

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DIRECTV, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2024-01064
Patent 8,631,450

PATENT OWNER'S PRELIMINARY RESPONSE

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EXHIBIT LIST	
2001-2002	Reserved
2003	Declaration of Samuel H. Russ, Ph.D.
2004	Excerpts from Samuel H. Russ, <i>Signal Integrity Applied Electromagnetics and Professional Practice</i> [Signal-Integrity]
2005	OneRingNetworks, <i>What is a T1 line and How Fast is T1 Internet?</i> , September 28, 2018, https://oneringnetworks.com/what-is-a-t1-line-and-how-fast-is-t1-internet [One-Ring-Networks]
2006	Excerpts from Andrew Afflerbach, <i>Existing and Emerging Broadband Technologies</i> [CTC]
2007	Excerpts from Cable Television Laboratories, Inc., <i>Radio Frequency Interface Specification</i> , November 19, 2001, https://account.cablelabs.com/server/alfresco/e3fd2614-2d4c-4902-a7e3-e721f729be0f [Cable-Television-Laboratories]
2008	The Cable Center, <i>The Cable History Timeline</i> , 2014, https://syndeoinstitute.org/wp-content/uploads/2022/10/CableTimelineFall2015.pdf [Cable-History-Timeline]
2009	Sparklight Business, <i>Coaxial Cable vs. Twisted Pair</i> , https://business.sparklight.com/the-wire/tech-talk/business-internet/coaxial-cable-vs-twisted-pair (last visited May 24, 2024) [Coaxial-vs-Twisted-Pair]
2010	GNS Wireless, <i>Coaxial Cables</i> , https://www.gnswireless.com/product-category/products/coaxial-cables/ (last visited May 20, 2024) [Coaxial-Products]
2011	Nishant Sagar, <i>Powerline Communications Systems: Overview And Analysis</i> , https://rucore.libraries.rutgers.edu/rutgers-lib/34055/PDF/1/play/ [Powerline-Communications]

2012	Custom Solutions, Inc., <i>X10 Debugging Tips</i> , http://www.csi3.com/app_x10.pdf [X10-Debugging-Tips]
2013	ScienceDirect, <i>Broadband Power Line Communication</i> , https://www.sciencedirect.com/topics/engineering/broadband-power-line-communication (last visited May 23, 2024) [Broadband-Powerline]
2014	Decision Denying Institution (Paper 11) in <i>DISH Network L.L.C. v. Entropic Communs. LLC</i> , IPR2024-00560 (Aug. 15, 2024) [560-DDI]

The arguments raised in the Petition have already been rejected by the Board. This Petition is a copycat of the petition in IPR2024-00560, featuring identical arguments and verbiage and supported by the same expert. *See* Paper 3 [Joinder-Motion] 1 (“The present Petition and the DISH IPR Petition are substantively identical with respect to the asserted grounds and supporting evidence.”). The Board denied institution in IPR2024-00560, finding that petitioner failed to prove that a POSITA would have modified or combined Grube and further finding that the petitioner’s arguments were “insufficient,” “not adequately explained,” and “based on improper hindsight reasoning.” Ex. 2014 [560-DDI] 13-19. The Board should reach the same conclusion here and for precisely the same reasons. Because Petitioner’s arguments are the same as those rejected in IPR2024-00560, what follows is substantively identical to the preliminary response in that case.

I. INTRODUCTION

Each of Petitioner’s grounds rely upon Grube alone or in combination. Grube, however, is a fundamentally different system from the ’450 patent. The ’450 patent concerns a local area “broadband coaxial network” (“BCN”), wherein existing cables are utilized to enable peer-to-peer communications within the BCN. Grube, by contrast, concerns a citywide telephonic system employing twisted-pair

wiring that is directed towards facilitating one-to-many and many-to-one communications within that framework. *See* Section II.A.

As a consequence of these profound differences, Petitioner fails to prove that Grube is analogous art that is eligible for use as prior art in an obviousness ground. The '450 patent is in the field of local area broadband coaxial networks ("BCNs") and directed toward solving the problems inherent to preexisting BCNs within a building. By contrast, Grube is in the field of twisted-pair telephone lines and directed toward solving the problems inherent to twisted-pair telephone lines in a citywide network. *See* Section II.B. The significant differences between Grube's twisted-pair teachings and coaxial cable are pervasive, and, unsurprisingly, the Petition does not prove that at least two critical claim elements are taught: the "Broadband Coaxial Network" and "relaying the common bit-loading modulation scheme to the plurality of receiving nodes." *See* Sections II.C-D.

II. PETITIONER'S GROUNDS FAIL (ALL CLAIMS, ALL GROUNDS).

A. Grube And The '450 Patent Are Fundamentally Different Systems.

The '450 patent is directed towards a local area broadband coaxial network ("BCN"). More specifically, the '450 patent's inventive system facilitates peer-to-peer communications between various types of customer premises equipment within a BCN within a building (*e.g.*, a home). Ex. 2003 [Russ-Decl.] ¶ 32; Ex.

1001 ['450] 4:1-8. These BCNs utilize coaxial cables, which are shielded and thus have high bandwidths of, *e.g.*, “50 MHz bandwidth [] at approximately 900 MHz.” Ex. 1001 ['450] 14:32-37; *see also id.*, 1:33-40, 1:45-57; Ex. 2003 [Russ-Decl.] ¶¶ 33-34 (discussing Ex. 2004 [Signal-Integrity] 82).

The '450 patent addresses a problem with preexisting BCNs within a building wherein signal is distributed throughout the network with “splitters,” resulting “in significant isolation between the various CPEs.” Ex. 1001 ['450] 3:56-64; Ex. 2003 [Russ-Decl.] ¶¶ 35-36.

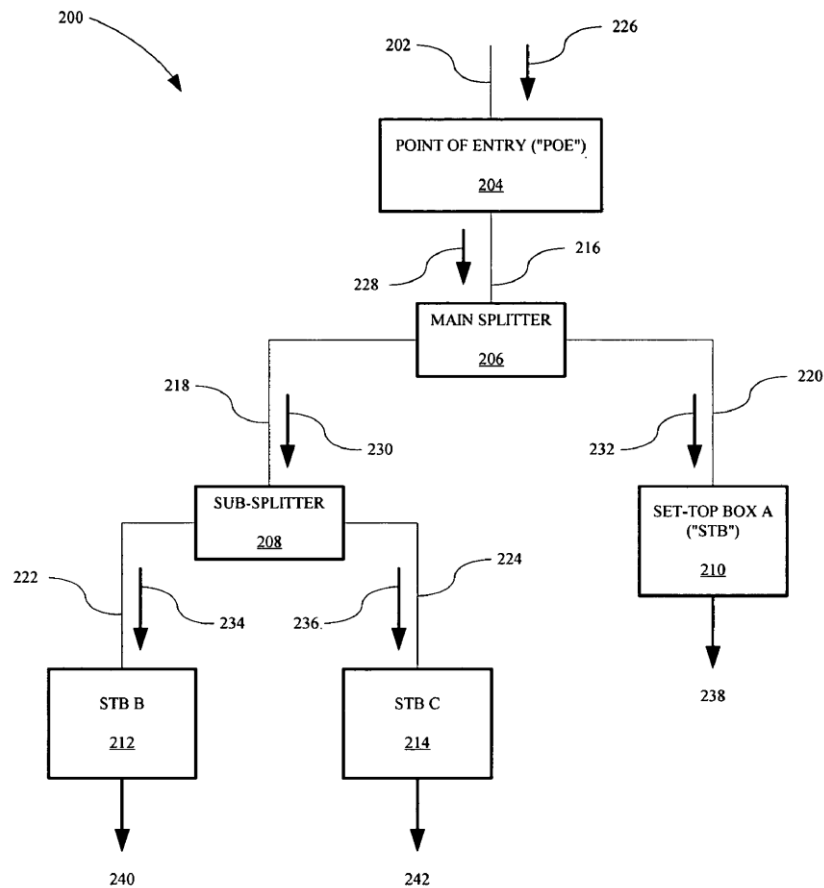


FIG. 2 (Prior Art)

Ex. 1001 ['450] Fig. 2; Ex. 2003 [Russ-Decl.] ¶¶ 35-36. This “isolation results in difficulty for transmitting two-way communication data between the different CPEs,” thus frustrating direct peer-to-peer communications. Ex. 1001 ['450] 3:56-64; Ex. 2003 [Russ-Decl.] ¶ 36. To address this issue, the '450 patent, *inter alia*, “utilizes” a “common bit-loading modulation scheme” for communication between

nodes. Ex. 2003 [Russ-Decl.] ¶ 37 (discussing Ex. 1001 [’450] 20:12-20, 17:50-57).

Grube, relied upon by Petitioner in every ground, concerns a fundamentally different system. In stark contrast to the ’450 patent, Grube has nothing to do with broadband, coaxial cable, or the local networks that lie at the heart of the ’450 patent. Ex. 2003 [Russ-Decl.] ¶ 38; *see generally* Ex. 1005 [Grube]. Rather, Grube addresses a citywide telephonic infrastructure utilizing twisted-pair telephone lines. Ex. 2003 [Russ-Decl.] ¶ 38 (discussing Ex. 1005 [Grube] 6:57-60, 77:1-3; 9:41-46; 12:32-33; 13:38-40); *id.*, ¶ 41 (discussing Ex. 1005 [Grube] Fig. 8, 8:24-28).

Twisted-pair telephone lines are unshielded, resulting in only low frequencies being successfully transmitted, and thus, low bandwidth. Ex. 2003 [Russ-Decl.] ¶ 39 (discussing Ex. 1005 [Grube] Fig. 4; Ex. 2004 [Signal-Integrity] 107, 112-115, 121). Because of this low bandwidth, communications over twisted-pair telephone lines have traditionally been only one-to-one. *Id.*; *see* Ex. 1005 [Grube] 2:41-43, 2:53-55, 4:20-23. Grube teaches that “[t]o enhance the transmit capabilities of a twisted pair copper telephone line, several techniques have been developed.” Ex. 1005 [Grube] 2:34-36; Ex. 2003 [Russ-Decl.] ¶ 40. One such technique is “Asymmetrical Digital Subscriber Loop, or Link, (ADSL)” which “increases the bandwidth of the twisted pair telephone line”—albeit to a still much

lower bandwidth than coaxial cable—“up to 1.1 MHz.” Ex. 1005 [Grube] 2:49-53; Ex. 2003 [Russ-Decl.] ¶ 40. Despite the increased bandwidth, ADSL is still only “used for one-to-one communications.” Ex. 1005 [Grube] 2:51-56; Ex. 2003 [Russ-Decl.] ¶ 40.

Grube’s intention thus is to take advantage of the increased bandwidth from ADSL and add capability for one-to-many/many-to-one communications in its twisted-pair telephone line system. Ex. 1005 [Grube] 4:21-28. Grube accomplishes this by utilizing a “primary site” at the headend that communicates with Grube’s “secondary sites” spread across, *e.g.*, an entire city. Grube’s “secondary sites” are the entry points for particular buildings (*e.g.*, an apartment building with multiple units) which in turn communicate with multiple “subscribers” such as pagers, telephones, or televisions. Ex. 2003 [Russ-Decl.] ¶¶ 41-44 (discussing Ex. 1005 [Grube] Fig. 8, 6:62-64, 8:29-35, 8:48-53, Figs. 1, 2). This primary site transmits calls to the secondary sites, allocating channels to each call such that it occupies the minimum number of channels possible. Ex. 2003 [Russ-Decl.] ¶ 44 (discussing Ex. 1005 [Grube] Fig. 29, 32:44-58, 33:5-67). In this way, Grube reserves as much open bandwidth as possible to service potential future calls. *Id.*

Thus, Grube and ’450 concern fundamentally different technologies with fundamentally different problems and goals. These differences are

consequential—especially as Petitioner relies heavily upon Grube’s teachings for all grounds—and Petitioner fails to demonstrate a reasonable likelihood of prevailing as to at least one challenged claim.

B. Petitioner Fails To Demonstrate That Grube Is Analogous Art (All Claims, All Grounds).

Petitioner’s grounds fail because Petitioner relies on Grube (alone or in combination with Cioffi and Matsumoto) in every ground (Pet., 1), but Petitioner fails to prove Grube is analogous art. “A reference qualifies as prior art for an obviousness determination . . . only when it is analogous to the claimed invention.” *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011). An obviousness ground that relies upon non-analogous art fails. *Id.*, 1352.

“Petitioner bears the burden of showing by a preponderance of evidence that the asserted prior art references are analogous art.” *SCHOTT Gemtron Corp. v. SSW Holding Co., Inc.*, IPR2013-00358, Paper 106, 26 (Aug. 20, 2014); *In re Nat. Alts., LLC*, 659 Fed. App’x. 608, 613-14 (Fed. Cir. 2016) (nonprecedential).

To be analogous, a reference must be either (1) from the same field of endeavor as the patent-at-issue, or (2) reasonably pertinent to the particular problem with which the inventor of the challenged patent is involved. *In re Clay*, 966 F.2d 656, 658-59 (Fed. Cir. 1992). As discussed below, however, Petitioner fails to prove that Grube is analogous under either prong. Whereas the ’450

patent's field is local area broadband coaxial cable networks, Grube's citywide twisted-pair telephonic system is far afield and has nothing to do with broadband, coaxial cable, or local area networks. *See* Section II.B.1. And whereas the '450 patent is directed towards using preexisting coaxial cables within a building to enable communication between nodes, Grube is directed towards the very different problem of facilitating one-to-many or many-to-one communications within a citywide telephonic network. *See* Section II.B.2. Because Petitioner's grounds inexorably rely upon non-analogous art (Grube), they must be rejected.

1. Grube And The '450 Patent Do Not Share The Same Field Of Endeavor.

The '450 patent and Grube do not share the same field. The '450 patent's field of endeavor—as confirmed by its title, abstract, field of endeavor, figures, written description, and claims—is local area broadband coaxial cable networks. Grube, by contrast, has nothing to do with broadband, coaxial cable, or local area networks. Rather, Grube's field is citywide twisted-pair telephonic systems and is far removed from the local area broadband coaxial networks (“BCNs”) that are the subject of the '450 patent.

To discern the field of endeavor, the Federal Circuit has often looked to a patent’s “background of invention” and “field of the invention” sections.¹ Additionally, a patent’s title, claim preamble, and function and structure of the claimed inventions may also bear upon the field of endeavor. *Airbus*, 941 F.3d at 1380-81 (affirming Board’s finding of field of endeavor based on “the title of the [] patent and the preamble of a ... claim”); *In re Bigio*, 381 F.3d 1320, 1326 (Fed. Cir. 2004) (“The Board thus correctly set the field of the invention by consulting the structure and function of the claimed invention as perceived by one of ordinary skill in the art.”).

Here, each of these traditional sources for identifying a field of endeavor unanimously confirms that the ’450 patent’s field is local area broadband coaxial cable networks. Ex. 2003 [Russ-Decl.] ¶¶ 50-54. The ’450 patent’s title concerns a “broadband local area network” and the abstract concerns a “BCN network with

¹ See, e.g., *In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979) (determining field of endeavor based on “Background of Invention”); *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1237-38 (Fed. Cir. 2010) (similar); *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1381 n. 8 (Fed. Cir. 2019) (“[T]he specification of each reference includes a ‘Field of the Invention’ section that distinctly describes each applicable field of endeavor.”).

BCN modems that enable network wired devices to communicate over a typical **home coaxial network** that may include passive splitters and different types of **coaxial cable**.” Ex. 1001 [’450] Title, Abstract. The ’450 patent’s “field of invention” similarly identifies “broadband communication networks,” and “in particular ... local area” ones. *Id.*, 1:21-24. The Background of the Invention similarly focuses upon local broadband coaxial networks. *Id.*, 1:33-40; 1:45-57. The ’450 patent further addresses “a need for a system and method to connect a variety of **CPEs into a local data network**, such as a local area network (LAN), within a building such as a home or office, while utilizing **an existing coaxial cable network** within the building.” *Id.*, 4:1-8; *see also* 1:45-57.

Similarly, each of the claims is directed towards a “Broadband Coaxial Network.” Ex. 1001 [’450] cls. 1-38. Each of the ’450 patent’s embodiments, like the claims, is directed towards a broadband coaxial/cable network as reflected in Figure 3 below, which reflects a “BCN” in the context of a home or building:

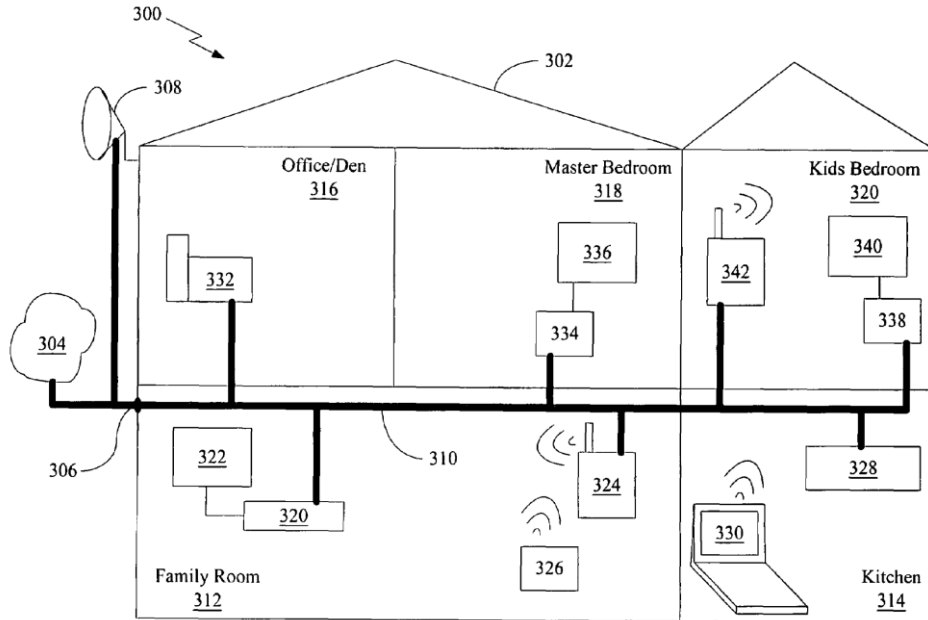


FIG. 3

Id., Fig. 3, 4:53-54 (“FIG. 3 shows an example of a BCN network within a home or building and its utilization.”); see 4:12 (defining “BCN” as “Broadband Coaxial Network”). Similarly, the other figures either refer to prior art “broadcast cable system[s]” or refer back (directly or indirectly) to Figure 3’s “BCN.” *Id.*, 4:48-5:33. Looking beyond the claims, discussion of “broadband” and “broadband coaxial networks” (“BCNs”), is pervasive throughout the disclosure and appear **over 400 times** in the ’450 patent. Similarly, and in addition to the 400+ references to “BCNs,” “coaxial” or “coaxial cable” is also discussed throughout the ’450 patent’s disclosure and appears over 75 times. Ex. 2003 [Russ-Decl.] ¶ 53.

And there can be little doubt concerning the '450 patent's field. Petitioner and its expert, Dr. Williams, concede that "[t]he '450 Patent *relates to [a] Broadband Coaxial Network (BCN) network ...*" Pet., 3; Ex. 1003 [Williams-Decl.] ¶ 23.

Grube's field is not local area "broadband coaxial networks." Significantly, Grube does not mention "broadband" or "coaxial" at all. *See generally* Ex. 1005 [Grube]; Ex. 2003 [Russ-Decl.] ¶ 55. Nor is "cable" mentioned aside from a solitary reference to a "cable box" which can "interface with" Grube's secondary site (an alleged "receiving node"). *See id.*, 12:67-13:2. As Dr. Russ explains, Grube instead concerns twisted-pair telephone networks:

There is no reason to believe that Grube's field has anything to do with "broadband coaxial networks." Rather, Grube is directed to networks that use twisted pair telephone wires, not coaxial cable. Ex. 1005 [Grube] 6:57-60 ("Generally, the present invention provides a method and apparatus for establishing a communication system infrastructure utilizing *low pass transmission path, i.e. twisted pair telephone line.*"); 7:1-3; 9:41-46; 12:32-33; 13:38-40; *see also* 1:21-24; Ex. 2005 [One-Ring-Networks] 1. Petitioner and Dr. Williams similarly acknowledge Grube's focus upon "telephone lines." *See, e.g.*, Pet., 7 ("Grube focuses on improving reliability and bandwidth over existing wiring in a home environment, e.g., *telephone lines*,"), 13 ("Grube developed a one-to-many communication system utilizing 'twisted pair telephone line.'"); Ex. 1003 [Williams-Decl.] ¶¶ 43, 58.

Ex. 2003 [Russ-Decl.] ¶ 56.²

And that Grube is directed toward a twisted-pair system is consequential. The substantial physical differences between twisted-pair wires and coaxial cable mean they have significantly different capabilities, network configurations, and shortcomings. As Dr. Russ explains, twisted pair wires are substantially different from coaxial cable. Ex. 2003 [Russ-Decl.] ¶ 57 (discussing Exs. 2009, 2004). The frequencies and corresponding wavelengths differ dramatically due to coaxial cable's superior shielding and precisely controlled geometries at manufacturing. *Id.* One consequence of these physical differences is that Grube's network using twisted pair wires would not be considered broadband, at least at the time of the '450 patent's invention. *Id.* And indeed, whereas Grube contemplates a bandwidth of approximately 1.1 megahertz (Ex. 1005 [Grube] 1:21-24, 15:44-51, 16:29-32, 52:6-9), the '450 patent refers to a bandwidth of, *e.g.*, 50 MHz, *i.e.*, over 45 times broader than Grube (Ex. 1001 ['450] 14:32-39). Ex. 2003 [Russ-Decl.] ¶¶ 57-58; *see, e.g.*, Ex. 2006 [CTC] 7.

Moreover, Grube has nothing to do with **local** area networks, such as in a home. Rather, Grube concerns a twisted pair telephonic system on a **citywide** scale. As Dr. Russ explains:

² Some parenthetical quotations omitted.

As can be seen in Grube's Figure 8 below, Grube's primary site communicates with numerous secondary sites, including secondary site 108 which services a fax machine, a phone, and a TV:

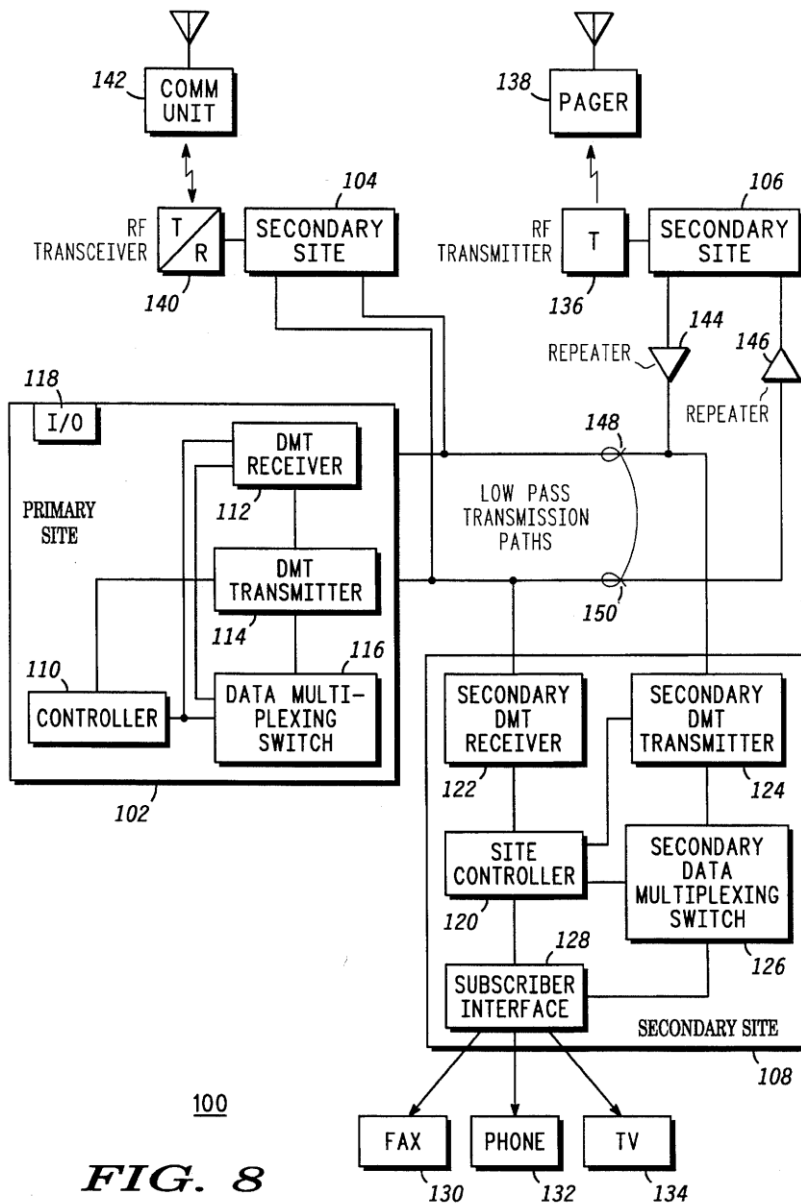


FIG. 8

Ex. 1005 [Grube] Fig. 8. Grube thus teaches that its primary site communicates with receivers meant to service entire buildings.

Indeed, Grube teaches that its primary site is responsible for receiving call requests, determining which secondary site should receive a particular call, and then allocating available channel resources to the call. See Ex. 1005 [Grube] 8:39-9:40 (describing how Grube's primary site handles call requests). In accord, Grube teaches that its primary site "would ***include a public switched telephone network (PSTN) interconnection*** to support telephone interconnect operations and to transceive facsimiles." *Id.*, 10:26-29; see also *id.*, 8:62-67. Grube also teaches that its primary site may be miles away from the secondary sites. *Id.*, 8:24-28 ("Note that, if ***the secondary sites are separated by more than a given geographic distance (12 Kft to 18Kft) from the primary site***, ... repeaters 144 146 may be required.")

Ex. 2003 [Russ-Decl.] ¶ 61.

Consequently, Grube is not directed toward "broadband coaxial networks," much less local area BCNs and thus, is not in the same field of endeavor as the '450 patent. Likewise, while Grube's focus is upon twisted pair telephone wires, the '450 patent never even mentions "twisted pairs." Ex. 2003 [Russ-Decl.] ¶ 63.

Petitioner, for its part, asserts that "Grube is analogous art to the '450 Patent because both are from the same field of endeavor (one-to-many communication network infrastructures) ..." Pet., 11 n.5 (citing Ex. 1001 ['450] 3:65-67, 4:1-8, 23:41-24:9; Ex. 1005 [Grube] 1:6-8, 2:48-3:17, 4:21-28, 6:57-67). Petitioner's alleged field, however, is overly generic and not supported by any of its citations.

The sections of the '450 patent that Petitioner cites as allegedly supporting a field of “one-to-many communication network infrastructures” do not in fact mention “one-to-many communications,” let alone in the context that Grube describes it (between a headend and buildings). Ex. 1001 ['450] 3:65-68 (“a growing number of users desire to **network multiple CPEs to share storage and capabilities across the network.**”), 4:1-8 (“Therefore, there is a need for a system and method to **connect a variety of CPEs into a local data network**”), 23:41-24:15 (describing method of determining common bit-loading modulation schemes so the BCN may “freely transmit information **between the various nodes.**”). While Grube describes that adding one-to-many communications between a headend and buildings to telephone lines as its invention (see Ex. 1005 [Grube] 4:24-28), one-to-many communications between cable operators and premises were addressed long ago in cable. Ex. 2003 [Russ-Decl.] ¶ 62 (discussing Ex. 2007 [Cable-Television-Laboratories] 150). Thus, any assertion that the '450 patent's field concerns “one-to-many communication network infrastructure” misses the mark. *Id.*

Significantly, in making its assertions, Petitioner makes no mention of “broadband,” “coaxial cable,” or “local area” BCNs which are the overwhelming focus of the '450 patent's disclosures and claims. *E.g.*, Ex. 1001 ['450] Title, Abstract, cls. 1-38. Nor does Petitioner's proffered field mention twisted-pair wires which are the foundation of Grube. Ex. 1005 [Grube] 6:56-67. Petitioner's

omissions are not surprising as “broadband” and “coaxial cable” are only mentioned in the ’450 patent, and “twisted-pair wiring” is only addressed in Grube.

Instead, Petitioner’s approach of identifying incidental technological overlap has long been rejected. Under Federal Circuit precedent, even art with substantial similarities and in the same technological area as the patent-at-issue may not be in the same field. *Clay*, the leading analogous art decision, is instructive. There, a finding of analogous art was “clearly erroneous” where the patent-at-issue and the allegedly analogous art (Sydansk) were two patents owned by the same company (Marathon Oil) and the patent-at-issue concerned a gel for use in the petroleum industry while Sydansk concerned a “similar” gel for use in the petroleum industry. *Clay*, 966 F.2d at 657-60. As to the field-of-endeavor test, the Court found that the Board clearly erred in finding Sydansk was analogous because the patent-in-question’s “field of endeavor is the *storage* of refined liquid hydrocarbons” whereas “[t]he field of endeavor of Sydansk’s invention ... is the *extraction* of crude petroleum.” *Id.*, 659 (italicization in original). Thus, the “storage” and “extraction” of oil are two separate fields.

Similarly, semiconductor “memory” is likewise too broad a field. As the Federal Circuit found:

The Allen-Bradley art is not in the same field of endeavor as the claimed subject matter merely because it relates to memories. It

involves memory circuits in which modules of varying sizes may be added or replaced; in contrast, the subject patents teach compact modular memories.

Wang Labs., Inc. v. Toshiba Corp., 993 F.2d 858, 864 (Fed. Cir. 1993). Thus, in *Clay* a similar gel used in the petroleum industry did not indicate the two references were in the same field, nor were two references directed towards semiconductor memory in *Wang Labs*.

Here too, that the '450 patent and Grube both discuss different types of communication network infrastructure does not indicate the field of endeavor for either is “one-to-many communication network infrastructures.” Rather, as consulting the traditional sources for identifying the field of endeavor confirms, the '450 patent (local area broadband coaxial networks) and Grube (twisted-pair telephone systems) do not share the same field of endeavor.

2. Petitioner Does Not Demonstrate Grube Is Reasonably Pertinent To The Problem The Inventors Of The '450 Patent Were Addressing.

Neither Petitioner nor Dr. Williams establishes that Grube is reasonably pertinent to the problem the inventors of the '450 patent were trying to solve. The '450 patent's inventors were concerned with problems relating to a broadband coaxial network installed within a building (*e.g.*, a home or small office). Under existing BCNs, broadcast signals are received at a “**point-of-entry ('POE')**” (Ex.

1001 [’450] 1:28-33) and then distributed from the POE to “nodes” which may be “various types of customer premise equipment (‘CPE’)”. *Id.*, 1:37-43. Such prior art systems are illustrated, *e.g.*, in annotated Figure 2 below.

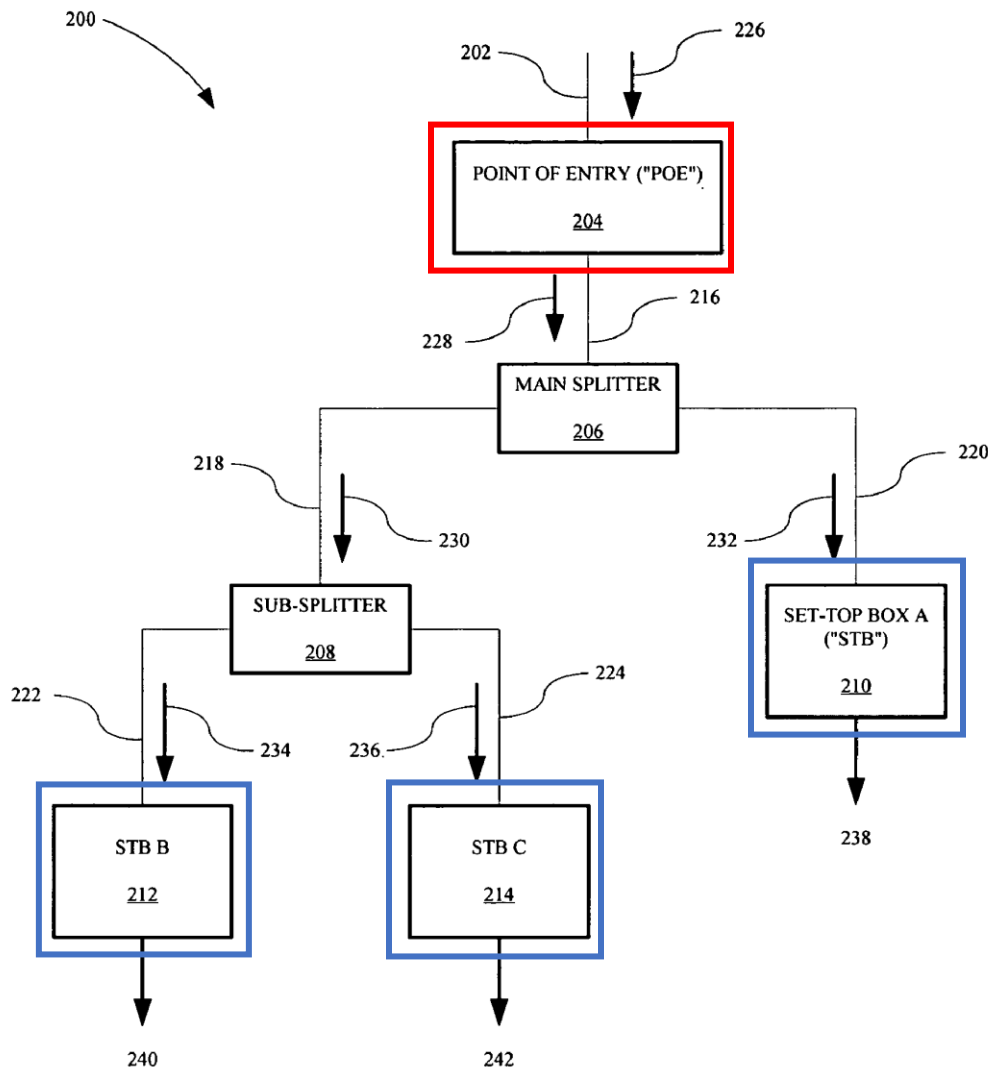


FIG. 2 (Prior Art)

Id., Fig. 2 (annotated); Ex. 2003 [Russ-Decl.] ¶ 65.

A major difficulty in peer-to-peer communications in such systems results from the use of splitters as shown, *e.g.*, Figure 2. Ex. 2003 [Russ-Decl.] ¶ 66. As a result of this configuration, “most broadband cable networks ... presently utilized within most existing buildings are not configured to allow for networking **between CPEs [because m]ost broadband cable networks utilize broadband cable splitters ...**” Ex. 1001 [’450] 3:20-25. As the ’450 patent further explains, “the splitters typically have a high level of isolation between the different connected terminals resulting in significant isolation between the various CPEs” and this “**isolation creates a difficult environment in which to network between the different CPEs** because the isolation results in difficulty for transmitting two-way communication data between the different CPEs.” *Id.*, 3:56-64; *see also* 17:50-57 (“Physically the channels often vary in length between nodes and electrically vary because of the paths through and the reflections from the various cables, switches, terminals, connections, and other electrical components in the BCN network.”).

The ’450 patent thus addresses a need to “connect a variety of CPEs into a local network ... while allowing the utilization of an existing coaxial cable network within the building.” Ex. 1001 [’450] 4:1-8; *see also id.*, 4:35-10 (“There is a growing need **for different CPEs to communicate between themselves in a network type of environment within the building.**”); Ex. 2003 [Russ-Decl.] ¶ 66.

Petitioner’s contention that the ’450 patent’s inventors were concerned with “enabling one-to-many communications in a network using existing wired communication infrastructure” (Pet., 11 n.5) is imprecise and divorced from the technological context in which Grube and the ’450 patent arise. The problem of “one-to-many communications”—especially as Grube describes one-to-many communications between a headend and buildings—had already been solved before the time of the ’450 patent’s invention. Indeed, the industry standard for one-to-many/many-to-one communications between cable operators and premises had already been established in 1997, well before the time of the invention. Ex. 2007 [Cable-Television-Laboratories] 150 (discussing broadcasting); Ex. 2003 [Russ-Decl.] ¶ 68. Thus, the ’450 patent is directed towards allowing direct communication amongst customer premise equipment within a building.

Grube, by contrast, is directed towards a different problem in an entirely different portion of a signal path than what is relevant in the ’450 patent. Grube seeks to improve upon prior communication systems by adding a primary site at the headend to allow “one-to-many or many-to-one communications” between the headend and receivers in the context of a citywide twisted-pair telephonic system. Grube has nothing to do with allowing devices within a building to directly communicate with one another. As Dr. Russ explains:

Grube addresses a need “for a one-to-many and/or many-to-one communication system infrastructure that utilizes existing telephone lines while providing the highly reliable service subscribers of wireless communication systems expect.” Ex. 1005 [Grube] 4:24-28.

To address this need, Grube teaches the use of a “primary site” which routes calls to various secondary sites (receivers) which are in turn affiliated with various subscribers (e.g., pagers, phones, faxes). Ex. 1005 [Grube] Abstract, Fig. 8, 7:1-8:15, 8:16-37. Importantly, the secondary sites receive all communication from the primary site and not from each other. *Id.*, Fig. 8, 8:17-21.

Ex. 2003 [Russ-Decl.] ¶¶ 69-70.

Grube’s problem has nothing to do with connecting devices within a building’s network. As Dr. Russ explains:

The problems the ’450 patent and Grube address are simply entirely different from each other, dealing with different parts of a signal transmission and the different issues that arise due to the different wires the ’450 patent uses (coaxial cable) and Grube uses (twisted pair). Again, the ’450 patent addresses issues with devices within a building communicating with each other, in a peer-to-peer manner, at high frequencies (*e.g.*, 800 MHz). Grube addresses issues with a single citywide-scale headend transmitting signals to multiple receivers or receiving signals from those receivers at much lower frequencies (*e.g.*, 1.1 MHz). *See* Ex. 1005 [Grube] 8:24-28 (“if the secondary sites are separated by more than a given geographic

distance (**12 Kft to 18Kft**) from the primary site, ... repeaters 144 146 may be required.”). Grube’s receivers or secondary sites are more akin to the points of entry to buildings described in the ’450 patent rather than the terminal devices within those buildings the ’450 patent allows to communicate with each other.

Ex. 2003 [Russ-Decl.] ¶ 71.

Grube and the ’450 patent are not only directed towards different problems, Grube’s solutions have no relevance to the problems the ’450 patent’s inventors were trying to solve in view of the dramatic differences between twisted pair telephonic systems and coaxial cable. Per Dr. Russ:

Petitioner and Dr. Williams overlook that the physical media involved (coaxial cable versus twisted-pair phone lines) are substantially different, and so a POSITA would know that a solution for one (*e.g.*, twisted-pair phone lines) would not be relevant to the other (*e.g.*, coaxial cable). To illustrate this point, consider the language of Grube. It consistently (over 27 times) refers to the phone line as a “low pass transmission path.” *E.g.*, Ex. 1005 [Grube] 6:62-64 (“The primary site is coupled to a plurality of secondary sites via **low pass transmission paths**.”). This is correct—a twisted pair phone line acts like a low pass filter over distance. The twisted-pair structure is unshielded (for cost reasons), which leads to a loss of signal energy over distance. Electrically, therefore, the medium appears as a low-pass filter. In other words, the twisted-pair wiring causes higher frequencies to be filtered out, leaving only low

frequencies successfully transmitted. This is why the diagrams in Grube (*e.g.*, Fig. 4) show a 1.1 MHz bandlimit. This is also the technical reason why nearly all phone lines are point-to-point connections—they cannot carry enough information to distribute information to multiple users. Grube attempts to address the lack of point-to-multipoint connections but cannot address the more fundamental issue that twisted-pair is unsuitable for it.

Conversely, coaxial cable, because of its shielding and tightly controlled impedance, can carry signals at a much higher frequency. *Contrast, e.g.*, Ex. 1001 [’450] Fig. 6 (showing signal-carrying capacity above 770 MHz) *with* Ex. 1005 [Grube] Fig. 4 (showing a 1.1 MHz bandlimit). The differences between the physical properties of coaxial and telephone cabling are particularly noticeable at high frequency. Transmitting signals at a higher frequency over telephone lines actually results in higher losses and drops in signal strength. *See* Ex. 1005 [Grube] Fig. 2 (drops in bit-loading as frequency goes up). Meanwhile, at high frequencies, the behavior of coaxial cable is well-known to be chaotic, with sharp increases in attenuation at very specific frequencies.

... Significantly, the problems that Grube seeks to address in the context of citywide telephonic infrastructure had already long been solved at a macro level in cable infrastructure, *i.e.*, at the operator-to-premises level. Indeed, the industry standard for one-to-many/many-to-one communications in cable between a headend and buildings had already been established in 1997, well before the time of the

invention. Ex. 2007 [Cable-Television-Laboratories] 150 (discussing such broadcasting). To be sure, however, Grube (and DOCSIS for that matter), are one further step removed from—and share no relevant characteristics with—a local BCN much less any communications between devices within that BCN.

Ex. 2003 [Russ-Decl.] ¶¶ 72-74.

Thus, Grube and the '450 patent are directed towards entirely different problems and the issues Grube addresses have no bearing upon coaxial cable. And, the fact that the '450 patent and Grube may have some technological overlap is immaterial as even technologically similar references may not be reasonably pertinent. *Clay* found it was “clearly erroneous” to consider Sydansk as reasonably pertinent because a POSITA “would not reasonably have expected to solve the problem of dead volume in tanks for storing refined petroleum by considering a reference dealing with plugging underground formation anomalies.” *Clay*, 966 F.2d at 660; *see also Wang*, 993 F.2d at 864 (prior art memory modules not reasonably pertinent to patented memory modules); *Polygroup Ltd. v. Willis Elec. Co., Ltd.*, IPR2016-01610, Paper 187, 31, 35-40 (Feb. 26, 2018) (rejecting argument that “structurally and functionally similar” electrical connectors in reference and patent made reference reasonably pertinent).

Thus, Petitioner fails to demonstrate that Grube is analogous art to the '450 patent, and consequently, all of Petitioner's grounds fail.

C. Petitioner Fails To Demonstrate That Its Grounds Teach Or Render Obvious “A Broadband Coaxial Network” (All Claims, All Grounds).

Each of the claims require “a Broadband Coaxial Network (‘BCN’).” Ex. 1001 [’450] cls. 29, 34. Independent claim 29’s preamble requires “[a] broadcasting method within a **Broadband Coaxial Network** (‘BCN’) ...”

Petitioner does not dispute that the limitation is limiting. Nor could it as the preamble provides a prior antecedent basis for dependent claim 32’s “the BCN.” It is well-settled that a preamble is generally limiting when it provides a prior antecedent basis for a limitation in the body of the claim. *C.W. Zumbiel Co. v. Kappos*, 702 F.3d 1371, 1385 (Fed. Cir. 2012) (“the preamble constitutes a limitation when the claim(s) depend on it for antecedent basis ...”); *Eli Lilly & Co. v. Teva Pharms. Int’l GmbH*, 8 F.4th 1331, 1341 (Fed. Cir. 2021) (similar). This same conclusion follows where, as here, the preamble of an independent claim provides an antecedent basis for the limitation that appears only in the body of a dependent claim. *Pacing Techs., LLC v. Garmin Int’l, Inc.*, 778 F.3d 1021, 1024 (Fed. Cir. 2015) (“The term ‘repetitive motion pacing system’ in the preamble of claim 25 ... provides antecedent basis for the term ‘repetitive motion pacing system’ recited ... in the body of claim 28, which depends from claim 25.”).

In independent claim 34, the “Broadband Coaxial Network (‘BCN’)” appears in the preamble and also in the body of the claim which requires a “first

BCN modem” and “a plurality of BCN modems.” Here too, Petitioner does not dispute that the preamble is limiting and, in any event, a BCN is, nonetheless, a requirement of the claim by virtue of the requirement of a “first BCN modem” and a “plurality of BCN modems ...” Thus, undisputably, each of the challenged claims requires a broadband coaxial network (“BCN”).

Petitioner contends that the BCN limitation is satisfied by Grube alone (Ground 1) or Grube in combination with Cioffi (Grounds 2 and 3). Pet., 11, 38, 62, 64, 80, 83. Both arguments fail as discussed below.

1. Grube Does Not Render Obvious A “Broadcast Coaxial Network” (“BCN”).

In its first ground, Petitioner argues that “Grube renders obvious that the claimed ‘broadcasting method’ is implemented ‘within a Broadband Coaxial Network.’” Pet., 14. Petitioner concedes that “Grube does not explicitly describe its system as” a BCN. *Id.*, 15-16. But even this is a gross understatement. Grube has nothing to do with a broadband coaxial network either explicitly **or implicitly**. Grube, as discussed in Section II.B.1, *supra*, does not even mention “broadband” or “coaxial” cable. *See also* Ex. 2003 [Russ-Decl.] ¶ 84; *see generally* Ex. 1005 [Grube].

Rather, as explained, Grube is directed toward a citywide twisted-pair telephonic system, which is significantly different from and not even in the same

field as the required BCN. *See* Section II.B.1, *supra*; Ex. 2003 [Russ-Decl.] ¶ 85. Nor would Grube’s twisted-pair system—which is 45x smaller than the ’450 patent’s bandwidth—be considered “broadband.” Ex. 2003 [Russ-Decl.] ¶¶ 86-87 (comparing Grube’s bandwidth of approximately 1.1 MHz with the ’450 patent’s bandwidth of 50 MHz) (citing Ex. 1005 [Grube] 1:21-24, 15:44-51, 16:29-32, 52:6-9, Ex. 1001 [’450] 14:32-39; Ex. 2006 [CTC] 7).

Grube, thus, has nothing to do with either “broadband” or “coaxial” cable and, consequently, the “broadband coaxial network” of the challenged claims is entirely absent from Grube. Petitioner, however, contends that “a POSITA would have been motivated and would have found it obvious to implement Grube’s system and method in broadband coaxial networks.” Pet., 15. Petitioner contends its proposed modification “would have allowed Grube’s invention to reap the well-known benefits of the high bandwidth available in coaxial networks.” Pet., 15. Petitioner also attempts to argue that “a POSITA would have been motivated *to implement Grube’s system and method without modification* in a broadband coaxial network,” arguing that “[c]oaxial cable networks and twisted-pair telephone line networks are structurally similar.” *Id.*, 16; *see also* 15 (“Grube was applicable to pre-existing home/building networks, and coaxial cable networks were already commonly used to connect various devices throughout a home/building.”); 17-18 (“coaxial cable networks ... also involves multiple carrier

channels possibly possessing different transmission characteristics from the point-of-entry to a network device.”).

Thus, Petitioner argues that a POSITA would be motivated to increase Grube’s bandwidth based upon the assumption that this would require no “modification” to “Grube’s system and method” because coaxial cable and twisted-pair telephone line networks are, allegedly, “structurally similar.” Petitioner’s proposed modification fails, and for a multitude of reasons.

As an initial matter, an argument, such as this, that a claim is obvious in the face of a missing limitation faces a high bar and the Federal Circuit has stressed the stringent requirements necessary to supply a missing limitation, particularly a “key limitation” like the one in question:

In cases in which “common sense” is used to supply a missing limitation, as distinct from a motivation to combine, moreover, our search for a reasoned basis for resort to common sense must be searching. And, this is particularly true where the missing limitation goes to the heart of an invention.

Arendi S.A.R.L. v. Apple, Inc., 832 F.3d 1355, 1362-63 (Fed. Cir. 2016); *see also DSS Tech. Mgm’t v. Apple Inc.*, 885 F.3d 1367, 1374-75 (Fed. Cir. 2018) (rejecting “ordinary creativity” as a basis for overcoming a missing limitation); *K/S HIMPP v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1366 (Fed. Cir. 2014).

The broadcast coaxial network here lies at the heart of the claimed inventions. As previously explained, the '450 patent's field is local area BCNs (see Section II.B.1) and the '450 patent is directed towards peer-to-peer communications within a local area BCN in view of the problems that arise from a local BCN infrastructure (see Section II.B.2). See also Ex. 2003 [Russ-Decl.] ¶¶ 80-81.

Petitioner, however, fails to surmount the high bar required to supply this critical missing limitation. Petitioner's proposed modification is to somehow replace all of Grube's twisted-pair telephone lines with coaxial cable—allegedly without modifying Grube's system—in order to increase Grube's bandwidth. But this is precisely the sort of generic motivation, untethered to any specific reason why a POSITA would be motivated to make the proposed modification, that the Federal Circuit has rejected. See, e.g., *ActiveVideo Networks, Inc. v. Verizon Comms., Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (finding expert testimony that “[t]he motivation to combine would be because you wanted to build something better. You wanted a system that was more efficient, cheaper, or you wanted a system that had more features, makes it more attractive to your customers” was “insufficient” as a matter of law to show a motivation to combine.); *Samsung Elecs. Co., Ltd. v. Red Rock Analytics, LLC*, IPR2018-00556, Paper 18, 21 (Aug. 20, 2018) (“statements of increased utility and minimal modifications are generic,

and fail to provide necessary factual support—they are akin to stating in a conclusory fashion that the combination ‘would have been obvious.’”).

Petitioner’s proposed modification must further be rejected because it relies upon the erroneous premises that switching Grube to a “broadband coaxial network” would require no “modification” to Grube’s system and that “[c]oaxial cable networks and twisted-pair telephone line networks are structurally similar.” Pet., 16. As to the former, as discussed, Grube is founded upon a twisted-pair telephonic system; changing that system into a broadband coaxial network would require replacing Grube’s twisted-pair system entirely with a BCN system. Ex. 2003 [Russ-Decl.] ¶ 90. The notion that this would require “no modification” to Grube’s system is nonsensical. Among other things, the entirety of Grube’s twisted-pair system would have to be replaced with coaxial cable. This directly undermines Grube’s stated purpose which is to “utilize[] existing telephone lines” and take advantage of these “inexpensive twisted pair copper wire telephone lines” which are of “added benefit in newly emerging industrialized nations that have a limited communication infrastructure of twisted pair copper wire telephone lines and little, if any, of the more expensive transmission links.” Ex. 1005 [Grube] 4:24-28, 27:63-28:3.

Moreover, “coaxial cable networks and twisted pair-telephone line networks” are most definitely not “structurally similar.” Broadband coaxial cable

networks and twisted-pair systems are manifestly different and operate using materially different frequencies and wavelengths. Ex. 2003 [Russ-Decl.] ¶ 91. To obtain its higher frequencies, coaxial cable is shielded, something entirely absent from twisted-pair. And, as a result of these differences, by way of example, the '450 patent's system's bandwidth is 45 times broader than Grube. *Id.* As a consequence, the problems twisted-pair telephonic systems have with managing and allocating their limited bandwidth are nonexistent, or at most trivial, in a coaxial cable system. Thus, Petitioner's proffered modification is founded upon demonstrably and materially false premises.

Additionally, a POSITA would not be motivated to so profoundly alter Grube's principle of operation, from one rooted in a twisted-pair system to a coaxial cable system. Again, Grube's twisted-pair system lies at the heart of its invention which seeks to "utilize[] existing telephone lines." Ex. 1005 [Grube] 4:24-28; *see also In re Ratti*, 270 F.2d 810, 813 (CCPA 1959) (proffered combination is not proper where it would change the basic principles of operation of one of the references); *Plas-Pak Indus. v. Sulzer Mixpac AG*, 600 Fed. App'x 755, 759 (Fed. Cir. 2015) ("a change in a reference's 'principle of operation' is unlikely to motivate a person of ordinary skill to pursue a combination with that reference").

If more is needed, Petitioner’s proposed modification would negate the entire purpose of Grube’s system. Grube’s system, again, is entirely rooted in a citywide twisted-pair system and is directed towards addressing a need “for a one-to-many and/or many-to-one communication system infrastructure that utilizes existing telephone lines” between a headend and buildings. Ex. 1005 [Grube] 4:24-28; *see also* Section II.B.2, *supra*; Ex. 2003 [Russ-Decl.] ¶ 92. Grube’s system is intended to overcome shortcomings specific to twisted-pair telephone wires—particularly the lack of frequency bandwidth available for one-to-many communications in a citywide area—while taking advantage of widely available preexisting telephone networks. Ex. 2003 [Russ-Decl.] ¶ 92.

The entire problem Grube is trying to address, however, is irrelevant to coaxial cable systems, which have far higher bandwidths and which addressed one-to-many communications between a cable operator and premises in 1997 via the DOCSIS standard. Ex. 2003 [Russ-Decl.] ¶ 93 (discussing Ex. 2007 [Cable-Television-Laboratories] 150). Replacing Grube’s twisted-pair telephone wires with coaxial cable would, thus, eviscerate Grube’s entire purpose. But, as the Federal Circuit has held, a POSITA would not be motivated to render Grube “inoperable for its intended purpose.” *Plas-Pak*, 600 Fed. App’x at 760 (“modifying Jacobsen to accommodate the spray nozzle of Hunter would render Jacobsen ‘inoperable for its intended purpose,’ and a person of ordinary skill

would thus not have been motivated to pursue the combination.”) (citing *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984), *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374 (Fed. Cir. 2007). Additionally, to the extent that Petitioner proposes implementing Grube’s teachings in a local area coaxial network, Petitioner also fails to demonstrate that a POSITA would be motivated to do so. Petitioner says that Grube is directed to home/building networks, but this is not so. See Pet.,15 (“Grube was applicable to pre-existing home/building networks”). As previously explained, Grube is directed toward a citywide telephone network, not a local area network. See Section II.B.2; Ex. 2003 [Russ-Decl.] ¶¶ 94-95 (discussing Ex. 1005 [Grube] Fig. 8, 8:24-28).

In sum, Grube, indisputably, has nothing to do with either broadband or coaxial cable much less a “broadband coaxial network,” a limitation that lies at the heart of the ’450 patent, which is directed towards facilitating peer-to-peer communications within a BCN. Petitioner provides only a generic motivation to improve Grube’s bandwidth, but this falls well short of the “searching” inquiry demanded by *Arendi* and is, moreover, founded upon the risible notion that converting Grube to a BCN would require “no modification” to Grube’s system and the equally errant notion that “coaxial cable” and “twisted-pair” telephonic systems are “structurally similar.” Petitioner’s modification would, instead, represent a fundamental change to Grube’s principle of operation and would

eviscerate Grube's intended purpose. Petitioner's single reference obviousness ground over Grube, thus, fails.

2. Petitioner Fails To Demonstrate That A POSITA Would Be Motivated To Add Cioffi's Coaxial Cable To Grube's Twisted-Pair Wire System.

Perhaps recognizing Grube's shortcomings, Petitioner's second ground "incorporates *Cioffi's teachings about broadband coaxial networks* into Grube's system and method for determining a common bit-loading modulation scheme." Pet., 56. But Petitioner's second ground fails for much the same reasons its first ground fails as well.

Grube's entire purpose and principle of operation, again, is to achieve one-to-many and many-to-one communications "utiliz[ing] existing telephone lines," *i.e.*, the existing twisted-pair telephonic system. Ex. 1005 [Grube] 4:24-28. Petitioner's proposed combination of simply adding coaxial cable to Grube's system without modification is just as nonsensical as it would be to argue that a POSITA would be motivated to replace an automobile engine in a reference specifically directed towards improving that automobile's engine with a jet engine—somehow without modifying the automobile's system—because it would make the automobile "faster." See Ex. 2003 [Russ-Decl.] ¶¶ 89, 98. A POSITA, as the Federal Circuit's precedents make clear, would not be motivated to upend a

reference's entire principle of operation and stated purpose in this fashion. See Section II.C.1.

Moreover, Petitioner fails to substantiate its alleged motivation to combine Cioffi and Grube. Petitioner argues that Grube's primary and secondary sites have "DMT" transmitters and receivers, and that "Cioffi recognizes that 'DMT transmission scheme[s] ha[ve] the potential for use in applications well beyond data transmissions over telephone lines,' and 'it can be used in a variety of other digital subscriber access systems as well,' including 'cable based subscriber systems (which typically use coaxial cable).'" Pet., 57-58. In other words, Petitioner alleges that because Grube uses DMT transmitters and receivers, a POSITA would be motivated to add coaxial cable to Grube's system. But that "DMT transmission schemes" may generally be used in coaxial cable systems has no bearing on whether Grube's specific teachings are appropriate for coaxial cable. And, as previously explained, Grube's teachings of enabling one-to-many communications between a headend and buildings on a telephone line are simply not needed in a cable system, which long ago addressed one-to-many communications between a cable operator and cable modems. See Sections II.B.2, II.C.1; Ex. 2003 [Russ-Decl.] ¶ 100.

Moreover, that two references may have some technological overlap does not substitute for a motivation to combine. See *PersonalWeb Techs., LLC v.*

Apple, Inc., 848 F.3d 987, 993-994 (Fed. Cir. 2017) (“reasoning [that] seems to say no more than that a skilled artisan, once presented with the two references, would have understood that they could be combined” “is not enough: it does not imply a motivation to pick out those two references and combine them to arrive at the claimed invention.”); *Securus Techs., Inc. v. Global Tel*Link Corp.*, 701 F. App’x. 971, 977 (Fed. Cir. 2017) (“a broad characterization of [prior art references] as both falling within the same alleged field . . . without more, is not enough for [Petitioner] to meet its burden of presenting a sufficient rationale to support an obviousness conclusion”) (non-precedential); *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9, 10-11, 16-17 (Oct. 16, 2018) (informative) (neither “mere compatibility of the references” nor a showing “that the prior art references [were] analogous art or in the same field of endeavor as the challenged patent” were sufficient “to establish that one of ordinary skill would have had reason to combine the teachings of the prior art in the manner set forth in the claim.”).

In the end, Petitioner has proposed combining two fundamentally different systems for no reason other than that the modification or combination would allegedly meet the claims. It is well-settled that obviousness is not established merely because the “elements of the claimed invention were independently known in the prior art.” *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1367

(Fed. Cir. 2017); *see also Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 887 (Fed. Cir. 2024) (“It does not suffice to meet the motivation to combine requirement to recognize that two alternative arrangements ... were both known in the art.”). Rather, an *ex post facto* obviousness assessment that “break[s] an invention into its component parts, then find[s] a prior art reference corresponding to each component” “would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components” and “would discount the value of combining various existing features or principles in a new way to achieve a new result—often the essence of the invention.” *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed. Cir. 2005); *see also Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1275 (Fed. Cir. 2004) (“This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result - often the very definition of invention.”).

Critically, what is required, and what Petitioner fails to provide, is proof that “one of skill in the art would have combined these particular references to produce the claimed invention.” *Metalcraft*, 848 F.3d at 1367. Where, as here, Petitioner fails to provide that proof, “we are left with only hindsight bias that *KSR* warns

against.” *Id.* Petitioner’s combination of two disparate, incompatible systems is precisely the sort of conclusory, hindsight-driven analysis that the law forbids.

D. Petitioner Fails To Demonstrate That Grube Or Grube-Cioffi-Matsumoto Renders Obvious “Relaying The Common Bit-Loading Modulation Scheme To The Plurality Of” “Receiving Nodes” Or “Controllers” (All Claims, All Grounds).

The claims require the transmitting node (claim 29) or first controller (claim 34) “transmit[ting] a broadcast signal relaying the common bit-loading modulation scheme to the plurality of” receiving nodes (claim 29) or controllers (claim 34). Petitioner argues that Grube alone renders these limitations obvious (Grounds 1 & 2) or that the Grube-(Cioffi)-Matsumoto combination teaches these limitations (Ground 3). Both of these arguments fail.

1. Grube Does Not Render Obvious “Relaying The Common Bit-Loading Modulation Scheme To The Plurality Of” “Receiving Nodes” Or “Controllers” (Grounds 1-2).

As Petitioner concedes, Grube does not disclose “relaying the common bit-loading modulation scheme to the plurality of receiving nodes.” Pet., 37 (arguing only that “Grube renders obvious” this limitation), 48-49 (claim 34); *see generally* Ex. 1005 [Grube]. Rather, as Petitioner acknowledges (Pet., 38-39), Grube teaches that when its system allocates an outbound channel for a particular call request, “the primary site transmits a signal to all the secondary sites **indicating the carrier channel allocations** as the control channel.” Ex. 1005 [Grube] 18:7-16. Thus,

Grube discloses relaying the **channels** allocated for a particular call to the secondary sites, **not** the “control bit loading table” (the alleged common bit-loading modulation scheme).

Nonetheless, Petitioner argues a POSITA would be motivated to modify Grube to relay the control bit loading table:

Based on Grube’s disclosures, a POSITA would have been motivated to transmit information from the primary site to the secondary sites to enable effective data transmissions. DISH-1003, ¶¶132-135. For example, *a POSITA would have understood that transmitting the information in Grube’s “control channel bit loading table 1110” to all secondary sites* (claimed “transmitting ... common bit-loading modulation scheme”) *prior to the occurrence of a call over the network would be beneficial so Grube’s secondary sites can prepare to receive data transmissions from the primary site.* DISH-1003, ¶133; see, e.g., DISH-1007, 6:24-7:4, 5:9-14 (The “commonly-used carrier among the communication devices and the commonly-used number of bits that can be assigned to each carrier” is known as “mapping information,” which may be provided to “all the communication devices” to allow them to operate “based upon the mapping information”).

Pet., 38. Thus, Petitioner argues that relaying Grube’s control channel bit loading table would have allowed secondary sites to prepare to receive data transmissions

from the primary site. Grube's secondary sites, however, would obtain no such benefit.

As discussed in Section II.C.1, in *Arendi* and its progeny, the Federal Circuit has stressed the stringent requirements necessary to supply a missing limitation. *Arendi*, 832 F.3d at 1362-63; *see also DSS Tech.*, 885 F.3d at 1374-75; *K/S HIMPP*, 751 F.3d at 1366. The limitation-at-issue is undeniably not disclosed in Grube and, moreover, addresses the '450 patent's stated problem of communication between nodes in a BCN within a building. Ex. 2003 [Russ-Decl.] ¶ 107; Ex. 1001 ['450] 4:1-8. But Petitioner does not come close to surmounting *Arendi*'s high bar.

As previously explained, Grube's goal is to allow one-to-many communications in a twisted-pair telephone line network, which has limited bandwidth. *See* Ex. 2003 [Russ-Decl.] ¶ 43; Section II.B.2. To achieve this, Grube teaches a primary site which coordinates calls by using the control channel bit loading table to minimize the amount of channel resources each call takes. Ex. 2003 [Russ-Decl.] ¶ 109; Ex. 1005 [Grube] 7:1-3, 8:53-9:5. Specifically, Grube's bit-loading table enables the primary site to select particular channels to be utilized to service a particular call. Ex. 2003 [Russ-Decl.] ¶ 109; Ex. 1005 [Grube] 8:53-59. The secondary sites—which do not have a coordinating role, do not see call requests for other secondary sites, and only communicate with the primary site—

simply would have no use for the control bit loading table which only the primary site can use to coordinate calls. Ex. 2003 [Russ-Decl.] ¶ 110.

Moreover, the secondary sites would not be able to “prepare to receive data transmissions from the primary site,” based just upon the carrier channel bit loading table, as Petitioner asserts they would. See Pet., 39. The secondary sites never receive the call requests, let alone information about the call requests, or determine the bandwidth requirements for the call as the primary site does. See Ex. 1005 [Grube] 12:24-13:45 (discussing functions of secondary site); Ex. 2003 [Russ-Decl.] ¶ 110. Consequently, without this additional information, the secondary sites would not be able to “prepare to receive data transmissions from the primary site” using the carrier channel bit loading table alone. Ex. 2003 [Russ-Decl.] ¶ 110. The “carrier channel allocations” that Grube already teaches sending is all the secondary sites need to “prepare to receive data transmissions from the primary site.” *Id.*

To support the alleged benefit of allowing Grube’s secondary sites to “prepare to receive data transmissions from the primary site,” Petitioner cites Matsumoto. Pet., 38. Matsumoto, however, is not part of grounds 1 and 2, which rely on Grube alone or in combination with Cioffi. *Id.*, 1. Petitioner cannot use Matsumoto to establish a motivation to modify Grube in grounds 1 and 2. *RPX Corp. v. Parity Networks, LLC*, IPR2018-00097, Paper 7, 14 (Apr. 24, 2018)

(“Petitioner also cites to several other references . . . but does not assert these references are part of the combination. Pet. 34–35. Relying on knowledge in the art does not . . . show a motivation to combine existing components in the manner claimed free of hindsight motivation.”) (denying institution); *Edwards Lifesciences Corp. v. Aortic Innovations LLC*, IPR2023-01232, Paper 10, 36 (Feb. 7, 2024) (“Petitioner’s rationale to modify Spenser II based on inchoate and **unasserted combinations** is also unpersuasive.”) (denying institution); *Parsons Xtreme Golf, LLC v. Taylor Made Golf Co., Inc.*, IPR2018-00518, Paper 14, 18 n.4 (July 18, 2018) (similar).

But even if Matsumoto were to be considered in Petitioner’s grounds 1 and 2 arguments, that **Matsumoto’s power line system** benefits from giving “mapping information to all the communication devices” has no bearing upon whether **Grube’s twisted pair telephonic system** would benefit from such a thing. Ex. 2003 [Russ-Decl.] ¶ 111. Indeed, “giving the mapping information to all the communication devices” allows Matsumoto to overcome the problem of “synchronization” in “N to N communications,” which Matsumoto defines to be many-to-many communications. See Ex. 1007 [Matsumoto] Abstract, lines 14-24; Ex. 2003 [Russ-Decl.] ¶ 111. Grube, however, concerns one-to-many communications (Ex. 1005 [Grube] 4:24-28), which Matsumoto itself recognizes does not have this synchronization issue present in many-to-many

communications. Ex. 1007 [Matsumoto] 3:14-22 (“In ... one-to-N (integer of not less than 2) communications, for example, communications between a base station and a plurality of (or single) mobile stations, can be achieved on ***the base station side which controls the respective mobile stations so as to be synchronized.***”); Ex. 2003 [Russ-Decl.] ¶ 111. Grube’s system, thus, would not benefit as Matsumoto’s system does from providing the carrier channel bit loading table to the secondary sites. Ex. 2003 [Russ-Decl.] ¶ 111. As for ground 3, as explained below in Section II.D.2, Petitioner fails to demonstrate that a POSITA would have been motivated to add Matsumoto’s N-to-N communications to Grube’s system.

Thus, Petitioner’s alleged benefit has no relevance to Grube. It is not obvious to modify a reference in a manner that serves no purpose. *See, e.g., Apple Inc. v. Cellular Comm’ns Equipment, LLC*, IPR2015-00576, Paper 7, 12 (June 12, 2015) (denying institution where “Petitioner ... fails to provide a specific explanation why [the primary reference] did not already accomplish [the asserted benefits] by itself.”); *F5 Networks, Inc. v. Radware, Ltd.*, IPR2017-00124, Paper 48, 64-65 (Apr. 23, 2018) (no motivation for modification that “serve[s] no purpose”).

2. A POSITA Would Not Be Motivated To Combine Grube And Matsumoto To Add “Relaying The Common Bit-Loading Modulation Scheme To The Plurality Of” “Receiving Nodes” Or “Controllers” (Ground 3).

In Ground 3, Petitioner argues that a POSITA would be motivated to “incorporate Matsumoto’s techniques for providing ‘mapping information’ to ‘all the communication devices’ simultaneously and for enabling each network node to determine its own ‘mapping information’ into Grube(-Cioffi)[.]” Pet., 73.

Specifically, Petitioner argues that a POSITA would have been motivated to add N-to-N (also referred to as many-to-many) communications to Grube(-Cioffi):

A POSITA would thus have recognized the benefit of having increased connectivity between nodes. *Id.*, ¶268; DISH-1005, 4:22-24 (applicable to “one-to-many” communications); *see generally* DISH-1007 (applicable to N-to-N communications). This is particularly so, because technological advancements have resulted in an increasing number of devices within a home/building environment. DISH-1003, ¶¶268-269. ***To further increase connectivity between nodes, a POSITA would have been motivated to expand Grube(-Cioffi)’s method and system to include many-to-many communications. Id.***

Pet., 74-75. A POSITA, however, would not be motivated to add Matsumoto’s many-to-many communications to Grube, alone or in combination with Cioffi. As explained below, (1) Matsumoto’s communication over power lines is fundamentally different from Grube’s twisted-pair telephone communication, (2)

many-to-many communications are not beneficial to Grube's system, and (3) adding many-to-many communications to Grube's system would render it inoperable for its intended purpose and would be contrary to its (and Cioffi's) principle of operation.

As an initial matter, Petitioner fails to establish why a POSITA would have looked to Matsumoto's teachings to improve Grube's system in the "normal course of research and development." *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011); Ex. 2003 [Russ-Decl.] ¶¶ 114-116. Matsumoto "concerns a communication method which realizes data communication through ... existing **power lines**." Ex. 1007 [Matsumoto] 1:8-14; Ex. 2003 [Russ-Decl.] ¶ 114. Grube, by contrast, uses twisted-pair telephone lines, not power lines. *See* Section II.B.1; *see also* Ex. 1005 [Grube] 6:57-60, 7:1-3; 9:41-46; 12:32-33; 13:38-40.

Power lines carry power and, thus, are more susceptible to noise interference and subject to many more noise sources compared to data lines such as twisted-pair telephone wires. *See* Ex. 1007 [Matsumoto] 3:1-7 ("Moreover, in the case when the existing power lines whose main purpose is not directed to data communication such as the power line modem are used for data communication, various equipment connected for supplying power form noise sources, and **countermeasures have to be taken to deal with these noise sources**."); Ex. 2003 [Russ-Decl.] ¶ 115

(discussing Ex. 2011 [Powerline-Communications] 45, Ex. 2012 [X10-Debugging-Tips] 4-5).

Matsumoto and Grube thus are faced with very different problems inherent to the type of transmission media used. Whereas Matsumoto is directed towards overcoming the noise inherent in power lines, Grube is directed towards allocating channels to service calls in a twisted pair telephonic system in view of the limited frequency range. Ex. 2003 [Russ-Decl.] ¶ 116. Petitioner does not acknowledge this fundamental difference between Matsumoto's power line teachings and Grube's twisted-pair system, let alone explain why a POSITA looking to modify Grube would turn to Matsumoto's teachings in the "normal course of research and development." *See* Pet., 71-79.

Moreover, there is no reason to believe that adding Matsumoto's many-to-many communications would be beneficial in Grube's system. As explained, twisted-pair telephone lines are physically limited to a bandwidth of up to only 1.1 MHz. *See* Section II.B.1; Ex. 2003 [Russ-Decl.] ¶ 117; Ex. 1005 [Grube] Fig. 4, 15:44-51, 16:29-32, 52:6-9. As a consequence, communications over twisted-pair telephone lines have traditionally been one-to-one. *See* Section II.B.2; Ex. 2003 [Russ-Decl.] ¶ 117; Ex. 1005 [Grube] 2:41-43, 2:53-56, 4:20-23. The limited bandwidth is further exacerbated by the fact that Grube's system must service a citywide area. *See* Section II.B.2; Ex. 2003 [Russ-Decl.] ¶ 117; Ex. 1005 [Grube]

Fig. 8, 8:24-28. In accord, Grube must utilize a primary site that minimizes the bandwidth dedicated to each call in order to achieve even one-to-many/many-to-one communications. Ex. 2003 [Russ-Decl.] ¶ 117; Ex. 1005 [Grube] 4:24-28, 8:53-9:5 (describing process of allocating carrier channels to a call). Many-to-many communications, however, are not suitable for systems with such limited bandwidth because of the difficulty in allocating the available bandwidth. Ex. 2003 [Russ-Decl.] ¶ 118. Unsurprisingly, Grube never mentions the possibility of—let alone the desire to—add many-to-many communications to its system. *See, e.g.*, Ex. 1005 [Grube] 3:23-27; Ex. 2003 [Russ-Decl.] ¶ 118.

Finally, even if, *arguendo*, Matsumoto’s many-to-many communications could be added, it would fundamentally change Grube’s and Cioffi’s principles of operation—which rely on hub-and-spoke architectures to manage communications—and render them inoperable for their intended purposes. As previously explained, Grube relies upon a primary site which allocates channels to and transmits calls for multiple secondary sites. *See* Section II.C.1; Ex. 2003 [Russ-Decl.] ¶ 120; Ex. 1005 [Grube] 6:57-8:15. Similarly, Cioffi teaches a “central unit” which “communicates with a plurality of remote units over a common transmission line.” Ex. 1006 [Cioffi] Fig., 1, 7:23-26; Ex. 2003 [Russ-Decl.] ¶ 121. The central unit “allocat[es] ... bandwidth to the remote units” (Ex. 1006 [Cioffi] 4:22-23) and transmits data between a “service provider” and the

remote units (*id.*, 7:29-33). Ex. 2003 [Russ-Decl.] ¶ 121. Thus, both Grube and Cioffi's principles of operation are one-to-many/many-to-one communications using a primary/central site to allocate the channels used to transmit data. *Id.*, 120-122.

Adding many-to-many communications to Grube and Cioffi would render the primary site and central unit inoperable. Ex. 2003 [Russ-Decl.] ¶ 123. By allowing the secondary sites/remote units to communicate directly with each other, Petitioner's combination would mean that the primary site/central unit would no longer be aware of which channels were allocated to ongoing calls. *Id.* Without this information, the primary site/central unit would no longer be able to coordinate transmissions to or from the secondary sites/remote units. *Id.* Thus, in Petitioner's proposed combination, Grube and Cioffi's primary site/central unit would no longer function and there would no longer be any one-to-many/many-to-one communications. *Id.*

As previously explained in Section II.C.1, the Federal Circuit has held that a POSITA would not be motivated to render a reference "inoperable for its intended purpose" or to change its "principle of operation." *Plas-Pak*, 600 Fed. App'x at 760 (citing *Gordon*, 733 F.2d at 902, *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374 (Fed. Cir. 2007)); *Ratti*, 270 F.2d at 813 (proffered combination is not proper where it would change the basic principles of operation of one of the references);

Plas-Pak, 600 F. App'x. at 759 (“a change in a reference’s ‘principle of operation’ is unlikely to motivate a person of ordinary skill to pursue a combination with that reference”).

Here, Petitioner’s proposed combination violates both of these principles. The combination would fundamentally change Grube and Cioffi’s “principle of operation”—which is rooted in a hub-and-spoke system wherein a primary site/central unit allocates channels—to a many-to-many communication system where secondary sites/remote units communicate directly with each other, bypassing the primary site. Moreover, allowing secondary sites/remote units to communicate directly with one another via many-to-many communications would render Grube and Cioffi “inoperable for its intended purpose” because the combined system would bypass the primary site/central unit thereby preventing the primary site/central unit from having the information necessary to coordinate one-to-many/many-to-one communications.

Thus, Petitioner fails to demonstrate that Grube or Grube-Cioffi-Matsumoto renders obvious “relaying the common bit-loading modulation scheme to the plurality of receiving nodes.”

III. CONCLUSION

As the Board stated when denying institution of the substantively identical petition in IPR2024-00560, “Petitioner’s reasoning... lack[s] rational underpinning.” Thus, Petitioner fails to demonstrate a reasonable likelihood of success as to any of the challenged claims, and the Petition should be denied.

Respectfully submitted,

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Date: October 28, 2024

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Preliminary Response (the “POPR”) consists of 10,152 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The POPR complies with the type-volume limitation of 14,000 words as mandated in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Respectfully submitted,

/ Colette Woo /

Date: October 28, 2024

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the following documents were served
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