

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DISH NETWORK LLC, DISH NETWORK SERVICE LLC, DISH NETWORK
CORPORATION, AND DISH NETWORK CALIFORNIA SERVICE
CORPORATION,

Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,

Patent Owner.

CASE: IPR2024-00393

U.S. PATENT NO. 7,295,518

PATENT OWNER RESPONSE

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TABLE OF PATENT OWNER’S EXHIBITS

Exhibit No.	Description
2001	U.S. Patent No. 6,438,174 to Isaksson et al. (“ <i>Isaksson IP</i> ”)
2002	Declaration of Mr. Albert Garrett
2003	Deposition Testimony of Dr. Tim Williams (Oct. 1, 2024)
2004	Deposition Transcript of June Ann Munford (IPR2024-00393) (September 19, 2024)
2005	Deposition Transcript of June Ann Munford (IPR2024-00373) (September 19, 2024)
2006	Excerpts from Samuel H. Russ, <i>Signal Integrity Applied Electromagnetics and Professional Practice</i> (“Signal-Integrity”)
2007	GNS Wireless, <i>Coaxial Cables</i> , https://www.gnswireless.com/product-category/products/coaxial-cables/ (last visited May 20, 2024) (“Coaxial-Products”)

Patent Owner, Entropic Communications, LLC (“Patent Owner”), submits this Patent Owner Response (“POR”) in response to the petition for *Inter Partes* Review (“Petition”) (Paper 2) filed by DISH Network L.L.C., Dish Network Service L.L.C., DISH Network Corporation, and Dish Network California Service Corporation (collectively, “Petitioner”) and the Board’s Institution Decision (“ID”) (Paper 7) for U.S. Patent 7,295,518 (the “’518 Patent,” Ex. 1001).

I. INTRODUCTION

The ’518 Patent claims a novel solution to the problem of “impairments present in the home [coaxial] wiring that restricts high bandwidth communication between devices in the home.” Ex. 1001, 4:28-33. To achieve this, the ’518 Patent claims an inventive in-home coaxial network that uses probe messages, bit loading, and multi-carrier signaling to enable a high-speed and reliable local coaxial network.

Notably, the Petition does not identify any reference that uses probe messages and bit loading in a coaxial network. Instead, the Petition relies on hindsight bias to reconstruct the novel features of the ’518 Patent. In particular, the Petition relies on *Isaksson*¹—a non-analogous twisted pair, point-to-point system used for communication outside of the home. But this type of system fails to address—let

¹ Int’l Pub. No. WO 1998/010545 to Isaksson et al. (Ex. 1013). Citations to *Isaksson* are to *Isaksson*’s page numbering, not Petitioner’s bates numbering.

alone overcome—the problem that the '518 Patent seeks to solve, *i.e.*, impairments within coaxial cabling that impede local communication between devices in the home. Ex. 1001, 4:28-33.

Traditionally, coaxial cabling was used to distribute signals from a cable head-end to devices within the home. *Id.*, 1:40-45. To distribute signals to multiple devices in the home, the cabling used splitters, which receive signals at an input port and transmit identical signals via tap ports. *Id.*, 1:40-45, 1:53-65, Fig. 1. The splitter's tap ports were designed to carry signals coming from outside the home to end devices within the home. *Id.*, 2:35-38. To facilitate communication from the head-end to each in-home device, coaxial splitters were configured to isolate the in-home devices from one another. *Id.* This deliberate isolation reduced interference between the different signal paths from the head-end to each device. *Id.*, 2:27-34. However, this isolation also made communication between devices within the same coaxial LAN more difficult, less reliable, and less efficient. *Id.*

The '518 Patent claims a novel way to overcome the isolation between splitter tap ports and thereby enable local, device-to-device communication over coaxial cables. *Id.*, Abstract, 4:19-47. In the claimed invention, devices transmit probe messages to one another across the tap ports of a coaxial splitter, analyze the probe messages, determine characteristics for the channel between them, and select a bit loading scheme to be used for intra-device communication. *Id.* This data

communication provided by the '518 Patent relies on *on-premises networking* over coaxial cabling using multi-carrier signaling. *Id.*, Abstract. Further, the claimed invention can use traditional coaxial cabling and does not require new and difficult-to-install hardware, such as an intermediate device to amplify signal power. *Id.*, 2:54-3:4.

The '518 Patent explicitly distinguishes prior art solutions directed to communication between on-premises units and a cable head end. *Id.*, 4:19-33. Unlike the claimed invention, this communication does not occur *within the premises* and thus involves different signal paths (no communication across tap ports of a splitter) and different impairment concerns (no isolation to overcome). The Petition uses base references (*Amit*² and *Kliger*³ in Grounds 2 and 1, respectively) to teach on-premises networks. But these references lack critical attributes of the Challenged Claims, including transmitting and analyzing probe messaging for adaptive bit loading—a key limitation that distinguished the claims from the art during prosecution. To attempt to bridge the chasm separating the '518 Patent from *Amit* and *Kliger*, the Petition turns to *Isaksson*. But *Isaksson* relates to communication over twisted pair (not coaxial cable), sent from a head end (not

² U.S. Patent No. 7,127,734 to Amit et al. (Ex. 1014).

³ U.S. Patent App. Pub. No. 2002/0069417 to Kliger et al. (Ex. 1007).

between devices in a local network), and without traversing any splitters or tap ports at all. Patent Owner presents new technical evidence establishing that a person of skill would not have looked to *Isaksson*. Rather, the Petition improperly relies on hindsight gained from the '518 Patent itself (which cites *Isaksson*).

The Petition proposes two theories of unpatentability, and both fail.

First, each Ground relies on *Isaksson* but fails to establish that *Isaksson* is analogous art. *See* Ex. 2002, ¶¶52-53, 56-79. The '518 Patent solves impairments specific to on-premises communications between network devices over existing coaxial cable wiring. Ex. 1001, 4:36-47; Ex. 2002 ¶¶71-73. *Isaksson* does not use coaxial cabling or communicate over splitters and thus cannot be reasonably pertinent to this problem. Ex. 2002, ¶¶74-75. Nor is *Isaksson* from the same field of endeavor of the '518 Patent. Ex. 2002, ¶¶56-69. The '518 Patent concerns an on-premises coaxial network that communicates over existing coaxial cables and through the tap ports of a splitter while *Isaksson* provides an out-of-home system that communicates over conventional telephone lines without any splitter or tap ports at all. *See, e.g.*, Ex. 1013, 24:8-13; Ex. 2002, ¶¶57-58. The Petition attempts to sidestep this problem by characterizing the '518 Patent and *Isaksson* as generally directed to “wired networks,” but this characterization is too broad and too divorced from the evidence to show that *Isaksson* is analogous art. *See* Ex. 2002, ¶¶59-69.

In Ground 2, the Petition relies on the combination of *Amit*, *Jacobsen*,⁴ and *Isaksson*. But the actual teachings of these references undermine this combination, as Patent Owner’s coaxial cable expert, Mr. Al Garrett, explains. Ex. 2002, ¶¶54, 80-123; *see id.*, ¶¶8-13. First, *Amit* already provides a solution for communicating over coaxial splitters that differs from the ’518 solution. Namely, *Amit* proposes low-cost single-carrier signaling that leverages high reflections for intra-device communication. *See* Ex. 2002, ¶¶92-94, 97-98. Thus, a person of skill would not be motivated to modify *Amit* to solve a problem that *Amit* already solves. Ex. 2002, ¶¶82-102. Second, *Amit* teaches against the cost and complexity of the Petition’s combination. For example, *Amit* repeatedly emphasizes that it “presents a low cost solution, which is very important to enable a solution to the mass market.” Ex. 1014, 17:10-11. Replacing *Amit*’s single-carrier system with a multi-carrier system would increase its cost substantially, contrary to *Amit*’s teachings and without evidence in the Petition that this modification would yield substantial improvements. Ex. 2002, ¶¶95-96. Third, *Isaksson* is incompatible with *Amit* because it describes the use of

⁴ 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 (Ex. 1016).

probe signals sent from a head or central office over twisted pair, without traversing any splitters. The Petition ignores the complexity associated with introducing such technology into a coaxial network and its splitters. At the time of institution, the record was incomplete as to the technical evidence regarding these issues. The testimony of Al Garrett, a coaxial cable expert, establishes that the proposed combination of Ground 2 fails for multiple reasons. Ex. 2002, ¶54.

Although the ID did not address Ground 1, the testimony of Mr. Garrett also confirms the impropriety of the proffered combination. Ground 1's primary reference, *Kliger*, proposes a fundamentally different solution to signal impairments in coaxial LANs. *Kliger's* network manages signal attenuation through adjustments to ***the power level*** of the transmitted signal from the home network module ("HNM") to the demarcation point unit ("DPU"). This is in contrast to the claimed invention of the '518 Patent, which manages attenuation through bit-loading.

Kliger's power management network is not only distinct from the network claimed by the '518 Patent's, but also incompatible with the probing techniques that the '518 Patent claims. *Kliger's* network requires an intervening device that modifies the signal (*Kliger's* DPU), which impedes sending and analyzing probe messages between network devices. Ex. 2002, ¶¶149-150. Put simply, *Kliger* does not disclose the claimed probes messages, and its system could not be modified to include such probe messages. Ex. 2002, ¶143. Further still, there is no basis to add

such probe messages because *Kliger* already addresses signal attenuation through adaptive power control managed by the DPU, rather than through bit loading. Ex. 2002, ¶150.

The Petition identifies no reference that used probe messages for communication through the tap ports of coaxial splitters. Instead, it uses hindsight to leap to the unrelated field of wide-area twisted pair networks in an effort to modify *Kliger*. But a POSITA would not have been motivated to modify *Kliger* in this manner because it already solves the problem of communication through splitters by using power-management. And as Mr. Garrett explains, a POSITA looking at *Kliger* and its local coaxial network would not have been motivated to look to wide-area twisted pair communication, which uses a different medium, different frequencies, and lower bandwidth, and which has no teachings at all about communicating through the tap ports of a splitter. Ex. 2002, ¶55. The non-obvious combination of *Kliger* and *Isaksson* show that the Petition is replete with hindsight bias and is based on what the '518 Patent already identifies, proposes, and solves. Ex. 2002, ¶55.

The Petition fails to satisfy its burden of proving, by a preponderance of the evidence, that either Ground renders the Challenged Claims obvious. The Petition fails to establish a motivation to combine *Kliger* and *Isaksson* or to combine *Amit*, *Jacobsen*, and *Isaksson* to arrive at claim 1. Both Grounds fail to render obvious

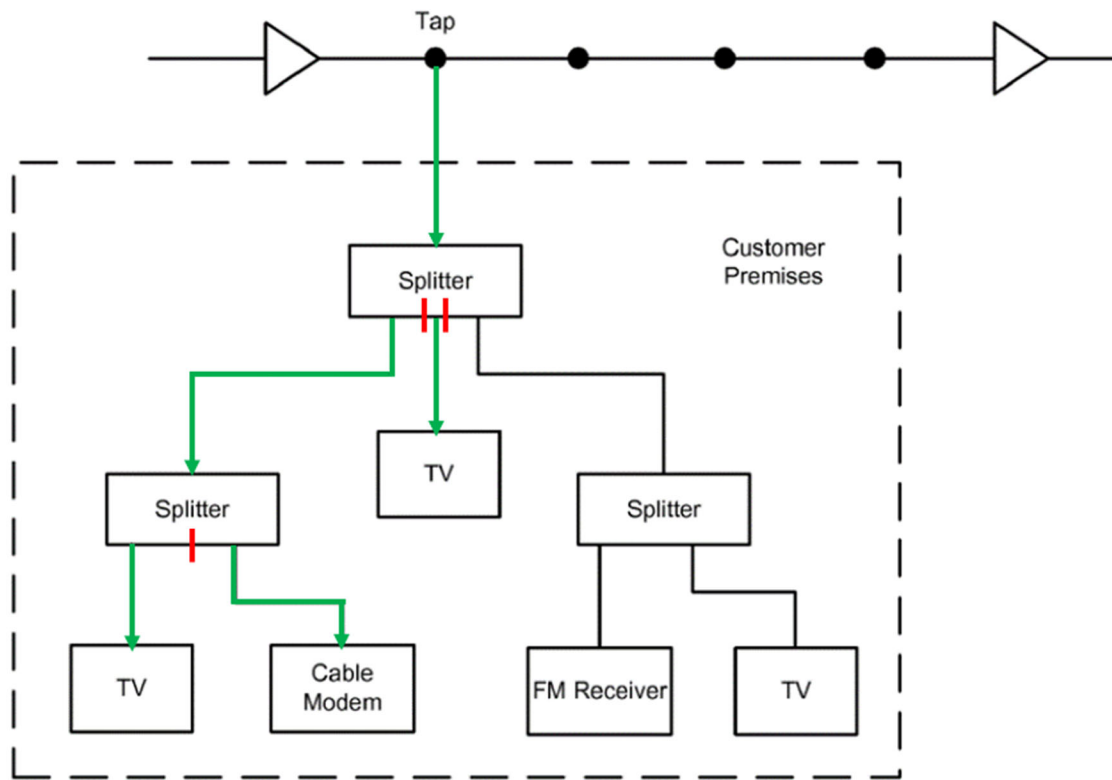
claim 1. And because claim 3 depends from independent claim 1, the entirety of each Ground should be rejected.

Based on an incomplete record, the ID found a reasonable likelihood that the Challenged Claims are obvious over Ground 2. ID, 13-24. Patent Owner has now supplemented this record with new technical evidence from Mr. Garrett. This new evidence confirms the fatal flaws in the analysis of the Petition's expert, Dr. Williams, and demonstrates that both Grounds fail.

II. SUMMARY OF THE '518 PATENT

The '518 Patent provides a broadband local area network using existing coaxial cable wiring for device communication. Ex. 1001, Abstract; Ex. 2002, ¶44. To optimize communication, devices on the network send probe messages to one another to characterize and determine optimum multi-carrier bit loading for each channel in the on-premises broadband coaxial local area data network. Ex. 1001, Abstract; Ex. 2002, ¶44.

Figure 1 illustrates a traditional on-premises coaxial signal distribution plan, including signal splitters and network devices. Ex. 1001, 5:10-11; Ex. 2002, ¶45. Signal splitters distribute downstream signals from the point-of-entry to various network devices. Ex. 1001, 1:40-45; Ex. 2002, ¶45. For example, a signal splitter receives a signal at the input port and splits the power between two output ports. Ex. 1001, 1:53-56, 61-65, Fig. 1; Ex. 2002, ¶¶45-46.



Ex. 1001, Fig. 1 (illustrating traditional channel path of signal distribution (green) and isolated channel path between devices (red)).

Although splitters provide needed functions for distributing a signal from a head-end or external source to multiple devices in a home, prior art cable TV wiring configurations present obstacles for device-to-device communication. Ex. 1001, 2:28-34, 2:35-48, 4:19-32; Ex. 2002, ¶46.

First, a splitter's tap ports are isolated. Ex. 1001, 2:27-34; Ex. 2002, ¶47. Inter-port isolation leads to signal attenuation when terminal devices communicate through the tap ports. Ex. 1001, 2:27-34; Ex. 2002, ¶47. In a conventional cable TV configuration, this isolation is desirable because terminal devices did not

communicate with each other (and instead would only receive and transmit signals from/to the head end). Ex. 1001, 2:28-38; Ex. 2002, ¶47. Thus, most on-premises splitters have this isolation. The described and claimed system, however, requires terminal devices to communicate with each other, and the signal loss caused by inter-port isolation becomes an undesirable byproduct of the existing design. Ex. 1001, 2:35-41; Ex. 2002, ¶47.

Second, signal attenuation in the on-premises broadband coaxial network is variable across the different paths. Ex. 1001, 2:41-48; Ex. 2002, ¶48. The signal path between each terminal device is unique, which results in varying levels of loss between each terminal device through a varied number of splitters/combiners, various connected and nearby devices, and channel length. Ex. 1001, 2:41-48; Ex. 2002, ¶48. This signal loss could be overcome by replacing the main splitter at a building point-of-entry with a symmetric splitter/combiner. Ex. 1001; 2:54-56; Ex. 2002, ¶48. However, a bi-directional power amplifier would have to be installed to boost the signal, and power (which is generally not available at the main splitter) would have to be provided to the amplifier. *See* Ex. 1001, 2:54-3:4; Ex. 2002, ¶48.

Third, imperfect connection points create micro reflections, which may combine with the dominant main signal to produce a multipath signal. Ex. 1001, 3:5-10, 10:39-54, Fig. 8; Ex. 2002, ¶49. Multipath signals may be undesirable because they create inter-symbol interference (“ISI”). Ex. 1001, 3:7-10; Ex. 2002,

¶49. ISI degrades the bit error rate performance of the communication channel and impairs data rates in the network. Ex. 1001, 3:15-16, 4:23-25; Ex. 2002, ¶49.

The '518 Patent, recognizing the above impediments to on-premises broadband networks over coaxial cable, provides an innovative approach to communication networks to solve the above impairments that restrict on-premises intra-terminal device communications. Ex. 1001, 4:36-47; Ex. 2002, ¶50. To transmit data signals through existing coaxial cabling and address the shortcomings of the prior art, the '518 Patent uses variable multi-carrier modulation, where a channel's modulation scheme (bit loading) is optimized through using probe messages to gather information regarding the channels (signal paths) between network devices (across coaxial splitters). Ex. 1001, 4:36-62; Ex. 2002, ¶¶50-51.

III. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA would have at least a bachelor's degree in electrical engineering, computer engineering, or an equivalent field with at least two years of experience with coaxial cables. Ex. 2002, ¶¶37-43. Experience with coaxial networking is central to the patent's field of work. Ex. 2002, ¶38. The title, claims, abstract, background, and detailed description all refer to coaxial cable. Ex. 1001, Cover, Abstract, 1:27-29, 4:36-40, 5:14-16, Fig. 3, cl. 1; Ex. 2002, ¶38. As referenced in the summary of the invention, the use of terms such as "coaxial cable wiring" in connection with "splitters" confirms that the summary of the invention section is

referring to a coaxial network. Ex. 1001, 4:36-47. Claim 1’s use of a “splitter with a common port and a plurality of tap ports” also confirms the coaxial network. Ex. 1001, cl. 1; Ex. 2007, ¶38.

IV. BOTH GROUNDS FAIL BECAUSE EACH RELIES ON *ISAKSSON*, A NON-ANALOGOUS REFERENCE RELATED TO LOW-BANDWIDTH TWISTED PAIR COMMUNICATION

Both Grounds in the Petition rely on the combination of an in-home coaxial network (*Kliger* in Ground 1 and *Amit* in Ground 2) with *Isaksson*, a twisted pair, long-distance communication reference. But *Isaksson* is not analogous art because *Isaksson* (1) is not reasonably pertinent to the particular problem with which the inventors of the ’518 Patent are involved, and (2) is not in the same field of endeavor as the ’518 Patent. *See In re Clay*, 966 F.2d 656, 658-59 (Fed. Cir. 1992). Because *Isaksson* is not analogous art, it cannot be used as part of an obviousness combination. *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011). Without *Isaksson*, the entire Petition fails.

A. Overview of *Isaksson* and Its Use of Twisted Pair Communication

Isaksson discloses “a method of synchronizing the updating of parameters relating to bit-loading” on a two-node (*i.e.*, point-to-point), full-duplex, twisted pair network. Ex. 1013, 1:3-7; Ex. 2002, ¶60. *Isaksson* does not mention splitters, port-to-port isolation, or otherwise suggest its teachings would apply to a network having two nodes separated by a coaxial cable splitter. Ex. 2002, ¶¶68-69.

Isaksson's out-of-home-focus is clear through its point-to-point network topology implemented over twisted pair. Ex. 1013, 4:21-25, 6:13-16, 25:26-31, 26:20-24; Ex. 2002, ¶69. *Isaksson's* system shares the telephone plant with POTS and ISDN devices but lacks any disclosure of any communication between more than two devices; *Isaksson* does not describe a channel access method for additional device to be added to *Isaksson's* system because *Isaksson's* network is simply a single hop over twisted pair. Ex. 2002, ¶69; Ex. 1013, 32:14-20.

Isaksson's synchronization between nodes occurs through the transmission of “base sync frames” over a “special control channel.” Ex. 1013, 6:1-20. In *Isaksson's* full duplex system, this control channel “will be a two-way connection since both the uplink transceiver and downlink transceiver contain a transmitter and a receiver.” *Id.*, 73:4-11. “The establishment of this channel is an ***absolute requirement*** as further configuration is impossible without a connection between the transmitter and the receiver.” *Id.*, 73:12-15. Although the special control channel is an “absolute requirement” for the use of bit-loading in *Isaksson*, the Petition omits this channel from its proposed combinations, a feature essential to the operation of the “base sync frames” relied on by the Petition, leaving out any analysis of how these frames would be transmitted if not over this channel. See Petition, 25-26 (describing the use of only *Isaksson's* bit-loading in *Kliger's* network), 53-54 (describing the use of only *Isaksson's* bit-loading in a combination of *Amit* and *Jacobsen*).

In the ID, the record before the Board was incomplete regarding the fundamental differences between twisted pair and coaxial cables. Patent Owner now submits technical evidence from Mr. Garrett that shows *Isaksson* is not analogous. Ex. 2002, ¶¶56-79.

To start, *Isaksson*'s twisted pair is unshielded. Ex. 2002, ¶¶60, 63; Ex. 2006, 121. As an unshielded medium, twisted pair essentially functions as a low pass filter, successfully transmitting low frequencies while filtering out high frequencies. Ex. 2002, ¶63; Ex. 2006, 107, 112-115. Thus, twisted pair provides low bandwidth. Ex. 2002, ¶64. Due to this low bandwidth, communications over twisted pair have traditionally been point-to-point, which *Isaksson* reflects with its full duplex, two node system. Ex. 2002, ¶65. As *Isaksson* explains, bandwidth constraints in twisted pair led to the development of various transmission schemes, including ADSL and VDSL. Ex. 1013, 1:8-18; Ex. 2002, ¶64. Despite these efficiency improvements, ADSL is still used in two node, point-to-point systems. Ex. 2002, ¶65.

In contrast to twisted pair, coaxial cables include effective shielding, can carry signals at high frequencies, and can support large bandwidths that are magnitudes larger than that of twisted pair. Ex. 2002, ¶¶62, 65; *see* Ex. 2006, 82; Ex. 2007 (Coaxial cable “is designed to carry high-frequency signals, 900 MHz to 6GHz, and to protect those signals against electromagnetic interference (EMI) from external sources.”). Due to these properties, signals behave drastically different on coaxial

cable than on twisted pair. Ex. 2002, ¶67. For example, signals transmitted at high frequencies over twisted pair results in higher losses and drops in signal strength. Ex. 2002, ¶67. However, signals transmitted over coaxial cables at high frequencies are known to be chaotic, with sharp increases in attenuation at very specific frequencies. Ex. 2002, ¶67; Ex. 2006, 94-96, 99-101.

In sum, coaxial and twisted pair communication use different frequencies, face different attenuation challenges, and support dramatically different bandwidths. Ex. 2002, ¶¶62-69. Based on these fundamental differences, a POSITA would not view solutions over twisted pair to necessarily apply to a network implemented over coaxial cables. Ex. 2002, ¶¶61, 69.

B. Isaksson is Not Reasonably Pertinent to the Problems that the '518 Patent Addresses

The '518 Patent solves impairments specific to on-premises communications between network devices *over existing coaxial cable wiring*, including the splitters located therein. Ex. 1001, 4:36-47; Ex. 2002, ¶71. *Isaksson* cannot be reasonably pertinent to this problem because *Isaksson* does not include coaxial cables or communicate over splitters, let alone propose solutions to the impediments that splitters cause in a coaxial network. Ex. 2002, ¶¶70-75. Instead, *Isaksson* addresses synchronization within a twisted pair, point-to-point network. Ex. 2002, ¶76.

1. The '518 Patent Addresses Issues Specific to Its On-premises Local Area Broadband Coaxial Cable Network

The background of the '518 Patent lays out a specific problem and solution. The inventors of the '518 Patent did not merely set out to solve “signal impairment” generally, but rather address specific impairments that previously restricted high bandwidth communication between devices over *on-premises coaxial cabling*. Ex. 1001, Abstract, 4:19-33; Ex. 2002, ¶71. These impediments include (1) inter-port isolation from communicating across *splitters*, (2) variable signal attenuation caused by *different channel paths*, and (3) imperfect connection points at *splitters*, which cause micro reflections. Ex. 1001, 2:27-34, 2:41-48, 3:5-16, 4:23-25; Ex. 2002, ¶72.

Such impairments are the result of using a preexisting coaxial network and are not present in every type of wired network. Ex. 2002, ¶73. For example, coaxial networks include splitters to distribute signals downstream; twisted pair networks do not use splitters in this fashion. Ex. 1001, 2:27-34; Ex. 2002, ¶73. In these coaxial networks, splitter ports are isolated and include imperfect connections, leading to the inter-port isolation and reflections that would not be found in network types that do not use splitters. Ex. 1001, 2:27-34, 3:5-16; Ex. 2002, ¶73. Further, signal paths vary between devices in a coaxial network based on the branch topology, causing variable signal attenuation. Ex. 1001, 2:35-48; Ex. 2002, ¶73. These issues are specific to coaxial cable installations. Ex. 2002, ¶73. The '518

Patent provides a novel solution that overcomes these issues that previously restricted network devices from communicating with each other. Ex. 2002, ¶71; Ex. 1001, 4:36-47.

2. *Isaksson* Addresses Synchronization Issues Across a Twisted Pair Hop Without Intervening Devices

Isaksson is not (and cannot be) pertinent to the problems that the '518 Patent solves because *Isaksson* does not include a branched topology with splitters that cause these issues, and thus *Isaksson*'s system does not suffer from these issues. Ex. 2002, ¶74. Namely, *Isaksson* does not include splitters and does not communicate over tap ports of any splitters. Ex. 2002, ¶75; see Ex. 2003, 64:25-65:1 (“Isaacson is agnostic as to whether there is a splitter in the transmission path.”). Therefore, *Isaksson* does not suffer from inter-port isolation or imperfect connection points at splitters. Ex. 2002, ¶74. Moreover, *Isaksson*'s network does not include varying channel paths. Ex. 2002, ¶74. *Isaksson* provides a simple point-to-point architecture that does not suffer from variable attenuation because its paths are uninterrupted. Ex. 2002, ¶74; Ex. 2003, 60:1-3 (“One application of Isaacson is point to point.”).

Accordingly, *Isaksson* is reasonably pertinent to solving an entirely different problem. *Isaksson* explains that bit-loading techniques for any given hop in a twisted pair network effect the total bandwidth of a system. Ex. 1013, 3:24-29; Ex. 2002, ¶76. “This variation in bandwidth leads to an *absolute system requirement* for

synchronous configuration of the transmitter and the receiver.” Ex. 1013, 3:29-32. *Isaksson*’s “invention relates to a method that, by means of a particular algorithm, ensures the synchronism of the system during configuration changes.” *Id.* at 4:17-20; *see* Petition, 25 (“Isaksson teaches a solution ‘in which synchronism between two transceivers is maintained during dynamic system reconfiguration of bit-loading factors.’”) (citing Ex. 1013, 3:24-34; Ex. 1004, ¶70).

3. *Isaksson* is not Pertinent to the ’518 Patent’s Problems

Because *Isaksson*’s synchronization problem and solution are not pertinent to the ’518 Patent’s problems or solutions, *Isaksson* is not analogous art. The Petition ignores the actual focus of the references to broadly characterize the ’518 Patent as reasonably pertinent to the problem of “overcoming wired-network signal impairments.” Petition, 27 (citing Ex. 1004, ¶¶76-80). The text of the ’518 Patent is clear. *See* Ex. 2002, ¶¶77-78.

The ’518 Patent does not solve “signal impairment” generally, but rather solves impairments specific to on-premises coaxial cabling. Ex. 1001, Abstract, 4:19-33; Ex. 2002, ¶71. These impairments include inter-port isolation, variable signal attenuation, and imperfect connection points at splitters. Ex. 1001, 2:27-34, 2:41-48, 3:5-16, 4:23-25; Ex. 2002, ¶72. *Isaksson*’s teachings are silent with regard to coaxial splitters, and a POSITA would not look to such a reference for teachings to provide bit-loading when attempting to communicate through a coaxial splitter,

let alone through the unconventional method of communicating through the tap ports of such a splitter. Ex. 2002, ¶74. Specifically, *Isaksson* does not suffer from inter-port isolation or imperfect connection point because *Isaksson* does not communicate over splitters. Ex. 2002, ¶74. Further, unlike the '518 Patent's branch topology, *Isaksson*'s provides a point-to-point system and does not have to account for the variable attenuation from varying channel paths. Ex. 2002, ¶74. Without the problems of the '518 Patent present in *Isaksson*, *Isaksson* is not (and has no reason to be) reasonably pertinent to solving these issues.

The Petition ignores the issues that the '518 Patent faces. Instead, it provides an overly broad characterization of the '518 Patent without explaining why *Isaksson* is reasonably pertinent. Petition, 27; Ex. 2002, ¶¶77-78. Dr. Williams fails to remedy this characterization and actually makes it worse by omitting relevant *Isaksson* disclosure from his analysis. See Ex. 1004, ¶80. Dr. Williams selectively omitted *Isaksson*'s express teaching that it “handles frequency dependent loss and noise *in twisted pair-cables*,” when he selectively quoted *Isaksson* as being directed towards “handl[ing] frequency dependent loss and noise...in an efficient manner.” See Ex. 1004, ¶69 (citing Ex. 1013, 26:4-20); Ex. 2002, ¶77.

In sum, the problem of overcoming the isolation and attenuation caused by splitters in a coaxial network (as in the '518 Patent) is not reasonably pertinent to

the problem of synchronizing devices in a point-to-point network using twisted pair communication in *Isaksson*. Ex. 2002, ¶79.

C. The '518 Patent and *Isaksson* Are Not from The Same Field of Endeavor

The '518 Patent concerns an on-premises broadband network implemented over existing coaxial cables. Ex. 2002, ¶¶57, 68. *Isaksson*, in contrast, provides an out-of-home system that communicates over conventional telephone lines. *See, e.g.*, Ex. 1013, 24:8-13; Ex. 2002, ¶¶59, 69. *Isaksson* does not discuss broadband networks or on-premises coaxial cabling—key aspects of the '518 Patent. The Petition's single conclusory statement regarding field of endeavor does not disturb this conclusion. Ex. 2002, ¶61.

1. The '518 Patent's Field of Endeavor is Wired Networking Systems Using Coaxial Cables

The experts agree that the '518 Patent's field of endeavor is “wired networking systems using coaxial cables.” Ex. 1004, ¶184; Ex. 2002, ¶¶56-58; Ex. 2003, 76:25-77:2 (The field of endeavor of the '518 patent is “[w]ired network systems using coaxial cables.”). To determine the field of endeavor, the Federal Circuit considers the “background of invention” and “field of the invention.” *See, e.g., Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1381 n.8 (Fed. Cir. 2019) (“[T]he specification of each reference includes a ‘Field of the Invention’ section that distinctly describes each applicable field of endeavor.”). A patent's title, claim

preamble, and function and structure of the claimed invention may also be considered. *Id.* at 1380-81 (affirming Board’s finding of field of endeavor based on “the title of the [] patent and the preamble of a...claim”). Each expert relied on these sections to correctly determine the ’518 Patent’s field of endeavor.

First, the ’518 Patent is titled, “Broadband network for coaxial cable using multi-carrier modulation.” Ex. 1001, Cover; Ex. 2002, ¶57; Ex. 2003, 76:25-77:9 (Williams relying on the title of the ’518 Patent to determine field of endeavor). Second, the abstract is consistent with the title, stating “A broadband local area data network uses **coaxial cable** wiring for interconnection of terminal devices.” Ex. 1001, Cover; Ex. 2002, ¶57; Ex. 2003, 78:13-17 (Williams agreeing that the abstract discusses coaxial cables). Third, the ’518 Patent’s “technical field” states that this “invention relates to broadband communication networks and specifically to communications using **coaxial cable building wiring**.” Ex. 1001, 1:27-29; Ex. 2002, ¶57; *see* Ex. 2003, 76:25-77:7 (Williams relying on the technical field description to determine field of endeavor). Fourth, the background focuses on local broadband **coaxial networks** and the issues present in such networks. *See generally* Ex. 1001, 1:33-4:33; Ex. 2002, ¶57; Ex. 2003, 76:25-77:7 (Williams relying on the background section to determine field of endeavor). Also, the background of the ’518 Patent distinguishes on-premises networks with out-of-home systems. *See* Ex. 1001, 4:19-33. Fifth, the claims reflect this field of endeavor, reciting a specific data network

over coaxial cables. *See* Ex. 1001, cl. 1; Ex. 2002, ¶57; Ex. 2003, 78:10-12 (agreeing that claim 1 requires coaxial cable).

In view of the overwhelming evidence, the Petition and its expert agree: “[t]he ’518 patent describes ‘a coaxial cable based local area network (LAN)’ that shares cables with a CATV network.” Petition, 4 (citing Ex. 1001, 1:33-36). *See* Ex. 1004 (“The technology of the ’518 patent ‘relates to broadband communication networks and specifically to communications using coaxial cable building wiring.’”) (citing Ex. 1001, 1:27-29). The Board’s description of the ’518 Patent also conforms with this field of endeavor. *See* ID at 3 (“The patent discloses a broadband local area network that uses coaxial cable wiring for interconnecting terminal devices.”) (citing Ex. 1001, code (57)). Despite these uniform views of the ’518 Patent’s field of endeavor as “wired networking systems using coaxial cables” in a local network context, the Petition fails to make any showing that *Isaksson* is of a similar field, because it is not.

2. *Isaksson’s* Field of Endeavor is Multi-Carrier Signaling Over Twisted Pair

The Petition erroneously claims *Isaksson’s* field of endeavor should be wired networking systems. Petition, 27; Ex. 2002, ¶59. But neither this field nor *Isaksson’s* correct field of endeavor of multi-carrier singling over twisted pair correctly identify the field of endeavor of the ’518 Patent. Ex. 2002, ¶59. Further,

Isaksson's field of endeavor as wired networking systems is unreasonably broad, which has often been rejected by the Federal Circuit. *See Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 864–65 (Fed. Cir. 1993).

Isaksson repeatedly asserts that its system is specific to twisted pair. Ex. 2002, ¶60. *Isaksson* names its system Multi-carrier System for the Installed Copper network (“MUSIC”). Ex. 1013, 24:8-13 (“MUSIC is intended to provide high-speed communication on telephone copper wire pairs for supporting broadband multimedia services.”); *see* Paper, 7 (“*Isaksson* mentions demand for multi-media and other services create a need for high bit-rate traffic over copper pairs.”) (citing Ex. 1013, 1:8-11).

The Petition provides a *single* sentence related to *Isaksson*'s field of endeavor: “Kliger and *Isaksson* are analogous art to the '518 patent because they are from the same field of endeavor as the patent.” Petition, 27 (citing Ex. 1004, ¶¶76-80). But the Petition cites only Dr. Williams' opinion for this assertion, and his analysis fares no better. Without support, Dr. Williams simply parrots the same position. *See* Ex. 1004, ¶77 (“Kliger and *Isaksson* are analogous art because both Kliger and *Isaksson* are in the same field of endeavor as the '518 patent (i.e., wired communication networks).”); Ex. 2002, ¶61. Notably, Dr. Williams makes no mention of “coaxial cable”, which is the undeniable focus of the '518 Patent's disclosures and claims. Ex. 2002, ¶61. Dr. Williams also fails to address that both he and the Petition already

confirmed that the '518 Patent is directed towards such a coaxial environment. Because *Isaksson* relates to twisted pair, Dr. Williams attempts to characterize *Isaksson*'s field of endeavor in improper and overly broad terms.

The Federal Circuit has rejected similar generic characterizations of the field of endeavor. For example, the Federal Circuit found that semiconductor "memory" was too broad of a field. *Wang Labs.*, 993 F.2d at 864-65. The court explained that the references were not in the same field of endeavor "merely because it relates to memories." *Id.* The court found that the type of memory, swappable versus fixed size memory banks, and the size of the memory banks needed to be accounted for when deciding the field of endeavor. *Id.* For the same reason, "wired communication networks," without regard to the type of network or the size of the network (WAN vs. LAN), is too broad of a field of endeavor. *Id.*; see also *Amazon.com Inc. et al v. ZitoVault*, IPR2016-00021, Paper 8, 33 (PTAB Apr. 15, 2016) (recognizing that the Petitioner's characterization of the field of endeavor as "encrypted, distributed network communication" was unduly broad).

Coaxial cabling (the field of the '518 Patent) and twisted pair (the field of *Isaksson*) are similarly different, having different physical structures, which results in different properties. Ex. 2002, ¶62. As an unshielded medium, twisted pair transmits low frequencies and filters out high frequencies. Ex. 2002, ¶63. This results in low bandwidth capabilities; therefore, twisted pair is often implemented

on simple, point-to-point networks. Ex. 2002, ¶¶63-65. In contrast, coaxial cables are shielded. Ex. 2002, ¶62. Because of this shielding, coaxial cables can support large and high-frequency bandwidths. Thus, coaxial cables are used as a shared medium for complex mesh networks. Ex. 2002, ¶62.

In addition to bandwidth differences, coaxial cable and twisted pair have dramatically different frequencies and therefore wavelengths. Ex. 2002, ¶66; Ex. 2006, 82. The difference in wavelength is physically significant as transmission-line effects, such as reflections, cause the frequency response of coaxial cable to be much more chaotic than telephone lines. Ex. 2002, ¶67; Ex. 2006, 67. Signals transmitted at high frequencies over twisted pair results in higher losses and drops in signal strength while signals transmitted over coaxial cables at high frequencies are known to be chaotic, with sharp increases in attenuation at very specific frequencies. Ex. 2002, ¶67. Furthermore, these transmission-line effects appear over much shorter cable lengths, such as those found inside homes, than telephone lines. Ex. 2002, ¶67. Inside a home, propagation over telephone lines is lumped, not distributed, and transmission-line effects such as reflections disappear. Ex. 2002, ¶67. Just as the Federal Circuit found that material differences in size and type of memory prevented two references from being in the same generic field of endeavor as “memory,” so too do the material differences between local networking over coaxial cable and wide-area networking over twisted pair prevent the ’518

Patent and *Isaksson* from sharing the same field of endeavor. *Isaksson* is not analogous art under this prong, either.

V. THE INSTITUTION DECISION ERRED IN FINDING THAT GROUND 2 RENDERS THE CHALLENGED CLAIMS OBVIOUS

The ID preliminary found that Ground 2 had a reasonable likelihood of success. However, this decision was made on an incomplete record. Patent Owner now submits technical evidence in the form of Mr. Garrett’s declaration. Mr. Garrett’s technical analysis shows that a person of skill would lack both motivation to combine *Amit*, *Jacobsen*, and *Isaksson* and a reasonable expectation of success from such a combination. Ex. 2002, ¶¶80-81.

Mr. Garrett provides several technical reasons for this conclusion. First, a POSITA would not have been motivated to combine *Amit* and *Jacobsen* because *Jacobsen*’s multi-carrier modulation contradicts *Amit*’s clear goals. Ex. 2002, ¶81. Second, a POSITA would not be motivated to combine *Amit* / *Jacobsen* with *Isaksson* because *Jacobsen* already provides synchronized bit-loading. Ex. 2002, ¶103. Third, *Isaksson*’s “base sync frames” would not function on *Amit*’s fundamentally different half-duplex system. Ex. 2002, ¶81. As such, Ground 2 fails because the proffered motivation to combine is insufficient. Ex. 2002, ¶81.

A. Ground 2 Fails Because New Technical Evidence Establishes Lack of Motivation to Combine *Amit* and *Jacobsen*

1. *Amit* already solves the problems that Ground 2 cites as a motivation

A POSITA would have recognized that *Amit* already identifies and addresses each alleged “challenge” that the Petition identifies. Ex. 2002, ¶¶82-83; see *Stryker Corp. v. Karl Storz Endoscopy America, Inc.*, IPR2015-00764, Paper 13 at 13 (PTAB Sept. 2, 2015) (declining to add redundant functionality in a proposed combination). These “challenges” are not issues at all and do not support a motivation to improve *Amit*’s with *Jacobsen*. Ex. 2002, ¶¶82-83. Each of the Petition’s citations to *Amit* is addressed below.

a. *Amit* Addresses Reflections Within the Network

First, the ID references the Petition’s reliance on *Amit*’s “reflections” as a motivation to combine *Amit* and *Jacobsen*. ID, 14 (“Petitioner contends that a POSITA seeking to implement *Amit*’s coaxial network would have understood that...there can be problems with reflections.”). *Amit*’s “reflections” do not provide a sufficient motivation to combine. Ex. 2002, ¶84.

The Petition cites a passage from *Amit* alleging that “there **can** be ‘houses where there is a problem with reflection.’” Petition, 47 (citing Ex. 1014, 20:42-43). But the Petition omits the remainder of the sentence of *Amit*, which explains that *Amit* already solves this problem: “[t]herefore this module can be inserted in houses

where there is a problem with reflection.” Ex. 1014, 20:42-43. Specifically, the module addresses reflections by changing the frequency of upstream signals to a separate downstream frequency when transmitting the signal back into the home. Ex. 1014, 20:26-31; Ex. 2002, ¶85. This way, a device can receive a signal with no echo. Ex. 1014, 20:26-31; Ex. 2002, ¶85. Thus, the “reflection” problem of *Amit* was already identified and solved by *Amit* and cannot be the basis to make an additional modification of *Amit*. Ex. 2002, ¶86; see *Polaris Industries, Inc. v. Arctic Cat, Inc.*, 391 F.3d 1195, 1068-69 (Fed. Cir. 2004) (holding that the Board erred in “focus[ing] on what a skilled artisan would have been *able* to do, rather than what a skilled artisan would have been *motivated* to do.”).

b. *Amit’s* “Hidden Nodes” Are Unrelated to *Jacobsen*

Second, the ID references the Petition’s reliance on *Amit’s* “hidden nodes” as a motivation to combine *Amit* and *Jacobsen*. ID, 14 (“Petitioner contends that a POSITA seeking to implement *Amit’s* coaxial network would have understood that...there can be problems with reflections and “hidden nodes” in houses.”). This “hidden node problem,” which is caused by isolation differences between nodes, does not provide a motivation to even look to *Jacobsen*, let alone modify *Amit* in view of *Jacobsen*. Ex. 2002, ¶87; Ex. 1014, 13:55-61.

The Petition never even explains how or why *Jacobsen* would address this alleged “problem.” Ex. 2002, ¶88. The Petition uses *Jacobsen* for teachings

regarding multi-carrier signaling but fails to connect any aspect of those teachings to the “hidden node problem.” Petition, 47-49; Ex. 2002, ¶88. In other words, the Petition identifies *Amit*’s “hidden node problem” as a motivation to add *Jacobsen*, but then fails to explain why *Jacobsen* would even address this issue. Ex. 2002, ¶88.

This failure of explanation is no accident: *Jacobsen*’s teachings say nothing whatsoever about the “hidden node problem.” Ex. 2002, ¶89. *Amit* explains that “hidden nodes” exist “when the isolation difference between two different nodes is different than the isolation between other two nodes.” Ex. 1014, 13:55-61. “This problem usually exist[s] in a home that contains some splitters [and] no notch filter.” *Id.* *Jacobsen*, by contrast, provides an out-of-home system without any disclosure related to a “notch filter.” Ex. 2002, ¶89. *Amit*’s “hidden node” problem is specific to an in-home network without a notch filter; the Petition does not and cannot explain why a POSITA would add *Jacobsen*’s multi-carrier modulation for communication to the home to address an issue specific to communication *within* a home that lacks a notch filter. Ex. 2002, ¶89. This is because *Jacobsen*’s multi-carrier modulation would not address isolation differences between nodes. Ex. 2002, ¶90. The isolation differences are based on the structure of the physical medium—not the type of signaling. Ex. 2002, ¶90; Ex. 2003, 55:16-56:3 (explaining that ISI is “highly network topology dependent”). Thus, *Amit*’s “hidden nodes” would not have

motivated a POSITA to add *Jacobsen*'s multi-carrier modulation to *Amit*'s in-home network. Ex. 2002, ¶91.

c. *Amit* Leverages Splitter Reflections for Communication

Lastly, the ID cites to the Petition's reliance on *Amit*'s "high reflection" as an "RF challenge" that needs to be solved.⁵ ID, 17 (citing Petition, 47 (citing Ex. 1014, 13:54-14:1)). This is not a "challenge" because *Amit* uses this "high reflection" to **achieve** on-premises communication. Ex. 1014, 14:1-6; Ex. 2002, ¶¶92-93. In other words, the Petition identifies *Amit*'s communication method (*i.e.*, using high reflections) as a "challenge" that would motivate a POSITA to combine *Amit* and *Jacobsen*. Ex. 2002, ¶¶92-93. According to the Petition, *Amit* teaches that reflections can be leveraged to improve communication, so a POSITA would of course look to *Jacobsen*'s teachings about how to **reduce** those useful reflections. This reasoning is facially illogical and should be rejected.

Amit's disclosure explains that the "high reflection" is intentionally sought out and used in a beneficial manner in certain embodiments of its home network. Ex. 2002, ¶92. For example, "the reflection from the notch filter is in the power of the

⁵ This "high reflection" (Ex. 1014, 13:54-14:1) differs from the Petition's citation (Ex. 1014, 20:42-43) to "houses where there is a problem with reflection;" Petitioner's quote mischaracterizes a solution of *Amit*, as an alleged problem.

signal or it might be higher. When this reflection is higher than the signal *we can use this* reflection as our main signal.” Ex. 1014, 14:1-7; *see also id.*, 3:37-42 (“The quality of the signal transmitted by one subscriber device to another subscriber device can be further improved *by deliberately using splitters with high reflections.*”), 6:41-44, cl. 12 (reciting an “RF element further compris[ing] a splitter with high reflections”); Ex. 2002, ¶92.

A POSITA would have understood that *Amit’s* home network intentionally leverages this “high reflection” and thus a POSITA would see “solving” this “issue” as contradicting *Amit’s* teachings. Ex. 2002, ¶93. In short, without reflections, *Amit* would not function as intended. Ex. 2002, ¶94. *Amit’s* “high reflection” is a property to be leveraged, not a problem to be solved. Ex. 2002, ¶94. *Amit’s* high reflection does not provide a motivation to a POSITA to add *Jacobsen*. Ex. 2002, ¶94.

2. Ground 2’s Addition of *Jacobsen’s* Multi-Carrier Modulation Frustrates *Amit’s* Goal to Lower Cost and Complexity

The ID indicates that a POSITA would have “recognized that *Jacobsen’s* multicarrier modulation would improve upon *Amit’s* single-carrier modulation.” ID, 17 (citing Pet. 49-50). But replacing *Amit’s* single-carrier modulation would frustrate *Amit’s* clear goal of providing a simple, low-cost home networking solution. Ex. 2002, ¶¶95-96; *see, e.g.*, Ex. 1014, 2:40-43. Specifically, *Jacobsen’s* multi-carrier modulation would (1) add unwanted complexity, (2) add hardware

costs, and (3) add operational costs to *Amit*'s network. Ex. 2002, ¶96. In view of these disadvantages—which outweigh any of the Petition's purported benefits—a POSITA would not implement *Jacobsen*'s multi-carrier modulation scheme over *Amit*'s cost-effective home-networking solution. Ex. 2002, ¶96.

a. *Amit*'s Goal of Providing a Simple, Low-Cost Home Network is Reflected in *Amit*'s Design Choices

Amit references costs over a ***dozen times*** throughout its specification. Ex. 1014, 1:67-2:3, 2:40-43, 2:53-56, 3:15-18, 3:49-53, 4:1-8, 4:37-39, 9:53-55, 10:8-9, 17:10-11, 17:33-35, 18:24-34, 19:46-48, 21:44. A POSITA would have quickly recognized *Amit*'s goal of providing a simple, low-cost home networking solution. Ex. 2002, ¶97. In one example, *Amit* describes its invention as a system for “home networking over these coax cables, allowing for very high data rates and a low cost implementation.” Ex. 1014, 2:53-55, 2:40-43, 18:33-34 (The home networking solution “[*m*]ust be low cost.”). The Petition's expert also recognizes *Amit*'s goal as providing “communications within the home...using low cost devices.” Ex. 1004, ¶[0156].

Amit's goal of providing a cost-effective network is reflected in *Amit*'s design choices. Ex. 2002, ¶98; *see, e.g.*, Ex. 1014, 8:30-32. *Amit* installs its home networking devices in devices with general purpose computers. Ex. 1014, 4:1-8. With such design, *Amit*'s home networking devices use the ***other device***'s processor

to “reduc[e] the implementation cost.” Ex. 1014, 4:1-8; Ex. 2002, ¶98. Further, *Amit* explains that modulation is chosen “according to the equipment capabilities.” Ex. 1014, 8:30-32. Based on these considerations, *Amit* requires its home-networking device to implement single-carrier modulation; “the home networking device **must** provide QPSK and QAM 16.” *Id.*, 8:30-37. In view of *Amit*’s consistent disclosure, which is reflected in its design choices, a POSITA would have understood *Amit*’s goal of a simple, low-cost home network. Ex. 2002, ¶98.

b. A POSITA Would Not Be Motivated to Add *Jacobsen*’s Multi-Carrier Modulation to *Amit*’s Home Network

A POSITA would not be motivated to implement *Jacobsen*’s multi-carrier modulation because it contradicts *Amit*’s express teachings. Ex. 2002, ¶99; *see Sharkninja, Inc. et al v. Dyson Technology Limited*, IPR2023-01322, Paper 7 at 25 (PTAB Feb. 27, 2024) (“A reference teaches away from a claimed invention if it ‘criticizes, discredits, or **otherwise discourages**’ modifying a reference to arrive at the claimed invention.”). *Jacobsen*’s multi-carrier modulation would increase costs and complexities, frustrating *Amit*’s explicit goals and thereby discouraging the modification the Petition proposes. Ex. 2002, ¶99.

First, multi-carrier modulation would add hardware costs, which *Amit* considers when choosing a modulation technique. Ex. 1014, 8:30-33 (choosing modulation based on equipment capabilities); Ex. 2002, ¶100. These costs are

directly caused by the Petition's addition of multi-carrier modulation. Ex. 2002, ¶100. To use multi-carrier modulation, *Amit's* devices would have to efficiently implement both a fast Fourier transform ("FFT") and peak to average power, requiring equipment beyond the needs of *Amit's* current system. Ex. 2002, ¶100. For example, *Amit* would require multiplexers and demultiplexers, dedicated FFTs and inverse FFTs blocks, and additional QAM constellation modulators and demodulators for 1024-pt QAM. Ex. 2002, ¶100.

Second, multi-carrier modulation would add operational costs through increased power consumption. Ex. 2002, ¶101. In an example, a power amplifier transmits a maximum power out of 0dBm or 1mW in a single-carrier QAM system. Ex. 2002, ¶101. This power amplifier would require a 1dB compression point of -16dBm input because the signal has a very low peak to average power (0dB) utilizing an amplifier with a gain of 15dB. Ex. 2002, ¶101.

In a multi-carrier system, the same power amplifier would utilize an input operational point of -28 dBm and an output power of -16dBm. Ex. 2002, ¶101. To achieve a 0dBm output power, the system would require a power amplifier capable of 16dBm. Ex. 2002, ¶101. That implies a power consumption increase of 30 times that of a single carrier system, which further implies higher cost of implementation. Ex. 2002, ¶101. A POSITA, well aware of these added costs and *Amit's* explicit

focus on low-cost solutions, would not be motivated to alter the equipment device of *Amit* to implement *Jacobsen*'s multi-carrier modulation. Ex. 2002, ¶99.

Third, implementing multi-carrier modulation would add complexity to *Amit*'s network. Ex. 2002, ¶102. Multi-carrier modulation is more complex because it would require, for example, each of *Amit*'s devices to efficiently implement a fast Fourier transform ("FFT"). Ex. 2002, ¶102. This FFT would need to achieve required timelines, a redesign, and implementation of preamble and acquisition algorithms to enable reliable reception. Ex. 2002, ¶102. Further, each of *Amit*'s devices would have to increase the size of the DAC and the ADC to achieve sufficient dynamic range to accommodate the digital peak to average power. Ex. 2002, ¶102. *Amit* would also have to implement RF hardware to accommodate the dynamic range and compensation algorithms that are not required for single-carrier modulation. Ex. 2002, ¶102.

By ignoring these added costs and complexities, the Petition clearly uses hindsight to replace *Amit*'s single-carrier modulation with *Jacobsen*'s multi-carrier modulation to arrive at the Challenged Claims. Petition, 50. These shortcomings illustrate why the Petition does not provide a fulsome description of the technology and relies on the overly broad position that a POSITA would have been motivated to implement *Jacobsen* on *Amit*'s home network because multi-carrier signaling of *Jacobsen* is more efficient than the signal carrier signaling of *Amit*. This motivation

is legally insufficient and does not outweigh the added costs—contradicting *Amit*'s goals. Ex. 2002, ¶¶95-96. For these reasons alone, the disclosures of *Amit* and *Jacobsen* show that a POSITA would not be motivated to make the combination to arrive at the Challenged Claims. Ex. 2002, ¶¶95-96.

B. Ground 2 Fails Because New Technical Evidence Establishes Lack of Motivation to Combine *Amit* and *Jacobsen* with *Isaksson*

The ID also found a reasonable likelihood that a POSITA would have been motivated to combine *Amit* and *Jacobsen* with *Isaksson* to achieve synchronized base sync messages. ID, 21. This decision, too, was based on an incomplete technical record. In view of *Amit* and *Jacobsen*, a POSITA would not look to *Isaksson*'s fundamentally different full duplex twisted pair system. Ex. 2002, ¶103. *Isaksson*'s operation as a full duplex system—which the ID did not consider—highlights notable gaps in the proffered combination. Ex. 2002, ¶¶103-04; *see generally* ID. Further, *Jacobsen* already provides a synchronized bit-loading method, undermining the ID's reliance on *Isaksson*'s synchronism as the sole motivation to make this combination. Ex. 2002, ¶103; *see* ID, 21.

A POSITA would not combine *Amit* and *Jacobsen* with *Isaksson*. Ex. 2002, ¶103.

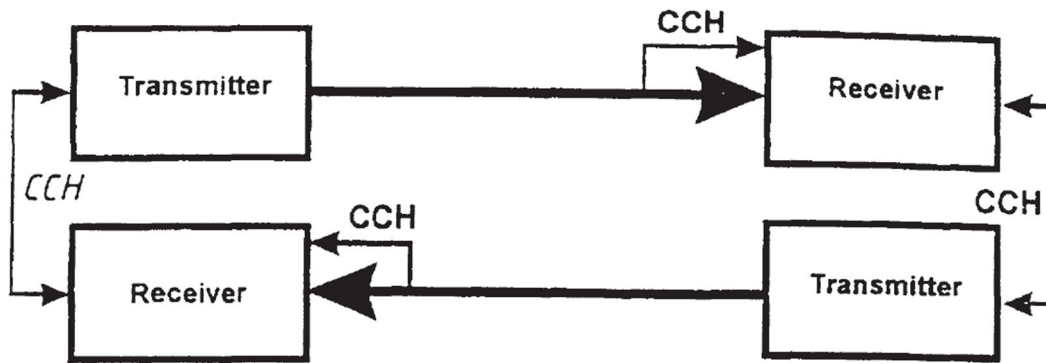
1. A POSITA Would Not Be Motivated to Combine *Amit* and *Jacobsen* with *Isaksson*'s Inapplicable System

At the time of the ID, the record only included expert testimony from Dr. Williams, which failed to consider fundamental differences between *Amit*, *Jacobsen*, and *Isaksson*. Ex. 2002, ¶103. With the proper context from Mr. Garrett, it becomes clear that—to the extent a POSITA would even have looked to other references for synchronized bit-loading—*Isaksson* would not have been such a reference. See Ex. 2002, ¶105. Instead, a POSITA would have understood that (1) *Isaksson*'s base sync frames would not function on *Amit*'s shared medium and (2) *Isaksson* does not extend to coaxial cables. Ex. 2002, ¶¶105, 108.

a. *Isaksson*'s Base Sync Frames Would Not Function on *Amit*'s Shared Medium

A POSITA would have understood that *Isaksson* is not designed to function on a shared medium like *Amit*'s coaxial network. Ex. 2002, ¶¶104-105. *Isaksson* provides a two node, full-duplex system that utilizes multi-carrier modulation. Ex. 2002, ¶105; Ex. 2003, 61:11-14 (agreeing that *Isaksson* provides a full duplex connection). An example configuration, where the control channel links the receiver and transmitter, is shown in Figure 33. *Id.*, 74:22-31. In this full duplex system, the control channel “will be a two-way connection since both the uplink transceiver and downlink transceiver contain a transmitter and a receiver.” *Id.*, 75:4-11; Ex. 2002,

¶105. The control channel “is an absolute requirement.” *Id.*, 75:12-15; Ex. 2002, ¶105; Ex. 2003, 63:10-24.



Ex. 1013, Fig. 33.

The Petition explains that *Amit-Jacobsen's* devices would transmit and analyze *Isaksson's* base sync frames to determine channel characteristics. Petition, 52. Despite the “absolute requirement” of *Isaksson's* control channel to transmit base sync frames, both the Petition and its expert, Dr. Williams, fail to even mention the control channel, let alone explain how *Isaksson's* base sync frame would function on *Amit's* network. Ex. 2002, ¶106. This is unsurprising as a POSITA would readily understand that *Amit* is a fundamentally different system, and *Isaksson's* base sync frames could not function in *Amit's* in-home coaxial system. Ex. 2002, ¶106. Thus, a POSITA would not be motivated to implement *Isaksson's* base sync frames. Ex. 2002, ¶104.

Amit provides a home network in a half-duplex, unsynchronized manner using CSMA protocol. Ex. 2002, ¶107; *see, e.g.*, Ex. 1014, 27:2-3. Under this such

protocol, each network device is required to first check the coaxial network for a transmission (*i.e.*, carrier sense) before transmitting (*i.e.*, accessing) a waiting burst. Ex. 2002, ¶107. While CSMA provides very low-latency for networks with low utilization, it also limits bandwidth to devices when the network experiences high-utilization. Ex. 2002, ¶107. A POSITA would have understood that a control channel, like that of *Isaksson*, requires guaranteed bandwidth. Ex. 2002, ¶107. To the extent that a control channel could be implemented on *Amit*'s network—which a POSITA would not be motivated to do so—high network traffic could limit bandwidth of the control channel. Ex. 2002, ¶107. With limited bandwidth, *Amit*'s device would be unable to synchronize and communicate as the Petition suggests. Ex. 2002, ¶¶106-07; *see* Petition 54-56. *Amit*'s uncoordinated mesh network does not provide any disclosure of a control channel, which is required by *Isaksson* to implement the base sync frames. Ex. 2002, ¶107.

b. *Isaksson* Does Not Extend to Coaxial Cables

The ID also erred by crediting Dr. Williams' testimony that *Isaksson* "deal[s] with developing coaxial networks for digital communications and overcoming potential signal impairments that could impede that goal." Ex. 1004, 20 (citing Petition, 49). The ID relied on Dr. Williams' mischaracterization to find a motivation where none exists. Ex. 1004, 20-21; Ex. 2002, ¶108. Instead, a POSITA would have understood that *Isaksson* does not extend to coaxial cabling but rather

only applies to a point-to-point system implemented over twisted pair. Ex. 2002, ¶¶109, 118. At each turn, the Petition’s evidence fails to establish that *Isaksson* can extend to coaxial systems like *Amit*. See Ex. 2002, ¶¶109-114.

Isaksson relates to communication infrastructure ***outside*** of a home network implemented on ***twisted pair cabling*** while *Amit* relates to communication infrastructure ***inside*** of a home network. Ex. 2002, ¶¶114-15. The Petition contends that *Amit*’s “HomeCN does not interfere with VDSL,” and alleges that this shows the relatedness between coaxial and non-coaxial wired networks. Petition, 53. The Petition fails to explain how this “relatedness” between wired networks supports implementing *Isaksson*’s twisted pair system on *Amit*’s home coaxial network. *Id.*; Ex. 2002, ¶117. Instead, the disclosure confirms that *Amit*’s system is incompatible with twisted pair. *Id.* *Amit*’s network is isolated and does not interfere with VDSL because *Amit*’s network uses coaxial cables while VDSL uses twisted pair. *Id.*

The Petition then misrepresents *Isaksson*, stating that “*Isaksson* recognizes that its features can extend to coaxial networks.” Petition, 53 (citing Ex. 1013, 1:8-18, 3:4-15); Ex. 2002, ¶110. In contrast, *Isaksson*’s disclosure explains that various transmission schemes (*e.g.*, DMT) were developed in response to a need to transmit high-rate traffic over copper pairs. Petition, 53; Ex. 2002, ¶110. The Petition, however, fails to explain how this portion of *Isaksson* (*i.e.*, the overview of the background) “recognizes that its features can extend to coaxial networks.” Petition,

53 (citing Ex. 1013, 1:8-18); Ex. 2002, ¶110. To the contrary, this portion highlights the technological *differences* between *Isaksson* and *Amit*. Ex. 2002, ¶110. *Isaksson* is specific to communications over copper pair, whereas *Amit* provides an in-home network over coaxial cables. Ex. 2002, ¶110.

The Petition’s second citation states that “the DAVIC specification reverses this order to enable *premises distribution* of VDSL signals over coaxial cable systems.” Ex. 1013, 3:13-15. But this single sentence does nothing to disturb the disclosure as a whole of *Isaksson*, which is entirely directed towards the distribution of signals *to* the home. Ex. 2002, ¶¶111-14. Nor does it suggest that the DAVIC specification is directed to distribution *within* the home. Ex. 2002, ¶114. A POSITA would have understood that VDSL signal distribution is fundamentally different than in-home signal distribution. Ex. 2002, ¶114. And even if it was assumed that VDSL is related to in-home distribution, nothing in *Isaksson* teaches how that specification would handle such a shared medium for signal distribution. Ex. 2002, ¶114. Further, even in the case of terrestrial distribution of coax, the DAVIC standard itself asserts that additional innovation is required on the shared medium of coaxial, making VDSL inapplicable in its existing form on coaxial cable. Ex. 2002, ¶114.

Isaksson does not support the Petition’s hindsight-driven conclusion that *Isaksson*’s features (e.g., the distribution of signals *to* the home) can extend to communication *within* the home over coaxial cables; rather, *Isaksson* instead

reiterates that its system applies to twisted pair cabling. *See, e.g., id.*, 24:8-10. Ex. 2002, ¶¶114-15.

A POSITA would not have looked to *Isaksson* because *Isaksson* contains no teachings whatsoever on sending or receiving data over communication channels that traverse the tap ports of coaxial splitters, as in *Amit*. Ex. 2002, ¶116; Ex. 2003, 64:25-65:1 (“*Isaksson* is agnostic as to whether there is a splitter in the transmission path.”). *Isaksson* does not mention—let alone discuss in detail—any of the important aspects of this communication channel, including reflection, attenuation, and isolation. Ex. 2002, ¶116. Neither the Petition nor Dr. Williams address any of these issues; instead, they argue that *Amit*’s system “does not interfere with VDSL” and can “connect to non-cable infrastructures.” Petition, 53 (citing Ex. 1014, 2:24-30, 28:67); Ex. 2002, ¶117. But this is not motivation to modify *Amit*’s network. Rather, it suggests that other network types would connect *separately* to *Amit*’s network, not change its operation. Ex. 2002, ¶117.

In view of this key distinction, a POSITA would not be motivated to combine *Amit* and *Isaksson* because *Isaksson* is not pertinent to any of *Amit*’s potential issues caused by communicating over splitters. Ex. 2002, ¶118.

These fundamental technological differences between the references demonstrate why the Petition fails to provide a sufficient motivation to combine. Ex. 2002, ¶118. *Isaksson* relates to communication infrastructure *outside* of a home

network over a point-to-point twisted pair system while *Amit* provides an *in-home* network over coaxial cabling as a shared medium. Ex. 2002, ¶118.

2. *Jacobsen* Already Provides the Petition’s Sole Motivation to Combine *Amit* and *Jacobsen* with *Isaksson*

The only motivation provided by the Petition, and thus the only motivation that the ID considered, fails. Ex. 2002, ¶¶119-20; *see* ID, 19-21; Petition 52. Specifically, the Petition argues, circularly, a POSITA would have been motivated to combine *Amit* and *Jacobsen* with *Isaksson* to achieve “synchronized bit-loading” and “prevent the connections between *Amit*’s HCN devices from failing due to one HCN device sending more/fewer bits per carrier than another HCN device expects.” Petition, 52. But neither *Amit* nor *Jacobsen* suffer from failing to provide synchronized bit loading. Ex. 2002, ¶¶120-21. In contrast to the ID, a POSITA would not be motivated to look to any reference for synchronization for bit-loading, let alone look to *Isaksson*. Ex. 2002, ¶¶120-21; *see* ID, 19-21.

The ID correctly recognized that *Amit* uses single-carrier modulation. ID, 21. And because the issue of “sending more/fewer bits per carrier” with bit-loading only arises in multi-carrier signaling, *Amit* could not (and does not) suffer from lack of synchronization. Ex. 2002, ¶120. Moreover, a POSITA would have understood that *Jacobsen*’s multi-carrier modulation also does not suffer from lack of

synchronization but for a different reason. Ex. 2002, ¶121. *Jacobsen*'s disclosure already provides synchronized bit-loading. Ex. 1016, 307; Ex. 2002, ¶121.

As *Isaksson* recognizes, a transmitter and receiver must be synchronized regarding the number of transmitted bits and “[i]f this requirement is not met, the system will be unable to maintain a connection.” Ex. 1013, 3:29-34; Ex. 2002, ¶122. A POSITA would have understood this basic principle and viewed *Jacobsen* as disclosing a method of synchronized bit-loading. Ex. 2002, ¶122; Ex. 1013, 3:29-34; Ex. 2003, 61:22-62:11 (explaining that synchronization is important in all communications).

Specifically, *Jacobsen* explains that “bit distribution is continuously updated during transmission as the receiver sends the ***required information*** to the transmitter on secure overhead channels.” Ex. 1016, 10; Ex. 2002, ¶122. A POSITA would have understood that this “required information” includes the number of bits, allowing the transmitter to synchronize with the receiver. Ex. 2002, ¶122. After all, if the “required information” ***did not*** include the number of bits for synchronization, *Jacobsen* would not be able to maintain a connection. Ex. 2002, ¶122. With synchronization already present in the *Amit* and *Jacobsen* combination, a POSITA would not be motivated to look to *Isaksson*. Ex. 2002, ¶123. This Ground must fail.

C. Ground 2 Fails Because *Jacobsen* Is Not Prior Art

1. There is no evidence that a POSITA would have been able to identify *Jacobsen*

To establish that *Jacobsen* is prior art, the Petition relies solely on the testimony of June Munford. But Ms. Munford is not a member of the relevant group from whose perspective the public accessibility analysis is undertaken. *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1348 (Fed. Cir. 2016) (explaining that prior art status is based on whether **POSITAs** are able to identify and locate the reference). Rather, Ms. Munford has specialized training in information science that a POSITA would not have and is thus able to locate materials that would be inaccessible to a POSITA. Ex. 2005, 11:2-7 (“I have a master’s in library and information science from the University of Wisconsin as well as a Level 2 certification as a public librarian in the State of Michigan”); *see* Ex. 2004, 7:10-14 (“So if you said something about a MARC record or a process of identification of a reference in the 373 deposition, that would apply equally to the 393 Declaration, right? A. Yes.”); Ex. 2004, 6:25-7:19.

A party seeking to introduce a reference “should produce sufficient proof of its dissemination or that it has otherwise been available and accessible to **persons concerned with the art** to which the document relates and thus most likely to avail themselves of its contents.” *In re Wyer*, 655 F.2d 221, 227 (CCPA 1981) (quoting

Philips Elec. & Pharm. Indus. Corp. v. Thermal & Elecs. Indus., Inc., 450 F.2d 1164, 1171 (3d Cir. 1971)). Ms. Munford’s testimony does not, and cannot, meet that standard, as she is not a POSITA and does not offer opinions from such position. *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018). The Petition fails to explain any basis as to why or how *Jacobsen* was “accessible to *persons concerned with the art* to which the document relates and *thus most likely to avail themselves of its contents.*” *Id.*

Although Petitioner contends that its technical expert, Dr. Williams, is a POSITA, he did not provide any opinions relating to the public availability of *Jacobsen*. Moreover, Dr. Williams has never used the type of record that Ms. Munford relied on—a MARC record—to identify any prior art reference. Ex. 2003, 72:15-24. There is no testimony that any POSITA would be familiar with or know how to use MARC records. *Id.* Petitioner does not rely on any other theory to establish a POSITA would have been able to identify *Jacobsen* as a prior art reference.

Other than the MARC indexing (which Petitioner’s evidence plainly establishes that a POSITA and a member of the *relevant* public would not have used), Petitioner provides no other evidence that *Jacobsen* was publicly available at any time that would qualify it as prior art to the ’518 Patent. While indexing may not be the only way to establish a reference is prior art (*Voter Verified, Inc. v.*

Premier Election Sols., Inc., 698 F.3d 1374, 1380 (Fed. Cir. 2012)), it is the only theory advanced by the Petition. Petitioner has thus failed to establish *Jacobsen* is prior art. Ex. 2005, 11:2-7; Ex. 2003, 72:15-24.

2. Petitioner's MARC evidence does not establish when *Jacobsen* was cataloged in any library

To establish that *Jacobsen* is prior art, the Petition relies solely on the testimony of June Munford. But Ms. Munford is not a member of the relevant group from whose perspective the public accessibility analysis is undertaken. *Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1348 (Fed. Cir. 2016) (explaining that prior art status is based on whether **POSITAs** are able to identify and locate the reference). Rather, Ms. Munford has specialized training in information science that a POSITA would not have and is thus able to locate materials that would be inaccessible to a POSITA. Ex. 2005, 11:2-7 (“I have a master’s in library and information science from the University of Wisconsin as well as a Level 2 certification as a public librarian in the State of Michigan”); *see* Ex. 2004, 7:10-14 (“So if you said something about a MARC record or a process of identification of a reference in the 373 deposition, that would apply equally to the 393 Declaration, right? A. Yes.”); Ex. 2004, 6:25-7:19.

Petitioner relies solely on a form of indexing known as a MARC record to claim that *Jacobsen* was publicly available as of the priority date of the '518 Patent.

But there are a number of reasons why Petitioner's reliance on a MARC record is not reliable evidence of public availability.

First, MARC records may be edited after being generated. Ex. 2005, 16:13-44:9 ("what is the process for editing a MARC record field?" ... "It's my experience that any field in a MARC record can be edited via the cataloguing software if the permissions are allowed on the policy end.>"). There is no way to tell whether the MARC record relied upon by Petitioner has ever been edited, and as it is simply a text file, it cannot be authenticated by Ms. Munford (who did not create the MARC record she relies upon).

Further, new releases of serial journals (like the collection containing *Jacobsen*) are appended to **existing** MARC records without any update indicating when a specific volume (*i.e.*, the one containing *Jacobsen*) was actually received. Ex. 2005, 19:22-24 ("New issues of a given serial are appended to the existing MARC record describing the serial.>"). There is no evidence that the MARC record Ms. Munford identified was created when the version of the journal that includes *Jacobsen* was received. Ex. 1006 at 44 (entry 008 corresponding to a date (1995) that is different from the alleged date of *Jacobsen* (1994)), 45 (unknown creation date). As such, the creation of the MARC record is not evidence that the version of the journal containing the *Jacobsen* reference was publicly available as of the MARC record's creation date.

Absent an additional theory as to why *Jacobsen* constitutes prior art, the Petition's evidence is insufficient.

VI. GROUND 1 DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS

The ID did not reach Ground 1, but Patent Owner's new technical evidence shows that Ground 1 also fails. As discussed above, *Isaksson* is not analogous art and would not be used in a combination relevant to the '518 Patent. Further, Patent Owner's technical evidence establishes that Ground 1 improperly combines incompatible references in a manner contrary to the teachings and suggestions of the base reference, *Kliger*. The Petition therefore fails to provide a sufficient motivation to combine *Kliger* and *Isaksson* and thus Ground 1 fails. Ex. 2002, ¶¶124-25.

A. Overview of *Kliger*

Kliger's home network uses a DPU and HNM to facilitate terminal device communication. Ex. 1007, Abstract. The DPU divides the network into two parts—an uplink from the originating device to the DPU and a downlink from the DPU to a destination device. See, e.g., *id.*, ¶[0055]. Specifically, *Kliger*'s HNMs 28 transmit signals upstream, over the backbone 20, to the home-network reflector unit ("HRU"). *Id.*, ¶[0055]. The HRU, which is one component of the DPU (14 in Fig. 1), receives the upstream signal, amplifies the signal power and shifts the RF

frequency, and then returns the signal to the backbone 20 as a downstream signal, which is then received by an HNM. *Id.*, ¶[0056].

As part of this amplification, *Kliger's* HNMs employ transmission power control. *Id.*, ¶[0057]. Each HNM adjusts the initial transmission power of its signals to ensure that the HRU receives all signals at a predefined power level. *Id.* As a result, the HRU receives all upstream signals at a consistent power “because each HNM 28 uses an appropriate transmission power level to account for the attenuation of the signal over the backbone 20.” *Id.*, ¶[0057]. Unlike *Kliger's* network, the Challenged Claims address signal attenuation through bit loading.

B. Ground 1 Fails Because New Technical Evidence Establishes Lack of Motivation to Combine *Kliger* and *Isaksson*

The Petition fails to provide a sufficient motivation to combine *Kliger* and *Isaksson*. Ex. 2002, ¶¶124-25. The Petition identifies “issues” with *Kliger* that *Kliger* already solves; thus, a POSITA would have no reason to look to *Isaksson* to address these “issues.” Ex. 2002, ¶¶126-27. But even crediting these manufactured “issues,” a POSITA would not—and could not—implement *Isaksson's* point-to-point, twisted pair solution on *Kliger's* full-duplex network because *Kliger's* network relies on intermediary devices to modify signals sent over the coaxial network. Ex. 2002, ¶¶143-46.

1. *Kliger* Already Solves Each Alleged “Issue” that the Petition Relies on for a Motivation to Combine

The Petition attempts to motivate its combination by citing three “issues” in *Kliger*: (1) reflections at the splitter, (2) *Kliger*’s dynamic network, and (3) interference and noise. But a POSITA would not have been motivated “to improve *Kliger*’s multi-carrier signaling using Isaksson” because *Kliger* already solves each “issue” that allegedly exists. Petition, 23, 24 (citing Ex. 1004, ¶[0068]); Ex. 2002, ¶¶126-27; see, e.g., *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012) (“Because each device independently operates effectively, a person having ordinary skill in the art...would have no reason to combine the features of both devices.”). The Petition presents no evidence that the solutions proposed in *Kliger* would even be improved by the proposed combination. Thus, there is no basis to conclude a POSITA would have made the proposed combination.

a. *Kliger* Already Solves for Reflections at the Splitter

First, the Petition alleges that “[r]eflections can occur at the splitter, resulting in inter-symbol interference to [*Kliger*’s] home network signal.” Petition, 23-24. This would not motivate a POSITA to make any changes to *Kliger* because *Kliger* already addresses this issue. Ex. 2002, ¶128. While “[r]eflections can occur at the splitter,” *Kliger*’s “modem enables the home network 10 to coexist with pre-existing low quality splitters often found in cable networks.” Ex. 1007, ¶[0073]; Ex. 2002,

¶129. *Kliger* demonstrates that the Petition manufactures the first identified “issue” because *Kliger*’s modem addresses the reflections at the splitter. Ex. 1007, ¶[0073]; see Ex. 2002, ¶129. Specifically, *Kliger*’s modem “uses an efficient modulation scheme.” Ex. 1007, ¶[0073]; Ex. 2002, ¶129. As a result, *Kliger* “achieves higher data rates for a specific frequency band produces less cross talk between potentially interfering signals.” Ex. 1007, ¶[0073]; Ex. 2002, ¶129. A POSITA would have understood that *Kliger*’s modem addresses the reflections identified by the Petition. Ex. 2002, ¶130. As such, a POSITA would not be motivated to improve *Kliger* based on this “issue.” Ex. 1007, ¶[0073]; Ex. 2002, ¶130.

Assuming *arguendo* that *Kliger* had issues with reflections ***at the splitter***, the disclosure of *Isaksson* is not relevant to such reflections. Ex. 2002, ¶131. The Petition identifies reflections at the splitter as the “issue” (Petition, 23-24), but *Isaksson*’s network does not include splitters and does not communicate over tap ports of any splitters. Ex. 2002, ¶¶131-32; see Ex. 1007, ¶[0073]. *Isaksson*, rather, provides a network that communicates over a simple point-to-point architecture, as opposed to *Kliger*’s communication over splitters. Ex. 2002, ¶132; see, e.g., Ex. 1013, Fig. 1. Thus, there is no reason that a POSITA would have looked to *Isaksson* to solve *Kliger*’s “issues” regarding reflections that occur at the splitter, and the Petition provides none. Ex. 2002, ¶132.

Moreover, *Isaksson* provides a twisted pair network for data distribution outside of the home. Ex. 2002, ¶133; Ex. 1013, 24:8-28. The Petition’s issue concerns in-home networking over coaxial cabling. Ex. 2002, ¶133. Dr. Williams fails to address these distinctions, and the Petition relies on nothing more than hindsight to identify and rely upon a reference that is inapplicable to the solved “issue” of *Kliger*. Ex. 2002, ¶133. These two networks have different interference, attenuation, carrier signals, and power considerations. Ex. 2002, ¶133. The Petition and Dr. Williams are silent regarding these differences. Ex. 2002, ¶133. The Petition’s first alleged “issue” would not motivate a POSITA to combine *Kliger* and *Isaksson*. Ex. 2002, ¶128.

b. *Kliger* Addresses Its Dynamic Network

Second, the Petition alleges that *Kliger*’s network conditions are dynamic due to (1) the ability to add and remove network devices and (2) changing external conditions. And based on the dynamic nature of *Kliger*’s network, “a carrier that was once clear of interference can later become overwhelmed with interference.” Petition, 23-24 (citing Ex. 1004, ¶[0067]). But neither of these issues would motivate a POSITA to make any changes to *Kliger*. Ex. 2002, ¶¶134-35. *Kliger*’s network already solves for (1) adding and removing network devices and (2) changing external conditions. Ex. 2002, ¶135.

Kliger's registration process solves the alleged “issue” of adding and removing devices. Ex. 1007, ¶¶[0089], [0108]-[0112]; Ex. 2002, ¶136. During the registration period, the master HNM indicates where the new HNM appears in the transmission order and “the amount of bandwidth that has been allocated to the HNM.” Ex. 1007, ¶[0110]; Ex. 2002, ¶136. As new HNMs are added to the network, the master HNM may change the amount of bandwidth allocated to each HNM to guarantee quality of service. Ex. 1007, ¶[0103]; Ex. 2002, ¶136. This protocol demonstrates that *Kliger's* is well-equipped to dynamically adapt to the number of HNMs and, in contrast to the Petition's contentions, adding or removing a network device would not cause a carrier to “later become overwhelmed with interference.” Petition, 24; Ex. 2002, ¶136.

Tellingly, neither the Petition nor Dr. Williams mentions *Kliger's* registration process. Ex. 2002, ¶137. This functionality in *Kliger* defeats the Petition's purported motivation to combine because it shows that whatever issues are caused by the “dynamic nature” of *Kliger's* network are already solved by *Kliger's* system. Ex. 2002, ¶137. The Petition overlooks these disclosures in *Kliger* and thus does not explain how the non-obvious combination with *Isaksson* would function on *Kliger's* network. Ex. 2002, ¶137.

c. *Kliger* Addresses Interference and Noise

Third, the Petition’s broad statements concerning “signal impairments” and “external noise” do not save the Petition’s insufficient motivation. *See* Petition, 23; Ex. 2002, ¶138. *Kliger*’s registration process addresses the issue with its quality of service. Ex. 1007, ¶¶[0089], [0108]; Ex. 2002, ¶¶139-40. And even if *Kliger* did not already address this issue, a POSITA would recognize that twisted pair system (*i.e.*, *Isaksson*) suffers from different types of noise and interference than a coaxial cable network (*i.e.*, *Kliger*). Ex. 2002, ¶141. To avoid this distinction, the Petition and Dr. Williams selectively quote *Isaksson*, which specifically states that, “A multi-carrier modulation technique, such as DMT, handles frequency dependent loss and noise *in twisted pair-cables* in an efficient manner.” Ex. 1013, 26:4-20; *see* Petition, 24 (“Isaksson explains, ‘[a] multi-carrier modulation technique, such as DMT, handles frequency dependent loss and noise...in an efficient manner.’”) (citing Ex. 1013, 26:4-20); Ex. 1004, ¶69. Thus, a POSITA would not be motivated to look to *Isaksson* even if *Kliger* did not already address the issues. Ex. 2002, ¶141.

The Petition ignores *Kliger*’s teachings that are directed to solving each “issue” that the Petition purports to use as motivation: *Kliger*’s modem addresses reflections cause by the splitter; *Kliger* details a registration process to address the dynamic nature of its network and interference. Ex. 2002, ¶142. A POSITA would not have been motivated to combine *Kliger* with *Isaksson* for any of the “issues” identified by the Petition. Thus, Ground 1 fails for lack of motivation to combine.

2. A POSITA Would Not Implement *Isaksson*'s "Base Sync Frames" Over *Kliger*'s Network

The Petition's alleged shortcomings of *Kliger* and advantages of *Isaksson* each fail to provide a sufficient motivation to combine. For this reason alone, Ground 1 fails. However, even crediting these manufactured "issues," a POSITA would not—and could not—implement *Isaksson*'s "base sync frames" over *Kliger*'s network. Ex. 2002, ¶¶143-44. *Isaksson*'s "base sync frames" are designed for simple, point-to-point communication over twisted pair outside of the home. Ex. 2002, ¶147. A POSITA would have understood that these "base sync frames" would not function over *Kliger*'s full-duplex coaxial network. Ex. 2002, ¶¶145-46.

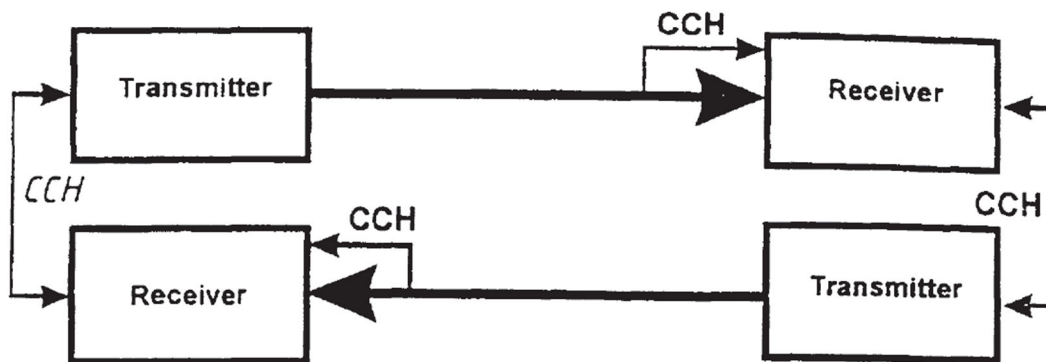
a. *Isaksson*'s "Base Sync Frames" Would Not "Determine Channel Characteristics" Within *Kliger*'s Network

Relying on the non-obvious combination of *Kliger* and *Isaksson*, the Petition contends that the resulting HNM would analyze *Isaksson*'s "base sync frames" to determine channel characteristics for bit loading selection. Petition, 26. The Petition fails to explain how the "base sync frames" would be able to estimate channel characteristics. Ex. 2002, ¶¶147-48. This is because they could not. Ex. 2002, ¶148. First, *Isaksson*'s "base sync frames" would not function in *Kliger*'s half-duplex system. Ex. 2002, ¶148. The Petition does not acknowledge the differences between *Kliger* and *Isaksson*, let alone explain how the "base sync frames" would function over *Kliger*'s fundamentally different system. Ex. 2002, ¶148. Second, *Kliger*'s

network relies on an intermediary device, further preventing *Isaksson's* point-to-point “base sync frames” from functioning over *Kliger's* network. Ex. 2002, ¶149.

i. Isaksson's Base Sync Frames Would Not Function on Kliger's Shared Medium

Isaksson's “base sync frames” are not designed to function on a shared medium like *Kliger's* coaxial cables. Ex. 2002, ¶147. *Isaksson* provides a two node, ***point-to-point***, full-duplex system that utilizes multi-carrier modulation. Ex. 2002, ¶147. Figure 33 illustrates an example configuration where the control channel links the receiver and transmitter. Ex. 1013, 74:22-31.



Ex. 1013, Fig. 33.

In *Isaksson's* duplex system, the control channel is used to provide “a two-way connection since both the uplink transceiver and downlink transceiver contain a transmitter and a receiver.” *Id.*, 73:4-11; Ex. 2002, ¶147. This control channel “is an absolute requirement.” Ex. 1013, 73:12-15; Ex. 2002, ¶147.

In its motivation to combine rationale, the Petition alleges that *Kliger's* HNMs would transmit and analyze *Isaksson's* base sync frames to determine channel characteristics. Petition, 26. But despite the “absolute requirement” of *Isaksson's* control channel to transmit base sync frames, the Petition fails to mention the control channel, or how such a channel would exist across a coaxial splitter's multi-path signal. Ex. 2002, ¶148. This is unsurprising because a POSITA would understand that *Kliger* is a fundamentally different system. Ex. 2002, ¶148. Thus, a POSITA would not be motivated to implement *Isaksson's* base sync frames. Ex. 2002, ¶148.

ii. Isaksson's Base Sync Frames Would Not Function with Kliger's Intermediary Device

The Petition's failure to address how *Isaksson's* “base sync frames” are transmitted is amplified by the fact that *Kliger* uses an intermediary device (HRU) that changes the signals' properties. Ex. 2002, ¶149. To communicate, *Kliger's* HNMs transmit signals upstream to the HRU (*i.e.*, the upstream signal path). Ex. 1007, ¶[0055]. The HRU amplifies the signal power and shifts the RF frequency of the signal before reflecting the signal downstream to the receiving HNM (*i.e.*, the downstream signal path). *Id.*, ¶[0056]; Ex. 2002, ¶150. Unlike *Kliger*, *Isaksson* transmits the base sync frames over its point-to-point architecture ***without*** an intermediary device. Ex. 1013, 24:8-28, Fig. 1; Ex. 2002, ¶151.

Isaksson's method of sending base sync frames from point-to-point would not work in *Kliger*. *Kliger*'s HNM transmits a signal upstream to the HRU. With transmission power control, the HRU receives the upstream signal at a predefined power level. Ex. 1007, ¶[0057]; Ex. 2002, ¶150. The HRU then alters both the power and frequency of the signal before the signal is transmitted downstream to the receiving HNM. Ex. 1007, ¶[0056]; Ex. 2002, ¶150. As *Isaksson* does not include an intermediary device that alters the properties of the base sync frames, *Isaksson* does not provide any disclosure regarding the process of determining channel characteristics via a signal that is transmitted along an upstream signal path, altered by an intermediary device, and transmitted downstream to a receiving device. Ex. 2002, ¶¶151-52. The Petition fails to mention, let alone address, this fundamental architectural difference between *Kliger* and *Isaksson*. Instead, the Petition simply concludes that the receiving device “would analyze the received base sync frames to determine channel characteristics of the respective channels.” Petition, 26. There is no explanation of how, or even which channel, would allegedly be “analyzed” when the signal has been modified by the HRU.

Moreover, even assuming the receiving HNM could somehow reconstruct the upstream signal *before* the HRU alters the signal properties, the receiving HNM still would not be able to determine channel characteristics. Ex. 2002, ¶153. Based on *Kliger*'s transmission power control to account for signal attenuation, all upstream

signals are received by the HRU at the same power level. Ex. 1007, ¶[0057]; Ex. 2002, ¶153. Thus, to the extent that the receiving HNM can determine the properties of the unaltered upstream signal, the power level of the upstream signal would be the same regardless of the originating HNM (or the channel characteristics of the upstream path). Ex. 2002, ¶154. Without being able to differentiate between upstream signals, the receiving HNM could not simply “analyze the received base sync frames to determine channel characteristics” as the Petition concludes. Ex. 2002, ¶154. Other than this conclusory statement, the Petition does not provide an explanation of how the combined system would function to arrive at the Challenged Claims.

b. *Isaksson*’s “Base Sync Frames” Would Alter the Intended Operation of *Kliger*’s HNMs

The Petition also proposes a combination that would improperly alter the principle of operation behind *Kliger*. *Kliger* requires all devices to transmit on a fixed constellation size based on overall network characteristics—not the specific channel characteristics between each HNM. Ex. 2002, ¶155. *Isaksson*, by contrast, uses variable constellation sizes for data transmission over its single point-to-point hop. Ex. 2002, ¶156. The Petition fails to explain how or why a POSITA would be motivated to combine *Kliger* and *Isaksson* given this critical technological difference. To the contrary, the Petition’s combination would fundamentally alter

the principle of operation of *Kliger*. Ex. 2002, ¶157. Neither reference, nor anything identified in the Petition, provides any disclosure or suggestion of altering constellation size based on *channel specific* characteristics that function over splitters, the very problem that the '518 Patent addresses. Ex. 2002, ¶155.

Kliger details the function of its HNMs for facilitating end device communication. Notably, each HNM transmits data via burst over the backbone using the *same constellation size*, which is based on network characteristics. Ex. 1007, ¶¶[0091], [0099]; Ex. 2002, ¶155. Every communication in *Kliger* is reduced to the lowest signal to noise ratio of the home network. Ex. 2002, ¶155.

In an example, the channel (green) from the study to the living room may support 256-QAM. Ex. 2002, ¶155. However, the channel (red) from the family room to the bedroom may only be capable of supporting QPSK. Ex. 2002, ¶155. Although the channel from the study to living room could support higher order constellation, *Kliger* mandates both channels to implement the lower order constellation (*i.e.*, QPSK). Ex. 2002, ¶155.

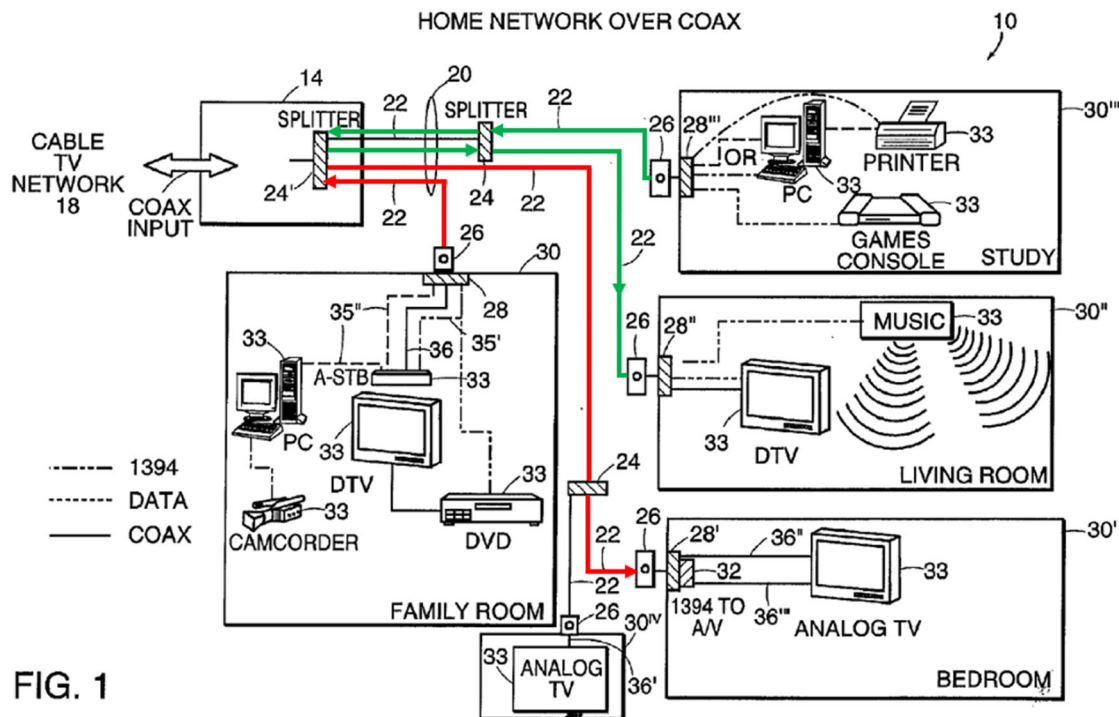
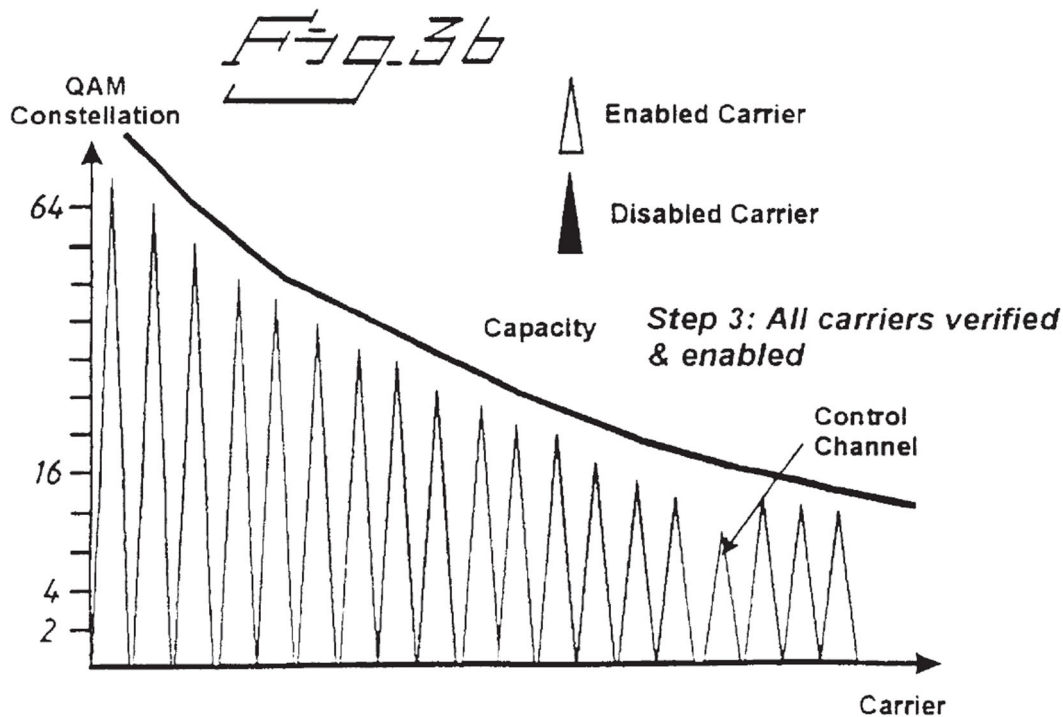


FIG. 1

Kliger, Fig. 1 (annotated); Ex. 2002, ¶155.

Unlike the fixed networked constellation size used in *Kliger*, *Isaksson* dynamically changes the number of bits for each carrier wave over a single hop without communicating over splitters. Ex. 1013, 3:24-27; Ex. 2002, ¶156. Figure 36 of *Isaksson* illustrates a channel in a fully configured system. *Id.*, 20:24-25, Fig. 36 (reproduced below). The system “transmits the bit-loading diagram (constellation) to the downlink transceiver,” and the receiver updates the constellation for *each* carrier wave. *Id.*, 78:5-79:5. As shown in Figure 36, QAM constellation varies depending on the carrier. *See id.*, Fig. 36. The number of bits and corresponding constellation size is proportional to the SNR of the carrier. *Id.*, 26:14-17. The higher the SNR, the higher the constellation size.



Ex. 1013, Fig. 36. This is possible in *Isaksson* because *Isaksson* only analyzes a single point-to-point connection, a hop lacking any splitter or other intervening signal dividing devices. Ex. 2002, ¶156.

The Petition ignores this disclosure, instead proposing a combination that would alter the communication technique of *Kliger*. Petition, 23-28; Ex. 2002, ¶157. *Kliger*'s disclosure centers around in-home communication using its HNMs, and "the constellation size is the same for each HNM 28 (when transmitting)." Ex. 1007, Abstract, ¶¶[0040]-[0044], [0099]. Replacing *Kliger*'s method of transmitting data with *Isaksson*'s twisted pair system would require such a change to *Kliger* that a POSITA would not be motivated to look to *Isaksson*, let alone pursue the proposed combination. Ex. 2002, ¶157.

VII. CONCLUSION

Isaksson is not analogous art to the '518 Patent and therefore cannot serve as the basis for obviousness; as *Isaksson* is relied on exclusively for the same claim elements in both Grounds, this issue is dispositive. Moreover, a POSITA would not have been motivated to make the proposed combinations, such that the fundamentally different architectures of coaxial LANs and twisted pair WANs would not have been combined in the manner alleged. As a result, the Petition fails to establish any claim is unpatentable.

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Respectfully submitted,

By: /Jason A. Engel/
Jason A. Engel
Reg. No. 51,654
K&L GATES LLP
70 W. Madison Street, Suite 3100
Chicago, IL 60602
Jason.Engel.PTAB@klgates.com
T: (312) 807-4236
F: (312) 827-8145

Counsel for Patent Owner

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By: /Jason A. Engel/
Jason A. Engel
Reg. No. 51,654
K&L GATES LLP
70 W. Madison Street, Suite 3100
Chicago, IL 60602
Jason.Engel.PTAB@klgates.com
T: (312) 807-4236
F: (312) 827-8145

CERTIFICATE OF SERVICE

I hereby certify that on November 8, 2024, a true and correct copy of the foregoing was caused to be served on the following counsel of record for Petitioner by electronic mail at the following addresses:

Adam R. Shartzner
Ruffin B. Cordell
Michael J. Ballanco
Matthew P. Mosteller
John J. Thuermer
Timothy Riffe
Usman Khan
Alyaman Amer
Fish & Richardson P.C.
60 South Sixth Street
Minneapolis, MN 55402
Tel: 202-783-5070
Fax: 877-769-7945
Email: IPR45035-0025IP1@fr.com

By: /Jason A. Engel/
Jason A. Engel
Reg. No. 51,654