UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK L.L.C.,

Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,

Patent Owner.

IPR2024-00393
U.S. Patent No.: 7,295,518 B1

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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LIST OF EXHIBITS

DISH-1001	U.S. Patent No. 7,295,518 to Monk et al. ("the '518 Patent")
DISH-1002	Excerpts from the Prosecution History of the '518 Patent ("the '518 Patent Prosecution History")
DISH-1003	The Prosecution History of U.S. Patent Application No. 10/230,687 to Monk et al. ("the '687 Patent Application Prosecution History")
DISH-1004	Declaration of Tim A. Williams, Ph.D.
DISH-1005	Tim A. Williams's Curriculum Vitae and Case History
DISH-1006	Declaration of June Munford
DISH-1007	U.S. Patent App. Pub. No. 2002/0069417 to Kliger et al. ("Kliger")
DISH-1008	U.S. Provisional Application No. 60/229,263 to Kliger et al. ("'263-Provisional")
DISH-1009	U.S. Provisional Application No. 60/230,110 to Kliger et al. ("'110-Provisional")
DISH-1010	U.S. Provisional Application No. 60/275,060 to Kliger et al. ("'060-Provisional")
DISH-1011	U.S. Provisional Application No. 60/291,130 to Kliger et al. ("'130-Provisional")
DISH-1012	U.S. Provisional Application No. 60/297,304 to Kliger et al. ("'304-Provisional")
DISH-1013	Int'l Pub. No. WO 1998/010545 to Isaksson et al. ("Isaksson")
DISH-1014	U.S. Patent No. 7,127,734 to Amit et al. ("Amit")

DISH-1015	U.S. Provisional Application No. 60/128,810 to Amit et al. ("Amit-Provisional")
DISH-1016	Jacobsen et al., *An Efficient Digital Modulation Scheme for Multimedia Transmission on the Cable Television Network*, 43rd Annual National Cable Television Association Convention and Exposition, New Orleans, LA. 1994 ("Jacobsen")
DISH-1017	Excerpts from Robert M. Gagliardi, *Introduction to Communications Engineering*, 2d ed., 1988 ("Gagliardi")
DISH-1018	U.S. Patent No. 5,822,372 to Emami ("Emami")
DISH-1019	Excerpts from Shlomo Ovadia, *Broadband Cable TV Access Networks*, 1d ed., March 2001 ("Ovadia")
DISH-1020	U.S. Patent No. 5,488,632 to Mason et al. ("Mason")
DISH-1021	Excerpts from Walter Y. Chen, *DSL: Simulation Techniques and Standards Development for Digital Subscriber Lines*, 1998 ("DSL Simulation Techniques")
DISH-1022	Excerpts from Dennis J. Rauschmayer, *ADSL/VDSL Principles*, 1999 ("ADSL/VDSL Principles")
DISH-1023	Jacobsen, Krista S., *Synchronized Discrete Multi-Tone (SDMT) Modulation for Cable Modems: Making the Most of the Scarce Reverse Channel Bandwidth*, WESCON/97 Conference Proceedings, Santa Clara, CA, USA, 1997 ("Jacobsen2")
DISH-1024	U.S. Patent No. 6,771,706 to Ling et al. ("Ling")
DISH-1025	Complaint from *Entropic Communications, LLC v. DISH Network Corporation et al.*, Case 2:23-cv-01043, ECF No. 1 (C.D. Cal. Feb. 10, 2023)
DISH-1026	Federal Court Management Statistics for September 2023 published by the Administrative Office of the U.S. Courts,

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DISH-1029	LegalMetric Time to Trial Report, Central District of California, Patent Cases (Jan. 2021 – Nov. 2023
DISH-1030	Declaration of Michael J. Ballanco
DISH-1031	Walter Y. Chen, *DSL: Simulation Techniques and Standards Development for Digital Subscriber Lines*, 1998 ("DSL")
DISH-1032	U.S. Patent No. 7,099,349 to Phillips et al. ("Phillips")
DISH-1033	U.S. Patent No. 6,970,905 to Jeffery et al. ("Jeffery")
DISH-1034	Shlomo Ovadia, Broadband Cable TV Access Networks, 1d ed., March 2001 ("Ovadia")
DISH-1035	Second Declaration of June Munford
DISH-1036	Second Declaration of Tim A. Williams, Ph.D.
DISH-1037	George Lawton, *New Technologies Take the Network Home*, 1999
DISH-1038	Regis J. Bates, *Voice & Data Communications Handbook*, 4th ed., July 2001

DISH-1039 Deposition Testimony of Mr. Albert Garrett (January 15, 2025)

I. INTRODUCTION

Patent Owner (PO) concedes through silence that, as admitted by the '518 Patent and established by the Petition, the claimed elements were known before the '518 Patent. Petition, 7-8. Instead of addressing the claimed elements, PO's Response (POR, Paper 16) attempts to distinguish from Isaksson by erroneously importing an "in-home" requirement into the claims. PO compounds this error by requiring bodily incorporation of Isaksson's components into the instituted obviousness grounds. PO also improperly focuses on the immaterial differences between twisted pair and coaxial cables to wrongly contend that (1) Isaksson is limited to twisted pair and is not analogous art, and (2) a POSITA would not be motivated to combine Isaksson with coaxial systems Kliger and Amit-Jacobsen.

II. PO'S IMPROPER CLAIM FEATURE IMPORTATION AND BODILY INCORPORATION OF ISAKSSON'S COMPONENTS DOOM ITS ARGUMENTS AGAINST ISAKSSON

A. PO Improperly Imports "In-home" into the Claims to Try Distinguishing from Isaksson

PO misrepresents the scope of the challenged claims by importing "in-home" (and variants "local" and "on-premises") into the claims. On the POR's first page, PO asserts that "the '518 Patent **claims** an inventive **in-home coaxial network**."[1]

[1] All emphasis added unless otherwise stated.

POR, 1. The challenged claims, however, do not recite any limitation that restricts the claims to an in-home network. DISH-1001, 12:8-36; DISH-1036, ¶¶11-13. This false narrative perpetuates the POR in an attempt to distinguish from Isaksson. *See* POR, 16 (arguing that the '518 Patent addresses issues in an on-premises coaxial network), 20 (distinguishing the '518 Patent's "on-premises broadband network" and Isaksson's "out-of-home system"), 22 (arguing the '518 Patent's field of endeavor is limited to "a local network context").

But PO cannot now narrow the claims to distinguish from the asserted references. *See Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (The written description cannot be used to rewrite the claim language.). Properly viewing the claims without the "in-home" limitation nullifies PO's manufactured issues with Isaksson (discussed below).

B. PO Wrongly Requires Bodily Incorporation of Isaksson's Components into Kliger's and Amit's Networks

PO asserts Petitioner's grounds fail because it would not be possible to bodily incorporate Isaksson's components into the Kliger and Amit-Jacobsen combinations. POR, 1, 37, 50, 57. But this is not the Petition's proposal, nor the proper approach to evaluating obviousness. Rather, the Federal Circuit warns against PO's assertion, noting that the test for obviousness is ***not*** whether a secondary reference's features may be ***bodily incorporated*** into the primary

reference, but whether a POSITA would have been motivated to combine the references. *Intel Corp. v. PACT XPP Schweiz AG*, No. 2022-1038, 2023 WL 2198649, at *3 (Fed. Cir. 2023) ("*Intel I*").

The Petition explains why it would have been obvious to modify Kliger and Amit-Jacobsen in view of Isaksson's teachings on base sync frames. *See* Petition, 23-27, 47-54. In response, PO raises supposed problems with bodily incorporating Isaksson's twisted pair system into Kliger's and Amit-Jacobsen's coaxial systems. PO offers variations of this argument—such as, incorporating Isaksson's full-duplex transceivers into Kliger's and Amit-Jacobsen's half-duplex systems (*id.*, 37, 50), and incorporating Isaksson's control channel into Kliger's and Amit-Jacobsen's control-channel-free systems (*id.*, 37, 57). As discussed below, the Petition does not propose this bodily incorporation. Thus, this challenge to the instituted grounds should be dismissed.

PO's legally deficient arguments should be rejected. Since PO does not dispute that the instituted grounds teach the claimed elements, the challenged claims should be deemed unpatentable.

III. ISAKSSON IS ANALOGOUS ART

Two tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of endeavor, whether the reference still is reasonably

pertinent to the particular problem with which the inventor is involved. *Netflix, Inc. v. DivX, LLC*, 80 F.4th 1352, 1358 (Fed. Cir. 2023) (citing *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1379 (Fed. Cir. 2019)). Isaksson is analogous under both tests. *See* Petition, 27, 54.

A. PO's New "Evidence" is Incorrect or Irrelevant

PO introduces new evidence purportedly showing that Isaksson is non-analogous art. POR, 14-15. But this evidence at best highlights immaterial differences between Isaksson's twisted pair (though Isaksson is not limited to twisted pair) and the '518 Patent's coaxial cables. DISH-1036, ¶¶14-15. Indeed, both twisted pair and coaxial cables provided home networking solutions at the relevant timeframe. *Id.*, ¶¶16-22 (citing DISH-1037); DISH-1035, ¶¶19-22.

PO asserts without citation that Isaksson's twisted pair is unshielded and limited to point-to-point networks. POR, 14. Both assertions fail. ***First***, twisted pair can be shielded or unshielded. *E.g.*, DISH-1038, 1018 ("twisted pair wiring is … shielded or unshielded")[2]; DISH-1035, ¶¶23-26. Nothing in Isaksson limits its teachings to unshielded wiring, twisted pair, or otherwise. ***Second***, references from the relevant timeframe confirm that twisted pair was used in various configurations, including point-to-multipoint. DISH-1032, Abstract (describing point-to-multipoint communication on twisted pair); DISH-1033, 1:5-10 ("[T]his invention relates to …

[2] Citations are to each reference's page numbering, not the bates numbering.

point-to-multipoint communications using twisted pair copper telephone wire."). On this point, PO selectively quotes Petitioner's expert Dr. Williams' testimony that "[o]ne application of Isaksson is point-to-point," (POR, 17 (citing Ex. 2003, 60:1-3)), but omits his very next answer that "Isaksson can be deployed in point-to-multipoint networks" (Ex. 2003, 60:4-6). PO's attempts to limit Isaksson to low-bandwidth, low-frequency, and/or point-to-point applications are therefore baseless. DISH-1036, ¶¶30-34, 42-44.

PO does not acknowledge the similarities between coax and twisted pair; focusing solely on alleged differences between the mediums, like supported frequencies, bandwidth ranges, and attenuation challenges. POR, 14-15. But neither PO, nor its expert, Mr. Garrett, explain why these differences render Isaksson non-analogous. Assuming such differences exist, the two mediums experience similar signal impairments, which PO asserts is the problem addressed by the '518 Patent. POR, 11; DISH-1036, ¶¶23-26. Just like coax, twisted pair suffers from amplitude attenuation, phase distortion, inter-symbol interference (ISI), inter-subchannel interference, and RF interference (external noise). DISH-1031, 7, 12, 150, 207, 440-41, 575. Coax suffers from these same impairments. DISH-1016, 305-06 (discussing channel amplitude and phase distortions, ISI, and RF interference); DISH-1001, 3:5-19 (discussing ISI and amplitude distortions); DISH-1034, 262 (discussing noise, reflections, and amplitude variations); DISH-1036, ¶¶23-27.

These impairments are addressed in both mediums using the same solutions. DISH-1031, 7 and 441-443 (discussing channel equalization, multi-carrier modulation, and bit loading to address impairments in twisted pair); DISH-1006, 306-307 (discussing channel equalization, multi-carrier modulation, and bit loading, to address impairments in coaxial cables). The '518 Patent itself cites and incorporates by reference several twisted pair references (including one that shares inventorship with Isaksson) that use the claimed bit loading. DISH-1036, ¶¶28-29. PO cannot now credibly claim that such references are non-analogous when the inventors treated them as analogous. *See Ericsson Inc. v. Intell. Ventures II LLC*, No. IPR2014-01471, 2016 WL 1085092, at *16 (P.T.A.B. Mar. 17, 2016) (finding contemporaneous art provided context that satellites and CATV networks are analogous).

Both experts agree that these signal impairments, along with their corresponding solutions, were well-known before the '518 Patent. DISH-1036, ¶¶27-28; DISH-1039, 34:22-35:6, 36:9-19, 37:10-38:2, 45:19-46:7, 55:21-56:18. A POSITA encountering these impairments in coaxial networks (Kliger or Amit-Jacobsen) would thus apply the corresponding solutions, even if they had been implemented in a different network (Isaksson). DISH-1036, ¶36.

In any event, as shown below, Isaksson satisfies both *Netflix v. DivX* analogous art tests.

B. The ’518 Patent and Isaksson Share the Same Field of Endeavor

The focus of the field of endeavor test is what the references disclose, which a factfinder considers from a POSITA’s perspective. *Airbus*, 941 F.3d at 1380. The Petition explains that the ’518 Patent and Isaksson share the same field of endeavor of “wired networking systems.” Petition, 27, 54. PO mischaracterizes the record to assert that they do not.

When defining the ’518 Patent’s field, PO mischaracterizes Dr. Williams’ testimony. PO argues that the ’518 Patent’s field is limited to “wired networking systems *using coaxial cables in a local network context*,” (POR, 22) and relies on Dr. Williams’ statement that the Ground 2 references “are in the same field of endeavor as the ’518 patent (i.e., wired networking systems using coaxial cables)” (DISH-1004, ¶184). But Dr. Williams does not limit “wired networking systems” in the ’518 Patent exclusively to local coaxial networks. DISH-1036, ¶¶45-46. In the same Declaration, Dr. Williams states that the Ground 1 references “are in the same field of endeavor as the ’518 patent (i.e., wired communication networks).” DISH-1004, ¶77. Dr. Williams’ statements recognize that the ’518 Patent encompasses wired networks that may use coaxial cables, but not that the patent is limited only to local coaxial networks, as PO suggests.

For Isaksson, PO narrowly offers “multi-carrier signaling over twisted pair.” POR, 22. This is wrong because the Federal Circuit has held that the field of

endeavor is "not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field." *Netflix*, 80 F.4th at 1359 (citing *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1001 (Fed. Cir. 2016)). Instead, the field of endeavor relies on all embodiments in a patent's specification. *Netflix*, 80 F.4th at 1359. Through this proper lens, Isaksson and the '518 Patent are in the same field.

As the Petition explains, Isaksson discloses that it encompasses coaxial cables. Petition, 27, 53. Isaksson describes a "multi-carrier transmission system" (DISH-1013, 5:4-5) that is agnostic to wiring type and highlights "coaxial cable systems" (*id.*, 3:15) as a known implementation of that multi-carrier transmission system. Isaksson explains that the "multi-carrier system may be a DMT based VDSL system" (*id.*, 6:13-14) and that "distribution of VDSL signals over coaxial cable systems" is possible (*id.*, 3:14-15). Dr. Williams explains that a POSITA would have thus understood that Isaksson encompasses coaxial cables. DISH-1036, ¶¶37-39, 47-50.

Seeking to manufacture a difference in the fields of endeavor, PO presents differences between twisted pair and coax. POR, 24-26. But those differences are trivial. PO argues that the lumped (not distributed) propagation modeling of in-home telephone lines is a "material difference" between twisted pair and coax. POR, 24-26. Not so. Putting aside that "in-home" is not in the claims, choosing whether

to model reflections by selecting lumped or distributed modeling is merely a choice, as Dr. Williams explains. DISH-1036, ¶35. This choice is based on factors like the frequency of operation and the level of abstraction chosen for the analysis, rather than an intrinsic characteristic of the medium itself. *Id.* Tellingly, though Mr. Garrett relies on Ex. 2006 to introduce lumped and distributed models, he provides ***no evidence*** to support his conclusions that the propagation modeling of in-home twisted pair is lumped and that reflections disappear in such networks. Ex. 2002, ¶67.

Here, PO again argues that twisted pair and coax use different frequencies and bandwidths and experience different loss levels. POR, 24-26. As explained, even when factoring these purported differences, a POSITA would have appreciated the cross-applicability of solutions between twisted pair and coax. *See* §III.A, *supra*; DISH-1036, ¶29.

C. Isaksson is Reasonably Pertinent to the Problems of the '518 Patent

Isaksson meets the second *Netflix v. DivX* test because it is reasonably pertinent to solving the '518 Patent's problems of wired network impairments. PO's disagreement rests on two errors: a mischaracterization of the '518 Patent's problems and an inaccurate interpretation of Isaksson's solutions.

i. PO Improperly Defines the '518 Patent's Problems

The '518 Patent describes signal impairments such as signal reflections, ISI,

and signal attenuation. DISH-1001, 3:5-19. PO improperly constrains these problems as "issues specific to [an] on-premises local area broadband coaxial cable network, including the splitters located therein." POR, 16. This impermissibly narrows the patent's problems-to-be-solved for several reasons.

First, the Federal Circuit has held that the problem being examined must not be defined so narrowly as to collapse the field of endeavor and "reasonable-pertinence" inquiries. *Donner Tech., LLC v. Pro Stage Gear, LLC*, 979 F.3d 1353, 1360 (Fed. Cir. 2020). Here, the PO collapses the '518 Patent's known problems to apply only to PO's proposed field of endeavor: a local-area broadband coaxial network with impairments due solely to splitters.

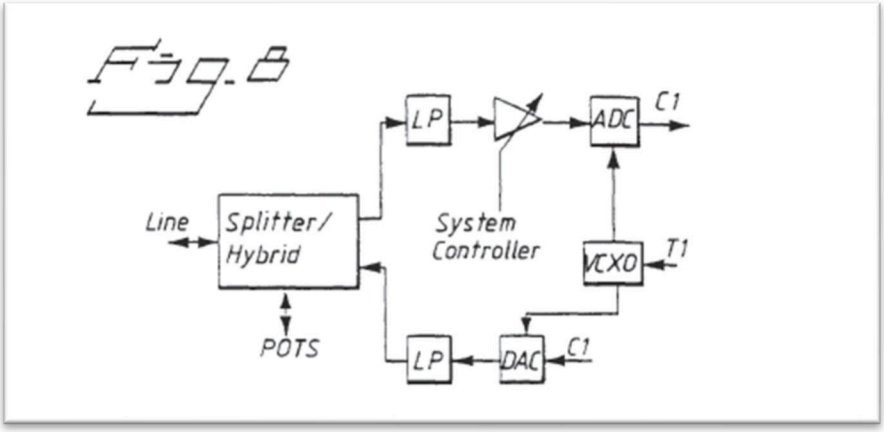
Second, the signal impairments described in the '518 Patent are not unique to an on-premises local area broadband coaxial cable network, but also arise in other mediums. *See* §III.A (describing the same signal impairments in twisted pair). Even if PO could show that the sources of these impairments are different across different mediums, both the impairments themselves and their solutions remain similar. DISH-1036, ¶¶27-28. The '518 Patent's problems are thus wired-network signal impairment issues. *See* Petition, 27 (citing DISH-1004, ¶¶76-80), 53 (citing DISH-1004, ¶¶183-184); DISH-1036, ¶¶50-54.

ii. PO Mischaracterizes Isaksson's Solutions

PO contends that Isaksson cannot be reasonably pertinent because it does not

involve coaxial cables or communicate over splitters. This is false.

As explained above, Isaksson encompasses coaxial cables. DISH-1036, ¶¶38-39 (citing DISH-1013). Isaksson also communicates over splitters. DISH-1036, ¶¶40-41. A POSITA would have understood Isaksson's twisted pair implementation to include at least one splitter at each of the transmitter and receiver. DISH-1031, 6 (A POTS splitter is included on each end of the twisted pair system). Isaksson sets forth a splitter at the receiver on the left-hand side of FIG. 8 (reproduced below).



PO also argues that Isaksson only addresses synchronization issues across twisted pair, and not the '518 Patent's splitter-related impediments. POR, 17-18. This is also false. DISH-1036, ¶¶55-59.

The '518 Patent describes the "splitter-related impediments" as "[i]mperfect terminations at connections create micro reflections … that create[] **inter-symbol interference (ISI)**," and that "[i]n the frequency domain, a reflection … create[es] **amplitude variations**." DISH-1001, 3:5-20. Isaksson addresses these very

impairments. Isaksson's solutions address wired impairments, like signal interference, variable frequency dependent loss and noise across sub-channels, ISI, and attenuation. DISH-1036, ¶¶55, 59 (citing DISH-1013). As an example, Isaksson's multi-carrier modulation handles frequency dependent loss and noise across the signal's sub-channels. DISH-1013, 26:4-6; *see Apple Inc. v. Evolved Wireless LLC*, No. IPR2016-01229, 2017 WL 6209180, at *12 (P.T.A.B. Nov. 30, 2017) (rejecting an artificial distinction between wired and wireless systems because the references addressed the same problem).

In sum, Isaksson is analogous art, and Petitioner properly relies on its teachings to render the challenged claims obvious. DISH-1036, ¶60.

IV. IN GROUND 2, A POSITA WOULD HAVE COMBINED AMIT AND JACOBSEN

Ground 2 establishes that the Amit-Jacobsen-Isaksson combination renders obvious the challenged claims. In response, PO contends that Ground 2 fails because a POSITA would not have combined Amit and Jacobsen. POR, 27. But PO largely rehashes arguments from the PO Preliminary Response (POPR, Paper 6) that the Board already found unpersuasive. In doing so, the POR fails to identify any flaws in the Board's preliminary findings.

A. Jacobsen is Not Redundant of Amit

PO initially asserts that Petitioner relies on Amit's "reflections" as motivation

to combine Amit and Jacobsen, then asserts that a POSITA would not have made the Amit-Jacobsen combination because Amit purportedly already solved reflections within its network. POR, 27-28. These allegations, already rejected by the Board, mischaracterize Petitioner's combination.

The Petition demonstrates multiple ways in which a POSITA would have recognized Jacobsen's multi-carrier modulation as an improvement over Amit's single carrier modulation, including, reducing distortions, adapting to channel degradations, and achieving more computationally efficient modulation for transmission over coaxial cables. *See* Petition, 47-49; DISH-1036, ¶¶62-63.

PO's focus on Amit's reflections suggests an obviousness combination must demonstrate a known problem existed in the prior art. The Federal Circuit has explicitly rejected this rigid approach. In *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380 (Fed. Cir. 2023) ("*Intel II*"), the court emphasized that "universal" motivations known in a particular field provide sufficient motivation to combine, even without explicit suggestion in any reference. The Institution Decision (ID, Paper 7) follows this precedent, noting that PO's argument does not negate Petitioner's demonstration that a POSITA would have recognized the benefits of incorporating Jacobsen's multi-carrier into Amit's system. ID, 17.

PO's reliance on the non-precedential decision in *Stryker Corp. v. Karl Storz Endoscopy Am., Inc.* is misplaced. POR, 27. *Stryker* suggests that a petitioner must

explain why a POSITA would add an element to perform a function already being performed by another system element. IPR2015-00764, Paper 13 at 13. Here, however, while Amit's optional frequency-shifting module may affect reflections, PO has not shown that the module performs the functions of Jacobsen's ***multi-carrier modulation***, like reducing distortions, adapting to channel degradations, and improving computational efficiency. DISH-1036, ¶¶64-65.

PO's argument also fails because, as Mr. Garrett testified, a POSITA would have considered using multiple techniques to address signal impairments. DISH-1039, 102:15-18. Even if Amit's frequency-shifting module manages reflections, it would not have precluded a POSITA from using Jacobsen's multi-carrier modulation to also address signal impairments. DISH-1036, ¶64.

B. Amit's Use of Reflections Does Not Preclude Jacobsen's Benefits

PO contends that Amit and Jacobsen are incompatible because they take opposing approaches to reflections. Again, this argument, rejected before by the Board, mischaracterizes the Petition.

The Petition acknowledges Amit's use of reflections for communication. Petition, 72. But it also notes that Amit recognizes "houses where there is a problem with reflection." Petition, 47 (citing DISH-1014, 20:42-43). As Dr. Williams explains, a POSITA would have recognized this house-related problem and considered Jacobsen's teachings about compensating for signal impairments caused

by reflections. DISH-1036, ¶¶66-67. The ID correctly agreed, finding that Petitioner satisfactorily explained that, while reflections can facilitate in-home network communications, they require appropriate management. ID, 18. PO does not explain why the Board's finding was wrong.

C. Jacobsen's Multi-Carrier Modulation Does Not Frustrate Amit's Goals

PO incorrectly argues that adding Jacobsen's multi-carrier modulation to Amit's system undermines Amit's simplicity and low-cost goals. POR, 31-36. But "[t]he fact that [a] motivating benefit comes at the expense of another benefit … should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another." *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000). "Instead, the benefits, both lost and gained, should be weighed against one another." *Id.*

PO overlooks the Federal Circuit's balancing framework. Instead of properly weighing the benefits, PO's argument relies only on describing the alleged drawbacks of the combination. POR, 31-36.

As Dr. Williams explains, under the Federal Circuit's balancing framework, a POSITA ***would*** implement Jacobsen's multi-carrier in Amit's network. DISH-1036, ¶68. Illustrating this point, Jacobsen's author performed this very cost-benefit analysis for a coaxial network in another paper, Jacobsen2. To balance tradeoffs

between performance and cost when using multi-carrier modulation, Jacobsen2 proposes solutions like dividing a channel into subchannels, segmenting the subchannels into disjointed groups, decreasing the fast Fourier transform (FFT) size (which is also proposed in Jacobsen), and reducing the number of active channels for hardware-limited scenarios. DISH-1023, 378-79. Jacobsen2 concludes that multi-carrier for cable modems is "a **cost-effective** solution." *Id.*, 374. PO fails to address any of that analysis. DISH-1036, ¶¶69-70.

Instead, PO raises exaggerated power consumption concerns—supported with an example from Mr. Garrett in which the power increase from single carrier to multi-carrier is thirty-fold. POR, 34-35. Mr. Garrett's example should be disregarded for several reasons. ***First***, Mr. Garrett testified that his example was prepared for a specialized form of multi-carrier modulation—OFDM—that is not required by the challenged claims. DISH-1039, 92:7-11. ***Second***, Mr. Garrett's methodology for preparing the example is unreliable. He selected the example's values based on his "most recent recollection" (*id.*, 92:20) and "grabb[ing][] from memory" (*id.*, 92:16)—despite not having worked in the field since 2019 (*id.*, 25:14-21). These shortcomings show Mr. Garrett's methodology was not properly tethered to the time of the purported invention.

Third, Mr. Garrett acknowledged his methodology did not consider cost-saving techniques, like lowering the FFT size. *Id.*, 88:14-16. Nor did his

methodology account for how Jacobsen's multi-carrier modulation (a) "alleviate[s] the problems caused by both frequency-domain ripple and interferers" (DISH-1016, 307), (b) improves computational efficiency (*id.*, 312), (c) "improve[s] the transmission efficiency" (DISH-1031, 443), and (d) "achieves high spectral efficiencies" (DISH-1023, 374). Each of these improvements can offset the power increases. As such, Mr. Garrett's power-consumption opinions are not relevant to the obviousness inquiry and ignore the optimizations achieved by Jacobsen's bit loading. DISH-1036, ¶¶71-72.

PO also argues that Jacobsen's multi-carrier modulation would introduce design challenges. POR, 35. This too, is overstated. As Dr. Williams explains, Amit's modulation architecture is implemented in silicon. DISH-1036, ¶73. Therefore, the costs of scaling to multi-carrier modulation would not have been significant. Jacobsen2—presented in 1997—confirms as much: "Each remote terminal [implementing multi-carrier] … has a computational complexity that can be **handled easily by a single DSP chip**." DISH-1023, 379.

Because a POSITA properly weighing the benefits would have implemented Jacobsen's multi-carrier modulation in Amit's network, PO's motivation arguments fail. They also fail because the Federal Circuit expressly rejects cost-based arguments against obviousness. *See Grit Energy Sols., LLC v. Oren Techs., LLC*, 957 F.3d 1309, 1323–24 (Fed. Cir. 2020) (holding a modification that would result

in a more expensive system is not, by itself, sufficient to reject a motivation to combine).

D. A POSITA Would Combine Amit and Jacobsen with Isaksson

PO also disputes the ID's correct finding of a reasonable likelihood that a POSITA would have been motivated to combine Amit and Jacobsen with Isaksson. POR, 36.

i. Isaksson is Compatible with Amit-Jacobsen's System

(a) *POSITAs understood Isaksson's base sync frames would function in Amit's network*

PO erroneously contends that Isaksson's base sync frames would not function on Amit's network because Isaksson is a full-duplex system and Amit is a half-duplex system. POR, 37-39. PO's contention rests on the incorrect conclusion that a POSITA must bodily incorporate Isaksson's full-duplex transceivers into Amit's network. As detailed above, this is wrong because the Petition argues that a POSITA would have found it obvious to use base sync frames like Isaksson's in Amit-Jacobsen's devices. *See* Petition, 51-54. As Dr. Williams explains, incorporating ***signaling*** from a full-duplex system into a half-duplex system is within the capabilities of a POSITA. A POSITA would treat Isaksson's base sync frames as a message allocated to the control aspects of the Amit-Jacobsen network. DISH-1036, ¶¶74-75.

PO also argues that Isaksson's base sync frames could not function in the Amit-Jacobsen system because Isaksson requires a control channel. POR, 37-39. This argument also fails. Dr. Williams explains that communication systems require a mechanism for control signaling. DISH-1036, ¶76. Rather than bodily incorporate Isaksson's control channel as PO contends, a POSITA implementing Isaksson's base sync frames in the Amit-Jacobsen system would do so using Amit's control signaling mechanism. A POSITA would recognize that Amit's IEEE 802.11 CSMA/CA protocol uses management frames for control messaging. DISH-1038, 606-609. As Dr. Williams confirms, a POSITA would have used these management frames to implement base sync frames. DISH-1036, ¶77.

(b) *POSITAs would extend Isaksson to coax*

PO's opposition to Isaksson being combined into the Amit-Jacobsen system fails on three grounds: (1) erroneously requiring bodily incorporation of Isaksson's twisted pair, (2) misinterpretation of Isaksson's teachings, and (3) a flawed analysis of the motivation to combine.

As discussed, Petitioner does not propose bodily incorporating Isaksson's twisted pair into the Amit-Jacobsen system. *See* §II, *supra*. In any event, Isaksson states that "the present invention can be used not only with the [disclosed] system … **but with other multicarrier systems**." DISH-1013, 72:5-8. The Amit-Jacobsen multi-carrier system falls squarely within this scope. DISH-1036, ¶79.

In misinterpreting Isaksson's teachings, PO relies on Mr. Garrett—who challenges Isaksson's statement that the DAVIC specification enables distribution of VDSL signals over coaxial cables. POR, 41 (citing Ex. 2002, ¶114). Mr. Garrett's opinion should be disregarded. ***First***, Mr. Garrett is not familiar with DSL technologies like VDSL. *See* DISH-1039, 18:18-19:15 (unable to answer basic questions on DSL technologies). ***Second***, Mr. Garrett's opinion relies on a source that he could not name and that he found through an internet search. *Id.*, 109:4-22. ***Third***, Mr. Garrett raises a strawman by asserting—without citation—that the DAVIC standard requires additional innovation for VDSL distribution over coaxial cables. Ex. 2002, 59. But even if further innovation were required, it would not preclude obviousness. *See GE v. Raytheon Techs. Corp.*, 983 F.3d 1334, 1352 (Fed. Cir. 2020) ("[T]he fact that it would take some creativity to carry out the combination does not defeat a finding of obviousness." (internal cites omitted)); DISH-1036, ¶81.

PO again incorrectly claims that Isaksson lacks teachings on communications over splitters, reflections, and attenuation. POR, 41-42. PO also repeats the same flawed analysis from the POPR by focusing on incorporating Isaksson's teachings into Amit, rather than into the Amit-Jacobsen system. POPR, 44. As the Board correctly found in the ID, PO's argument "does not address the reasons Petitioner gave for the motivation to combine Isaksson." ID, 21; DISH-1036, ¶80.

ii. <u>Isaksson is Not Redundant of Amit-Jacobsen's System</u>

PO incorrectly asserts that a POSITA would not have combined Isaksson's synchronization with the Amit-Jacobsen system because Jacobsen already teaches synchronized devices. POR, 43-44. This argument is flawed for several reasons.

First, PO wrongly addresses Jacobsen in isolation. The Petition demonstrates that a POSITA would have combined Jacobsen's multi-carrier modulation with Amit's devices. *See* Petition, 47-51. PO never explains how Jacobsen's alleged synchronism must be extended to the Amit-Jacobsen devices. POR, 43-44. This is improper because obviousness "cannot be overcome by 'attacking references individually.'" *See Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019). Here, Petitioner had established the rationale for the Amit-Jacobsen combination and the motivation to modify the combination to use Isaksson's synchronism. DISH-1036, ¶¶82-83.

Second, even if Jacobsen did teach synchronism, a POSITA would still look to Isaksson for details of how to achieve that synchronism. The Federal Circuit's *Unwired Planet* decision illustrates this point. *Unwired Planet* held that it would have been obvious to combine a secondary reference's teachings on ordering techniques with a primary reference that already disclosed grouping by location, but did not disclose how that grouping was prioritized. *Unwired Planet*, 841 F.3d at 1003-04. Similarly, while Jacobsen supposedly discloses synchronizing, it does not explain the "how." For example, *how* bit loading factors are determined, *how* often

they are reconfigured, or *how* a channel is characterized. Isaksson, by contrast, provides these implementation details. Thus, a POSITA would still have been motivated to apply Isaksson's teachings to the Amit-Jacobsen system. DISH-1036, ¶84.

E. Jacobsen is Prior Art

The Petition details how MARC records prove Jacobsen was accessible to POSITAs no later than September 1995. Petition, 44-45. Yet PO relies solely on attorney argument to question the authenticity of MARC records. POR, 45-49.

To remove all doubt arising from PO's allegations, Petitioner submits a second Declaration of June Ann Munford that confirms Jacobsen was publicly accessible to POSITAs before the critical date. *See* DISH-1035, ¶¶3-18; *VidStream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1065-67 (Fed. Cir. 2020) (affirming PTO's finding that a reference was prior art, and publicly accessible, where the petitioner provided new supporting evidence in its reply to PO's Response).

V. IN GROUND 1, KLIGER'S SOLUTIONS DO NOT PRECLUDE A MOTIVATION TO COMBINE

PO's argument that Kliger's solutions preclude a motivation to combine (1) misapplies Federal Circuit precedent, and (2) does not address Petitioner's articulated motivations to combine.

A. PO Misapplies Federal Circuit Precedent

The Federal Circuit has rejected PO's position that the Petition must present evidence of an improvement by a proposed combination. POR, 51; *see Intel II*, 61 F.4th at 1381 (holding a combination need only be a "suitable option"—improvement in a "categorical sense" is not required). Also, PO's reliance on *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342 (Fed. Cir. 2012) is misplaced. POR, 51. There, the issue was whether to combine references that "both … independently accomplish similar functions." *Kinetic*, 688 F.3d at 1369. Here, Petitioner has established a POSITA would have been motivated to improve Kliger's multi-carrier signaling to overcome signal impairments and determine carrier availability using Isaksson's bit-loading. Petition, 23-28. *Kinetic* is further distinguishable because the party challenging validity in *Kinetic* "never offered evidence articulating" a motivation to combine. *Kinetic*, 688 F.3d at 1368-69. Here, the Petition provides such motivation. Petition, 23-28.

B. PO Does Not Address Petitioner's Motivations to Combine

PO argues that Kliger solves reflections by: (i) using power control such that the HRU receives signals at a predefined power level (POR, 50), (ii) and using an efficient modulation scheme (POR, 51-52). But this fails to address the Petition's motivations to combine. The Petition establishes that a POSITA would have been motivated to, for example, use Isaksson's solutions to improve Kliger's modulation by determining the number of bits-per-carrier based on SNR, disabling noisy

carriers, and synchronizing bit loading. *See* Petition, 23-26. PO has not explained how Kliger already solves these issues, let alone why a POSITA would lack motivation to make these improvements. DISH-1036, ¶85.

Further, to the extent Kliger's power control or modulation scheme could reduce signal impairments (like reflections), PO's argument still fails. This is because, as Mr. Garrett testified, a POSITA would have considered using multiple techniques to address signal impairments. DISH-1039, 102:15-1; DISH-1036, ¶86.

PO also argues that Kliger's registration process solves both dynamic network conditions and interference/noise. POR, 53-55. PO, again, does not address the Petition's actual motivations to combine. The Petition explains that "[t]he dynamic nature of the network conditions means that **the carriers used in the multi-carrier signaling are subject to variable conditions**." Petition, 24. PO does not explain how Kliger's registration process addresses these variable conditions. It does not. As PO admits, Kliger's registration process provides "the amount of bandwidth that has been allocated to [each] HNM." POR, 54 (citing DISH-1007, ¶[0110]). But that bandwidth would still be subject to external noise, interference, and variable conditions. Contrary to PO's allegation, Kliger's registration process does not solve either dynamic network conditions or interference/noise. DISH-1036, ¶87.

As in Ground 2, PO argues that Isaksson is irrelevant to addressing the problems identified in the Petition. POR, 52-53. PO repeats the same false claims:

Isaksson does not include splitters, Isaksson's twisted pair experiences different noise/interference, and Isaksson is limited to twisted pair. *Id*. Petitioner's responses in Ground 2 to these errors apply here as well: Isaksson includes splitters (§III.C.ii, *supra*), twisted pair and coax experience similar impairments (§III.A, *supra*), and Isaksson is not limited to twisted pair (§III.C, *supra*). DISH-1036, ¶¶88-89.

For these reasons, a POSITA would have been motivated to use Isaksson to improve Kliger's multi-carrier modulation.

C. A POSITA Would Combine Kliger with Isaksson

i. Isaksson's Base Sync Frames Would Function in Kliger's Network

As in Ground 2, PO's arguments about Isaksson's solutions not functioning in a coaxial network miss the mark. PO incorrectly asserts that Isaksson's base sync frames are incompatible with Kliger's system, focusing on the same irrelevant distinctions raised in Ground 2. POR, 56-58. This argument fails for the same reasons. ***First,*** the Petition argues that a POSITA would have implemented base sync frames like Isaksson's in Kliger's modules (and not bodily incorporated Isaksson's full-duplex devices into Kliger's half-duplex system). *See* Petition, 23-26. Incorporating ***signaling*** from a full-duplex system into a half-duplex system is within the capabilities of a POSITA. DISH-1036, ¶90. PO and its expert do not contest this point. ***Second,*** Petitioner has established that a POSITA implementing

Isaksson's methodology in Kliger's system would have implemented base sync frames (which are control messages) using Kliger's mechanism for control signaling. *Id.*, ¶90.

ii. Isaksson's Base Sync Frames Would Function with Kliger's Intermediary Device

PO cloaks Kliger's teachings to argue that Isaksson's base sync frames cannot function with Kliger's intermediary device (HRU). POR, 58-60. PO claims that Kliger's HRU amplifies signal power and shifts the frequency of an upstream signal before reflecting it downstream to a receiving device. *Id*. But PO does not explain why those changes would prevent a channel from being characterized using Isaksson's base sync frames. DISH-1036, ¶¶91-92.

Further, PO wrongly focuses only on Kliger's "active" HRU. Kliger also describes an alternative "passive" HRU that does not change the upstream signal. Indeed, the Petition does not cite Kliger's active HRU. PO has not demonstrated that a POSITA would be unable to implement base sync frames like Isaksson's in Kliger's passive HRU. DISH-1036, ¶93.

iii. Kliger Does Not Teach Away from Bit Loading

Kliger does not teach away from bit loading. A reference does not teach away "if it merely expresses a general preference for an alternative invention but does not 'criticize, discredit, or otherwise discourage' investigation into the invention."

DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc., 567 F.3d 1314, 1327 (Fed. Cir. 2009).

PO has not shown where Kliger discourages using bit loading with Kliger's multi-carrier modulation. Instead, PO argues that the Petition does not explain why a POSITA would be motivated to combine Kliger-Isaksson given Kliger's teaching that HNMs use the same constellation size for data bursts. POR, 60-63. Not true. The Petition explains that a POSITA would be motivated to implement Isaksson's bit loading in Kliger's HNMs to "determine the number of bits-per-carrier based on SNR and turn off carriers affected by interferers, thereby handling frequency dependent loss and noise by sending fewer or no bits on noisy carriers." Petition, 25; DISH-1036, ¶¶94-95. PO's argument should thus be rejected.

VI. PO'S PROPOSED SKILL-LEVEL IS WRONG

PO's proposed skill-level includes a superfluous requirement of "at least two years of experience with coaxial cables." POR, 11. But PO did not explain why the Board's adoption of Petitioner's skill-level in the ID is wrong. ID, 9. The Board should maintain its original finding. DISH-1036, ¶¶7-10.

VII. CONCLUSION

For the foregoing reasons, Petitioner respectfully submits that the Board should find the challenged claims unpatentable.

Respectfully submitted,

Dated: January 31, 2025

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,580, which is less than the 5,600 allowed under 37 CFR § 42.24.

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(1) and 42.6(e)(4)(iii), the undersigned certifies that on January 31, 2025, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and exhibits were provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

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