

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

IPR2024-00373
Patent 7,594,249 B2

Before LYNNE H. BROWNE, PATRICK R. SCANLON, and
JON M. JURGOVAN, *Administrative Patent Judges*.

JURGOVAN, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background and Summary*

Dish Network, LLC (“Petitioner”) filed a Petition requesting *inter partes* review (“IPR”) of all of claims 1–17 of U.S. Patent No. 7,594,249 B2 (Ex. 1001, the “’249 patent”). Paper 2 (“Petition” or “Pet.”). Patent Owner, Entropic Communications, LLC, filed a Preliminary Response to the Petition on April 30, 2024. Paper 6 (“Prelim. Resp.”). Petitioner filed an authorized Preliminary Reply on May 31, 2024. Paper 7 (“Prelim. Reply”). Patent Owner filed an authorized Preliminary Sur-Reply on June 7, 2024. Paper 8 (“Prelim. Sur-Reply”).

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in a petition and the preliminary response “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Upon consideration of the Petition and Preliminary Response, and accompanying exhibits and evidence, we determine Petitioner has established a reasonable likelihood that it would prevail with respect to at least one challenged claim in the *inter partes* review. Therefore, we grant institution of an *inter partes* review as to all of the challenged claims of the ’249 patent on all challenges in the Petition.

B. *Real Parties in Interest*

Petitioner identifies itself and Dish Network Service LLC, DISH Network Corporation, and Dish Network California Service Corporation as real parties-in-interest. Pet. 93–94 (Petitioner’s Mandatory Notices).

Patent Owner identifies itself as the real party-in-interest. Paper 5, 1 (Patent Owner’s Mandatory Notice).

C. Related Matters

Petitioner and Patent Owner (“the parties”) identify the following as matters related to this proceeding:

Entropic Communications, LLC v. DirecTV, LLC f/k/a DirecTV, Inc. et al., 2-23-cv-05253 (CDCA), filed July 1, 2023;

Entropic Communications, LLC v. DISH Network Corporation et al., 2-23-cv-01043 (CDCA), filed February 10, 2023;

Entropic Communications, LLC v. Cox Communications, Inc. et al., 2-23-cv-01047 (CDCA), filed February 10, 2023;

Entropic Communications, LLC v. Comcast Corporation et al., 2-23-cv-01048 (CDCA), filed February 10, 2023;

Entropic Communications, LLC v. Charter Communications, Inc., 2-23-cv-00050 (EDTX), filed February 10, 2023; and

Entropic Communications, Inc. v. ViXS Systems, Inc. et al., 3-13-cv-01102 (SDCA), filed May 8, 2023.

Pet. 94, Paper 5, 1–2.

D. The '249 Patent

The '249 patent is titled “Network Interface Device and Broadband Local Area Network Using Coaxial Cable.” Ex. 1001, code (54). The '249 patent discloses a local area network that uses coaxial cable wiring to interconnect terminal devices within a building. *Id.* at code (57). A network interface device reflects network signals transmitted by terminal devices back into the building to be received by other terminal devices, thereby establishing a communication path for the terminal devices. *Id.*

Figure 2 of the '249 patent is shown below.

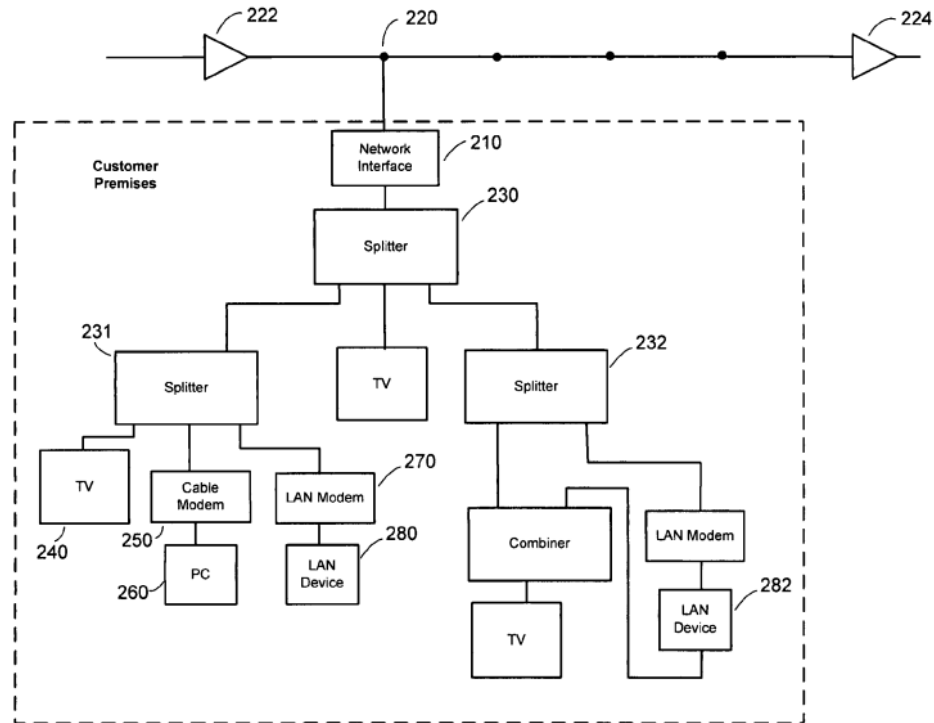


Figure 2 depicts “a diagram showing a signal distribution plan” of the '249 patent. *Id.* at 3:43–44. Network interface 210 receives a signal from a cable via tap 220, and distributes the signal to “existing devices” such as a TV 240 and cable modem 250 connected to PC 260. *Id.* at 3:58–59 and 4:14–15. These devices use frequency bands distinct from those of the LAN. *Id.* at 4:14–17 (*see also* Fig. 4 (showing representative frequency bands for upstream and downstream cable signals, and the LAN network)).

Network interface 210 reflects upstream signals from terminal devices so that other terminal devices, such as LAN modem 270, can receive them. *Id.* at 3:64–4:2. LAN modem 270 connects to LAN device 280, e.g., a personal computer (PC), that is the source or destination of data transmitted over the LAN. *Id.* at 4:8–11. LAN device 292 can be a modulator to produce a signal for driving a TV through a signal combiner. *Id.* at 4:11–13.

Splitters 230, 231, 232 provide isolation between terminal devices. *Id.* at 4:2–6.

Figure 3 of the '249 patent is shown below.

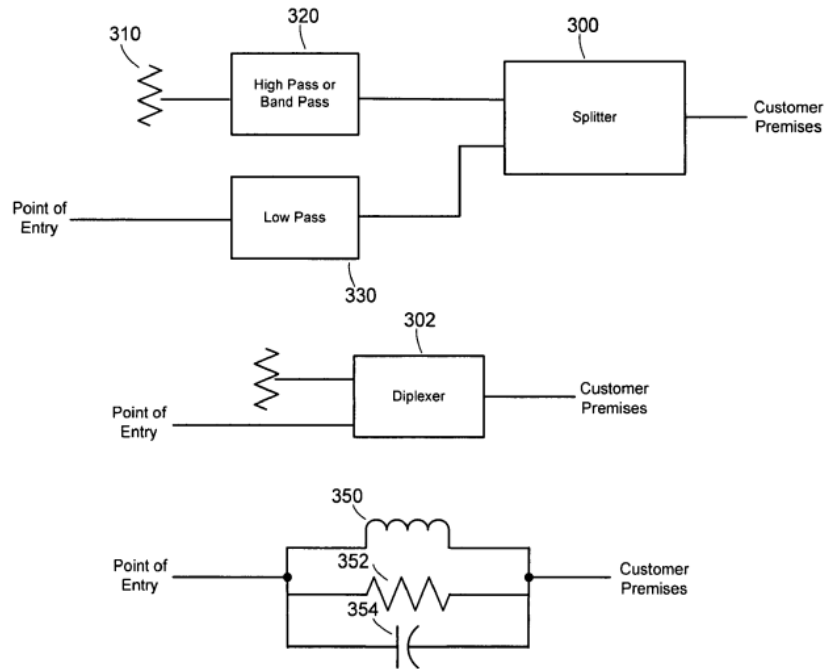


Figure 3 depicts various network interface devices. *Id.* at 3:45–46. In one embodiment (top), the network interface device has splitter 300 with an impedance mismatch 310 to create a reflected signal at one port, a high-pass or band-pass filter 320 coupled to the same port, and a frequency selective filter 330, e.g., a low-pass filter, coupled to a different port. *Id.* at 4:18–22. Filter 330 isolates the LAN signal from the cable plant and passes standard cable service signals. *Id.* at 4:22–25.

The '249 patent uses various methods to overcome multipath effects. *Id.* at 5:64–6:34. These include use of an adaptive equalizer to restore a flat frequency response. *Id.* at 6:9–13. Multipath effects may also be mitigated by multi-carrier techniques such as discrete multi-tone (DMT), orthogonal frequency division multiplexing (OFDM), direct sequence spread spectrum (DS-SS), and code division multiplexing (CDM). *Id.* at 6:14–31. Time

division duplex (TDD) and time division multiple access (TDMA) may be used with any of the described modulation techniques. *Id.* at 6:35–48.

E. Challenged Claims

Claims 1, 5, and 10 are independent. Claims 2–4 depend from claim 9, claims 6–9 depend from claim 5, and claims 11–17 depend from claim 10. Claim 1 is set forth below, with Petitioner’s limitation identifiers indicated in brackets.

[1.pre] A signal distribution network comprising:

[1.a] a filter located at the point of entry of a building tuned to reject network signals originating in the building, such that the network signals originating in the building do not pass through the filter, but rather are reflected back into the building;

[1.b.i] at least one signal splitter,

[1.b.ii] the signal splitter having a common port and a plurality of tap ports, the common port of the signal splitter being coupled to the filter; and

[1.c.i] a plurality of terminal devices,

[1.c.ii] each terminal device being coupled to a tap port of at least one signal splitter,

[1.c.iii] at least one of the terminal devices providing frequency bins with more transmit bits which occupy parts of the channel where the signal to noise ratio (SNR) is high;

[1.d] wherein the reflections from the filter provide a path for terminal devices back through the tap port of the signal splitter and out each other tap port to transmit signals to other terminal devices thus allowing terminal devices to communicate directly with each other to form the signal distribution network.

Ex. 1001, 8:62–9:14.

Claim 5 is set forth below with Petitioner's limitation identifiers.

[5.pre] A broadband local area network using coaxial cable building wiring as a communication channel, the network comprising:

[5.a.i] a plurality of terminal devices,

[5.a.ii] each terminal device communicating with other terminal devices using orthogonal frequency division multiplexing (OFDM) modulation,

[5.a.iii] at least one of the terminal devices providing frequency bins with more transmit bits which occupy parts of the channel where the signal to noise ratio (SNR) is high;

[5.b] a network of building cables coupled to the plurality of terminal devices; and

[5.c.i] a filter having a first and second port, the first port connected to a building point of entry and the second port connected to the plurality of terminal devices via the network of building cables,

[5.c.ii] wherein signals transmitted by any of the terminal devices and received at the second port of the filter are rejected by the filter such that such signals do not pass through the filter, but rather are reflected back into the network of building cables in order to create a communication path between the transmitting terminal device and at least one other terminal device coupled to the network of building cables.

Ex. 1001, 9:32–54.

Claim 10 is set forth below with Petitioner's identifiers.

[10.pre] A broadband local area network for transmitting modulated signals using coaxial cable building wiring containing a plurality of branches comprising:

[10.a] a filter located at the point of entry of the building wiring that rejects network signals originating in the building wiring such that the rejected network signals do not pass through the filter, but rather are reflected by the filter back into all branches of the building wiring;

[10.b] at least one signal splitter;

[10.c.i] a plurality of terminal devices connected to the wiring branches,

[10.c.ii] each terminal device capable of communicating with other terminal devices [using] the reflected signal path created by the filter,

[10.c.iii] wherein the terminal devices perform equalization on the received signal that restores a flat frequency response to overcome communication channel impairments caused by the reflected signals.

Ex. 1001, 10:18–33.

F. Evidence of Record

Petitioner relies upon the following prior art references¹:

Name	Reference	Date	Exhibit No.
Amit	US 7,127,734 B1	Issued Oct. 24, 2006	Ex. 1005
ADSL/VDSL	Dr. Dennis J. Rauschmayer, <i>ADSL/VDSL Principles, A Practical and Precise Study of Assymetric Digital Subscriber Lines and Very High Speed Digital Subscriber Lines</i>	Published 1999	Ex. 1006

¹ Petitioner alleges that all of the prior art references were filed, issued or published before the '249 patent's earliest alleged priority date of May 4, 2001. Pet. 2. Petitioner contends that all of these prior art references are prior art under 35 U.S.C. §§ 102(b) and (e) (pre-Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA")). *Id.* Patent Owner does not refute these assertions at this time.

Jacobsen	Krista S. Jacobsen et al., <i>An Efficient Digital Modulation Scheme for Multimedia Transmission on the Cable Television Network</i> , 1994 NCTA Technical Papers, 305–312	Published 1994	Ex. 1007
DSL-Book	Dr. Walter Y. Chen, <i>DSL, Simulation Techniques and Standards Development for Digital Subscriber Line Systems</i>	Published 1998	Ex. 1008

Petitioner also supports its challenges with a declaration from Dr. Scott Acton. Ex. 1003. Patent Owner does not rely on any declarant to support its contentions at this time.

G. The Asserted Challenges to Patentability

Petitioner asserts the following challenges to patentability:

Ground	Challenged Claims	35 U.S.C. §	Reference(s)
1	1–2	103	Amit
2	1–17	103	Amit, ADSL/VDSL
3	1–2, 4–6, 8–10, 12–14, 16–17	103	Amit, Jacobsen
4	2–3, 7, 9–13, 15, 17	103	Amit, Jacobsen, DSL-Book

II. PRELIMINARY MATTERS

A. 35 U.S.C. § 314(a)—General Plastic

The parties present arguments concerning the Board’s discretion to deny institution under § 314(a) based on the factors set forth in *General Plastic Industrial Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19

at 15–19 (§ II.B.4.i) (PTAB Sept. 6, 2017) (precedential) (“*General Plastic*”). Pet. 88–89; Prelim. Resp. 59–60.

General Plastic addresses “[m]ultiple, staggered *petitions* challenging the same patent and same claims rais[ing] the potential for abuse.” *General Plastic*, Paper 19 at 17 (emphasis added). The parties point to no authority to support that *General Plastic* has ever been applied in the context of a reexamination filed before a petition similar to the facts of this case. We decline to consider further discretionary denial under *General Plastic* under the facts presented here.

B. 35 U.S.C. § 325(d)

The parties present arguments concerning our discretion to deny institution under § 325(d). Pet. 90; Prelim. Resp. 57–59; Prelim. Reply 1–5; Prelim. Sur-Reply 1–5. After evaluating the parties’ arguments, we are not persuaded to exercise our discretion to deny institution under § 325(d) for the following reasons.

In evaluating discretionary denial under § 325(d), the Board follows a two-part framework: (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). The *Advanced Bionics* framework is further informed by the factors set forth in *Becton, Dickinson*

& Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 (Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) (“*Becton, Dickinson*”).²

At the outset, the parties dispute the meaning of “cumulative” in the *Advanced Bionics* framework and cite various cases in support of their positions. Prelim. Reply 2; Prelim. Sur-Reply 2–3. We find it unnecessary to look beyond the *Advanced Bionics* case itself, which defines “cumulative” as “substantially the same prior art or arguments” presented in a petition as were considered during prosecution. *Advanced Bionics* at 9.

Addressing *Advanced Bionics* part (1), Patent Owner states that Kliger³ and Humpleman⁴ are references that were considered during the original prosecution⁵ leading to issuance of the ’249 patent. Patent Owner argues that Kliger and Humpleman are cumulative to the primary reference,

² *Becton, Dickinson* identifies the following non-exclusive factors: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art; (e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson*, Paper 8 at 17–18 (§ III.C.5, first paragraph). Factors (a), (b) and (d) relate to *Advanced Bionics* factor (1), and factors (c), (e) and (f) relate to *Advanced Bionics* factor (2). *Advanced Bionics*, Paper 6 at 10.

³ U.S. Patent Publication No. 2002/0069417 A1, published June 6, 2002. Ex. 2004.

⁴ U.S. Patent No. 6,005,861, issued December 21, 1999. Ex. 2005.

⁵ File history for U.S. Application No. 10/322,834 filed December 18, 2002. Ex. 1002.

Amit, asserted in all grounds of the Petition. More specifically, Patent Owner states that Kliger and Humpleman each describe an in-home coaxial network that has “a filter-type device that acts on a signal coming from within the home network” similar to Amit’s filter. Prelim. Resp. 57 (citing Ex. 1005, Fig. 2; Ex. 2004 ¶ 51 (home-network reflector unit (HRU) 44), Fig. 1; Ex. 2005, 3:44–47, 8:66–9:14, Fig. 5).

Petitioner disputes Patent Owner’s argument, contending that Amit describes a filter that reflects a signal to permit communication between devices in a home network. Prelim. Reply 3 (citing Ex. 1005, 14:1–5). Petitioner contends that Patent Owner admitted during prosecution that Kliger takes signals in and loops them back out after processing, which requires significantly more hardware than just a filter. *Id.* (citing Ex. 1002, 33). Petitioner further asserts that Humpleman uses an active network interface unit, not a passive filter. *Id.* (citing Ex. 1001, 2:59–60). Accordingly, Petitioner argues, Amit is substantially different than Kliger and Humpleman. *Id.*

We agree with Petitioner that Amit is not cumulative to Kliger and Humpleman under *Advanced Bionics* part (1). Kliger discloses HRU 44 implemented as either “an unterminated or shorted coaxial cable, which reflects the home network signal,” or a device that, as Petitioner puts it, “loops back” upstream signals from the home network by frequency converting them to downstream signals transmitted back to the home network. Ex. 2004 ¶¶ 51–56, Figs. 2, 2A.

In allowing the ’249 patent over Kliger, the examiner stated the following:

the prior art of record to Kliger (US 2002/0069417) teaches a home network system in which a module in one room can communicate with modules in other rooms through a signal reflector unit. The prior art of record fails to reasonably show or suggest a filter located at the point of entry of a building tuned to reject network signals originating in the building such that the network signals originating in the building do not pass through the filter, but rather are reflected back into the building.

Ex. 1002, 5. Hence, the examiner allowed the '249 patent because the prior art of record, particularly Kliger, did not disclose a *filter* to reflect signals back to a building, comparable to what Amit discloses.

Humpleman is mentioned in one sentence in the '249 patent's background as follows: "Humpleman patents disclose a home network using an active network interface unit to couple the home network to the external network." Ex. 1001, 2:59–61. Humpleman is not listed on the '249 patent as having been considered by the examiner. *Id.* at code (56). Even if the examiner did consider Humpleman, the examiner's statement in the notice of allowance that the "prior art of record" failed to disclose the reflecting filter would apply to Humpleman.

Thus, we agree with Petitioner's contention that Amit's filter asserted in all grounds of the Petition is not cumulative of Kliger and Humpleman or the arguments presented concerning these references in the '249 patent's prosecution.

Claim 10 of the '249 patent was the subject of a Reexamination sought by Unified Patents, LLC. Pet. 87–88; Ex. 2002; Ex. 2006. During the Reexamination, the examiner initially found that the requestor raised a substantial new question of patentability against claim 10 over the

combinations of Ashfary⁶ and Mills⁷, and Amit and Mills. Ex. 2002, 760–763. However, over the course of the Reexamination, Patent Owner overcame the rejections and the examiner confirmed claim 10. Ex. 2006, 4.

Patent Owner argues that the Petition uses Amit in substantially the same way it was in the Reexamination. Sur-Reply 1. Patent Owner further asserts that it presented the “IPR challenge” of this proceeding to the examiner who confirmed the patentability of claim 10 thereover. *Id.*

As to ground 1 against claim 10 and its dependent claims, we agree with Patent Owner’s assertion that Amit is cumulative since it is subsumed in the combination of Amit and Mills considered during the Reexamination. However, the remaining claims were not challenged in the Reexamination and are directed to considerably different features. For example, independent claims 1 and 5 recite at least one terminal device with frequency bins with more transmit bits in parts of the channel where the signal to noise ratio (SNR) is high, which is a feature not recited in independent claim 10. Claim 5 further recites that each terminal device communicates with others using OFDM, which is a feature that is not recited in claim 10. Claim 10 recites that the terminal devices perform equalization, which is a feature that is not present in the other independent claims. Thus, the Petition grounds are not cumulative with respect to claims 1–9. Also, Petition grounds 2 to 4 combine Amit with other references that were not considered during the original prosecution or Reexamination, and thus are new combinations that are not cumulative.

⁶ U.S. Patent Application Publ. 2006/0218593 A1, published September 28, 2006. Ex. 2002, 2–12.

⁷ U.S. Patent No. 6,795,450 B1, issued September 21, 2004. Ex. 2003.

Patent Owner argues that the Office properly found that a person of ordinary skill in the art (“POSITA”) would not modify the primary references, Amit and Ashfary, directed to on-premises reflected signal environments, with the secondary reference, Mills, directed to a non-on-premise reflected signal environment. *Id.* at 4. Patent Owner asserts that the Petition is similarly deficient because the primary reference, Amit, involves a reflected signal environment whereas the secondary references, Jacobsen, ADSL/VDSL, and DSL-Book, allegedly do not concern reflected signal environments. *Id.*

Petitioner, however, contends that Jacobsen addresses reflected signals that can cause inter-symbol interference (ISI), which is also a concern of the other references as well as the ’249 patent. Pet. 61–62 (citing Ex. 1007, 305); Ex. 1001, 5:64–6:13. Accordingly, Patent Owner’s argument against this combination is not availing on the current record.

In sum, after consideration of the parties’ arguments and evidence, we determine that the grounds of the Petition asserted against claims 1–9 of the ’249 patent, and grounds 2–4 applied to claims 10–17, are not cumulative under *Advanced Bionics* part (1) because the cited evidence of record does not demonstrate that the obviousness combinations asserted in these grounds, or anything substantially the same as those arguments, were considered during prosecution. *See* § II.B (listing the challenge grounds). The Petition is cumulative, however, as to ground 1 asserted against claims 10–17 because the assertion of obviousness over Amit alone is subsumed by the combination of Amit and Mills considered in the Reexamination.

As the majority of the grounds in the Petition are not cumulative, we find that the first part of the *Advanced Bionics* framework is not met and decline to exercise our discretion to deny institution under § 325(d). *See* 37 C.F.R. § 42.108(a) (“When instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim”).

III. ANALYSIS AND DISCUSSION

In this section, we discuss Petitioner’s challenges to claims 1–17 of the ’249 patent and Patent Owner’s arguments for patentability. For the reasons that follow, we determine that Petitioner has presented a reasonable likelihood that at least one claim of the ’249 patent is unpatentable.

A. Legal Standards for Obviousness

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the claimed invention pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) where present, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner contends as follows:

A POSITA would have had a Bachelor's degree in electrical engineering, computer engineering, or a related field, and 2–3 years of experience in design or development of signal processing and communication systems or networks. . . . Additional education could substitute for professional experience, or vice-versa.

Pet. 6 (citing Ex. 1002 ¶¶ 17–18).

At this stage of the proceeding, Patent Owner does not dispute Petitioner's proposed level of skill in the art, which is consistent with the prior art references asserted by Petitioner. *Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill). Accordingly, we agree with and will use Petitioner's proposed level for purposes of this Decision.

C. Claim Construction

We construe the challenged claims under the same standard used by a federal court in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b). This standard is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc) and its progeny, and includes “construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b).

Only claim terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner contends that the challenged claims would have been “obvious under any reasonable interpretation, so no express constructions are required.” Pet. 3. Patent Owner does not offer construction of any claim term, so there is no dispute over claim construction that we need to resolve.

We apply the ordinary and customary meanings consistent with 37 C.F.R. § 42.100(b).

D. Ground 1: Obviousness over Amit

Petitioner contends that claims 1 and 2 would have been obvious over Amit, and Patent Owner presents arguments for patentability. Pet. 6–26; Prelim. Resp. 25–31.

We determine that a reasonable likelihood of prevailing to show unpatentability of these claims has been shown for grounds 3 and 4 discussed below. Consequently, we do not reach this ground.

E. Ground 2: Obviousness over Amit and ADSL/VDSL

Petitioner contends that claims 1–17 would have been obvious over the combination of Amit and ADSL/VDSL, and Patent Owner presents arguments for patentability for this ground. Pet. 61–75; Prelim. Resp. 31–47.

We determine that Petitioner has shown a reasonable likelihood of unpatentability for some of these claims in grounds 3 and 4, so we do not reach this ground.

F. Ground 3: Obviousness over Amit and Jacobsen

We now address Petitioner’s contention that claims 1–2, 4–6, 8–10, 12–14, and 16–17 would have been obvious over the combination of Amit and Jacobsen, and Patent Owner’s arguments for patentability for this ground. Pet. 61–75; Prelim. Resp. 47–54.

1. Amit (Ex. 1005)

Amit is titled “System and Methods for Home Network Communications.” Ex. 1005, code (54). Amit purports to provide “a

method and system which allows home networking over coax cables.” *Id.* at 2:53–55.

Amit’s Figure 2 is shown below.

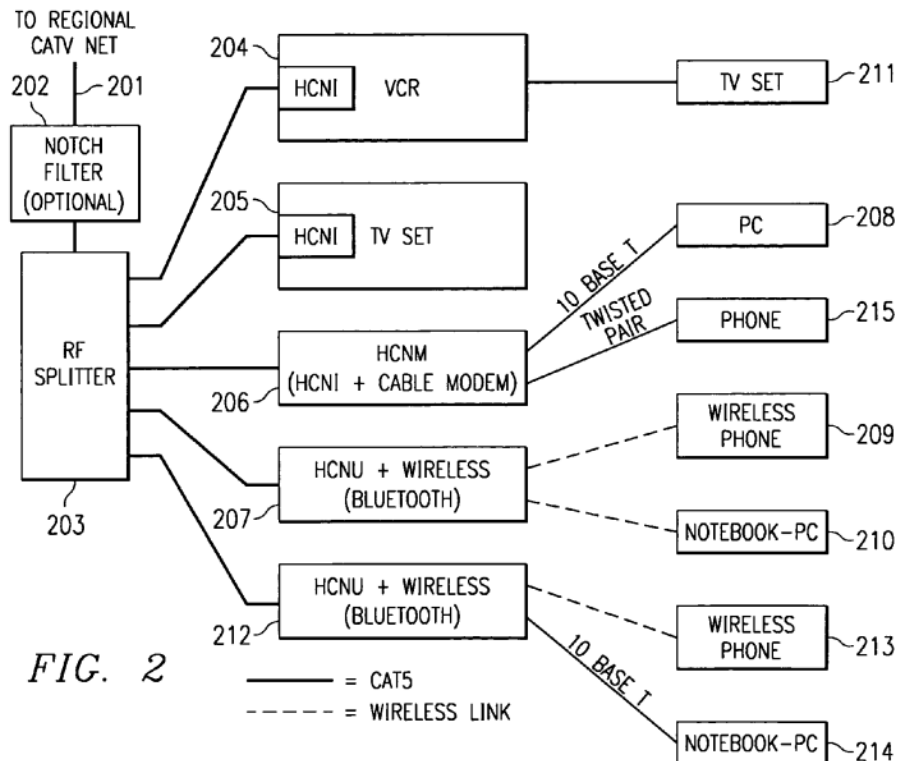


Figure 2 shows “a Home Cable networking (HomeCN/HCN)” that has five nodes 204–207, 212 and is connected to a regional CATV plant via cable 201. *Id.* at 2:13–17, 4:23–24, 6:24–26. Notch filter 202 is a band reject filter that does not pass the radio-frequency (RF) range used by the home networking devices 204–207, 212. *Id.* at 6:28–31. The “filter improves the isolation between the home network and other homes as well as the regional network.” *Id.* at 6:31–33. Reflection from the notch filter may be used as the main signal under certain circumstances. *Id.* at 14:1–5. The filter can be passive or active. *Id.* at 7:38–39. The filter may be included inside a splitter, or it may be separate and connected to a splitter. *Id.* at 4:30–43.

The notch filter is used at the entrance of a home in the “Single Home operation mode” as distinguished from the “Connected Home operation mode” which does not require the filter. *Id.* at 7:12–35. The filter disconnects the HomeCN from the regional cable network, leading to a simpler design. *Id.* at 7:16–19.

2. *Jacobsen (Ex. 1007)*

Jacobsen is an IEEE⁸ article titled “An Efficient Digital Modulation Scheme for Multimedia Transmission on the Cable Television Network.” Ex. 1007, 305. Jacobsen “present[s] a comparison between the performances of single carrier modulation with equalization and multicarrier modulation on simulated cable television (CATV) channels.” *Id.* Jacobsen states that service providers at the time were investigating “[t]he feasibility of offering high-speed interactive data services to customers on CATV networks or similar broadband coaxial networks.” *Id.* Jacobsen states that “there are several electrical transmission problems that must be overcome before these services can be supplied reliably over CATV networks.” *Id.*

Jacobsen recognizes that “[t]aps, amplifiers, and splitters can all cause signals to be reflected at their insertion points.” *Id.* Jacobsen states that these reflections can produce “[v]ariations in a channel’s frequency response caus[ing] successively transmitted symbols to interfere with one another, an effect known as intersymbol interference (ISI).” *Id.*

Jacobsen teaches that multicarrier modulation may be used to combat ISI. *Id.* at 308. Jacobsen states that “bits are originally assigned to subchannels just after training during system initialization in direct

⁸ Institute of Electrical and Electronics Engineers.

proportion to the subchannel signal-to-noise ratios.” *Id.* at 307. “As a result, subchannels that suffer from little attenuation and/or little noise carry the most bits, while subchannels that are severely attenuated and/or very noisy might not carry any bits.” *Id.*

3. *Motivation to Combine Amit and Jacobsen*

Petitioner contends that a POSITA would have modified “Amit’s coaxial home network by incorporating Jacobsen’s techniques for multimedia transmission on CATV networks, including modulation and equalization.” Pet. 62. For reasons explained in this section, we determine that Petitioner presents a reasonable likelihood that a POSITA would have combined Amit and Jacobsen.

Petitioner contends that the need for high-speed interactive data services drives the implementation of broadband coaxial networks. Pet. 62 (citing Ex. 1003 ¶ 252). Petitioner thus identifies a design and market trends toward faster broadband coaxial networks. *See KSR*, 550 U.S. at 418 (reason to combine known elements may be established by “the effects of demands known to the design community or present in the marketplace”). Petitioner contends that a “POSITA would have [] been motivated to use Jacobsen’s modulation teachings with Amit’s terminal devices to improve upon the QAM modulation and [improve] the bit rate.” Pet. 62 (citing Ex. 1003 ¶ 260).

On this record, we agree with Petitioner that improving bit rate would have led a POSITA to apply Jacobsen’s teachings to assign bits to sub-channels based on SNR, to the terminal devices in Amit’s home network. Ex. 1007, 307. Thus, we find unavailing Patent Owner’s argument that “modulation” or “simply increasing bit-rate” is not a reason to modify Amit

in view of Jacobsen. Prelim. Resp. 50–51. And to the extent that Patent Owner’s arguments from ground 1 concerning cost and complexity of adding multiple frequency bins to Amit applies to this ground (*see* Prelim. Resp. 29–31), there is insufficient evidence on this record to support that these considerations would have outweighed the demand for improved bit rates and overcoming channel impairments by using Jacobsen’s modulation techniques in Amit’s system noted by Petitioner. Pet. 62 (citing Ex. 1003 ¶¶ 250–260).

In light of the foregoing discussion, we do not reach Petitioner’s remaining reasons to combine or Patent Owner’s arguments against them.

4. *Reasonable Expectation of Success*

Petitioner contends that a POSITA would have had a reasonable expectation of success in combining the teachings of Amit and Jacobsen to achieve the signal distribution network of claim 1. Pet. 67 (citing Ex. 1003 ¶¶ 266–270). Petitioner’s declarant, Dr. Acton, contends that both references address QAM modulation of a channel, and Jacobsen “builds upon” and improves Amit’s QAM teachings through single carrier modulation with equalization or multicarrier (OFDM) modulation to deliver high-speed data over a coaxial network, such that the combination would have yielded predictable results. Ex. 1003 ¶¶ 266–267, 270. Dr. Acton contends that it would have been “straightforward” for a POSITA to implement QAM and OFDM because they are taught in a variety of engineering, science, and math courses that a POSITA would have taken, and because they are well-known in the art. *Id.* ¶¶ 267, 269.

Patent Owner contends that Petitioner’s citation to Dr. Acton’s declaration to support its contention of a reasonable expectation of success

improperly circumvents the word count limitation. Prelim. Resp. 52–53 (citing Pet. 67). To the extent that Petitioner relies on the discussion from ground 2, Patent Owner asserts that is pertinent to ADSL/VDSL, not Jacobsen, and that it is conclusory. *Id.* at 53 (citing Pet. 67).

Though a petition should explain the reasonable expectation of success, Petitioner did cite to Dr. Acton’s declaration for support, and elsewhere in the Petition, similar points as mentioned by Dr. Acton were made in sufficient detail. Pet. 61–62 (Amit and Jacobsen provide high-speed interactive data services), 64–65 (Jacobsen’s modulation techniques build upon Amit’s QAM teachings). We do not think that Petitioner’s reliance on Dr. Acton’s declaration, limited to just five paragraphs, was egregious in this case. We agree with Patent Owner to the extent that Petitioner’s citation to ground 2 for a reasonable expectation of success was in part not relevant because that is not the combination at issue in this ground.

Patent Owner further asserts that Jacobsen is “entirely directed towards an out-of-home network” and that a POSITA would not have had an expectation of success in modifying Amit’s in-home network with Jacobsen’s out-of-home network. *Id.* (citing Ex. 1007, 10, Fig. 2). Patent Owner contends that these references involve different transmission media, signal strengths, and frequencies, and Amit seeks to use reflections whereas Jacobsen seeks to avoid them. *Id.* at 53–54 (citing Ex. 1007, 8).

The distinction Patent Owner attempts to draw between Amit’s in-home network and Jacobsen’s out-of-home network is unavailing. Petitioner relies on Amit’s nodes 204–207, 212 as the “terminal devices.” *See, e.g.*, Pet. 19 (citing Ex. 1005, Fig. 2 (annotated in red)). These devices interface

between the regional cable TV network and the in-home network, and thus Amit's and Jacobsen's teachings are pertinent to these devices.

As to differences in transmission media, signal strengths, and frequencies, on this record, we do not find the technologies of Amit and Jacobsen so different that one would not be able to use techniques or devices from one in the other. *See, e.g., KSR*, 550 U.S. at 417 (a technique used to improve one device may be used in similar devices if predictable and beneficial). "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *Id.* at 421.

As to Amit's and Jacobsen's reflection teachings, we are persuaded on this record that a POSITA considering them would have understood that reflections can be beneficial in facilitating communications between in-home network devices, but can also be detrimental in some cases, and would have understood that reflections must be managed appropriately on the networks. *See, e.g., Pet.* 64–65 (citing Ex. 1005, 3:19–23, 20:42–43). Accordingly, on this record, we do not see Amit's and Jacobsen's reflection teachings as necessarily contradictory.

Thus, on the record, based on our current understanding, we determine that the Petition, supported by Dr. Acton's declaration, is sufficient for institution to establish a reasonable expectation of success in combining Amit and Jacobsen due to their detailed teachings and the skill level a POSITA would have had.

5. *Claim 1*

Petitioner relies on its ground 1 mapping for the limitations of claim 1 except for limitation 1.c.iii, for which it supplements Amit with Jacobsen's

teachings. Pet. 9–25, 67–69 (citing Ex. 1003 ¶¶ 271–285). We address Petitioner’s mapping and Patent Owner’s arguments for patentability below.

a) Limitation 1.pre: Signal Distribution Network

The preamble of claim 1 recites a “signal distribution network comprising.”

Petitioner contends that Amit discloses or renders obvious a “signal distribution network” as recited in the preamble of claim 1. Pet. 9–10. Specifically, Petitioner states

Amit “provides a system and methods for communication between subscribers’ devices over cable infrastructure designed to carry video signals,” including “home networking solutions that utilize in-home TV wiring for supplying high rate connectivity between any two home networking nodes.” [Ex. 1005, 2:34–46]. Exemplary signal distribution networks are depicted in Figures 2 and 7.

Pet. 9 (citing Ex. 1005, 2:34–46, 5:22–31).

Patent Owner does not dispute Petitioner’s contentions.

Petitioner has shown a reasonable likelihood that the preamble is disclosed by Amit’s system. Consequently, we need not decide whether the preamble is limiting.

b) Limitation 1.a: Filter

Limitation 1.a recites “a filter located at the point of entry of a building tuned to reject network signals originating in the building, such that the network signals originating in the building do not pass through the filter, but rather are reflected back into the building.”

Petitioner contends that Amit discloses or renders obvious limitation 1.a. Pet. 10–14 (citing Ex. 1003 ¶¶ 48–55). For example, Petitioner contends this feature is disclosed in the following passage:

In this “Single Home operation mode . . . a notch filter should be added . . . at the flat/single home entrance,” enabling “notch filter reflection,” wherein the filter rejects and reflects signals originating in the building such that they do not pass through the filter, allowing the same frequency range to be used by multiple households.

Pet. 11–12 (citing Ex. 1005, 3:33–35, 13:31–45, Fig. 2). Petitioner further states that Amit discloses that two modems in the same flat can communicate by echo from the notch filter. Pet. 14 (citing Ex. 1005, 13:65–67, 14:8–65).

Patent Owner does not dispute Petitioner’s contentions.

Petitioner has shown a reasonable likelihood that limitation 1.a is disclosed by Amit’s notch filter located at the entrance of a flat or home.

c) Limitation 1.b.i: Signal Splitter

Limitation 1.b.i recites “at least one signal splitter.”

Petitioner contends that Amit discloses or renders obvious limitation 1.b.i. Pet, 14–16 (citing Ex. 1003 ¶¶ 56–59). For example, Petitioner asserts that Amit’s Figure 2 and related description disclose that “RF splitter [203] splits the signal coming from and to the regional CATV plant [201], to the signals coming to and from units [204–207, 212] respectively.” *Id.* (citing Ex. 1005, 6:36–39). Petitioner further contends that Amit’s Figure 7 discloses two splitters 705, 706. *Id.* (citing Ex. 1005, 5:31).

Patent Owner does not dispute Petitioner’s contentions concerning this limitation.

Petitioner has shown a reasonable likelihood that limitation 1.b.i is disclosed by Amit’s splitters.

d) Limitation 1.b.ii: Splitter Ports

Limitation 1.b.ii recites “the signal splitter having a common port and a plurality of tap ports, the common port of the signal splitter being coupled to the filter.”

Petitioner contends that Amit discloses or renders obvious limitation 1.b.ii. Pet. 16–20 (Ex. 1003 ¶¶ 60–67). For example, referring to Figure 2 (annotated), Petitioner asserts that the RF splitter 203 has a common port (green) connected to notch filter 202, and tap ports (blue) connected to devices 204–207, 212. Pet. 16–17 (citing Ex. 1005, 6:36–39; Ex. 1003 ¶ 63).

Petitioner further contends that Amit’s Figure 7 (annotated) discloses a splitter 706 with common port (green) connected to notch filter 707, and tap ports (blue) connected to modem 701, unit 702 and splitter 705. Pet. 17–18. Petitioner further asserts that Amit’s splitter 705 has a common port (green) and tap ports (blue) connected to units 703, 704. *Id.* at 18.

Patent Owner does not dispute Petitioner’s contentions.

Petitioner has shown a reasonable likelihood that Amit’s splitter ports disclose limitation 1.b.ii.

e) Limitation 1.c.i: Terminal Devices

Limitation 1.c.i recites “a plurality of terminal devices.”

Petitioner contends that Amit discloses or renders this feature obvious. Pet. 18–20 (citing Ex. 1003 ¶¶ 68–74). For example, Petitioner contends that Amit’s Figure 2 (annotated) and related description disclose nodes 204–207, 212 (red) labeled “VCR” and “TV Set” with HCNIs (Home Cable Network Interfaces) as well as an HCNM (Home Cable Network Modem) and HCNUs (Home Cable Network Units) with Bluetooth. *Id.* at 18–19

(citing Ex. 1005, 6:26–41, 6:44–54, 6:57–64). Petitioner contends that Amit also refers to nodes 204–207, 212 as “home networking devices,” “units,” and “home units.” *Id.* at 18–19 (citing Ex. 1005, 6:26–41). Petitioner further contends that Amit’s Figure 7 (annotated) discloses nodes 701–704 (red) labeled “HCNM1,” “HCNU2,” “HCNU3,” and “HCNU4.” *Id.* at 20.

Patent Owner does not dispute Petitioner’s contentions.

Petitioner has shown a reasonable likelihood that Amit’s nodes disclose limitation 1.c.i.

f) Limitation 1.c.ii: Coupled to Splitter

Limitation 1.c.ii recites “each terminal device being coupled to a tap port of at least one signal splitter.”

Petitioner contends that Amit discloses or renders obvious limitation 1.c.ii. Pet. 20 (citing Ex. 1003 ¶¶ 75–78). For example, Petitioner contends that Amit’s Figure 2 shows terminal devices 204–207, 212 couple to a tap port of splitter 203, and in Figure 7, terminal devices 701–704 couple to a tap port of splitter 706, while terminal devices 703, 704 couple to a tap port of splitter 705. *Id.* (citing Ex. 1006, 6:36–41, Figs. 2, 7).

Patent Owner does not dispute Petitioner’s contentions.

Petitioner shows a reasonable likelihood that each of Amit’s terminal devices are coupled to a tap port of at least one splitter.

g) Limitation 1.c.iii: Frequency Bins

Limitation 1.c.iii recites “at least one of the terminal devices providing frequency bins with more transmit bits which occupy parts of the channel where the signal to noise ratio (SNR) is high.”

Petitioner contends that the combination of Amit and Jacobsen renders obvious limitation 1.c.iii. Pet. 67 (citing Ex. 1003 ¶¶ 272–276).

Petitioner contends that Jacobsen teaches that OFDM frequency channels are “frequency bins,” explaining that “[i]n multicarrier modulation, a channel is divided into N equal-bandwidth subchannels, each with its own carrier.” *Id.* (citing Ex. 1007, 306).

Petitioner contends that Jacobsen teaches “[i]n contrast to traditional frequency-division multiplexing (FDM) techniques, multicarrier modulation does not constrain the number of bits per subchannel to be equal for all subchannels.” *Id.* at 68 (citing Ex. 1007, 306–307). Petitioner further asserts that Jacobsen teaches that “bits are originally assigned to subchannels just after training during system initialization in direct proportion to the subchannel signal-to-noise ratios” and that “[a]s a result, subchannels that suffer from little attenuation and/or little noise carry the most bits, while subchannels that are severely attenuated and/or very noisy might not carry any bits.” *Id.* (citing Ex. 1007, 307 (emphases omitted)). Petitioner states that “it would have been obvious for Amit’s terminal devices to provide frequency bins with more transmit bits occupying parts of the channel with high SNR.” *Id.*

To the extent that Patent Owner’s arguments from ground 1 apply to this ground, we find them unavailing. Prelim. Resp. 27–31. Even if Amit does not disclose allocation of frequency bins based on SNR, as Patent Owner argues in ground 1, Petitioner contends that Jacobsen discloses this feature. *Id.* at 27–28; Pet. 68 (citing Ex. 1007, 306–307). Patent Owner does not dispute Petitioner’s contention.

In ground 1, Patent Owner also argues that Amit is a single-carrier reference and thus does not disclose limitation 1.c.iii, but does not dispute Petitioner’s contention that Jacobsen discloses multicarrier modulation with

bit-loading that meets this limitation. Prelim. Resp. 28–29; Pet. 68 (citing Ex. 1007, 306–307).

Petitioner has shown a reasonable likelihood that limitation 1.c.iii is disclosed or rendered obvious by the combination of Amit and Jacobsen.

h) Limitation 1.d: Reflections

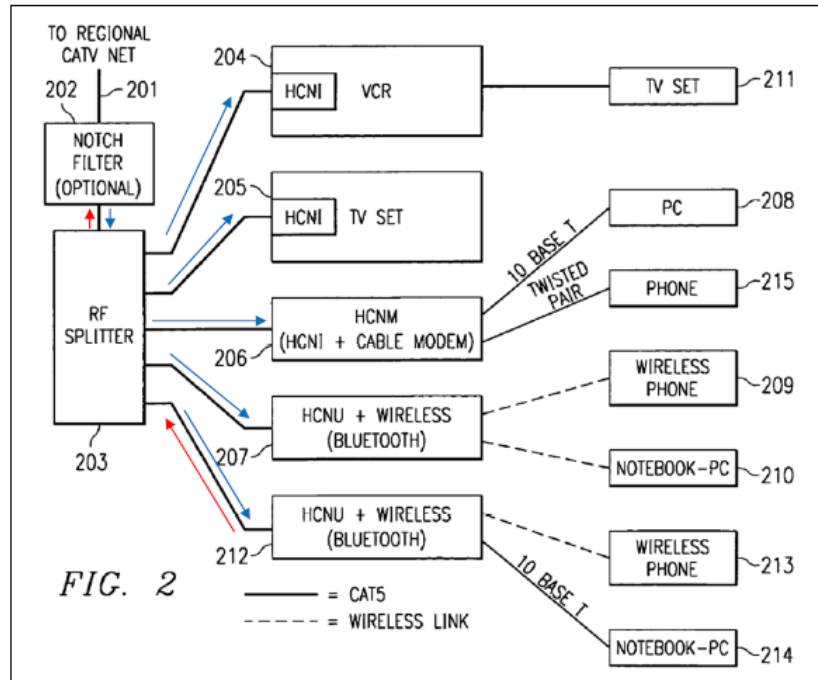
Limitation 1.d recites

wherein the reflections from the filter provide a path for terminal devices back through the tap port of the signal splitter and out each other tap port to transmit signals to other terminal devices thus allowing terminal devices to communicate directly with each other to form the signal distribution network.

Petitioner contends that Amit discloses or renders obvious limitation 1.d. Pet. 22–25 (citing Ex. 1003 ¶¶ 84–91). For example, Petitioner notes that Amit discloses that “devices may communicate directly (not via the headend)” because signals “propagate between the devices via reflections from other devices in the line.” *Id.* at 22 (citing Ex. 1005, 3:19–23). Petitioner further states that under certain conditions reflection from Amit’s notch filter may be used as the “main signal.” *Id.* (citing Ex. 1005, 13:44–14:5).

Petitioner asserts that “[f]or Figure 2’s network, Amit teaches or renders obvious using reflections from the filter as pathways for terminal devices to communicate directly with each other.” *Id.* at 23 (citing Ex. 1003 ¶ 86). Specifically, Petitioner contends that Amit’s notch filter 202 is a band reject filter that does not pass a certain RF range that is used by the home networking devices 204–207, 212. *Id.* (citing Ex. 1005, 6:29–31). Petitioner states that “Amit discloses that the filter reflects those RF signals, providing a path back through the tap port of the signal splitter and out each other tap port.” *Id.* (citing Ex. 1005, 3:19–23, 14:1–5).

Petitioner provides an annotated version of Amit's Figure 2, reproduced below.



Petitioner annotates Figure 2 to show an exemplary path where HCNU 212 transmits signals through splitter 203 that reflect off filter 202 before passing through splitter 203 again and flowing out each other tap port to terminal devices 204–207. *Id.* at 23–24.

Petitioner also relies on Amit's Figure 7 and related description as disclosing or rendering obvious limitation 1.d. *Id.* at 24–25 (Ex. 1005, 13:65–67, 14:10–65).

Patent Owner does not dispute Petitioner's contentions concerning limitation 1.d.

Petitioner shows a reasonable likelihood that Amit's notch filter receives signals from a home networking device via a splitter port and reflects them back through other splitter ports so that the devices can

communicate directly with one another, such that Amit discloses or renders obvious limitation 1.d.

i) Conclusion for Claim 1

Petitioner shows, on this record, a reasonable likelihood that a POSITA would have combined Amit and Jacobsen with a reasonable expectation of success, and that each limitation of claim 1 is taught or suggested by the combination of Amit and Jacobsen. Accordingly, on the current record, Petitioner shows a reasonable likelihood that claim 1 would have been obvious over the combination of Amit and Jacobsen notwithstanding Patent Owner's arguments.

6. Claim 5

Petitioner relies on its ground 2 mapping for the limitations of claim 5 except for limitations 5.a.ii and 5.a.iii for which it supplements Amit with Jacobsen's teachings. Pet. 67–69 (citing Ex. 1003 ¶¶ 271–285). Petitioner contends that claim 5 parallels claim 1 but also recites coaxial building wiring and OFDM modulation. *Id.* at 39–40 (citing Ex. 1003 ¶¶ 135–163).

a) Limitation 5.pre: Broadband Local Area Network

Claim 5's preamble recites a "broadband local area network using coaxial cable building wiring as a communication channel, the network comprising."

Petitioner contends that Amit teaches "home networking solutions that utilize [in-home] TV wiring for supplying high rate connectivity between any two home networking nodes" via "coaxial (coax) cables." Pet. 40 (citing Ex. 1005, 2:34–55). Petitioner further asserts that Amit explains that "devices may communicate directly (not via the headend) using RF signaling over the coax cable." *Id.* (citing Ex. 1005, 3:19–21).

Patent Owner does not dispute Petitioner's contentions.

Petitioner shows a reasonable likelihood that preamble limitation 5.pre is disclosed or rendered obvious by Amit's broadband local area network using building coaxial cable as a communication channel. Accordingly, we do not reach the issue of whether the preamble is limiting.

b) Limitation 5.a.i: Terminal Devices

Limitation 5.a.i recites "a plurality of terminal devices."

Petitioner relies on its showing for limitation 1.c.i for this limitation. Pet. 40 (citing § IV.A.2.a).

Patent Owner does not dispute Petitioner's contention.

Petitioner shows a reasonable likelihood that the terminal devices of limitation 5.a.i are disclosed or rendered obvious by the combination of Amit and Jacobsen.

c) Limitation 5.a.ii: OFDM Modulation

Limitation 5.a.ii recites "each terminal device communicating with other terminal devices using orthogonal frequency division multiplexing (OFDM) modulation."

Petitioner asserts that limitation 5.a.ii would have been obvious over the combination of Amit and Jacobsen. Pet. 68 (citing Ex. 1003 ¶¶ 278–283). Petitioner contends that Jacobsen discloses multicarrier modulation which divides a channel into N sub-channels with a frequency response that is roughly constant across each subchannel. *Id.* (citing Ex. 1007, 306). Petitioner contends that Jacobsen mentions that its multicarrier modulation is DMT, which is synonymous with OFDM. *Id.* Petitioner contends that Jacobsen recognizes that DMT is "a common form of multicarrier modulation" that "does not constrain the number of bits per subchannel to be

equal for all subchannels.” *Id.* at 68–59 (citing Ex. 1007, 306–307).

Petitioner asserts that “it would have been obvious for Amit’s terminal devices to communicate with other terminal devices using OFDM modulation.” *Id.* at 69.

Patent Owner does not dispute Petitioner’s contentions.

Petitioner shows a reasonable likelihood that limitation 5.a.ii would have been obvious based on the disclosed terminal devices communicating via OFDM modulation as taught or suggested by the combination of Amit and Jacobsen.

d) Limitation 5.a.iii: Frequency Bins

Limitation 5.a.iii recites “at least one of the terminal devices providing frequency bins with more transmit bits which occupy parts of the channel where the signal to noise ratio (SNR) is high.”

Petitioner contends that limitation 5.a.iii would have been obvious over the OFDM teachings in the combination of Amit and Jacobsen for the reasons addressed concerning limitation 1.c.iii. Pet. 67–69.

To the extent that Patent Owner’s arguments from ground 1 apply here, we addressed those arguments under the sub-section addressing limitation 1.c.iii (§ III.F.5.g) and find them unavailing.

Petitioner shows a reasonable likelihood that limitation 5.a.iii would have been obvious over the combination of Amit’s terminal devices and Jacobsen’s teaching of DTM allocating transmit bits based on SNR.

e) Limitation 5.b: Network of Building Cables

Limitation 5.b recites “a network of building cables coupled to the plurality of terminal devices.”

Petitioner contends that Amit discloses limitation 5.b. Pet. 41–42 (citing Ex. 1003 ¶¶ 148–152), 67. According to Petitioner, Amit discloses that TV wiring consists of coaxial cables connecting the antenna/cable TV output, typically via passive splitters, to the cable outlets at specific points in the home,” and that Amit “provides home networking solutions that utilize in-home TV wiring for supplying high rate connectivity between any two home networking nodes.” *Id.* at 41 (citing Ex. 1005, 2:4–6, 2:44–46). Petitioner asserts that Amit’s Figures 2 and 7 show a plurality of nodes or “terminal devices” 204–206, 212, 701–704 coupled to a network of coaxial building cables.

Patent Owner does not dispute Petitioner’s contentions.

Petitioner has shown a reasonable likelihood that Amit’s network of coaxial cables discloses limitation 5.b.

f) Limitation 5.c.i: Filter

Limitation 5.c.i recites “a filter having a first and second port, the first port connected to a building point of entry and the second port connected to the plurality of terminal devices via the network of building cables.”

Petitioner contends that Amit discloses or renders obvious limitation 5.c.i. Pet. 42–45 (citing Ex. 1003 ¶¶ 153–157), 67. Petitioner asserts that Amit’s notch filters 202, 707 are located at the entry point of a building, and have first ports connected to a regional CATV plant via cable 201. *Id.* at 43–45 (citing Ex. 1005, 4:30–34, 6:28, 13:31–45, Figs. 2, 7 (annotated); Ex. 1003 ¶¶ 154–155).

Petitioner further contends that Amit discloses or renders obvious the filter being connected to a splitter and each terminal device being coupled to tap ports of the splitter. *Id.* at 44 (citing Ex. 1003 ¶ 156). Petitioner states

that Amit's Figures 2 and 7 show terminal devices connected to the second port of the filter via the network of building cables and the splitter. *Id.* at 44–45 (citing Ex. 1005, 2:44–46).

Patent Owner does not dispute Petitioner's contentions.

Petitioner shows a reasonable likelihood that Amit's notch filter discloses or renders obvious limitation 5.c.i.

g) Limitation 5.c.ii: Reflection

Limitation 5.c.ii recites “wherein signals transmitted by any of the terminal devices and received at the second port of the filter are rejected by the filter such that such signals do not pass through the filter, but rather are reflected back into the network of building cables in order to create a communication path between the transmitting terminal device and at least one other terminal device coupled to the network of building cables.”

Petitioner contends that Amit discloses or renders obvious limitation 5.c.ii. Pet. 67 (citing § IV.B.3.b). Petitioner asserts that Amit's “signals transmitted by any of the terminal devices” will be “received at the second port of the filter.” *Id.* at 45. Petitioner further argues that Amit's “signals . . . received at the second port of the filter are rejected by the filter such that such signals do not pass through the filter, but rather are reflected back into the network of building.” *Id.* at 45–46. Petitioner states that Amit's reflections “create a communication path between the transmitting terminal device and at least one other terminal device coupled to the network of building cables.” *Id.* at 46.

Patent Owner does not dispute Petitioner's contentions.

Petitioner shows a reasonable likelihood that Amit's filter reflects signals as claimed such that limitation 5.c.ii is disclosed or rendered obvious by the combination of Amit and Jacobsen.

h) Conclusion for Claim 5

On this record, Petitioner shows a reasonable likelihood that a POSITA would have combined Amit and Jacobsen with a reasonable expectation of success, and that all limitations of claim 5 are taught or suggested by the combination of Amit and Jacobsen. Accordingly, Petitioner shows a reasonable likelihood that claim 5 would have been obvious over the combination of Amit and Jacobsen notwithstanding Patent Owner's arguments.

7. Claims 2, 4, 6, 8, and 9

Claims 2 and 9 are directed to using TDD protocol, synchronized by broadcasting a beacon message on the network, on the communication channel between terminal devices.

Petitioner contends that the '249 patent acknowledges that TD-based protocols use broadcast beacon messages to synchronize nodes. Pet. 71 (citing Ex. 1001, 2:42–6:35–48). While we find no mention of beacon messages in the cited passages, Dr. Acton's supporting testimony on this point, not specifically addressed by Patent Owner at this time, presents a reasonable likelihood that beacon messages were known to be used in TDD protocol such that claims 2 and 9 would have been obvious. *Id.* (citing Ex. 1003 ¶¶ 297–300).

Claims 4 and 6 are directed to adjusting the modulation order of each OFDM carrier according to the SNR at each carrier frequency.

Petitioner points to Jacobsen’s teaching of assigning bits to DMT subchannels according to subchannel SNRs such that subchannels that suffer little attenuation or noise carry most of the bits. Pet. 72–73 (citing Ex. 1007, 306–307). Petitioner presents a reasonable likelihood that claims 4 and 6, not specifically addressed by Patent Owner, would have been obvious over the combination of Amit and Jacobsen.

Claim 8 recites that the frequency used for communicating between terminal devices is above the cable television band.

Petitioner contends that Amit discloses that the home network uses an out-of-band frequency, e.g., above 860 MHz. Pet. 58–59 (citing Ex. 1005, 3:24–30, 5:28–29, Fig. 5), 73–74 (citing Ex. 1007, 305; Ex. 1003 ¶¶ 309–312). Patent Owner does not specifically address Petitioner’s contentions for claim 8. Petitioner presents a reasonable likelihood that claim 8 would have been obvious over the combination of Amit and Jacobsen.

8. *Claim 10*

Claim 10’s limitation 10.c.iii recites “wherein the terminal devices perform equalization on the received signal that restores a flat frequency response to overcome communication channel impairments caused by the reflected signals.”

Petitioner argues that Jacobsen teaches that an equalizer can be used to reduce ISI and thus improve performance of a single-carrier QAM system. Pet. 69–70 (Ex. 1007, 306). However, Patent Owner correctly argues that Jacobsen teaches that multicarrier modulation performs better than single carrier modulation with equalization at least by some measures under some circumstances. Prelim. Resp. 51 (citing Ex. 1007, 15).

Accordingly, on the current record, Petitioner has not shown a reasonable likelihood that claim 10 would have been obvious over the combination of Amit and Jacobsen.

9. *Claims 11–17*

For the reasons stated for independent claim 10, we determine that, on the current record, a reasonable likelihood that dependent claims 11–17 would have been obvious over the combination of Amit and Jacobsen has not been demonstrated on this record.

G. Ground 4: Amit, Jacobsen, and DSL-Book

We now address Petitioner’s contention that claims 2–3, 7, 9–13, 15, and 17 would have been obvious over the combination of Amit, Jacobsen, and DSL-Book, and Patent Owner’s arguments for patentability for this ground. Pet. 75–87; Prelim. Resp. 54–56.

1. *DSL-Book (Ex. 1008)*

DSL-Book is a textbook titled “DSL: Simulation Techniques and Standards Development for Digital Subscriber Line Systems.” Ex. 1008, cover. DSL-Book purports to disclose “simulation/implementation techniques and reference materials for the design and development of DSL systems.” Ex. 1008, 12. The textbook states that “[m]any techniques developed for DSLs can be very useful also for next-generation communication systems, such as a high-throughput home digital network.” *Id.* DSL-Book also includes a chapter on “channel equalization” which mentions an equalizer for a DMT system which calculates coefficients and SNRs for an equalizer in a DMT system. *Id.* at 149–150.

2. *Motivation to Combine Amit, Jacobsen, and DSL-Book*

Petitioner contends that a POSITA would have been motivated to incorporate various features from DSL-Book, including OFDM, equalization, TDD protocol, and FEC, into the Amit-Jacobsen combination. Pet. 75–78 (citing Ex. 1003 ¶¶ 329–353). Petitioner contends that DSL-Book is analogous to the ’249 patent because it addresses communication techniques for broadband networks, as well as the motivators (Internet, consumer, and entertainment services) for high-speed network communications. *Id.* at 76.

Petitioner further contends that a POSITA would have been motivated to consider techniques in noncoaxial networks in coaxial networks because all three references demonstrate an overlap between coaxial and non-coaxial networks, and DSL-Book recognizes that “[m]any techniques developed for DSLs can be very useful also for next-generation communication systems, such as a high-throughput home digital network.” *Id.* at 76–77 (citing Ex. 1005, 1:18–25, 1:31–37, 28:67; Ex. 1008, 12; Ex. 1003 ¶ 332).

Petitioner further contends that “all three references seek to overcome network communication channel impairments” and address the problem of “providing a suitable path for terminal-to-terminal communication” as described in the ’249 patent. *Id.* at 77–78 (citing Ex. 1001, 3:4–7; Ex. 1008, 149–150).

Petitioner further contends that DSL-Book “builds upon the concepts discussed in Amit and Jacobsen, including OFDM, equalization, TDD, and FEC,” and that “a POSITA would have been motivated to use DSL-Book for details on implementing these concepts.” *Id.* (citing Ex. 1003 ¶ 335).

Patent Owner contends that a POSITA would not have been motivated to arrive at the equalization of claim 10 because Jacobsen describes no equalization with its multicarrier teachings, and equalization would add 2.5 times the complexity to the system. Prelim. Resp. 54 (citing Pet. 82; Ex. 1007, 10, 13; Ex. 1008, 18).

Patent Owner further contends that DSL-Book's equalization is entirely different from that of Jacobsen. *Id.* at 54–55 (citing Ex. 1008, 19). Patent Owner asserts that Amit's communication network operates at frequencies that would have significant signal attenuation when using DSL-Book's techniques such that a POSITA would have been dissuaded from looking at the teachings of DSL-Book as a way to modify Amit. *Id.* (citing Ex. 1008, 14). Patent Owner asserts that Petitioner is engaging in impermissible hindsight. *Id.* at 55–56.

Petitioner has shown, on the current record, a reasonable likelihood that a POSITA would have been motivated to combine Amit, Jacobsen, and DSL-Book. Pet. 76–78. As Petitioner contends, the references disclose design and market trends toward faster broadband coaxial networks. *See KSR*, 550 U.S. at 418 (design and market trends may provide motivation). In addition, based on the current record, the three references address similar topics such as high-speed communications, cable networks, and home networks, and address ways to overcome signal impairments on them, which would have led a POSITA to consider them together. *Id.* at 77–78.

Although Patent Owner argues that the references' technologies are incompatible, this assertion amounts to attorney argument that is not sufficiently substantiated in the record. *Icon Health & Fitness, Inc. v.*

Strava, Inc., 849 F.3d 1034, 1043 (Fed. Cir. 2017) (“[a]ttorney argument is not evidence”).

However, we agree with Patent Owner’s argument that Jacobsen prefers multicarrier modulation over single carrier modulation with equalization, and address this argument further with respect to claim 10 and its dependent claims in a subsequent section for this ground.

3. *Reasonable Expectation of Success*

Petitioner contends that a POSITA would have had a reasonable expectation of success for similar reasons explained for ground 2 and for the reasons stated in Dr. Acton’s declaration. Pet. 81 (citing Ex. 1003 ¶¶ 347–353).

We have already addressed reasonable expectation of success with respect to ground 3 (§ III.F.4), and Petitioner’s contentions and Patent Owner’s arguments are similar for the combination of Amit and Jacobsen with DSL-Book. Pet. 81; Prelim. Resp. 56. Our view of these assertions remains unchanged with the addition of DSL-Book to this ground.

On the present record, we agree with Dr. Acton’s statement that “a POSITA would have expected DSL-Book’s teachings of OFDM modulation to work in the [] Amit-Jacobsen network, which already employed OFDM.” Ex. 1003 ¶ 350. In addition, based on the current record, that a POSITA would have been instructed by the teachings of the references, would have had relevant coursework, the fact that QAM and OFDM were well-known in the art, and the predictability of implementing the combination, all support a reasonable expectation of success. We address Patent Owner’s arguments concerning equalization in the following section.

4. *Claims 2, 9, 10, 12, 13, and 17*

In ground 3, on the current record, we decided that Petitioner had shown a reasonable likelihood to prevail in showing claims 2 and 9 obvious, but did not with respect to claims 10, 12, 13, and 17. The addition of DSL-Book does not change our view for these claims because it does not negate Petitioner's showing for ground 3 based only on Amit and Jacobsen.

Although DSL-Book addresses channel equalization, Petitioner has not shown that a POSITA would have combined it with Amit and Jacobsen when, as explained in ground 3 (§ III.F.16–18), Jacobsen indicates that multicarrier modulation performs better than single carrier modulation with equalization by some metrics under some circumstances.

5. *Claims 3 and 7*

Claims 3 and 7 depend from claims 1 and 5, respectively, and are directed to adjusting power level of each OFDM carrier to overcome selective channel impairments caused by reflections from the filter.

Petitioner states that DSL-Book discloses that “[o]ne way to improve the transmission efficiency with integer number of bits is to assign a different signal power for each subchannel.” Pet. 87 (citing Ex. 1008, 443).

Patent Owner does not present any argument specific to claims 3 and 7.

On this record, we agree with Petitioner's argument that DSL-Book discloses adjusting signal power to overcome selective channel impairments, which would have been applicable to Amit's terminal-to-terminal communications by reflections in its home network. Petitioner has shown a reasonable likelihood that claims 3 and 7 would have been obvious over the combination of Amit, Jacobsen, and DSL-Book.

6. *Claims 11 and 15*

Claims 11 and 15 depend from claim 10. As explained, Jacobsen prefers multicarrier modulation over single carrier modulation with equalization, so a POSITA considering it with Amit and DSL-Book would not have sought to use Jacobsen's equalization in Amit's multicarrier system. For the same reason, on this record, we determine that a POSITA would not have used DSL-Book's equalization with Amit and Jacobsen. Petitioner has not shown a reasonable likelihood to prevail in showing obviousness for claims 11 and 15.

IV. CONCLUSION

In light of the foregoing, based on the current record and at this stage of the proceeding, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing on its assertions that at least one of claims 1–17 of the '249 patent would have been obvious under 35 U.S.C. § 103 based on the grounds set forth in the Petition. Accordingly, we institute trial for all challenged claims on all grounds asserted by Petitioner. 37 C.F.R. § 42.108(a) (“When instituting . . . review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim”).

Our factual findings, conclusions of law, and determinations at this stage of the proceeding are preliminary, and based on the evidentiary record developed thus far. At this stage of the proceeding, we have not made a final determination with respect to the patentability of the challenged claims or to the construction of any claim term.

V. ORDER

For the foregoing reasons, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–17 of the '249 patent is hereby instituted on all challenges to patentability set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial and that the trial will commence on the entry date of this decision.

IPR2024-00373
Patent 7,594,249 B2

For PETITIONER:

Adam R. Shartzer
Ruffin B. Cordell
Matthew P. Mosteller
John J. Thuermer
Timothy Riffe
Usman Khan
FISH & RICHARDSON P.C.
shartzer@fr.com
cordell@fr.com
mosteller@fr.com
thuermer@fr.com
riffe@fr.com
khan@fr.com

For PATENT OWNER:

Jason A. Engel
Erik J. Halverson
Jared R. Lund
K&L GATES LLP
Jason.Engel.PTAB@klgates.com
erik.halverson@klgates.com
Jared.Lund@klgates.com