics (which indicate channel quality) and tailoring physical layer communication parameters (such as the number of bits that can be sent in a frame) to each group. The '682 Patent discloses that the CMTS manages this grouping, which determines an SNR-related metric for cable modems ("CMs") served by the CMTS, assigns CMs to a service group based on an SNR-related metric, generates a composite SNR-related metric corresponding to each service group that is based at least in part on a worst-case SNR profile, selects physical layer communication parameters for service groups based on the composite SNR-related metrics, and then communicates with the CMs in the service groups using those selected communication parameters. Unlike the inefficient and wasteful techniques of the past, the invention of the '682 Patent permits communication with CMs that is designed to optimize throughput and minimize unused headroom.

Petitioner, however, asserts prior art across two different IPR Petitions that either uses the same inefficient and wasteful techniques of the past or has nothing to do with the subject matter of the '682 Patent. In this Petition and in the "lower-ranked" one in IPR2024-00445, Petitioner attempts to bring its stale references forward, and to stitch its unrelated references together, with hindsight alone, but even then, Petitioner still fails to appreciate or explain why or how a POSITA would be motivated to make the extensive changes it suggests. Perhaps relatedly, Petitioner

also fails to accurately describe the cited references and thus fails to address the stark differences between the cited references and the requirements of the challenged claims of the '682 Patent.

The problems with Petitioner's references are common across its two Petitions: its primary references (Cooper and Prodan here; Thibeault in -445) are focused on assignment of cable modems to "logical channels" based modems' individual characteristics, and its secondary references (Saey and Gross here; also Cioffi in -445) are focused on characterization of portions of available bandwidth for communication with a single DSL modem on a twisted-pair communication line. None of these references recognized the problem that the '682 Patent recognized or solved it with the methods and systems recited in the '682 Patent claims. For example, the instant Petition is deficient in at least the following ways:

- In Ground A, Petitioner misrepresents what the Cooper and Saey references disclose. It is not true that Saey teaches "selecting the worst-case or lowest SNR of *the CMs [cable modems] in a group.*" *E.g.*, Petition, 19. Saey addresses the grouping of frequency bands—called *carriers*—used for communication with a *single DSL (not cable)* modem. Petitioner fails to address this entirely different point of view

in its analysis of [1D]¹ or its argued motivation to combine. Instead of tackling the difference in approach between grouping carriers (for one modem) versus grouping modems, Petitioner avoids the issue altogether. In fact, Petitioner does not even include a summary of Saey or otherwise disclose to the Board that the reference is a DSL modem reference. Likewise, it is not true that Cooper's CMTS makes a "selection of an optimal physical layer communication parameter (*e.g.*, modulation order)." *E.g.*, Petition, 20. Cooper discloses selection of modulation order by a human cable operator, applying his or her discretion, not selection by a CMTS. Petitioner does not and cannot explain how Cooper meets [1E], which requires that selection be made "by said CMTS."

- Also in Ground A, Petitioner fails to put forth a cognizable motivation to combine that addresses the many distinctions between Cooper and Saey (some of which are discussed above), none of which Petitioner addresses, and all of which a POSITA would have to overcome to apply the teachings of Saey to Cooper.

¹ See Petition, 84-88 for the shorthand convention used by the Petition, reflected in this Preliminary Response.

- Ground B swaps a different secondary reference into the same basic argument as put forth in Ground A. This reference, Gross, has the same substantive problems as Saey because, like Saey, it is a DSL modem reference that has nothing to do with groups of modems, let alone cable modems. Petitioner appears to be citing Saey and Gross solely because a presumed word search identified the phrase “worst case” in both references. Regardless, Ground B fails for similar reasons as Ground A.
- Grounds G and H mirror Grounds A and B, swapping out Cooper for Prodan but still proposing modification with the insufficient Saey or Gross. These Grounds are even more deficient than Grounds A and B, however, because Prodan was already considered by the Patent Office during the prosecution of the '682 Patent. What the Examiner found that Prodan lacked is also lacking in Saey or Gross as noted above relating to Grounds A and B.
- Grounds C through F and I through V are essentially backup Grounds, all of which incorporate the same proposed combinations and references of Grounds A, B, G, and H, shown to be insufficient above and in more detail below. These backup Grounds fail for the same reasons.

- The Petition should also be denied for having excessive Grounds, which exceed the number of challenged claims and lack particularity on the differences among them, and which in large part Petitioner treats as essentially the same, swapping Cooper for Prodan and Saey for Gross at will. The Petition’s excessiveness and lack of particularity is compounded by the fact that this is only one of two petitions filed against the ’682 Patent, the other being filed in IPR2024-00445. Both should be denied.

In sum, each Ground fails to render obvious the claimed “generating” [1D] and “selecting” [1E] elements of independent claim 1 (mirrored in [10E] and [10F] of independent claim 10). Accordingly, the Petition fails to articulate a *prima facie* case of obviousness for all challenged claims of the ’682 Patent.

Because all of the grounds fail to render obvious the independent claims of the ’682 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 ’682 PATENT

A. Background of the ’682 Patent

A common measure of cable network channel performance is signal-to-noise

ratio (“SNR”), or a variety of SNR-related metrics in either the analog or digital domain. Higher SNR (more signal than unwanted noise) means better channel performance and enables a provider to utilize more demanding physical layer communication parameters for faster or more efficient communication between the provider and customer equipment. On the other hand, lower SNR is characterized by more noise compared to the signal and would result in lower channel performance, more disruption of the signal, and consequently a requirement for use of less demanding (*i.e.*, less efficient or “slower”) physical layer communication parameters.

Traditionally, a cable operator may have used the same physical layer communication parameters for all of the cable modems served by a given CMTS, which would require the cable modems capable of better performance to be slowed down by use of parameters that are usable by the worst performing cable modems. *E.g.*, ’682 Patent, 5:53-6:2. For example, in system where a CMTS serves three modems, if one modem had sufficient channel quality to support a more demanding communication parameter (*e.g.*, 64-QAM on a hypothetical channel *z*), but the other two only had sufficient channel quality to support a less demanding communication

parameter (e.g., 16-QAM on channel z (a 50% less efficient² modulation scheme than 64-QAM)), all three would be forced to use 16-QAM on channel z. *Id.*, 5:58-64. This still may leave a great deal of unused headroom for the best performing cable modems (which may result in slower service for some subscribers who could otherwise receive faster service). The '682 Patent provides a method for CMTS management of cable modems allowing more precise, granular usage of physical layer communication parameters tailored to the modems' actual performance capabilities and makes use of otherwise wasted headroom in the modems' communication band with the CMTS.

Thus, the '682 Patent describes systems and methods for service group management in a cable television network whereby a CMTS determines SNR-related metrics of cable modems and assigns cable modems to service groups. Then for a given service group, the CMTS generates a composite SNR-related metric and uses it to select physical layer communication parameters for the service group. *See* '682 Patent, Abstract, 1:66-67; 4:40-67; *see also id.*, 5:5:27, 5:46-57, FIG.3A. The flow chart of Figure 3A describes, in part, the solution described above.

² 16-QAM provides 4 bits per symbol, whereas 64-QAM provides 6 bits per symbol, a 50% increase over 16-QAM.

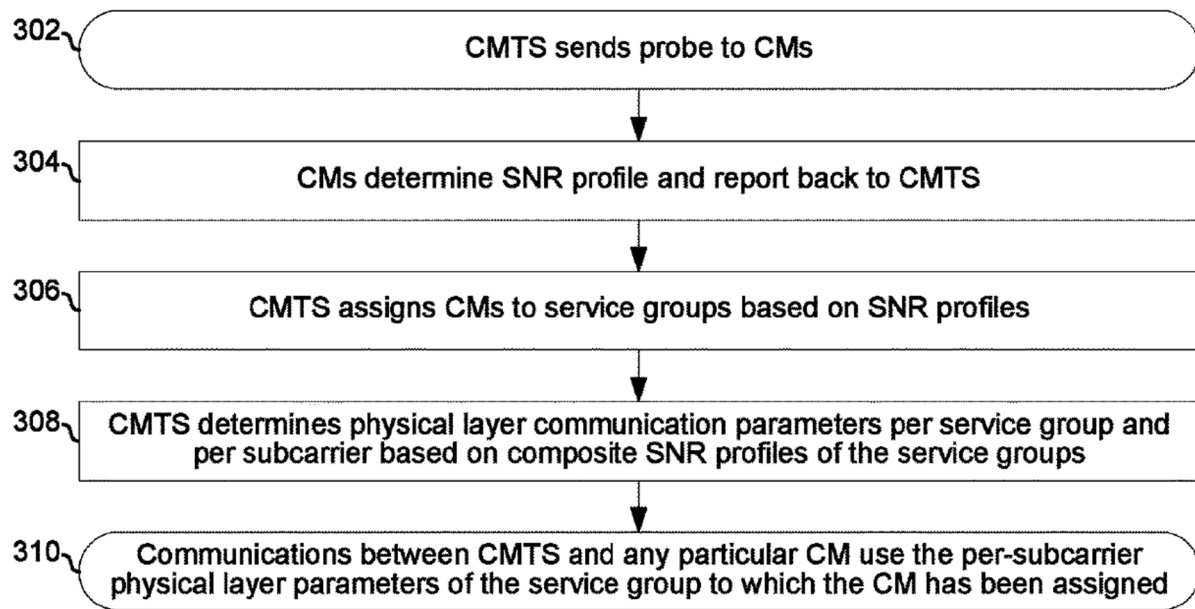
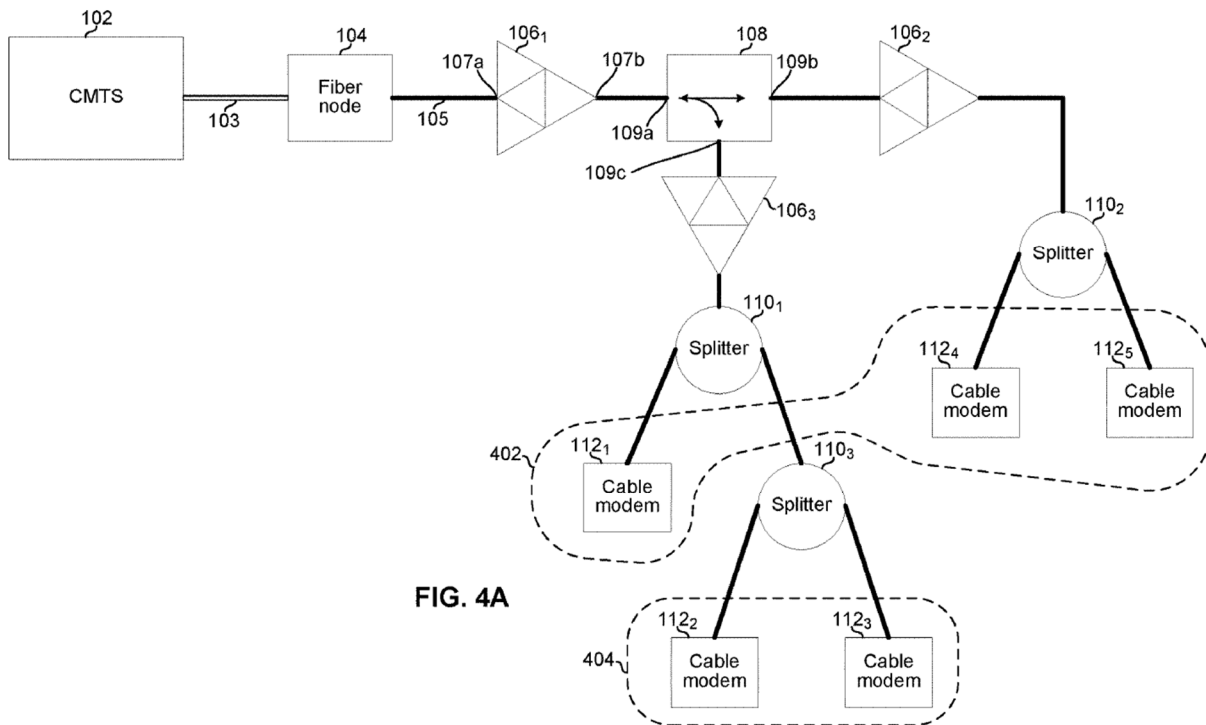


FIG. 3A

This inventive method configures the CMTS to treat cable modems in terms of their performance capabilities (i.e., how “good” or “poor” the channel conditions are from the CMTS to the cable modem). Thus the ’682 Patent recognizes that physical topology of the connection(s) may take a back seat to the actual, measured performance of the connection. This idea is illustrated in, e.g., Figure 4A, which shows cable modems grouped into group **402** and group **404** decided on the basis of connection performance, *without* regard to their location in the physical topology:



Id., Fig. 4A.

One illustration of an SNR versus frequency graph for an exemplary HFC network is shown in Figure 2B and uses eight channels/subcarriers (listed as sub1-sub8):

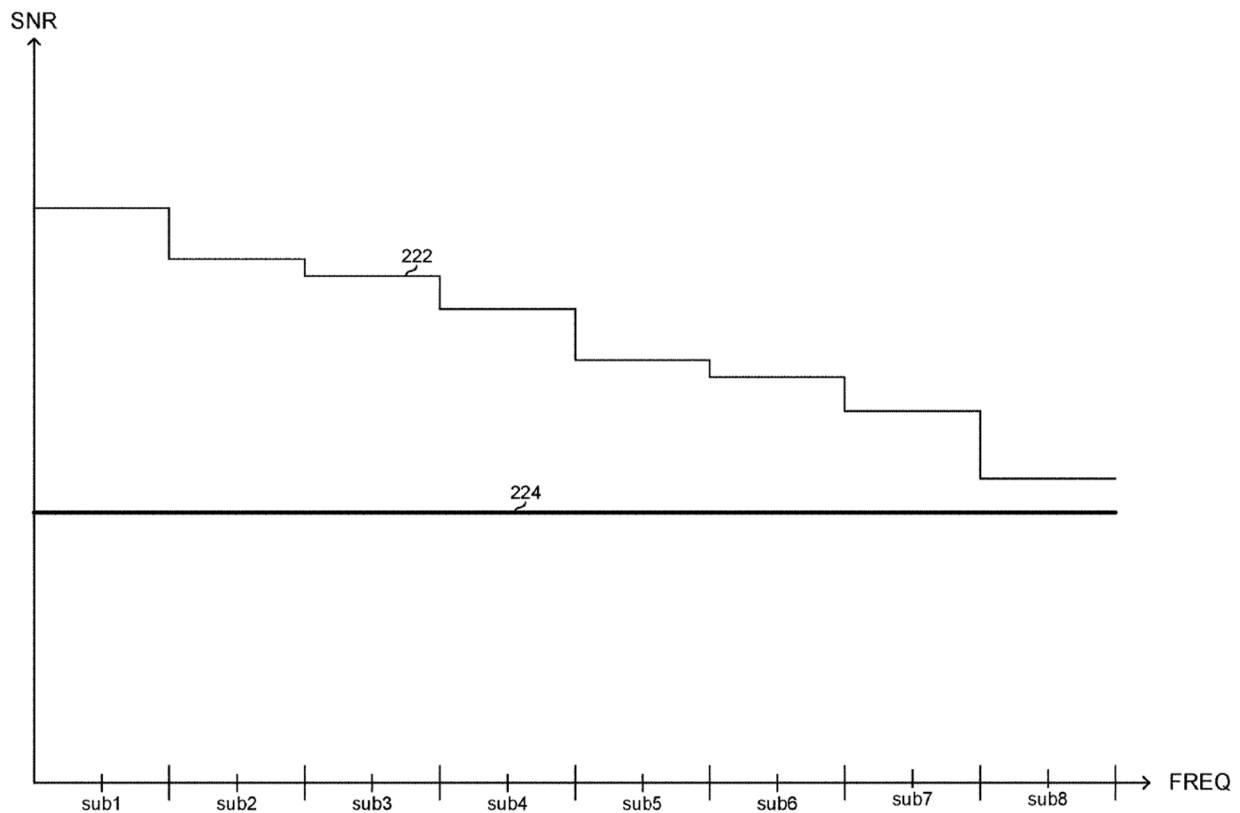


FIG. 2B

'682 Patent, 4:6-8, Fig. 2B. Here, line 222 (a “profile”) represents an indication of available SNR across the eight different subcarriers (sub1 to sub8) for one or more CMs in the HFC network. *Id.*, 4:9-20. Line 224 represents the SNR level required for successful communication with the cable modem(s), given a certain set of modulation parameter choices. If the CMTS sets parameters so that the required SNR 224 is below the SNR available 222 for all subcarriers, successful communication with the cable modem(s) is expected. *Id.*, 4:20-24. However, as the '682 Patent observes, setting line 224 (by setting the associated communication parameters like modulation) uniformly is wasteful. This approach underutilizes the

available SNR of the channels, particularly (in this example) at channels on the left side (e.g., sub1-sub4).

Figure 2C illustrates a more-optimal way of communicating with CM(s) having the same SNR profile 222:

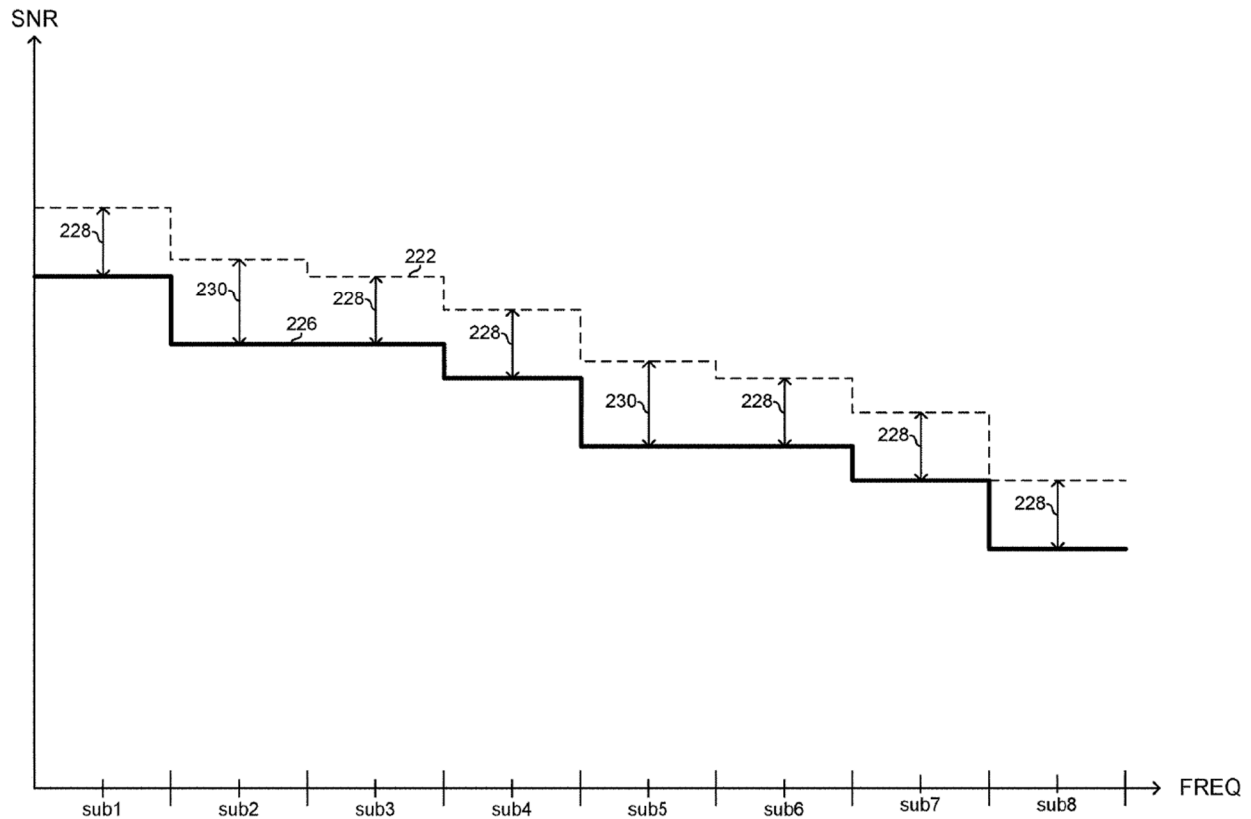


FIG. 2C

'682 Patent, Fig. 2C. Here, like in Fig. 2B, line 222 represents the applicable SNR profile for one or more CMs in an HFC network that uses eight channels/subcarriers (sub1-sub8). *Id.*, 5:7-12. Also like in Fig. 2B, solid line 226 represents the SNR

utilized by a given choice of communication parameters. *Id.*, 5:13-15. Now, however, the parameters are chosen for less waste:

Assuming the distance 228 is the minimum desired headroom, then the physical layer communication parameters resulting in line 226 are nearly optimal in the sense that there is minimal headroom on each of channels/ subbands 1, 3, 4, 6, 7, 8, and only slightly more than minimal headroom on channels/subbands 2 and 5.

Id., 5:15-21. That is, the parameters for each channel/subband (sub1-sub8) can be set differently, to more closely match the potential carrying capacity of the channel with the CM(s). Some headroom is built in as a margin of safety, but the physical communication parameters are now set to take better advantage of the available SNR for each subband. In this way, more data can be transferred over the same physical channel(s).

The '682 Patent also discloses that the above optimization may be performed for groups of cable modems called service groups. Cable modems, such as those sufficiently similar in performance (*e.g.*, having similar available SNR), may be treated as a group, with physical communication parameters assigned to the group. This concept starts with sorting cable modems served by a CMTS into one or more groups, called service groups. *Id.* 4:52-56. Once service groups are established, the CMTS selects appropriate physical communication parameters for each group, which are then used for communications between CMTS and the CMs of the group.

Claim 1 of the '682 Patent captures these concepts:

1. A method comprising:
determining, by a cable modem termination system (CMTS), for each cable modem served by said CMTS, a corresponding signal-to-noise ratio (SNR) related metric;
assigning, by said CMTS, each cable modem among a plurality of service groups based on a respective corresponding SNR-related metric;
generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups;
selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric; and
communicating, by said CMTS, with one or more cable modems corresponding to said one of said plurality of service groups using said selected one or more physical layer communication parameter.

Ex. 1001, cl. 1. Claim 1 is understood most easily as representing two classes of CMTS steps. The first class, represented by the first two elements, is about the CMTS assigning modems to groups. In [1B]³ the CMTS characterizes the

³ This Preliminary Response tracks Petitioner's mapping of shorthand references to the steps and elements of the challenged claims. *See* Petition, 84-88. Petitioner maps the preamble of claim 1 to "[1A]," therefore, following Petitioner's convention, the "determining" step of claim 1 is "[1B]."

communication link with cable modems it serves by determining an SNR related metric. In [1C] the CMTS sorts the cable modems into service groups based on channel quality (indicated by the SNR-related metric).

The second class is represented by the remaining three elements, where the CMTS works at the service group level. In [1D] the CMTS generates for each service group a composite SNR-related metric for that group. The CMTS uses this metric to select physical layer communication parameter(s) for the service groups in [1E]. And in [1F] the CMTS and one or more CMs in that group communicate using the selected parameters. Claim 10, the other independent claim, recites a system with similar elements as claim 1, but further includes additional elements required by that system. *Compare id.*, cl. 10 *with id.*, cl. 1.

B. Claim Construction

The Petition was filed after November 13, 2018, and, as such, the proper claim construction standard to be applied is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), in accordance with its regulation, 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).

Petitioner does not contend that any terms should be given a specific construction. Petition, 11. Because none of Patent Owner's arguments below turn

on a specific construction of any terms, Patent Owner agrees that all terms should be given their ordinary and customary meaning at this stage of the proceedings.

III. THE PETITION FAILS TO SHOW THAT THERE IS A REASONABLE LIKELIHOOD THAT THE PETITIONER WILL PREVAIL ON A SINGLE CLAIM

Each of Petitioner's Grounds (A through V) rest upon references having different principles of operation and different architectures than those claimed in the '682 Patent. Petitioner's proposed combinations and motivations to combine also make little sense and are accompanied by little substantive explanation. Petitioner and its expert, Dr. Kiaei, try to hide this by long, confusing paragraphs about the proposed combinations, but word count cannot cure the lack of substantive technical explanation. For the number of reasons explained below, Petitioner has failed to meet its burden on any of the many Grounds it asserts.

A. Ground A: The Proposed Combination of Cooper-Saey Fails to Render Obvious the Challenged Claims

Petitioner's proposed combination in Ground A of Cooper and Saey fails to demonstrate a likelihood of success for at least four reasons, each of which will be briefly mentioned before a detailed treatment in subsequent sections.

First, Petitioner concedes that Cooper does not disclose the "generating" step of claim 1 of the '682 Patent, and thus relies entirely on Saey for those elements. But unmentioned by Petitioner is that Saey is an entirely different field of art

(modem to modem DSL) and does not group modems or deal with groups of modems at all. Saey is based on the well-known twisted-pair (DSL) modulation technique that divides a communications channel running between two network elements (like modems) into portions of allocated bandwidth called “carriers.” Saey teaches selection of *carriers* on a communication channel, not grouping of modems. And Saey is a point-to-point architecture with communication between only two DSL modems. These are not *cable* modems nor is the point-to-point architecture applicable to a one-to-many architecture with some communication hub (like a CMTS) communicating with modems that it serves.

Thus, contrary to what Petitioner and its expert Dr. Kiaei contend, Saey *does not* teach selection of a worst-case SNR of *cable modems (CMs)*. Whether purposeful or accidental, this error results in a blind spot preventing Petitioner from demonstrating that a POSITA would consider Saey’s methods to choose physical carriers in a communication band to be applicable to groups of cable modems or why a POSITA would be motivated to combine a reference that discusses groupings of carriers (Saey) with a reference that discusses groupings of modems (Cooper). Petitioner and Dr. Kiaei are wholly silent on those critical points, and thus the Petition fails to meet Petitioner’s burden.

Second, no reference discloses key parts of [1D]. Petitioner responds by all but ignoring the corresponding claim language altogether. Petitioner and Dr. Kiaei

argue that Saey’s single worst-case SNR value for a group of carriers satisfies the claims but never explain how that value meets the claim’s requirement of a “*composite* SNR-related metric based at least in part on a worst-case SNR *profile of said SNR-related metrics*.” Petitioner cannot meet its burden by ignoring the words “composite” and “profile.”

Third, Petitioner and Dr. Kiaei are in error about Cooper’s disclosure relating to [1E]. Both assert that Cooper’s CMTS selects modulation profiles for its logical channels, but Cooper contemplates only manual selection of modulation profiles by a human cable operator, not by the CMTS. Because Petitioner misstates Cooper’s disclosures, Petitioner fails to address why a POSITA would consider Cooper’s disclosure to read on “selecting, by said CMTS, one or more physical layer communication parameter” as required by [1E] or why a POSITA would be motivated to combine Saey’s teachings with the manual-selection process of Cooper. Equally problematic is Petitioner’s silence on how the “worst-case” metric from Saey could inform selection of modulation profiles, since the purported selection in Cooper occurs only by human hand. Petitioner and Dr. Kiaei say nothing about those critical points, and thus fail to meet Petitioner’s burden.

Fourth, Petitioner fails to assert a motivation to combine that would address the critical differences between Saey and Cooper. For example, Petitioner fails to address the difference in the locus of control: in Saey, a modem determines which

carriers to select for that modem, at that modem; in Cooper the control occurs on the infrastructure side of an operator, namely at the CMTS where the user interface and corresponding human selection of modulation are located. As another example, Petitioner also fails to address that Saey and Cooper operate in different network architectures and topologies, with Saey being a point-to-point DSL DMT reference and Cooper being a central hub (CMTS) cable network/DOCSIS reference. In all, Petitioner fails to address at least *five* extensive modifications⁴ a POSITA would have to make to the cited references to come to the proposed combination, none of which are suggested by the prior art, and all of which come from the conclusory, hindsight-based testimony of Dr. Kiaei. The Board should disregard the conclusory, gap-filling testimony of the Kiaei Declaration on this and other points.

1. Overview of the Asserted Prior Art

Petitioner does not provide an overview of Cooper, Saey, or any of its cited prior art.⁵ This omission critically undermines the Petition, especially as to its secondary references Saey and Gross, because the prior art does not disclose what

⁴ See pages 35-36, *infra*.

⁵ Petitioner only relies on improper incorporation-by-reference of Dr. Kiaei's Declaration in a preliminary table in the Petition. See Petition, 7 (citing to "Discussion in Expert's Declaration").

Petitioner says it does, and the proposed combinations are made of prior art that have little to do with each other. For Saey, Petitioner fails to inform the Board that Saey: (1) makes its determinations for carriers (i.e. portions of communication channels), not cable modems, (2) is a DSL DMT reference dealing with telephony communication between two DSL modems, not a cable/DOCSIS reference dealing with a networking device (CMTS) communicating with multiple endpoints (CMs); and (3) makes its determinations at the modem, not at a CMTS (including because, as a DSL reference, it does not have a *cable* modem termination system). For Cooper, Petitioner fails to explain that Cooper discloses only manual selection by a human operator of modulation parameters for communicating over logical channels. The references and their proposed combination thus fail to disclose or render obvious multiple elements of the challenged claims. To put these failings into context, and to provide the Board that which Petitioner did not, a brief overview of the references follows.

a. Overview of Cooper (Ex. 1005)

Cooper utilizes the well-known concept of logical channels in a network. *See* Cooper, [0002]. Cooper's logical channels are constructs used in upstream communications from modems to a CMTS, and multiple of these upstream logical channels can be abstracted onto the same physical channel. *Id.*, [0005]; *see also id.* ("DOCSIS 2.0 introduced this concept"); Ex. 1023 (DOCSIS 2.0) at 17 (defining

“Logical (Upstream) Channel” as “A MAC entity identified by a unique channel ID and for which bandwidth is allocated by an associated MAP message. A physical upstream channel may support multiple logical upstream channels. The associated UCD and MAP messages completely describe the logical channel”). Cooper bemoans the manual grouping and assignment process of logical channels in the prior art and touts “an automated process to determine logical channels using network elements (such as MTAs or cable modems) in conjunction with measurements made at the headend, via a CMTS device.” Cooper, [0007]. But not all of Cooper is an “automated process,” especially not what is depicted in Figure 6, upon which Petitioner heavily relies. Specifically, Cooper does not automate the selection of physical layer communication parameters (*i.e.*, modulation profiles), which requires human intervention at the outset before cable modems are assigned to logical channels. *See id.*, Abstract, [0021], [0036], and [0037].

Figure 6 of Cooper illustrates “an exemplary panel display from a computer operation associated with the invention,” which “may be used by an operator to configure logical channels.” *Id.*, [0018], [0032]. The corresponding Figure 3 from the Cooper Provisional, as annotated by Petitioner, is reproduced below, and Figure 6 from Cooper (with element numbers and annotated by Patent Owner) is below that.

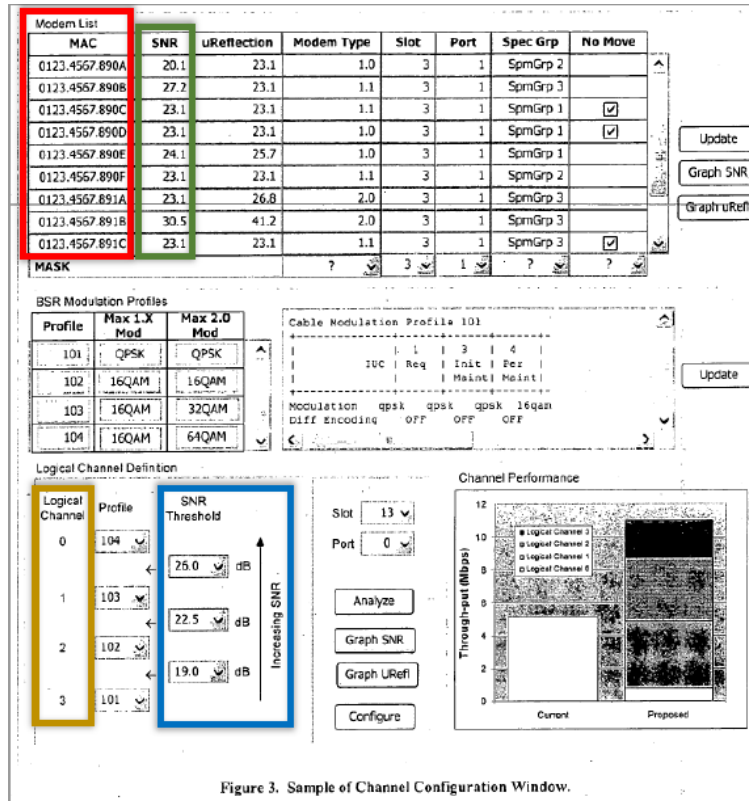


Figure 3. Sample of Channel Configuration Window.

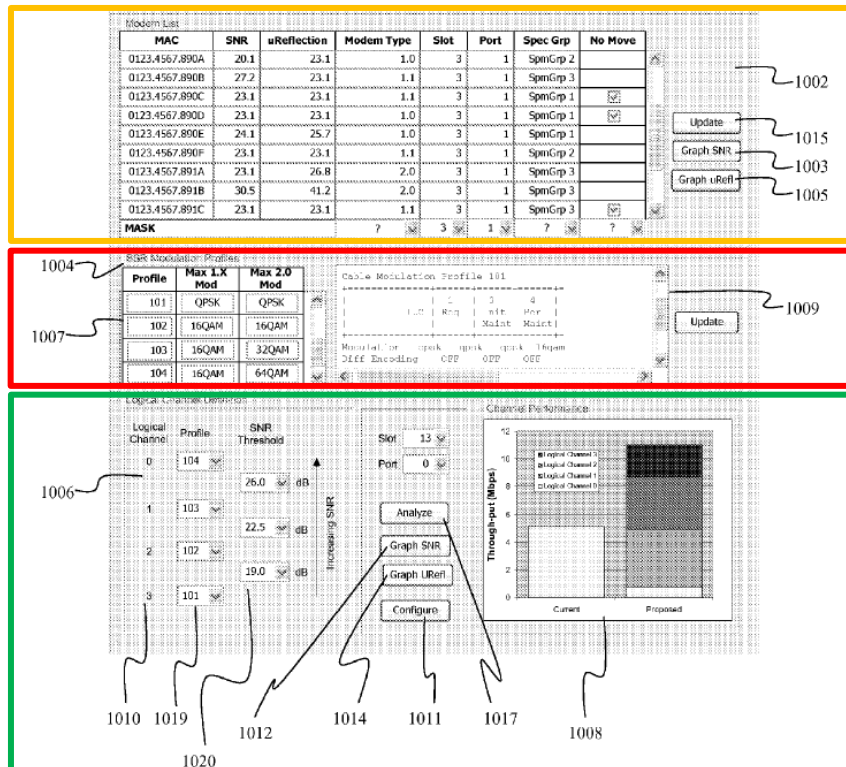


Fig. 6

Figure 6 from Cooper (shown immediately above) depicts a “three-panel window” split into thirds, horizontally. The top third (orange box) depicts “a sorting of network element [sic] by various parameters 1002.” The middle third (red box) depicts the “profile/channel parameter definitions,” which includes the Modulation Profile display 1004. The bottom third (green box) is the “logical channel definition/performance display.” *Id.*, [0032].

While certain portions of the Logical Channel performance display 1002 and the Logical Channel Definition display panel 1006 are described as permitting automation (*id.*, [0033], [0039]-[0040]), this automation is only of the parameter thresholds, not communication parameter selection or Modulation Profile display panel 1004. Instead, it is up to the human operator “to configure various profile configuration templates which may later be assigned to an individual logical channel.” *Id.*, [0036]. There are no disclosures in Cooper of anything other than the human operator making any selection in the Modulation Profile display panel. There are also no disclosures in Cooper of anything other than the human operator making any selection of the modulation profiles 1019 in the Logical Channel performance display 1002—in fact, as depicted in Figure 6, those modulation profiles are manipulated by mouse clicks on a drop-down menu of potential modulation profiles per the gray down-facing arrow next to the profile numbers shown.

b. Overview of Saey (Ex. 1007)

Saey is a Digital Subscriber Line (DSL) reference relating to twisted-pair telephony communication, point-to-point between two DSL modems, utilizing traditional discrete multi-tone modulation, or DMT, which is “a multiple carrier technique that divides the available bandwidth of a communications channel” between two modems “into a number of sub-channels, also referred to as carriers or bins.” Saey, [0003]. According to Saey, these increased number of carriers comes with an increased need for memory on-board each modem “to store the parameters relating to each individual carrier.” *Id.*, [0004]. Additionally, a long processing time is required to initialize a modem utilizing multiple individual carriers due to the increased number of parameters required. *Id.*, [0005].

Saey therefore seeks to relieve a modem of its burden by decreasing the memory needed to store parameters for that modem and to decrease the initialization time. *Id.*, [0005], [0007]. Saey’s solution is “grouping carriers” into “multiple carrier groups.” *Id.*, [0009]. Grouping slashes the number of parameters needed by applying certain parameters to an entire group of carriers, thus eliminating the need for a parameter for every individual carrier. In Saey’s words, the advantage is “a parameter relating to the carrier group rather than to each individual carrier in the carrier group.” *Id.*, [0010]. Among many possibilities, in one embodiment, this carrier-group-wide parameter may be “the worst case signal-to-noise ratio (‘SNR’)

for the specified carrier group.” *Id.* Saey also decreases startup time because initialization is easier with fewer parameter values to handle. *Id.*, [0014].

Importantly, Saey does **not** disclose grouping of cable modems or any other network elements. Saey works on carriers—portions of a communication band. Saey is different to both Cooper and the ’682 Patent in almost every conceivable way:

- **Field:** Saey does not involve cable networks, it is DSL;
- **Architecture:** Saey does not have the topology of a central controller like a CMTS, it is single modem-to-single modem;
- **Approach:** Saey does not deal with groups of modems, only with grouping carriers;
- **Problem and Solution:** Saey is not concerned with improving utilization or capacity of channels, but rather with decreasing memory and initialization time for a modem.

2. The Proposed Combination Fails to Render Obvious the “Generating” Step [1D]

Claim 1 of the ’682 Patent recites “generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups.” Ex. 1001, cl. 1. Petitioner admits that

Cooper does not disclose this element, so it relies entirely on Saey to meet it. Petition, 19-20. Yet Saey does not meet this element for a couple of reasons, and (as discussed in Section III.A.2-4 below) Petitioner’s rationale for combining Saey and Cooper does not make any sense.

The primary offense in Petitioner’s arguments is its plainly false statement that Saey teaches “selecting the worst-case or lowest SNR of the CMs [cable modems] in a group.” *E.g.*, Petition, 19; *id.* at 23 (referring to “Saey’s method of determining a worst-case SNR for a group of CMs”). Dr. Kiaei repeats the falsity in his Declaration. *E.g.*, Ex. 1002, ¶¶ 105 (referring to “Saey’s teaching of determining the worst-case SNR for each cable modem group”), 106 (referring to “Saey’s method of determining a worst-case SNR for a group of cable modems). It is true that Saey discloses the use of a “worst case signal-to-noise ratio (‘SNR’)” for a carrier group, Saey, [0010], but ***carriers are not cable modems***. Saey only discloses single (non-cable) modem-to-single (non-cable) modem communication via carriers. Carriers are divided portions of the available bandwidth in a channel for communication to a single modem, such as modem 110 or 120. Saey, [0003]. When Saey talks about “carrier groups,” it means groupings of smaller segments of bandwidth for use in communicating with a single endpoint. To prove the point further, the modulation technique discussed in Saey, DMT, is called discrete multi-***tone***, and Saey refers to its carriers as ***tones, not devices***. *E.g.*, Saey, [0027] (“These

carrier groups may have either a fixed size, such as 4 tones or 8 tones, or their size may be determined dynamically”), [0031] (“For example, the plurality of carriers may be grouped into multiple groups of 4 tones or 8 tones.”). Petitioner and Dr. Kiaei’s arguments to the contrary repeated at the beginning of this paragraph are wrong and unsupported by Saey’s disclosure.

Because Petitioner and Dr. Kiaei focus on the false assertion that Saey provides a worst-case SNR for a group of CMs, Petitioner does not bother to even assert that a POSITA would consider Saey’s worst-case SNR for DSL carrier groups to be applicable to a plurality of modems (much less *cable modems*) communicating with central service device such as a CMTS. For that same reason, Petitioner also fails to address why a POSITA would be motivated to combine Saey’s worst-case SNR for carrier groups with Cooper’s service groups of cable modems. This point is discussed in more detail in Section III.A.4 below. For either or both reasons, however, Petitioner fails to meet its burden to show that the proposed combination discloses that the worst-case SNR profile (of said SNR-related metrics) is “corresponding to said one of said plurality of service groups.”

Petitioner’s next fatal failure of proof is that it puts forth no analysis at all for the claim element a “*composite* SNR-related metric based at least in part on a worst-case SNR *profile of said SNR-related metrics*.” Although the element as a whole is discussed, Petitioner acts as if the emphasized words are not part of the claims.

Petitioner argues “Saey’s teaching of selecting the worst-case or lowest SNR of the CMs in a group” meets this element of the challenged claims because that “is consistent with the term’s plain meaning.” Petition, 19. This argument is devoid of content. What is “composite” about Saey’s “worst-case or lowest SNR”? What about that is a “profile”? Petitioner does not say. Assigning the plain meaning to a term is no authorization to read it out of the claim language, yet Petitioner does precisely that. Petitioner’s failure to even take on the task of proving this element reflects the reality: it is not disclosed nor obvious. No metric from Saey can correspond to “CMs in a group” as Petitioner and Dr. Kieai argue (Petition, 19; Ex. 1002, ¶¶ 105, 109) because Saey has nothing to do with groups of modems, let alone cable modems (CMs), as already noted above.

3. The Proposed Combination Fails to Render Obvious the “Selecting” Step [1E]

Claim 1 of the ’682 Patent recites “selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric.” Ex. 1001, cl. 1. Petitioner addresses this element with only a half page of conclusory language which refers back to its prior false statements and prior failures to address certain claim requirements in element [1D] discussed above. *E.g.*, Petition, 24 (“Cooper-Saey’s CMTS generates a *composite* SNR for each logical channel based

on the *worst-case SNR of a CM* assigned to that channel.”). The failings in [1D] thus apply equally here, by Petitioner’s own urging. But the Petition is deficient in other additional ways on this claim element too.

As an initial matter, Petitioner’s scant page of conclusory language, all referring back to [1D] without further substantive explanation or matching to the requirements of [1E], is insufficient to meet its burden. Elements [1D] and [1E] are different claim elements, with different meaning, yet Petitioner treats them as the same. This is not a situation of parallel independent claims where analysis of one claim might suffice for analysis of another. Petitioner has the burden to show that each element is met, and its failure to properly address [1E] does not meet that burden. Petitioner’s analysis of [1D] is five pages long, yet Petitioner does not say what of those five pages is relevant to [1E], only that some of it must be. It is not the Board’s or the Patent Owner’s burden “to sift through information presented by the Petitioners, determine where each element [of the challenged claims] is found in [the cited references], and identify any differences between the claimed subject matter and the teachings of [the cited references.]” *Google Inc. v. EveryMD.com LLC*, Case No. IPR2014-00347, Paper 9 at 25 (P.T.A.B. May 22, 2014); *see also Netflix, Inc. v. DivX, LLC*, 84 F.4th 1371, 1377 (Fed. Cir. 2023) (citing *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (“[T]he Board should [] not have to decode a petition to locate additional arguments

beyond the ones clearly made,” yet this is precisely what will be required if IPR is instituted.)). Petitioner’s paragraph of conclusory statements and *supra* citations cannot suffice, especially when Cooper so clearly does not disclose what [1E] recites.

Looking to what Petition does say, it argues (by reference to [1D]) that the alleged “composite SNR” is used by the proposed combination’s “CMTS to select an optimal modulation order for communicating with the modems assigned to each logical channel.” Petition, 24. Petitioner likewise argues that the “modulation order” is “selected by [the proposed combination’s] CMTS.” *Id.*; *see also id.*, 20 (arguing about “Cooper’s selection of an optimal physical layer communication parameter (*e.g.*, modulation order)”); *id.*, 22 (arguing about “Cooper’s method of configuring Modulation Profiles”). But nowhere in Cooper (or Saey) is there any discussion of a **CMTS** selecting modulation profiles.

Cooper contemplates only manual selection of modulation profiles by a human cable operator, not by the CMTS. Cooper, [0036], Fig. 6. There are only four passages that discuss “modulation profiles” in Cooper, and each of them describes those “modulation profiles” not as parameters selected by the CMTS but as parameters selected by a human operator interacting with a graphical display. *Id.*, Abstract (“An interactive display is ***provided to an operator*** which enables analysis of ... modulation profiles” (emphasis added)); *id.* at [0021] (“***[T]he operator*** can

differentiate cable modems ... And then set up multiple logical channels, each one with a different modulation rate” (emphasis added)). Even in Cooper’s most detailed disclosure about modulation profiles and their selection, Cooper provides no teaching or suggestion that anything about the modulation selection can be done by the CMTS, only that it is done manually by a human:

The Modulation Profile display panel 1004 provides *the ability for the operator* to configure various profile configuration templates which may later be assigned to an individual logical channel. That is, *the operator may view, create and edit modulation profiles 1007* which optimize the specific needs of a subset of the network elements. Additional details of a modulation profile may be displayed as well in an expanded detail window 1009.

Cooper, [0036] (emphasis added). The same is true in the discussion of the selection of modulation profiles in the Logical Channel Definition display panel at the bottom of Figure 6: it “provides the ability to ... select the modulation profiles 1019 *viewed in the channel profile/parameter definition panel* and associated with various performance parameters and thresholds 1020.” *Id.*, [0037] (emphasis added). This latter point is reinforced by Figure 6 itself, which depicts the familiar clickable drop-down lists of modulation profiles for selection by a user in a graphical user interface (at the bottom of the figure). While Cooper discloses certain automated configuration of logical channels, this automation is confined to automating

parameter thresholds only. *See* Cooper, [0039], [0040]. This automation is decidedly not of the physical layer communication parameters, which instead must be manually pre-selected by the human user. *See id.*; *see also id.*, Figure 6, Abstract, [0036], [0037]. Put succinctly, Cooper's CMTS fiddles only with **logical** channel parameters (*i.e.*, how to define the scope of the channel or the modems in it). Modulation is a **physical** channel parameter, and thus it makes sense why Cooper never discusses modulation being selected by the CMTS (and in particular "based on said composite SNR-related metric" as required by [1D]). In Cooper, the physical parameters like modulation are left alone to be configured by human technicians.

Accordingly, Petitioner has not met its burden to show that the proposed combination discloses "selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric."

4. A POSITA Would Not be Motivated to Combine Cooper and Saey as Proposed in the Petition

Petitioner's proposed motivation to combine has many failings, some of which stem from Petitioner's erroneous characterizations of Saey and Cooper discussed above, and some which stem from Petitioner's failure to address the *KSR* principles.

First, Petitioner proposes application of “Saey’s teaching of determining the worst-case SNR of the carriers for each CM group to Cooper’s selection of an optimal physical layer communication parameter (*e.g.*, modulation order).” Petition, 20; *see also id.*, 22 (proposing to apply “Saey’s teaching of generating a worst-case SNR-profile for a carrier group to beneficially determine group physical layer communication parameters to [sic] Cooper’s method of configuring Modulation Profiles for CM groups”), 23 (arguing a motivation due to “Saey’s method of determining worst-case SNR for a group of CMs ... to determine which physical layer parameters to apply to the group”).

The predicates underlying the proffered motivation are factually wrong. Saey does *not* teach determining a worst-case SNR for *cable modem* (CM) groups and Cooper does not teach a CMTS selecting an optimal physical layer communication parameter (based on a composite SNR-related metric). *See* Sections III.A.2-4, *supra*. Petitioner’s argument that it “would have been obvious to apply Saey’s teaching of determining the worst-case SNR for each CM group in order to implement Cooper’s dynamic SNR thresholds,” Petition 22, is unsupported naked argument that makes no sense for the same reasons. *See also id.*, 23 (similarly arguing “a POSITA would have an additional motivation to apply Saey’s teaching of generating a worst-case SNR-profile for a carrier group in order to implement Cooper’s dynamic SNR threshold”).

Second, to the extent that Petitioner occasionally recognizes that Saey teaches a worst-case SNR for a group of *carriers* being used to communicate with a single modem, Petitioner fails to bridge the gap to Cooper's assignment of cable modems to logical channels. Nowhere does Petitioner or Dr. Kiaei argue how or why a POSITA would combine teachings about applying parameters to carriers (to save memory and time) to the entirely different construct of Cooper's modems.

Third, Petitioner fails to address that Saey and Cooper operate in different network architectures and topologies. Saey operates in a DSL world, which includes communication over twisted-pair phone lines between a "first terminal 110 and...second terminal 120 [which] each comprise a modem." Saey, [0023]. Saey's specific disclosure relates only to a point-to-point communication arrangement *between two modems*, rather than communication between a modem and a central location. *See* Saey, Abstract, FIG. 1. Cooper, on the other hand, operates in a DOCSIS world. *See* Cooper, [0005], [0006], [0008]. DOCSIS is the coaxial cable communication standard, not a telephone architecture. *See generally* Exs. 1021, 1022, 1023 (DOCSIS standards). The architecture is based on a centralized infrastructure controller serving many modems. *See, e.g.*, Cooper, [0006] (explaining that a CMTS can service "over 20,000 cable modems"). Petitioner ignores these distinctions and, thus, has failed to explain how or why a POSITA would be motivated to apply the DSL-based teachings of Saey to Cooper.

Fourth, Petitioner fails to address that Saey makes its carrier group determinations at a DSL modem, whereas Cooper's user interface and service group determinations are all made on the infrastructure side of the operator's network (at the CMTS, sometimes by a human via the interface as discussed *supra* at pages 19-23). Putting aside whether a POSITA would be motivated to apply DSL modem teachings to cable modems (discussed in the third point above), nowhere does Petitioner or Dr. Kiaei argue how or why a POSITA would be motivated to include processing done at a single constituent modem into processing done at the CMTS, even if all of the other problems with the proposed combination had been addressed and accounted for by Petitioner. Cable modems are not like Saey's DSL modem which is making its own decisions; cable modems are controlled by the CMTS with perhaps 20,000 or more controlled by one CMTS. *See* Cooper, [0006].

Fifth, Petitioner argues that the proposed combination would be within the capabilities of a POSITA because it would only involve "minor modifications to the programming of Cooper's CMTS." Petition, 23. But this grossly understates the problem facing a POSITA trying to combine these two references. A POSITA would have to, at minimum:

1. Figure out how to apply Saey's method of selecting a worst-case SNR for a carrier group to a group of cable modems;

2. Figure out how to apply Saey's DSL-based teachings, which operate in a world of communication over twisted-pair phone lines, to Cooper's DOCSIS-based teachings, which operate in a world of communication over coaxial cable lines;
3. Apply the twice-modified Saey method to Cooper's method of assigning cable modems to logical channels based on SNR of each modem;
4. Design wholly new methods and systems in Cooper so that the CMTS, not a human operator, can select a "physical layer communication parameter"; and
5. Further modify those new methods so that the selection of a physical layer communication parameter is "based on said composite SNR-related metric."

Petitioner and Dr. Kiaei, however, do not address or even appear to recognize the myriad distinctions and changes a POSITA would have to make. This is a simple failure by Petitioner to prove a *prima facie* case of motivation to combine, and thus obviousness.

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

As described above, Petitioner has failed to carry its burden to show that claim

1 is obvious in view of the combination of Cooper and Saey. Petitioner’s analysis of claim 10 relies on its analysis for claim 1, at least for the elements on which it has failed to meet its burden. Petition, 25-26. Therefore, Petitioner fails to render obvious claim 10 for at least the same reasons as for claim 1. By failing to render obvious either independent claim, it follows that Petitioner has also failed to render obvious the dependent claims.

B. Ground B: The Proposed Combination of Cooper-Gross Fails to Render Obvious the Challenged Claims

Ground B suffers many of the same failings as Ground A because the Petition largely parallels its arguments in Ground A to support Ground B. In essence, Petitioner swaps out Saey for Gross, apparently because both contain the phrase “worst case.” As with Saey, Gross is far afield from Cooper or the ’682 Patent. Petitioner’s proposed combination of Cooper and Gross makes no more sense, and is no more supported by sufficient argument and evidence, than Cooper-Saey. For similar reasons as for Ground A, plus additional reasons detailed below, Petitioner has not met its burden on Ground B.

1. Overview of Gross (Ex. 1008)

Gross discloses a “Splitterless Multicarrier Modem” in the context of DSL communication that uses DMT (like Saey in both regards). *See* Gross, Title, Abstract, [0008], [0024]. Gross describes a problem inherent in systems like DSL

that use traditional phone lines to not only serve conventional telephony devices but also carry data to the internet. That dual purpose means that telephones, fax machines, and other telephony devices may disrupt the concurrent data communications of a DSL modem. *See* Gross, [0017] (describing the interference problems between DSL communications and the “plain old telephone service” or POTS). To avoid this problem, DSL systems before Gross required a splitter at the subscriber premises to separate DSL communications from telephone (POTS) signals to avoid this problem. *Id.*, [0017]-[0018], Fig. 1.

Gross seeks to provide a DSL modem that does not require a POTS splitter, and thus is known as a “splitterless” modem. *Id.*, [0025]. With Gross’s modem, when a disturbance event occurs on the communications channel (*e.g.*, an incoming phone call, fax, etc.), the modem detects the event and automatically switches modem operational parameters to be more resistant to higher levels of interference, albeit at the cost of being less efficient (*i.e.*, by slowing down data transfer). *Id.*, [0025], [0032]-[0033]. Specifically, Gross switches from a “primary channel control table” (parameters ideal for a clear communication line) to a “secondary channel control table” (less efficient control parameters suited for operation during a disturbance event). *E.g., id.*, [0030], [0095], [0097]-[0098]. Once the disturbance event is over, the DSL modem “is returned to its initial, high-rate, state” of data

communications over the twisted pair by returning to the primary table. *Id.*, [0025], [0101].

Gross teaches that its secondary (less efficient) table can be created in various ways, such as selecting parameters as a simple percentage of their value in the primary table. *Id.*, [0038], [0040], [0099]. Gross considers that the best method of creating the secondary control table is to calculate parameters for each subchannel to be used. *Id.*, [0100] (“[A] multiplicity of parameter sets in the secondary channel control table will generally provide the best match to the actual channel conditions and thus more nearly approach optimum communications conditions ...”); *see also id.*, [0088] (discussing division of subchannels in DMT).

2. The Proposed Combination Fails to Render Obvious the “Generating” Step [1D]

Petitioner’s argument under [1D] for the Cooper-Gross combination parallels that of the Cooper-Saey combination. Step [1D] requires a CMTS to generate a composite SNR-related metric for a service group, which as discussed above is a group of modems. But Gross, like Saey, does not disclose groups of modems (of any type, DSL, cable or otherwise). Whatever process Petitioner alleges Gross discloses (worst-case SNR profile or otherwise) that process is not directed at any group of cable modems. Gross is focused on an individual modem’s control of itself by determining interference sources and ways to tolerate that interference. Gross’s

modem evaluates different sources of interference (the telephones, fax machines, etc. connected to the common line) that may affect it. Gross attempts to determine how bad things might be for its DSL modem in isolation, depending on what other devices are in use on its line. And to be clear—Gross’s DSL modem is not communicating with the telephone, fax machine, etc. They are interference sources, not communication partners.

Accordingly, like Saey, Gross does not measure a worst-case SNR across modems in a group, or concern itself with communications between *cable* modems and a central controller/service provider (such as a CMTS). Cooper-Gross thus fails to render obvious the “generating” step [1D] for the same reasons as Cooper-Saey in Ground A, including because Gross does not relate to groups of modems, that Gross is a DSL DMT reference, and that Gross does not teach selection of a composite SNR-related metric of cable modems.

Petitioner relies on Paragraphs [0044] and [0100] of Gross to support its argument, Petition, 29, but they do not. Paragraph [0044] of Gross discusses in general terms how the secondary channel control table for a modem can be “based on a composite of the bit allocation or other characteristics of the individual devices” that will interfere with that modem (those devices being telephones, fax machines, etc.). Ex. 1008, [0044]; *see id.*, [0039], [0041] (discussing interfering devices).

Paragraph [0100] discusses the details of the secondary channel control table illustrated in Figure 5C, shown below:

FIG. 5C

49e	49a	49h	49c	49d	49f	
SC	B1	B2	B3	B4	B5	B'
9	8	7	7	6	5	5
10	8	6	6	4	4	4
11	7	7	6	5	5	5
12	8	7	6	5	5	5
40	7	7	6	6	5	5
41	7	7	6	5	5	5
42	7	7	6	5	5	5
43	6	7	6	5	5	5
:	:	:	:	:	:	:

Id., [0100], Fig 5C. Columns 45a-45d (B1 through B5) represent “sets ... of bit allocations for the subchannels 49e” shown in the column labeled SC. *Id.* Those sets of bit allocations (B1-B5) “may represent a corresponding number of different communication devices” that may interfere with the modem “or conditions associated with communications over these subchannels.” *Id.* Column 49f is created by “selecting, for each subchannel, the minimum bit allocation among the sets 49a-49d for each of the subchannels 49e.” *Id.* In summary, Gross creates column 49f (B') to represent the lowest bit allocation (corresponding to the highest level of

interference) its modem may need to employ to survive operation on the common line with the interfering devices.

Nowhere in Petitioner's citations to Gross is there anything about groups of modems, or metrics or bit allocations for groups of modems. Gross's "simplified second table" as described in Paragraphs [0044] and [0100] and depicted in Figure 5C relates to a single DSL modem and multiple sources of interference for that modem, not communication with those sources of interference. Petitioner has failed to explain how the combination of Gross's single-modem interference evaluation works with Cooper's logical channel assignments to disclose the required generation (1) by said CMTS of (2) a "*composite*" SNR-related metric, (3) at the *service group* level, and (4) "based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to one of said plurality of *service groups*."

Additionally for this element [1D], Petitioner has failed to explain why a POSITA would understand bit allocation to be an "SNR-related metric" or how the cited bit allocation is "based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups," as required by [1D]. This failing is not oversight that can be forgiven, either. Petitioner and another expert witness in a sworn declaration under the penalty of perjury told the U.S. District Court for the Central District of California that "SNR-related metric" recited in the challenged claims of the '682 Patent can only be understood

as one of the six examples explicitly listed in the '682 Patent. Ex. 2001, Defendants' Joint Responsive Claim Construction Brief (Dkt. 332), 19:1-8⁶, *Entropic Communication, LLC. v. Comcast Corporation, et al.* 2:23-cv-01050-JWH-KES (C.D. Cal.); *see also*, Ex. 2002, Declaration of Dr. Sandeep Chatterjee Regarding Claim Construction ¶¶ 82-84. Because "bit loading" is not an explicitly listed example of an "SNR-related metric" in the '682 Patent, Petitioner cannot take a different position here and argue that it is an "SNR-related metric."

Accordingly, Petitioner has not met its burden to show that the proposed combination discloses "a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics."

3. The Proposed Combination Fails to Render Obvious the "Selecting" Step [1E]

Petitioner also argues its Cooper-Gross combination for [1E] no different than it argues its Cooper-Saey combination for [1E], complete with half a page of conclusory language which relies entirely on the prior failures in its argument of [1D]. Thus, the failings in [1D] for Cooper-Gross apply equally here, by Petitioner's own urging. So do Petitioner's failings in [1E] for Cooper-Saey discussed above,

⁶ This citation refers to page 19, lines 1-8 of the Brief, per the page number at the bottom of the Brief.

particularly with regard to the differences between Cooper and the language of the challenged claims. To recap, Cooper contemplates only manual selection of modulation profiles by a human cable operator, not by the CMTS. Cooper, [0036], Fig. 6. The only automation disclosed in Cooper is decidedly not of the physical layer communication parameters, which instead must be manually selected by the human user. *See id.*; *see also id.*, Figure 6, Abstract, [0036], [0037]. Nothing about Gross changes the fact that Cooper's CMTS fails to meet [1E].

4. A POSITA Would Not be Motivated to Combine Cooper and Gross as Proposed in the Petition

A POSITA would not have been motivated to combine Cooper and Gross largely for the same reasons discussed above that a POSITA would not have been motivated to combine Cooper and Saey. Saey and Gross have more similarities than differences:

- Both are DSL DMT references;
- Both relate to point-to-point communications between two modems;
- Both make their determinations at the modem itself, rather than at a centralized system like a CMTS;
- Neither relates to groups of modems;
- Neither relates to cable modems or a CMTS-based architecture; and

- Neither generates a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to a group of modems.

Given these similarities, Petitioner argues its motivation to combine for Cooper-Gross using nearly identical language as for Cooper-Saey—so identical that much of it appears to be a copy/paste with only the reference names changed. Patent Owner invites the Board to compare the two. *Compare* Petition, 20-23 with *id.*, 29-31. Petitioner’s parallel arguments underscore why its Cooper-Gross grounds fail for similar reasons as its Cooper-Saey grounds:

First, Gross does not teach determining a worst-case SNR profile for groups of modems, let alone cable modems, and Cooper does not teach a CMTS selecting a physical layer communication parameter (based on a composite SNR-related metric). *See* pages 25-28, *supra* (discussing Cooper-Saey). There is no teaching in Gross that applies to ***cable modems***, much less cable modems at the ***group*** level, nor does Petitioner explain how a POSITA could use Gross in such a way given its lack of disclosure of the same.

Second, Petitioner fails to explain why a POSITA would combine Gross’s teachings about worst-case bit allocation during interference events on a single DSL modem to an entirely different construct of Cooper’s assignment of modems to logical channels. *See* pages 28-32, *supra* (discussing Cooper-Saey). Petitioner

offers no explanation of why or how a POSITA would take Gross's system, where a single modem decides for itself how to communicate, and instead surrender that authority to a centralized control system like a CMTS in Cooper. *Compare* Gross, [0044], [0100] *with* Cooper [0006], [0009].

Third, Petitioner fails to address how Gross (which operates in a DSL world), could inform Cooper's DOCSIS-related disclosure concerning CMTS and cable modem communications, the two having different network architectures and topologies. *See* page 32-36, *supra* (discussing Cooper-Saey). Petitioner assumes, without explanation, that a POSITA could adapt Gross's single modem bit allocation to Cooper's CMTS logical channels without explaining the differences in the architecture between the two or how a POSITA would overcome such differences.

Fourth, Petitioner fails to explain how POSITA would actually operationalize Gross's teachings in Cooper's CMTS, which would require a POSITA to, at a minimum:

1. Modify Gross's method of creating and selecting a less-efficient "second table" for dealing with interference by telephony devices of a single DSL modem into a method of generating a composite SNR-related metric for a group of modems;
2. Figure out how to apply Gross's DSL-based teachings, which operate in a world of communication over twisted-pair phone lines with DSL

- modems, to Cooper's DOCSIS-based teachings, which operate in a world of communication over coaxial cable lines with cable modems;
3. Apply the twice-modified Gross method to Cooper's method of assigning cable modems to logical channels based on SNR of each modem;
 4. Design wholly new methods and systems in Cooper so that the CMTS, not a human operator, can select a "physical layer communication parameter"; and
 5. Further modify those new methods so that the selection of a physical layer communication parameter is "based on said composite SNR-related metric."

See pages 35-37, supra.

Thus, for similar reasons as in Section III.A.4 above, a POSITA would ***not*** have been motivated to combine Cooper and Gross in the manner suggested.

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

As described above, Petitioner has failed to carry its burden to show that claim 1 is obvious in view of the combination of Cooper and Gross. Petitioner treats the analysis of claims 1 and 10 as the same. Petition, 28-32. Therefore, Petitioner fails to render obvious claim 10 for at least the same reasons as for claim 1. By failing to

render obvious either independent claim, it follows that Petitioner has also failed to render obvious the dependent claims.

C. Grounds C-D: Monk Cannot Fix the Underlying Problems with Cooper-Saey and Cooper-Gross in Grounds A and B

Petitioner's Grounds C and D are backup arguments in case the Board determines that "a POSITA would not have applied Saey's teachings ... or Gross's teachings ... in the proposed combinations to yield the use of a modulation order parameter in Cooper-Saey and Cooper-Gross." Petition, 33. In fact, Grounds C and D barely reference Monk at all, and only for its singular teaching "that bit loading and bit allocation are used to select modulation order." *Id.* But the problems with Ground A (Cooper-Saey) and B (Cooper-Gross) go far beyond selection of modulation order, and even then Monk is not offered to cure the fundamental problem in Cooper that it is a human, not Gross's CMTS, that selects a modulation order, as discussed in detail above. Monk thus cannot, and is not offered to, fill the significant chasms between the proposed combinations and the challenged claims for [1D] or [1E] discussed above. Nor can Monk cure the lack of a POSITA's motivation to combine Cooper with Saey or Gross, let alone with a third reference Monk. Accordingly, Grounds C and D fail for the same reasons as Grounds A and B, both for claims 1 and 10, and for all dependent claims.

D. Grounds E-F: Cooper437 Cannot Fix the Underlying Problems with Cooper-Saey and Cooper-Gross in Grounds A and B

Petitioner asserts Grounds E and F only for dependent claims 9 and 18. Because independent claims 1 and 10, from which 9 and 18 depend, are not obvious over Cooper-Saey or Cooper-Gross, claims 9 and 18 also are not obvious over Grounds E (Cooper-Saey-Monk-Cooper437) and F (Cooper-Gross-Monk-Cooper437).

E. Grounds G-H: The Proposed Combinations of Prodan-Saey and Prodan-Gross Fails to Render Obvious the Challenged Claims

Grounds G and H are additional backup grounds, where Petitioner substitutes Cooper from Grounds A and B and replaces it with Prodan for Grounds G and H, respectively. As discussed below, Grounds G and H fare no better than their counterparts in Grounds A and B and for similar reasons.

1. Overview of Prodan (Ex. 1011)

Prodan relates to high-speed data networks over a hybrid fiber coaxial (HFC) cable network. Ex. 1011, [0003]. Prodan recognizes that such HFC networks apply a one-size-fits-all approach to upstream transmissions from the cable modem (CM) to the headend, whereby the CM “use[s] as much transmission power as needed to achieve a desired received signal strength at the headend, without regard to cable length ... or cable type(s) or frequency assignment.” *Id.*, [0006]. Prodan describes that this is “highly sub-optimal in terms of power utilization.” *Id.*, [0007].

Prodan proposes a solution to this power-utilization problem by “allocating upstream frequency spectrum to cable modems in a cable network.” *E.g., id.*, [0030]. Prodan’s method determines signal strength versus frequency profiles per CM, and then assigns each CM to one of a three pre-defined “categories” based on the CM’s signal strength versus frequency profile. *Id.*, [0034].

2. The Proposed Combinations Each Fail to Render Obvious the “Generating” Step [1D]

Prodan was already considered by the Patent Office in connection with the prosecution of the ’682 Patent. *See* Ex. 1004 (’682 Patent File history), 85-87. There, the Examiner found that Prodan lacked “a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups,” as recited in [1D]. *Id.*, 85. Petitioner essentially agrees with the Examiner’s analysis and proposes to fill that gap in Prodan with Saey for Ground G and Gross for Ground H. But what the Examiner found that Prodan lacked⁷ also is not found in Saey or Gross as described in detail above in response to Grounds A and B. For similar reasons as detailed in

⁷ Entropic does not acquiesce to the Examiner’s analysis of Prodan, such as that Prodan lacked only this element of the challenged claims, consistent with the reservation made during prosecution of the ’682 Patent. *See* Ex. 1004, 105.

Grounds A and B that Saey and Gross fail to meet the requirements of [1D], their combination with Prodan in Grounds G and H fare no better; Saey and Gross still fail to meet the requirements of [1D]. *See* Sections III.A.4, III.B.4, *supra*.

3. A POSITA Would Not be Motivated to Combine Prodan with Saey or Gross as Proposed in the Petition

Petitioner also fails to set forth a sufficient motivation to combine Prodan with either Saey or Gross, for many of the same reasons already detailed with Cooper. The reason for the similar failures is that Petitioner treats the Cooper-based combinations and motivations to combine the same as it treats the Prodan-based combinations and motivations to combine. Like with Grounds A and B discussed above, the copy-and-paste feature was used heavily to fill in Petitioner's Grounds G and H too. *Compare* Petition, 23-24 *and id.*, 30-31 *with id.*, 53-54. Regardless, there is no more motivation to combine in these grounds than there was before.

First, Petitioner fails to address that Saey determines a worst-case SNR for a group of carriers and Gross is cited as determining a worst-case bit allocation parameter for a group of subcarriers, whereas Prodan groups cable modems by category. Nowhere does Petitioner or Dr. Kiaei argue how a POSITA would bridge the gap between groups of carriers (portions of bandwidth on a communications channel) and groups of modems (physical networking devices), or how teachings about carriers would be applicable to modems.

Second, and as related to the first, Petitioner fails to address that Saey makes its carrier group determinations at a cable modem and Gross makes its secondary-table determinations at a cable modem, whereas Prodan's categorization of cable modems is done at the headend or CMTS. Nowhere does Petitioner or Dr. Kiaei argue how or why a POSITA would be motivated to include processing done at a constituent cable modem (of which 20,000 or more could be serviced by a single CMTS, according to Cooper (at [0006])) into processing done at the CMTS, even if all of the other problems with the proposed combination had been addressed and accounted for by Petitioner.

Third, Petitioner fails to address that Saey and Gross operate in different network architectures and topologies than Prodan. Saey and Gross operate in a DSL world, which includes communication over twisted-pair phone lines in the public switched *telephone* network (PSTN) wherein the communication is between a user's DSL modem and another modem. Prodan, on the other hand, operates in an HFC world, which includes communication over fiber and coaxial cable lines wherein the communication functionally occurs between a *cable* modem termination system (CMTS) and a user's *cable* modem. Petitioner appears not to recognize these distinctions and, thus, has failed to explain how or why a POSITA would be motivated to apply the DSL-based teachings of Saey or Gross to Prodan.

Fourth, Petitioner argues that the proposed combination would be within the capabilities of a POSITA because it would only involve “minor modifications to the programming of Prodan’s CMTS.” Petition, 54, 59. But this well understates the problem facing a POSITA trying to combine Prodan with either Saey or Gross, those same problems and necessary modifications that are already discussed in detail at Sections III.A.4 and III.B.4 above. Petitioner and Dr. Kiaei, however, do not address or even appear to recognize the myriad distinctions and changes a POSITA would have to make. Rather than meet its burden, Petitioner has fallen far short, especially in explaining or proving up its motivation to combine.

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

As described above, Petitioner has failed to carry its burden to show that claim 1 is obvious in view of the combination of Prodan with either Saey or Gross. Grounds G and H do not challenge the other independent claim, claim 10. By failing to render obvious challenged independent claim 1, it follows that Petitioner has also failed to render obvious its dependent claims.

F. Grounds I-N: None of Jalali, Cooper, Monk, or Cooper⁴³⁷ Can Fix the Underlying Problems with Prodan-Saey and Prodan-Gross in Grounds G and H

Petitioner asserts Grounds I through N only for dependent claims 3-5 and 7-9. Because independent claim 1, from which dependent claims 3-5 and 7-9 depend,

are not obvious over Prodan-Saey or Prodan-Gross, claims 3-5 and 7-9 also are not obvious over Grounds I (Prodan-Saey-Jalali), J (Prodan-Gross-Jalali), K (Prodan-Saey-Cooper), L (Prodan-Gross-Cooper), M (Prodan-Saey-Monk-Cooper437), and N (Prodan-Gross-Monk-Cooper437).

G. Grounds O-P: The Proposed Combinations of Prodan-Saey-Pai and Prodan-Gross-Pai Fails to Render Obvious the Challenged Claims

Petitioner's Grounds O and P are essentially the same as Grounds G and H, except they challenge independent claim 10 and thus add Pai to fill in the gap left by Prodan that its CMTS does not have "circuitry comprising a network interface and a processor," as required by [10A]. *See* Petition, 73. Petitioner otherwise treats the requirements of claim 10 as the same as for claim 1, even cross-referencing its arguments for [1B]-[1E] in Grounds G and H. Petition, 75. Petitioner thus does not offer Pai to cure the fundamental problems in Grounds G and H, nor can Pai fill the significant chasms between the proposed combinations and the challenged claims for [1D] or [1E] discussed above. Accordingly, Grounds O and P fail for the same reasons as Grounds G and H, both for independent claim 10, and for all challenged dependent claims.

H. Grounds Q-V: None of Jalali, Cooper, Monk, or Cooper437 Can Fix the Underlying Problems with Prodan-Saey-Pai and Prodan-Gross-Pai in Grounds O and P

Petitioner asserts Grounds Q through V only for dependent claims 12-14 and 16-18. Because independent claim 10, from which dependent claims 12-14 and 16-18 depend, are not obvious over Prodan-Saey-Pai or Prodan-Gross-Pai, claims 12-14 and 16-18 also are not obvious over Grounds Q (Prodan-Saey-Pai-Jalali), R (Prodan-Gross-Pai-Jalali), S (Prodan-Saey-Pai-Cooper), T (Prodan-Gross-Pai-Cooper), U (Prodan-Saey-Pai-Monk-Cooper437), and V (Prodan-Gross-Pai-Monk-Cooper437).

IV. THE PETITION SHOULD ALSO BE DENIED BECAUSE ITS 22 GROUNDS ARE VOLUMINOUS AND EXCESSIVE

The Office has stated that if a petition raises “voluminous or excessive grounds,” the Board may deny institution:

- Q. In view of the Office’s policy to institute on all challenges or none, how will the Board handle petitions that contain voluminous or excessive grounds for institution in light of the Office’s policy of instituting on all claims?
- A. The panel will evaluate the challenges and determine whether, in the interests of efficient administration of the Office and integrity of the patent system ... the entire petition should be denied under 35 U.S.C. § 314(a).

Ex. 2003⁸ Post-SAS-Office-Guidance 8.

Following this guidance, the Board has routinely rejected petitions that raise voluminous and excessive grounds. The Board’s informative-designated *Adaptics* decision on petitions raising “voluminous and excessive grounds” is instructive. *Adaptics Ltd. v. Perfect Company*, IPR2018-01596, Paper 20, 18 (Mar. 6, 2019) (informative) (“*Adaptics*”) (“we agree with Patent Owner that the Petition suffers from a lack of particularity that results in voluminous and excessive grounds.”); *see also Uber Technologies, Inc. v. Surgetech LLC*, IPR2023-00738, Paper 8 (Oct. 23, 2023) (“Following *Adaptics*, the Board has consistently denied petitions that asserted inordinately large numbers of ambiguous grounds.”) (collecting cases). There, the Board found that even if the petitioner raised just “seventeen possible combinations,” that would “yield[] an unduly burdensome number of combinations.” *Adaptics*, 19 (“...Petitioner’s contention encompasses nine combinations with Bendel and another eight distinct combinations with Sartorius, **for a total of seventeen possible combinations.** Even that conservative interpretation of Petitioner’s contention **yields an unduly burdensome number of**

⁸ Also available at:

https://www.uspto.gov/sites/default/files/documents/sas_qas_20180605.pdf; *see also* <https://go.usa.gov/xU7GP>.

combinations.”); *see also Energysource Minerals, LLC, v. Terralithium LLC*, IPR2019-01607, Paper 10, 13 (May 4, 2020) (similar).

Thus, under *Adaptics*’s precedent, even “seventeen possible combinations” may be “an unduly burdensome number.” Here, however, Petitioner has five more possible combinations for a total of 22 (grounds “A” through “V”), involving eight separate references, challenging claims 1-18. *See* Petition, 7-8. All these grounds must be instituted for review, or none. *See SAS Inst., Inc. v. Iancu*, 584 U.S. 357, 363 (2019).

Given the required all-or-nothing approach, the Board “may consider whether a lack of particularity as to one or more of the asserted grounds justifies denial of an entire petition.” *Adaptics*, 17. The Petition lacks such particularity here. Some of Petitioner’s challenges involve the combination of four or five references in various combinations, but Petitioner treats them as essentially the same. *E.g., id.*, 8 (identifying grounds based on “Cooper-Saey-Monk-Cooper437”, “Prodan-Gross-Monk-Cooper437”, “Prodan-Saey-Pai-Monk-Cooper437” and others). In some Grounds, Petitioner combines its first primary reference (Cooper) with its second primary reference (Prodan) in a mishmash of Grounds and arguments, none of which meets the requisite particularity. *E.g., id.* (Grounds K, L, S and T). Petitioner does not sufficiently “specify what Petitioner regards as the difference(s)” among its most heavily relied-on and apparently interchangeable references (Cooper, Prodan, Saey,

Gross) and the challenged claims. *Adaptics*, 20. Petitioner also “fails to explain why it needs to assert so many grounds and references to show unpatentability of such a limited number” of claims. *Adaptics*, 21. In all, the Petition identifies ten grounds relying on Cooper, eleven grounds relying on Saey, eleven grounds relying on Gross, and sixteen grounds relying on Prodan, just to name a few. This to, allegedly, render obvious only 18 challenged claims.

The sheer volume and excessiveness of Petitioner’s grounds are exacerbated by the fact that Petitioner filed two simultaneous petitions seeking review of the ’682 Patent citing substantially similar prior art. *See* Petition, IPR2024-00445; Paper No. 3 (Petitioner’s Ranking Document), at 1. Petitioner’s second, lower ranked petition in IPR2024-00445 adds an additional 12 grounds to the instant petition’s 22, for a total of 34 grounds. And both Petitions rely on the same secondary references (Saey and Gross, among other overlapping prior art Monk and Cooper⁴³⁷) and primary references that rely on the same tired logical channel technology and all fail for the same reasons as caring only about assignment of modems to those logical channels. *Compare* IPR2024-00445, Petition *with* Petition. Meanwhile, Petitioner submitted only the barest of explanations for why both petitions should be considered. Paper No. 3 at 2-3. Petitioner does not even address why it was necessary for both Petitions to rely on Cooper (as both primary and secondary references in -444, and as a secondary reference in -445). *See id.* While Petitioner might have wanted to avoid

34 grounds in a single Petition, Petitioner’s “throw everything against the wall and see what sticks” approach is not appropriate.

Petitioner’s “voluminous and excessive” number of grounds, wholly lacking in the requisite particularity, especially as to Grounds E, F, M, N, and Q through V in this IPR, is an independently sufficient reason to deny institution. *Adaptics*, 18.

V. CONCLUSION

All grounds of the Petition fail for a multitude of reasons. As the Petition fails to show that there is a reasonable likelihood that Petitioner will prevail on a single claim, institution should be denied under 35 U.S.C. § 314(a).

Dated: June 10, 2024

Respectfully submitted,

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

The undersigned hereby certifies that the foregoing contains 11,939 words according to the word count of the word-processing software used to prepare the foregoing.

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CERTIFICATE OF SERVICE

I hereby certify that on June 10, 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 to the following addresses:

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