

**UNITED STATES PATENT AND TRADEMARK OFFICE**

---

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

---

COMCAST CABLE COMMUNICATIONS, LLC,

Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,

Patent Owner.

---

CASE: IPR2024-00431

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

---

**PATENT OWNER RESPONSE**

## TABLE OF CONTENTS

|      |                                                                                                                                                                                  |    |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| I.   | INTRODUCTION.....                                                                                                                                                                | 1  |
| II.  | SUMMARY OF THE '518 PATENT .....                                                                                                                                                 | 7  |
| III. | THE LEVEL OF ORDINARY SKILL IN THE ART.....                                                                                                                                      | 10 |
| IV.  | GROUND A FAILS TO ESTABLISH THAT <i>MIRFAKHRAEI</i> IS<br>ANALOGOUS ART .....                                                                                                    | 11 |
|      | A.Overview of <i>Mirfakhraei</i> and Its Twisted Pair Communication.....                                                                                                         | 13 |
|      | B. <i>Mirfakhraei</i> and the '518 Patent Do Not Share the Same Field of Endeavor<br>15                                                                                          |    |
|      | 1. The '518 Patent's Field of Endeavor is On-premises Local Area<br>Broadband Coaxial Cable Networks.....                                                                        | 16 |
|      | 2. <i>Mirfakhraei's</i> Field of Endeavor Is DSL Connections Over Twisted<br>Pair, Not On-premises Local Area Broadband Coaxial Cable Networks<br>.....                          | 18 |
|      | 3. The Petition, and ID, Do Not Show that <i>Mirfakhraei</i> is of the Same<br>Field of Endeavor as the '518 Patent. ....                                                        | 20 |
|      | C. <i>Mirfakhraei</i> is Not Reasonably Pertinent to the Problems that the '518 Patent<br>Addresses .....                                                                        | 24 |
|      | 1. The '518 Patent Addresses Issues Specific to Its On-premises Local<br>Area Broadband Coaxial Cable Network.....                                                               | 25 |
|      | 2. <i>Mirfakhraei</i> Addresses Different Attenuation Characteristics That Are<br>Not Analogous to the Problems Identified in the '518 Patent .....                              | 26 |
|      | 3. <i>Mirfakhraei</i> is Not Pertinent to the '518 Patent's Problems.....                                                                                                        | 28 |
| V.   | THE INSTITUTION DECISION ERRED IN FINDING THAT GROUND A<br>RENDERS THE CHALLENGED CLAIMS OBVIOUS.....                                                                            | 29 |
|      | A.Ground A Fails Because A POSITA Would Not Combine <i>Afshary</i> and<br><i>Mirfakhraei</i> .....                                                                               | 31 |
|      | 1. <i>Mirfakhraei's</i> Multi-Carrier Modulation Frustrates <i>Afshary's</i> Goal of<br>Providing a Simple, Low-Cost Home Network .....                                          | 31 |
|      | 2. A POSITA Would Not Implement <i>Mirfakhraei's</i><br>Modulator/Demodulator in <i>Afshary's</i> System Because <i>Mirfakhraei</i> is<br>Incompatible with <i>Afshary</i> ..... | 36 |
|      | a. <i>Mirfakhraei's</i> "Multi-Carrier Modulator and Multi-Carrier                                                                                                               |    |

|                                                                                                                                                                                     |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Demodulator” Would Not Work in <i>Afshary</i> ’s ASIC .....                                                                                                                         | 36        |
| b. <i>Mirfakhraei</i> ’s Point-to-Point Bit Loading Scheme is Incompatible with <i>Afshary</i> ’s Multi-Point Communication Network.....                                            | 40        |
| c. <i>Afshary</i> Operates on Frequencies Not Used by <i>Mirfakhraei</i> .....                                                                                                      | 44        |
| d. Mr. Bertonis’ Experience Does Not Cure the Petition’s Deficient “Motivation” to Combine.....                                                                                     | 48        |
| B. The Petition Erroneously Relies on Hindsight Bias to Combine <i>Afshary</i> and <i>Mirfakhraei</i> .....                                                                         | 51        |
| 1. Ground A Fails Because <i>Afshary</i> Already Addresses the Alleged Impairments Identified by the Petition.....                                                                  | 53        |
| a. <i>Afshary</i> already addresses the alleged impairment of a “variable frequency response” by implementing filters .....                                                         | 54        |
| b. <i>Afshary</i> already achieved a robust and reliable communication system.....                                                                                                  | 56        |
| 2. A POSITA Would Not Look to <i>Mirfakhraei</i> ’s Multi-Carrier Modulation Scheme to Improve <i>Afshary</i> ’s Network .....                                                      | 59        |
| a. <i>Afshary</i> operates in a clean medium, not a “harsh” environment..                                                                                                           | 60        |
| b. <i>Afshary</i> already includes a power-efficient modulation scheme ...                                                                                                          | 64        |
| C. <i>Mirfakhraei</i> ’s Multi-Carrier Modulation Scheme Operates at a Lower Frequency Than Those Used by <i>Afshary</i> ’s LAN and Does Not Render Obvious Dependent Claim 3 ..... | 67        |
| <b>VI. PETITIONER’S PURPORTED CLAIM CONSTRUCTIONS .....</b>                                                                                                                         | <b>70</b> |
| <b>VII. GROUND B: CLAIM 2 IS NOT OBVIOUS OVER GROUND A IN VIEW OF <i>WELLES</i> .....</b>                                                                                           | <b>71</b> |
| <b>VIII. CONCLUSION.....</b>                                                                                                                                                        | <b>71</b> |

**TABLE OF PATENT OWNER’S EXHIBITS**

| <b>Exhibit No.</b> | <b>Description</b>                                                                                                                                                                                                                                   |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2001               | Declaration of Mr. Albert Garrett                                                                                                                                                                                                                    |
| 2002               | Deposition Testimony of Mr. James Bertonis (Oct. 30, 2024)                                                                                                                                                                                           |
| 2003               | Excerpts from Samuel H. Russ, <i>Signal Integrity Applied Electromagnetics and Professional Practice</i> (“Signal-Integrity”)                                                                                                                        |
| 2004               | GNS Wireless, <i>Coaxial Cables</i> ,<br><a href="https://www.gnswireless.com/productcategory/products/coaxial-cables/">https://www.gnswireless.com/productcategory/products/coaxial-cables/</a> (last visited May 20, 2024)<br>(“Coaxial-Products”) |

Patent Owner, Entropic Communications, LLC (“Patent Owner”), submits this Patent Owner Response in response to the *Inter Partes* Review petition (“Petition”) (Paper 2) filed by Comcast Cable Communications, LLC (“Petitioner”) and the Board’s Institution Decision (“ID”) (Paper 8) for Claims 1-4 (the “Challenged Claims”) of 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 *Mirfakhraei*<sup>1</sup>—a non-analogous twisted pair, point-to-point system used for communication outside of the home over traditional telephone lines. But this type of system fails to address—let alone overcome—the problem that the ’518 Petition

---

<sup>1</sup> EP Pub. No. 1087586A2 to Mirfakhraei (Ex. 1007).

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. 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 a base reference (*Afshary*<sup>2</sup> in Grounds A and B) to teach on-premise networks. But *Afshary* lacks 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 gap between the '518 Patent and *Afshary*, the Petition turns to *Mirfakhraei*.

*Mirfakhraei* describes communication over twisted pair (not coaxial cable), sent from a head-end (not between devices in a local network), and without

---

<sup>2</sup> U.S. Pub. No. 2006/0218593 to Afshary et al. (Ex. 1006).

traversing any splitters or tap ports at all. The Petition ignores the lack of coaxial splitters in *Mirfakhraei*, and this lack of splitters is fatal to the proposed combination.

The accompanying new technical evidence establishes that a person of ordinary skill in the art would not have looked to *Mirfakhraei*. Rather, the Petition improperly relies on hindsight gained from the '518 Patent itself.

The Petition proposes two Grounds of unpatentability, both fail.

**First**, each Ground relies on *Mirfakhraei* but fails to establish that *Mirfakhraei* is analogous art. *See* Ex. 2001, ¶¶ 52-53, 58-79. The '518 Patent solves impairments specific to on-premises communications between network devices over existing coaxial cable networks comprising splitters. Ex. 1001, 4:36-47; Ex. 2001, ¶¶ 73-76. *Mirfakhraei* does not use coaxial cabling or communicate over splitters and thus cannot be reasonably pertinent to these problems. Ex. 2001, ¶¶ 77-79. Nor is *Mirfakhraei* from the same field of endeavor of the '518 Patent. *Id.*, ¶¶ 58-72. The '518 Patent's field of endeavor is an on-premises coaxial network that communicates over existing coaxial cables and through the tap ports of a splitter. *Id.*, ¶¶ 73-76. *Mirfakhraei* provides an out-of-home system that communicates over conventional telephone lines without any splitter or tap ports. *See, e.g.*, Ex. 1013, 24:8-13; Ex. 2001, ¶¶ 77-79.

The Petition does not address analogous art at all. Instead, Petitioner’s expert simply concludes *Mirfakhraei* is directed to “network communication” and is therefore analogous to the ’518 Patent. But this characterization is too broad under Federal Circuit law and too divorced from the evidence to establish *Mirfakhraei* as analogous art. *See* Ex. 2001, ¶¶ 58-72.

**Second**, the Petition relies on the combination of *Afshary* and *Mirfakhraei*. But Patent Owner’s coaxial cable expert, Mr. Garrett, explains how the actual teachings of these references undermine this combination. *Id.*, ¶¶ 54-55. *Afshary* already provides a solution for communicating over coaxial splitters that differs from the ’518 Patent’s solution. Namely, *Afshary* proposes low-cost single-carrier signaling that leverages high reflections for intra-device communication. *See Id.*, ¶ 54. A person of ordinary skill in the art would not be motivated to modify *Afshary* to solve a problem that *Afshary* already solves. *Id.*, ¶ 55.

*Afshary* also teaches against the cost and complexity of the Petition’s combination. For example, *Afshary*’s goal is to transmit data in “cost-effective” manners within a home. Ex. 1006, [0006], [0012], [0024], [0037]. Replacing *Afshary*’s single-carrier system with a multi-carrier system would increase its cost substantially, contrary to *Afshary*’s teachings and without evidence in the Petition that this modification would yield substantial improvements. Ex. 2001, ¶ 54.

Further still, *Mirfakhraei* is incompatible with *Afshary* because it describes the use of probe signals sent from a head or central office over twisted pair for analyzing a point-to-point communication link, without traversing any splitters. The Petition and ID ignore the complexity associated with introducing probe signals into a coaxial network and fail to address the implementation in an environment that requires communication through the tap ports of a splitter. At institution, the record was incomplete as to the technical evidence regarding these issues. The testimony of Mr. Al Garrett, a coaxial cable expert, establishes that the proposed combination of Ground A fails. Ex. 2001, ¶¶ 1-13, 54-57.

The ID did not address Ground B, but Ground B does not remedy the deficiencies of Ground A. Ground B adds a secondary reference, *Welles*,<sup>3</sup> to challenge dependent claim 2. *Welles* is not relied upon to address the identified deficiencies of the alleged *Afshary* and *Mirfakhraei* combination, and therefore Ground B fails for the same reasons as Ground A.

Based on an incomplete record, the ID found a reasonable likelihood that the Challenged Claims are obvious. ID, 35. Under a complete technical record, including the new technical evidence from Mr. Garrett, the Petition's challenges fail.

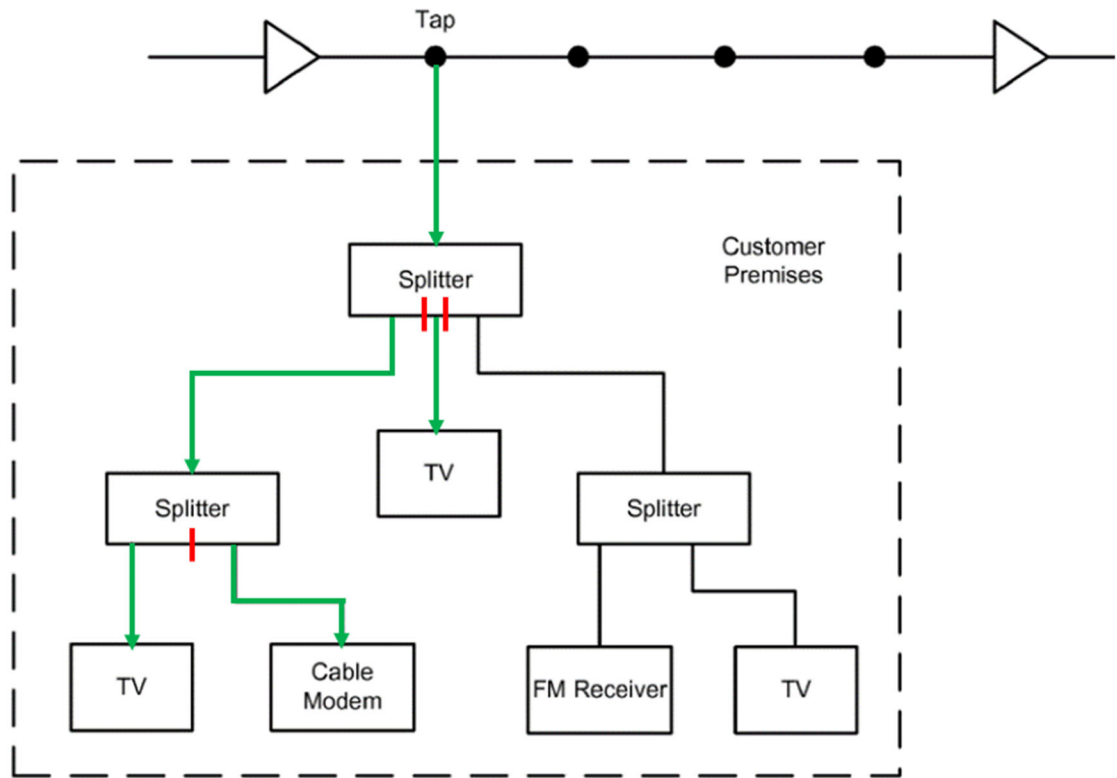
---

<sup>3</sup> U.S. Patent No. 6,737,984 to Welles, II et al. (Ex. 1022).

## **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. 2001, ¶ 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. 2001, ¶ 44.

Figure 1 illustrates a traditional on-premises coaxial signal distribution plan, including signal splitters and network devices. Ex. 1001, 5:10-11; Ex. 2001, ¶ 45. Signal splitters distribute downstream signals from the point-of-entry to various network devices. Ex. 1001, 1:40-45; Ex. 2001, ¶ 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. 2001, ¶ 45.



Ex. 1001, Fig. 1 (illustrating traditional channel path of signal distribution (green) and isolated channel path between devices (red)); Ex. 2001, ¶ 47.

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. 2001, ¶ 46.

**First**, a splitter's tap ports are isolated. Ex. 1001, 2:27-34; Ex. 2001, ¶ 47. Inter-port isolation leads to signal attenuation when terminal devices communicate through the tap ports. *Id.* 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. 2001, ¶ 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. 2001, ¶ 47.

**Second**, signal attenuation in the on-premises broadband coaxial network is variable across the different paths. Ex. 1001, 2:41-48; Ex. 2001, ¶ 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. *Id.* 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. 2001, ¶ 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. 2001, ¶ 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. 2001, ¶ 49. Multipath signals may be undesirable because they create inter-symbol interference (“ISI”). Ex. 1001, 3:7-10; Ex. 2001,

¶ 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. 2001, ¶ 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. 2001, ¶ 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. 2001, ¶¶ 50-51.

### **III. THE 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. 2001, ¶¶ 37-43. Experience with coaxial networking is central to the patent's field of work. *Id.* 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. 2001, ¶ 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 refers 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. *Id.*, cl. 1.

#### **IV. GROUND A FAILS TO ESTABLISH THAT *MIRFAKHRAEI* IS ANALOGOUS ART**

“A reference qualifies as prior art for an obviousness determination ... only when it is analogous to the claimed invention.” *In re Klein*, 647 F.3d 1343, 1348 (Fed. Cir. 2011); *see also SCHOTT Gemtron Corp. v. SSW Holding Co., Inc.*, IPR2013-00358, Paper 106, 26 (PTAB Aug. 20, 2014) (explaining that the Petitioner bears the burden to show that the asserted prior art references are analogous art). To be analogous, a reference must be either (1) from the *same* field of endeavor as the patent-at-issue, or (2) reasonably pertinent to the *particular* problem with which the inventor of the challenged patent is involved. *In re Clay*, 966 F.2d 656, 658-59 (Fed. Cir. 1992). The Petition fails to allege, let alone establish, that *Mirfakhraei* is analogous under either prong.

*First*, the '518 Patent and *Mirfakhraei* are not from the same field of endeavor. The Petition does not even allege, let alone show, that *Mirfakhraei* is from the same field of endeavor as the '518 Patent.<sup>4</sup>

The '518 Patent concerns an on-premises broadband network implemented over existing coaxial cables. *See* Section IV.B.1. *Mirfakhraei*, in contrast, provides an ADSL transceiver over twisted pair telephone wiring, which is an out-of-home facing device that communicates via a point-to-point methodology. Petition, 42; Ex. 1007, [0015], [0019]; *see* Ex. 2001, ¶¶ 61-72; Ex. 2002, 78:6-16. *Mirfakhraei* does not discuss cable broadband networks or existing on-premises coaxial cables, and its bit loading process for multicarrier communication would not work in a coaxial environment which includes signal splitters.

---

<sup>4</sup> While Mr. Bertonis has a single sentence on this issue (Ex. 1002, ¶ 88), the Petition's failure to make any argument regarding the field of endeavor cannot be remedied through improper incorporation by reference of Mr. Bertonis' declaration.

***Second***, *Mirfakhraei* is not pertinent to the problem solved by the '518 Patent. The Petition makes no argument on this point.<sup>5</sup>

The '518 Patent identifies and solves impediments that restrict on-premises communications between network devices over existing coaxial cable wiring. Ex. 1001, 4:36-47. For example, existing coaxial systems include splitters, which cause signal attenuation from inter-port isolation when terminal devices communicate over the tap ports. *Id.*, 2:27-34. Because *Mirfakhraei* provides a fundamentally different, structurally simple system—which does not include coaxial cables and does not communicate over splitters—*Mirfakhraei* is not pertinent to the problems caused by communicating over coaxial cables or splitters in an on-premises local network like the communication network of the '518 Patent.

**A. Overview of *Mirfakhraei* and Its Twisted Pair Communication**

*Mirfakhraei*'s disclosure relates to a system implemented over conventional twisted pair telephone lines. Ex. 1007, [0014]-[0015]; Ex. 2001, ¶ 52. *Mirfakhraei*

---

<sup>5</sup> While Mr. Bertonis makes passing argument on this issue in his declaration at paragraph 88, the Petition's failure to make such an argument cannot be remedied through improper incorporation by reference of Mr. Bertonis' argument. *See* Ex. 1002, ¶ 88.

explains that DMT protocols were “developed to increase the data transmission rate over conventional telephone lines” with specific references to Asymmetric Subscriber Loops, High bit rate Digital Subscriber Loops, the Very fast asymmetric digital Subscriber Loop, and light rate ADSL. Ex. 1007, [0003]; Ex. 2001, ¶ 66. The transmitter-to-receiver connection of *Mirfakhraei* utilizes a similar discrete multi-tone protocol to increase data rates over these conventional twisted pair telephone lines. Ex. 1007, [0003], [0007]; Ex. 2001, ¶¶ 77-78.

*Mirfakhraei* describes its transceivers as “xDSL transceiver[s]” as implementing the bit loading process described in its invention. Ex. 1007, [0014]; Ex. 2001, ¶ 62. These transceivers “connect to a conventional telephone line via a hybrid circuit.” Ex. 1007, [0015]. These types of transceivers are “implemented with dedicated hardware as in conventional xDSL transceivers and modems” which would specifically connect to conventional telephone lines alone. *Id.*; Ex. 2001, ¶ 62. *Mirfakhraei* states that all transmissions from the hybrid circuit are sent via an “analog signal from DAC 140 to telephone lines 152” which are “coupled to hybrid circuit 150.” Ex. 1007, [0019]; Ex. 2001, ¶ 62. The diagram of *Mirfakhraei*’s conventional xDSL transceiver is exemplified in Figure 1 reproduced below:



point-to-point system that communicates over conventional telephone lines. *See, e.g.,* Ex. 1007, [0015], [0019]; Ex. 2001, ¶¶ 61, 71-72. *Mirfakhraei* does not discuss broadband networks or existing on-premises coaxial cables, coaxial splitters, or multi-path reflections—all key to the '518 Patent. The ID ignores that the Petition never makes the showing that *Mirfakhraei* is analogous art, and over-generalizes the field of *Mirfakhraei*, while confirming that the two fields are themselves not the same.

Nowhere does the ID identify any argument by the Petition that *Mirfakhraei* is analogous art. ID at 20-22. Instead, the Board improperly makes its own findings, separate and apart from the arguments in the Petition. *See TQ Delta, LLC v. CISCO Systems, Inc.*, 942 F.3d 1352, 1361-62 (Fed. Cir. 2019).

1. The '518 Patent's Field of Endeavor is On-premises Local Area Broadband Coaxial Cable Networks

The '518 Patent's field of endeavor is on-premises local area broadband coaxial cable networks. Ex. 1001, 1:25-29; Ex. 2001, ¶ 58.

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.*, 1380-81 (affirming Board’s finding of field of endeavor based on “the title of the [] patent and the preamble of a ... claim”).

The ’518 Patent is titled, “Broadband network for coaxial cable using multi-carrier modulation.” Ex. 1001, Cover; Ex. 2001, ¶ 59. The abstract is consistent with the title, stating “[a] broadband *local area data network* uses *coaxial cable* wiring for interconnection of terminal devices.” *Id.* 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. 2001, ¶ 59. The background focuses on *local broadband coaxial networks* and the issues present in such networks. *See generally* Ex. 1001, 1:33-4:33; Ex. 2001, ¶ 59.

The background of the ’518 Patent expressly distinguishes on-premises networks with out-of-home systems. *See* Ex. 1001, 4:19-33; Ex. 2001, ¶ 59. This distinction allows on-premise networks to decrease interference from out-of-home networks. The claims of the ’518 Patent reflect this field of endeavor, reciting a specific data network over *coaxial cables*. *See, e.g.*, Ex. 1001, cl. 1; Ex. 2001, ¶ 59.

The Petition appears to agree: “[t]he ’518 patent is directed to ‘communications using *coaxial* cable building wiring.’” Petition, 2 (citing Ex. 1001,

1:28-29); *see* Ex. 1002, ¶ 58 (“[t]he ’518 patent acknowledges that “[ ] a coaxial cable based local area network (LAN).”) (citing Ex. 1001, 1:33-35). It is clear that the field of endeavor of the ’518 Patent is specific to “broadband local area network that uses *coaxial* cable wiring for interconnecting terminal devices.” ID, 4; *see also* Ex. 1001, 1:27-29; Ex. 2001, ¶¶ 59-61.

2. *Mirfakhraei’s* Field of Endeavor Is DSL Connections Over Twisted Pair, Not On-premises Local Area Broadband Coaxial Cable Networks

*Mirfakhraei* consistently reiterates that its system is specific to twisted pair telephone lines—a communication medium inapplicable to the ’518 Patent’s field of endeavor. Ex. 1007, [0002]-[0006]; Ex. 2001, ¶ 61. *Mirfakhraei* is solely described with regard to DMT and conventional telephone lines, and does not ever refer to other communication mediums. Ex. 1007, [0002]-[0006].

*Mirfakhraei* states that the DMT protocols were “developed to increase the data transmission rate over conventional telephone lines.” Ex. 1007, [0003]; Ex. 2001, ¶ 66. Other aspects of *Mirfakhraei* confirm its teachings are applicable to twisted pair telephone wires. Ex. 1007, [0019], [0021] (noting that the communication signals are transmitted over telephone wires); Ex. 2001, ¶ 62. The detailed description of the preferred embodiments further describe communication using ADSL transceivers which connect to conventional telephone wires: twisted

pair wiring. Ex. 1007, [0015]; Ex. 2001, ¶ 61. These disclosures in turn define *Mirfakhraei*'s teachings and confirm it is directed towards communications over telephone lines. Ex. 2001, ¶ 61.

The field of the '518 Patent and the WAN-based twisted pair field of *Mirfakhraei* are different, having different physical mediums, which results in different properties relevant to signal transmission. Ex. 2001, ¶¶ 63-64; Ex. 2004. As an unshielded medium, twisted pair transmits low frequencies and filters out high frequencies. Ex. 2001, ¶¶ 65-68; Ex. 2004. This results in low bandwidth capabilities; therefore, twisted pair is often implemented on simple, point-to-point networks. Ex. 2001, ¶ 65. In contrast, coaxial cables are shielded. Ex. 2001, ¶ 64; Ex. 2004. Because of this shielding, coaxial cables can support large and high-frequency bandwidths. *Id.* Thus, coaxial cables are used as a shared medium for complex mesh networks.

In addition to bandwidth differences, coaxial cable and twisted pair have dramatically different frequencies and therefore wavelengths. Ex. 2001, ¶ 69; Ex. 2003, 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. 2001, ¶ 70; Ex. 2003, 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 specific frequencies. Ex. 2001, ¶ 70. Further, these transmission-line effects appear over much shorter cable lengths, such as those found inside homes, than telephone lines. *Id.* Inside a home, propagation over telephone lines is lumped, not distributed, and transmission-line effects such as reflections disappear. *Id.*

3. The Petition, and ID, Do Not Show that *Mirfakhraei* is of the Same Field of Endeavor as the '518 Patent.

The Petition does not allege, let alone analyze, whether *Mirfakhraei* is of the same field of endeavor as the '518 Patent. The ID erroneously states that *Mirfakhraei* is directed to “multicarrier communications generally,” which is an improper simplification of *Mirfakhraei*. ID, 21. Contrary to the ID’s statement, *Mirfakhraei* is entirely directed to conventional telephone line (twisted pair) communications. Ex. 1007, [0002]-[0006], [0014]-[0015]; Ex. 2001, ¶ 61.

The ID’s conclusion brushes aside the discussion of conventional telephone lines in the “Detailed Description of the Preferred Embodiments” and “Description of the Related Art” sections in favor of the generic boilerplate language in the specification that “the specification should not be limiting” when defining the field of endeavor of *Mirfakhraei*. ID, 21. This conclusion is legally erroneous. *Fromson*

*v. Anitec Printing Plates*, 132 F.3d 1437, 1447 (Fed. Cir. 1997) (rejecting boilerplate statements from a prior art reference as being insufficiently specific).

The Petition seems to agree that *Mirfakhraei* is limited to “communications over a conventional telephone line,” by suggesting its teachings could be applied to other fields such as coaxial cable, thereby confirming that its teachings are not already of those other fields. Petition, 42.<sup>6</sup>

The Petition does not undertake any analysis of *Mirfakhraei*’s field of endeavor, let alone compare it to that of the ’518 Patent. Mr. Bertoni’s declaration simply concludes, without analysis, that *Mirfakhraei* is “analogous to the ’518 patent.” See Ex. 1002, ¶ 88. Mr. Bertoni makes no mention of “broadband,” “coaxial cable,” “splitter,” or “local area” networks, which are the overwhelming focus of the ’518 Patent’s disclosures and claims. Mr. Bertoni instead broadly characterizes *Mirfakhraei*, without analysis, as in the field of endeavor of “network

---

<sup>6</sup> Patent Owner notes that Petitioner specifically states that the “DMT bit-loading scheme” of *Mirfakhraei* “*could* be implemented over a variety of mediums, including coaxial cable.” Petition, 41. Such admission to this lack of disclosure in *Mirfakhraei* itself clearly highlights that even the Petitioner recognizes *Mirfakhraei* is limited to telephone line communications.

communication.” Ex. 1002, ¶ 88. This type of characterization is unreasonably broad. *See Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 864-65 (Fed. Cir. 1993).

The Federal Circuit rejects the type of generic characterization that Mr. Bertonis advances. 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 in *Wang* 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” and “network communication” without regard to the type, the medium, and the location of the network (e.g., 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).

The ID was incorrect in concluding that *Mirfakhraei* and the ’518 Patent share the same field of endeavor. ID, 20-21. The ID incorrectly uses aspects of *Mirfakhraei*’s boiler-plate prosecution language to support its conclusion of

analogous art. *Id.*, 21. Specifically, the ID notes that the claims of *Mirfakhraei* are not limited to “modems or receivers using telephone lines as the communication medium.” *Id.* The ID supplements this assertion by citing *Mirfakhraei*’s statement that “the description is only an example of the invention’s application[.]” *Id.* This is erroneous.

Claim 1 of *Mirfakhraei* recites that it is “[a] process for determining bit loadings ... of a **communication signal**.” Ex. 1007, cl. 1. The ID contends that the claims of *Mirfakhraei* are not limited to just telephone communications, yet the specification of *Mirfakhraei* specifically defines how the “communication signal” is transferred to the rest of the system in *Mirfakhraei*. Ex. 1007, [0021] (“Hybrid circuit 150 directs a received analog communication signal from **telephone lines** 152 to receiver 190.”). A POSITA at the time of the invention would understand that *Mirfakhraei* discloses DMT modulation schemes for its communication, a scheme specific to the “communication signals” *Mirfakhraei* sends over conventional telephone wires. Ex. 2001, ¶ 62.

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 *Mirfakhraei* from sharing the same field of endeavor. *Mirfakhraei* is not analogous art under this prong.

**C. *Mirfakhraei* is Not Reasonably Pertinent to the Problems that the '518 Patent Addresses**

Neither the Petition nor Petitioner's declarant even attempt to establish that *Mirfakhraei* is reasonably pertinent to the problem that the '518 Patent solves. Therefore, this cannot be the prong used to establish *Mirfakhraei* is analogous to the '518 Patent.

In any event, *Mirfakhraei* is not reasonably pertinent to the problem solved by the '518 Patent. The '518 Patent solves impairments *specific to* on-premises communications between network devices over existing coaxial cable wiring. Ex. 1001, 4:36-47; Ex. 2001, ¶ 73. *Mirfakhraei* cannot be reasonably pertinent to this problem because *Mirfakhraei* does not include coaxial cables or communicate over splitters, let alone propose solutions to the impediments that splitters cause in a coaxial network. Ex. 2001, ¶ 79.

Instead, *Mirfakhraei*'s system addresses synchronization for "point-to-point" communication within a twisted pair system—a system without these splitters or the micro-reflections they cause. Ex. 2001, ¶¶ 73, 79; Ex. 2002, 78:6-16.

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. 2001, ¶ 74. 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. 2001, ¶ 75.

Such impairments are the result of using a preexisting coaxial network and are not present in every type of wired network. Ex. 2001, ¶ 75. 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. 2001, ¶ 76. 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. 2001, ¶ 76. 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. 2001, ¶ 76.

These issues are specific to coaxial cable installations. Ex. 2001, ¶ 76. The '518 Patent provides a novel solution that overcomes these issues that previously restricted network devices from communicating with each other. Ex. 2001, ¶ 76; Ex. 1001, 4:36-47.

When asked about the different signal attenuation characteristics at issue that would be specific to coaxial cables, Mr. Bertonis stated that these attenuation characteristics are equally applicable to any medium. Ex. 2002, 120:18-21. However, he did confirm that intersymbol interference ("ISI") is, in his mind, specific to reflections caused at insertion points in the coaxial mediums created by amplifiers and splitters. *Id.*, 118:21-119:10. As such, Petitioner's expert confirms that the ISI solution of the '518 Patent is a problem and solution specific to the use of splitters in the coaxial LAN environment.

2. *Mirfakhraei* Addresses Different Attenuation Characteristics That Are Not Analogous to the Problems Identified in the '518 Patent

The signal impairments mentioned in the '518 Patent are characteristics that are *specific* to addressing noise across splitters within a coaxial LAN home network. See Section IV.C.1. In contrast, the attenuation characteristics mentioned in *Mirfakhraei* are tied to attenuation characteristics of cables with increased length, as *Mirfakhraei's* out-of-home focus confirms. Ex. 2001, ¶ 79. A POSITA would

recognize that the signal impairments are fundamentally different between the '518 Patent and *Mirfakhraei*. *Id.*

*Mirfakhraei* is directed to an entirely different problem than that of the '518 Patent. *Mirfakhraei* explains that bit loading techniques affect the total bandwidth and rate for the connection of the system by estimating the signal attenuation for each sub-channel. Ex. 1007, [0006]; Ex. 2001, ¶ 77. These attenuations are caused by frequency dependent issues that “distort communication signals having large bandwidths.” Ex. 1007, [0002]; Ex. 2001, ¶ 77. To combat these frequency dependent attenuation distortions, DMT protocols were developed to allow each signal to be transmitted over narrow bandwidths to reduce any distortion that may arise. Ex. 1007, [0003]; Ex. 2001, ¶ 78. These DMT protocols allows “the local modem [to] estimate the capacity or the target loading of each sub-channel.” Ex. 1007, [0006]. *Mirfakhraei*'s invention relates to “a process for determining a bit loading for a discrete multi-tone (DMT) communication signal.” Ex. 1007, [0005]; Ex. 2001, ¶ 78; *see* Petition, 11 (“*Mirfakhraei* describes modems that use discrete multi-tone (DMT) and bit loading to increase data transmission rates.”) (citing Ex. 1007, ¶¶ 2-3; Ex. 1002, ¶¶ 88-89).

3. *Mirfakhraei* is Not Pertinent to the '518 Patent's Problems

The ID erroneously concludes that the “variable attenuation across channel paths is a problem addressed by *Mirfakhraei* and the '518 patent.” ID, 22. This is not the inquiry. The '518 Patent specifically sets forth a solution unique to the coaxial environment. The ID impermissibly broadens the problem of the '518 Patent beyond its actual text in an effort to find *Mirfakhraei* analogous.

Instead, the signal attenuation scheme identified by *Mirfakhraei* is not the same variable attenuation as the coaxial-specific solution outlined in the '518 Patent. Ex. 2001, ¶ 79. *Mirfakhraei* was troubled with the distortion caused by the allocation of large bandwidths to communication signals. Ex. 1007, [0002]; Ex. 2001, ¶ 77. Such large bandwidths were prone to distortion and created a funnel preventing optimal data rates from being achieved over ***long distances***. Ex. 1007, [0002]; Ex. 2001, ¶ 79. These distortions over long-distance communications are a reason DSL is used as it provides a “more pronounced [] benefit” to the long-distance transmissions. Ex. 2002, 79:22-80:17.

The '518 Patent, in contrast, is focused on solving issues related to attenuation across ***splitters*** and channel paths based on branched topologies. Ex. 1001, 2:27-34, 2:41-48, 3:5-16, 4:23-25; Ex. 2001, ¶¶ 74-76. *Mirfakhraei* communicates over a single point-to-point communication system that does not use branched topology,

nor does *Mirfakhraei* utilize splitters. Ex. 2001, ¶¶ 71-72, 79; Ex. 2002, 78:6-16. *Mirfakhraei* does not suffer from inter-port isolation or imperfect connections at splitters due to *Mirfakhraei*'s system lacking these components. Ex. 2001, ¶ 79. Thus, *Mirfakhraei* does not utilize the same communication system as the '518 Patent and does not suffer from the same variable attenuation as addressed by the '518 Patent. Ex. 2001, ¶ 79.

Therefore, the problem and solution of overcoming signal impairments identified in the '518 Patent is not reasonably pertinent to the problem and solution of overcoming signal impairments in *Mirfakhraei* as they deal with fundamentally different problems. Ex. 2001, ¶ 79. Because *Mirfakhraei* is not analogous art to the '518 Patent, Ground A fails.

## **V. THE INSTITUTION DECISION ERRED IN FINDING THAT GROUND A RENDERS THE CHALLENGED CLAIMS OBVIOUS**

The ID preliminary found that Ground A had a reasonable likelihood of success. However, this decision was made on an incomplete technical record. Mr. Garrett's declaration and technical analysis shows that a person of skill would lack both a motivation to combine *Afshary* and *Mirfakhraei* and a reasonable expectation of success from the combination of *Afshary* and *Mirfakhraei*. Ex. 2001, ¶¶ 80-133. Mr. Garrett's declaration and technical analysis will further show that the Petition's

reasoning for making the proposed combination is insufficient to provide a POSITA with the motivation to combine *Afshary* and *Mirfakhraei*, for several reasons. *Id.*

First, A POSITA would not be motivated to combine *Afshary* with *Mirfakhraei*. A POSITA would understand that *Mirfakhraei* frustrates *Afshary*'s goals of providing a simple, low-cost solution. *See* Section V.A.1. And a POSITA would understand that *Mirfakhraei* is incompatible with *Afshary*'s network and hardware components. *See* Section V.A.2. Such incompatibilities are highlighted by the Petition's proposed combination of the modulator and demodulator in *Mirfakhraei* without the necessary components and the difference in frequency ranges used by the references. *See* Sections V.A.2.a to V.A.2.c.

Second, the Petition's motivations are infected with hindsight bias. A POSITA would understand that *Afshary* has already identified and solved any alleged impairments the Petition identifies. *See* Section V.B.1. And *Afshary*'s network would not require the addition of a multi-carrier modulation scheme as it operates over a clean medium with an efficient bit loading scheme. *See* Section V.B.2. These sentiments are further supported by Mr. Garrett's analysis. Ex. 2001, ¶¶ 118-133.

A such, Ground A fails because the motivation to combine these two references is insufficient.

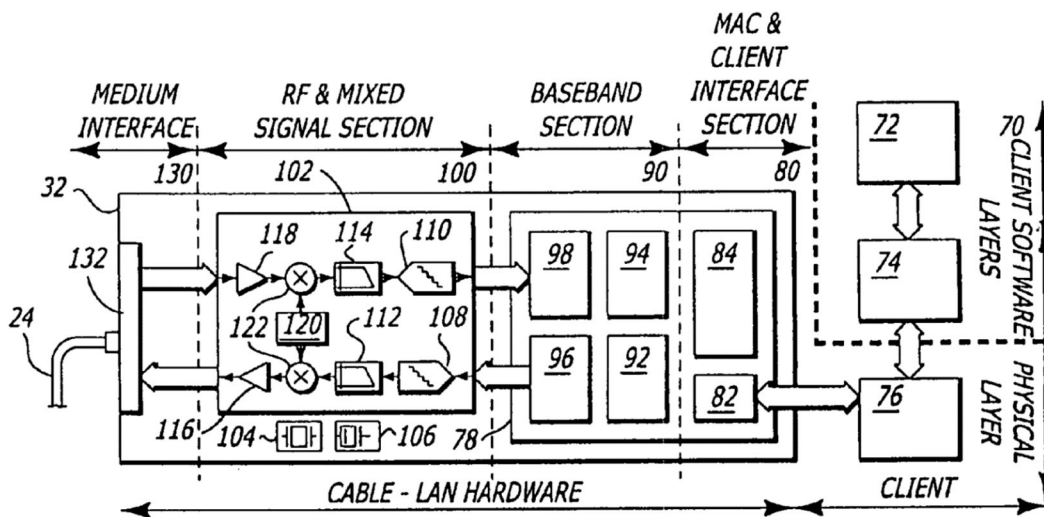
**A. Ground A Fails Because A POSITA Would Not Combine *Afshary* and *Mirfakhraei***

**1. *Mirfakhraei*'s Multi-Carrier Modulation Frustrates *Afshary*'s Goal of Providing a Simple, Low-Cost Home Network**

The Petition and the ID ignore the increased complexity and added hardware costs required to make the requisite changes of *Afshary*. Ex. 2001, ¶¶ 82-91. The ID on page 26 states that “a POSITA would have considered tradeoffs between cost and complexity and performance in making the combination,” but this overlooks the teachings of *Afshary* as creating a complete and cost-effective system. ID, 26. Replacing *Afshary*'s single-carrier modulation would frustrate *Afshary*'s clear goal of providing a simple, low-cost home networking solution. See Ex. 1006, [0005]-[0006] (citing the installation and maintenance costs as a limitation in using new wiring), [0037] (designing the adapters “in order to keep costs low”). A POSITA would not have been motivated to insert *Mirfakhraei*'s components into *Afshary*'s adapters because this combination would add additional costs and complexity—directly contradicting *Afshary*'s disclosure. Ex. 2001, ¶¶ 82-91. *Mirfakhraei*'s multi-carrier modulation would (1) add unwanted complexity, (2) add hardware costs, and (3) add operational costs to *Afshary*'s network. *Id.*

*Afshary*'s cost-effective and simple design is seen (and emphasized) throughout its disclosure. See Ex. 1006, [0005]-[0006] (citing the installation and

maintenance costs as a limitation in using new wiring), [0037] (designing the adapters “in order to keep costs low”). In particular, *Afshary* designs its adapters to provide robust communication with cost-effective components without the need to update or change any existing hardware. *Id.*, Fig. 4 (reproduced below), [0028]-[0042]; Ex. 2001, ¶¶ 84-87.



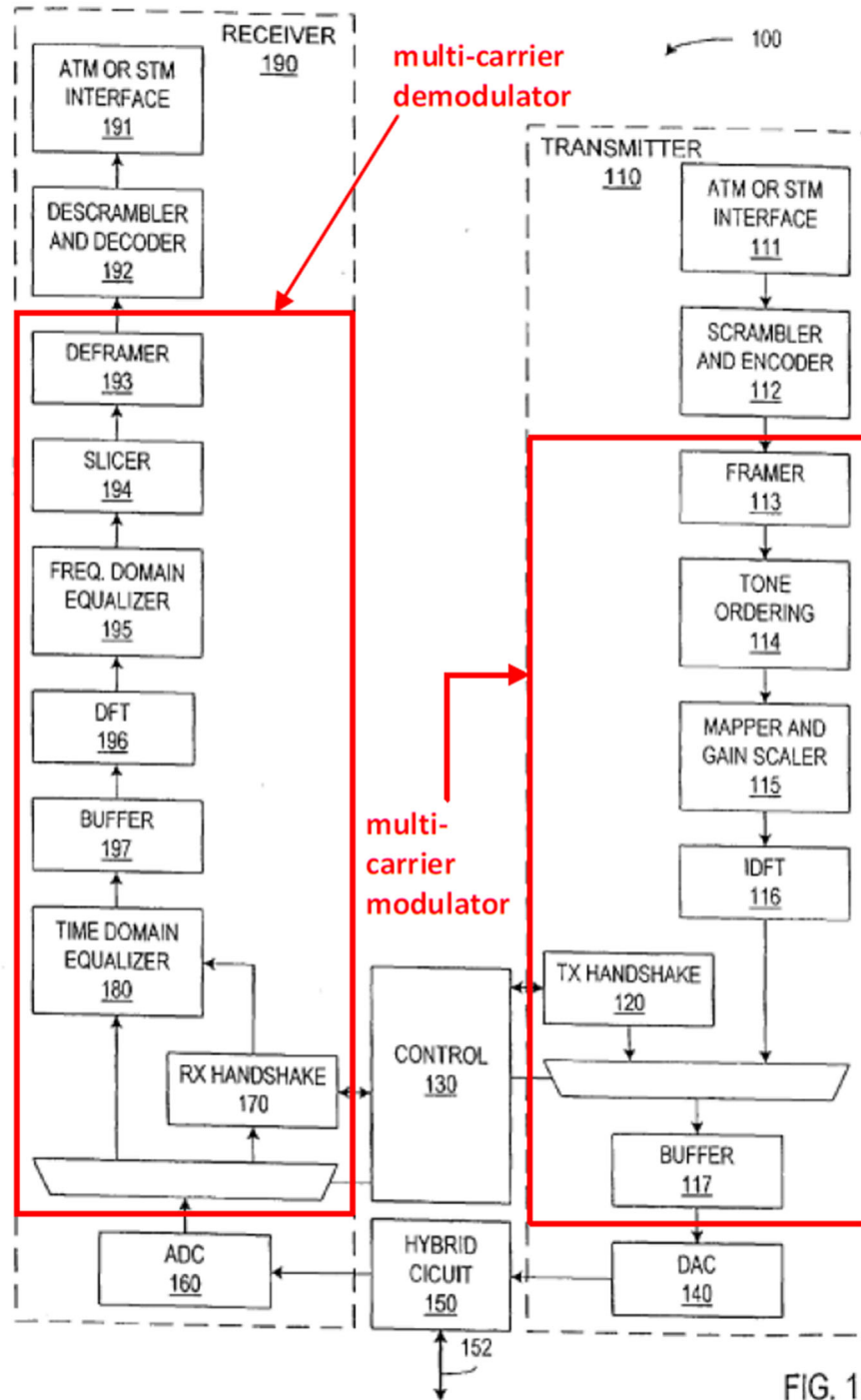
Ex. 1006, Fig. 4.

The adapter encodes received data, which is then transmitted to the modulator 96. *Id.*, [0037]. The modulator 96 remaps the digital data for transmission over the coaxial cable in accordance with the assigned bit loading scheme. Ex. 1006, Fig. 4, [0028]-[0042]. “[I]n order to **keep costs low** and the system robust,” the adapters use a specific digital modulation scheme. Ex. 1006, [0037]. For example, the modulator uses only one of Frequency Shift Keying (“FSK”), Binary Phase Shift Keying (“BPSK”), or Quadrature Phase Shift Keying (“QPSK”) digital modulation.

*Id.* Each of these modulation schemes are *single-carrier* modulation schemes—thoughtfully chosen by *Afshary* to provide a robust and inexpensive system. Ex. 2001, ¶ 86. This thoughtfully chosen process is not just a “trade-off” measure utilized by *Afshary* and is instead a focus of the prior art reference to achieve the desired results. *Id.*, ¶¶ 84-87. Accordingly, even if the decision between cost and performance were a “trade-off,” *Afshary* decided how that balance should be struck, favoring cost management, and nothing in the prior art motivates a deviation from *Afshary*’s teachings.

A POSITA would not have been motivated to insert *Mirfakhraei*’s components into *Afshary*’s adapters because this combination would add additional costs and complexity—directly contradicting *Afshary*’s disclosure. *Id.*, ¶ 83.

The Petition contends that a POSITA would ignore *Afshary*’s explicit disclosure and instead use the complicated multi-carrier architecture of *Mirfakhraei*. Petition, 42-43. The Petition highlights this complicated architecture through its own labeling and attempting to designate the multi-carrier modulator and demodulator. Petition, 39.



Petition, 39 (annotations added by Petitioner).

Unlike the simple system of *Afshary* that uses single-carrier modulation schemes to transmit data over coaxial cables, *Mirfakhraei* provides an ADSL transceiver having a transmitter 110 and a receiver 190 connected to a conventional telephone line. Ex. 1007, [0005], [0014]; Ex. 2001, ¶¶ 88-91. Within the transmitter, the scrambler 112 encodes data, which is broken into a data stream by the framer 113. Ex. 1007, [0017]; Ex. 2001, ¶ 89. A tone ordering block 114 then orders the bit sets for a constellation mapper 115, which determines a QAM symbol for each bit set. Ex. 1007, [0018]; Ex. 2001, ¶ 90. An IDFT block 116 receives the scaled QAM symbols and performs inverse Fourier transforms. Ex. 1007, [0019]; Ex. 2001, ¶ 90. The identified process is equally complicated on the receiver-side. Petition, 39; Ex. 2001, ¶¶ 90-91.

Even assuming *Mirfakhraei*'s out-of-home ADSL signaling over telephone wires could be used in *Afshary*'s in-home coaxial network, a POSITA would have not been motivated to do so because it would frustrate the goals of *Afshary*. *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1068-69 (Fed. Cir. 2018) (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” (citing *InTouch Techs.*, 751 F.3d at 1352)).

2. A POSITA Would Not Implement *Mirfakhraei's* Modulator/Demodulator in *Afshary's* System Because *Mirfakhraei* is Incompatible with *Afshary*

The Petition's alleged shortcomings of *Afshary*, and the purported "advantages" provided by *Mirfakhraei* all fail to provide a motivation to combine these references. See Sections V.A to V.C; Ex. 2001, ¶¶ 92-117.

*Mirfakhraei's* multicarrier modulator and demodulator would not operate in the Petition's alleged combination. Mr. Bertonis, and by extension the Petition, incorrectly omit key features needed for operation. As such, a POSITA would not—and could not—implement *Mirfakhraei's* "multi-carrier modulator and multi-carrier demodulator" into *Afshary's* ASIC hardware using the Petition's proposed combination. Ex. 2001, ¶¶ 92-117.

a. *Mirfakhraei's* "Multi-Carrier Modulator and Multi-Carrier Demodulator" Would Not Work in *Afshary's* ASIC

A POSITA would not implement *Mirfakhraei's* "multi-carrier modulator and multi-carrier demodulator" in *Afshary's* ASIC because *Mirfakhraei's* "multi-carrier modulator and multi-carrier demodulator" would fundamentally change the architecture of the ASIC in *Afshary*. Ex. 2001, ¶ 92. As correctly recognized by the ID and the Petition, *Afshary* uses a "single-carrier system" in a coaxial environment.

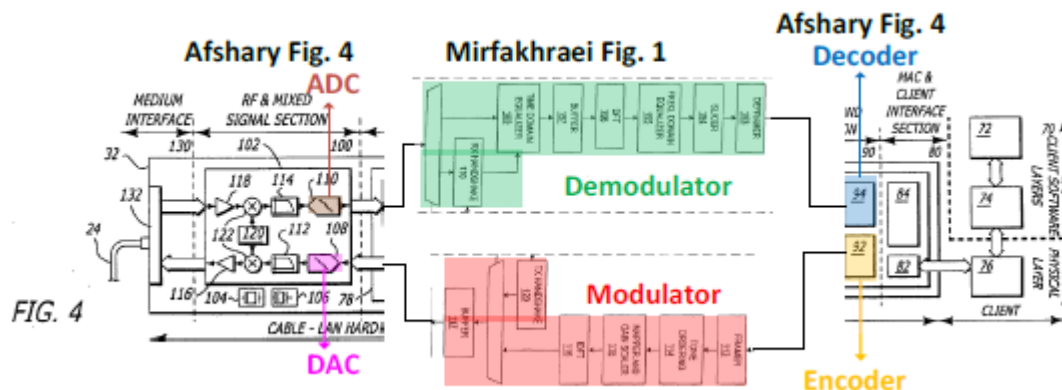
Paper 8, 43; Petition, 44 (*Afshary*'s "ASIC 78 provid[es] baseband single-carrier modulation and demodulation."); Ex. 2001, ¶ 93.

*Mirfakhraei*'s multi-carrier modulator and demodulator, in contrast, transmit in an "always on" fashion. Ex. 2001, ¶ 93. Mr. Bertonis overlooks several aspects of his integration of *Mirfakhraei* into *Afshary* in this regard, starting with his failure to address the substitution of the DAC 108 of *Afshary* with the DAC 140 of *Mirfakhraei*. Ex. 1002, ¶ 143; Ex. 2001, ¶¶ 93-100; *see* Trial Practice Guide (November 2019), 36 ("In other words, expert testimony may explain 'patents and printed publications,' but is not a substitute for disclosure in a prior art reference itself.") (citing *K/S Himpp v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1365 (Fed. Cir. 2014)). A POSITA would understand that the baseband transmissions from *Mirfakhraei* are different from those of *Afshary*. Ex. 2001, ¶ 94. Simply adding the modulator and demodulator from *Mirfakhraei* would require additional improvements in the baseband layer of *Afshary*. *Id.*

As outlined above, the handshake process to determine bit loading in *Mirfakhraei* originates at the TX Handshake 120, which transmits a known pseudo-random signal to the receiver. Ex. 1007, [0020]-[0022]; Ex. 2001, ¶ 95. This signal is received by the receiver and routed to the RX Handshake block 170. Ex. 1007, [0022]; Ex. 2001, ¶ 96. RX Handshake Block 170 will then calculate the SNR for

each sub-channel and transmit the determined bit loadings through controller 130 to the transmitter of the receiver. Ex. 1007, [0023]; Ex. 2001, ¶ 96; Ex. 2002, 63:6-8, 63:20-64:5, 65:21-66:12. Without the controller 130, the bit loading schemes determined by the RX Handshake block would not be transmitted to the transmission side of the modem. See Ex. 1007, Fig. 1 (noting the bidirectional arrows between the handshake blocks and controller 130.); Ex. 2001, ¶ 97.

In Petitioner's combination, the controller 130 is completely absent from Mr. Bertonis' combination. See Ex. 1002, ¶ 144; Ex. 2001, ¶ 97. Petitioner's expert did not include controller 130 in his combination and states that the only demodulator and modulator and relevant coders would be included. Ex. 1002, ¶¶ 142-43; Ex. 2001, ¶ 97. As reproduced below, Petitioner's expert diagrammed his combination to include the parts of *Mirfakhraei* he deemed would be incorporated into his final combination. Ex. 2001, ¶ 97.



Ex. 1002, ¶ 144. As noted during his deposition, the controller 130 is *necessary* to perform the bit loading process of *Mirfakhraei*. Ex. 2002, 63:20-64:5. Further, *Mirfakhraei* does not describe a process of transmitting this SNR value without the use of the controller. *Id.*, 65:22-66:12. Without the controller 130, proper SNR allocation to the subchannels cannot be achieved. Ex. 2001, ¶ 97.

*Afshary's* system does not provide for a synchronization mechanism that would overcome the shortcomings of Petitioner's combination. *Id.*, ¶ 98. Mr. Bertonis admits that *Afshary* does not have a "synchronization mechanism" as he "[doesn't] think that's the context of the patent." Ex. 2002, 87:20-88:6. As is explained in *Afshary*, the client interface keeps track of the time for the communications for use in the Time Division Multiple Access ("TDMA") scheme. Ex. 1006, [0031]. Transmissions between nodes may occur continuously, discontinuously, or some combination with the modulation schemes being performed "in a discontinuous or burst fashion" depending on the receiver setup time. *Id.*, [0037]. This type of transmission scheme allows for dynamic transmission of data between different nodes to be performed without collision due to the TDMA setup. Ex. 2001, ¶ 98. *Afshary's* TDMA would not be used as a replacement for *Mirfakhraei's* handshake protocol and would not solve the bit loading issue that Petitioner's combination creates. *Id.*

The alleged improvements claimed by the Petitioner in their combination would also require a buffer on all sides of the modulators, additional controls, and an overhaul of the circuit board to handle the increased components along with the reconciliation of the handshake process used by *Mirfakhraei*. Ex. 2001, ¶¶ 99-100. Additionally, a POSITA would need to reconcile the broadband to analog conversion within the ASIC when transmitting the data from the MAC layer of the ASIC in *Afshary*. *Id.* The increased work required to ensure that the ASIC is properly created would not motivate a POSITA to make the proposed combinations provided by the Petitioner. *Id.* Instead, a POSITA would understand that the ASIC of *Afshary* was already complete and needed no further improvements, especially when such improvements would create something that would no longer function. *Id.*

The Petition fails to explain why the baseband layer outlined in *Afshary* would sufficiently motivate a POSITA given the completeness of the system already created in *Afshary*. The Petition never addresses the pre-existing capabilities of *Afshary* or the difficulty of implementing the Petition's "improvements." Thus, a POSITA would not be motivated to make the proposed changes to the complete cable LAN system described in *Afshary*. Ex. 2001, ¶ 99.

- b. *Mirfakhraei's* Point-to-Point Bit Loading Scheme is Incompatible with *Afshary's* Multi-Point Communication Network

*Mirfakhraei's* “DMT bit loading scheme” would not characterize the proper bit loading schemes for bandwidth used on a multi-point network. Ex. 2001, ¶ 101. *Mirfakhraei* is designed for a point-to-point communication network without variance of endpoints. Ex. 1007, ¶ [0006]; Ex. 2001, ¶ 101; Ex. 2002, 78:6-16. *Afshary* is intended for use within a local area network in a home environment utilizing multiple splitters connected to multiple client endpoints to receive identical data. Ex. 1006, ¶¶ [0007], [0018], Fig. 1; Ex. 2001, ¶ 101; Ex. 1002, ¶¶ 80-81.

Neither the Petition nor Petitioner's expert address the implication of utilizing a splitter in the proposed combination or the effect a splitter will have on the data transmissions between the interconnected nodes of the proposed *Afshary-Mirfakhraei* combination. This oversight results in a failure to address how proper bit loading schemes would be loaded to each endpoint in the Petition's proposed combination. Ex. 2001, ¶ 102.

*Mirfakhraei's* local modem initially begins communication to a remote modem over a point-to-point link via a predetermined connection sequence to establish the bit loading sequence between the two points. Ex. 1007, ¶ [0022]-[0023]; Ex. 2001, ¶ 103. After the bit loadings are determined, the specific sub-channels are assigned depending on the SNR of the channel to achieve the desired data rate. Ex. 1007, ¶¶ [0031]-[0032]; Ex. 2001, ¶ 103. This allows optimization of

the bit loading depending on the bandwidth utilization at the time the handshake has occurred to meet the bitrate requirements of the channel. *Id.*, ¶ [0034]; Ex. 2001, ¶ 103. The bit-rates are determined on each sub channel between the two points to improve the frequency separations between other sub-channels and will continue this perpetual check until the channel is released. Ex. 1007, [0034]; Ex. 2001, ¶ 103. This system of connection requires a dedicated connection between the two points to maintain optimum bit loading profiles to be exchanged and selected for each data transmission. Ex. 2001, ¶ 104. *Mirfakhraei*'s style of bit loading and point-to-point connection would not operate effectively when connecting to multiple endpoints and transmitting the same data profile to different endpoints. Ex. 2001, ¶¶ 104-105; Ex. 2002, 78:6-16.

*Afshary*'s system utilizes a home network system with multiple points connected via coaxial cable using splitter junctions. Ex. 1006, ¶ [0018]; Ex. 1002, ¶¶ 80-82; Ex. 2001, ¶ 106. This system allows for the same signal to be sent to "more than one client." Ex. 1006, ¶¶ [0014], [0018]-[0019]; Ex. 1002, ¶ 83.

In contrast, the bit loading scheme of *Mirfakhraei* begins with a handshake transmission that is sent to the receiving node. Ex. 1007, ¶¶ [0020]-[0022]; Ex. 2001, ¶ 106. The receiving node transmits a signal back to the transmitting node in which the demodulator of *Mirfakhraei* will calculate the valued SNR for that sub-

channel. Ex. 1007, ¶¶ [0022]-[0023]; Ex. 2001, ¶ 106. Neither the Petition nor its expert, Mr. Bertonis, could explain how *Mirfakhraei*'s handshake process, an essential step, would work in the proposed combination. Ex. 2001, ¶ 107. Mr. Bertonis offered no guidance at his deposition, stating merely that the process would be "up to the person implementing the invention how they want to design and build it." Ex. 2002, 58:57:18-60:11; Ex. 2001, ¶ 107. And when attempting to explain how the signal to noise ratio (SNR) is calculated in *Mirfakhraei*, Mr. Bertonis gave a circular response: one would "look ... at the signal-to-noise ratio." Ex. 2002, 61:19-62:2. The Petition thus lacks credible expert support for its argument that a POSITA would have found it obvious to combine *Afshary* and *Mirfakhraei*.

If a POSITA did try to use *Mirfakhraei*'s handshake scheme in *Afshary*, it would create an unusable and inefficient system. Ex. 2001, ¶¶ 108-110. In that scenario, a transmitting node would send a handshake signal to every point in the system from the same data transmission. *Id.*, ¶ 108. The receiving nodes will each transmit a return signal giving the characteristics for that signal path. *Id.* The transmitting node will receive each return signal and will not be able to differentiate which channel characteristic should be attributed to the specific signal path. *Id.* This will lead the transmitting node in the combined system to calculate the SNR for the entire house as opposed to specific channel characteristics between each endpoint.

*Id.*, ¶¶ 108-109. Inevitably, the bit loading applied will not be the optimal bit loading scheme for each channel between *specific nodes* and will lead to an inefficient transfer of data, less efficient than what *Afshary* already provides. *Id.*, ¶ 110.

A POSITA will understand that the result of combining *Mirfakhraei*'s bit loading scheme with *Afshary*'s multi-point communication system will lead to problems with multi-node communication, an issue *Mirfakhraei* does not solve. *Id.* Thus, a POSITA would not be motivated to make the proposed combination. *Id.*

c. *Afshary* Operates on Frequencies Not Used by *Mirfakhraei*

*Afshary* and *Mirfakhraei* are designed to operate in incompatible settings with competing goals, as their systems function on intentionally distinct frequency bands. Ex. 2001, ¶ 111.

*Afshary*'s adapters communicate over a frequency that is “not used by conventional cable services” to avoid interference—a key design feature of *Afshary*'s in-home network. See Ex. 1006, [0007]; Ex. 2001, ¶¶ 111-112. Specifically, *Afshary* states that “[t]he benefits of the cable LAN is the ability transmit data in cost-effective, secure fashion, *without interfering with cable service company operations.*” Ex. 1006, [0012]. Figure 3 of *Afshary* discloses the data range that the client data typically uses for its operating frequencies as anything below 950 megahertz. *Id.*, Fig. 3. This data range is used by “cable TV, digital cable

TV, and cable modem services.” *Id.*, [0025]. The operational range of *Afshary* is instead between 1000 to 2000 megahertz. *Id.* The cable LAN of *Afshary* intentionally uses these higher frequency bands “not used by conventional cable services,” in an effort to avoid interference. *Id.*, [0024]-[0028]. While the specific frequencies can change, the adapters ***always*** use a frequency ***above*** the frequency bands used by the cable service. *Id.*, [0024]; Ex. 2001, ¶ 112. This functionality is made possible by the coaxial cable’s ability to support higher frequencies. Ex. 1006, [0024]; Ex. 2001, ¶ 112. This promotes efficiency and an increase in the available bandwidth for transmission characteristics. Ex. 2001, ¶ 112.

Conversely, *Mirfakhraei* provides an ADSL transceiver (*i.e.*, a modem) that communicates over conventional telephone lines on the very frequency that *Afshary*’s adapters ***specifically avoid***. Ex. 1007, [0005], [0015]; Ex. 1006, [0024]-[0025]; Ex. 2001, ¶ 113. *Mirfakhraei* explains that the modem will transmit on lower bandwidth frequencies as higher frequencies “are difficult to accurately transmit using systems such as conventional telephone lines.” Ex. 1007, [0002]. *Mirfakhraei* explains that, while high frequency carriers allow higher data transmission, high frequencies are difficult to transmit over conventional lines; thus, DMT protocols (*e.g.*, ADSL) are used to increase the transmission rate over greater distances. *Id.*, [0003]; Ex. 2001, ¶ 114. The DMT protocols used in *Mirfakhraei* were developed

to increase the data transmission rates over telephones lines as “the maximum data rate of a conventional modem architecture is limited.” Ex. 1007, [0002]-[0003]. The DMT scheme in *Mirfakhraei* optimizes data transmission over low frequency bands. Ex. 2001, ¶ 114. *Mirfakhraei* compares its DMT protocol to that of ADSL, HDSL, VDSL, and light rate ADSL. Ex. 1007, [0003]. These protocols typically operate over low bandwidth frequencies that are “generally low – low megahertz, or hundreds of kilohertz.” Ex. 2002, 54:17-55:1.

Because *Mirfakhraei* provides an ADSL system adapted for long range transmission over telephone lines, *Mirfakhraei* functions over low frequency bands. *Id.* This operation promotes efficient transmission of the packets without potential loss of the signal characteristics over long distances. Ex. 2001, ¶¶ 113-14.

*Mirfakhraei*’s low frequencies are exactly the band that *Afshary* **avoids** in an effort to not conflict with existing CATV signals. Ex. 2001, ¶ 113. As such, the teachings of *Mirfakhraei* would not suggest any modification of *Afshary* to a POSITA because the references themselves are specifically set up to avoid each other. Ex. 2001, ¶¶ 113, 115. *Afshary* further highlights this distinction in one example of its in-home network. *See* Ex. 1006, Fig. 1 (reproduced below and annotated). Figure 1 includes adapters having an operating frequency of “1000-2000 MHz at the center frequency of 1300 MHz with a bandwidth of 5 MHz.” *Id.*, [0025];



premise network. Ex. 2001, ¶ 117. This depiction further highlights *Afshary's* acknowledgement that any interference between the RF signals is possible in a coaxial environment, it is handled through *Afshary's* use of higher frequency bands to achieve effective transmission. *Id.* *Mirfakhraei's* disclosure is entirely directed towards a network that provides the signal to the modem of *Afshary*, not the manner in which the in-home network uses that signal. *Id.*

d. Mr. Bertonis' Experience Does Not Cure the Petition's Deficient "Motivation" to Combine

Petitioner contends that Mr. Bertonis is a POSITA, yet Mr. Bertonis' experience in electrical engineering is focused on wireless broadband technology. Ex. 2002, 11:17-13:4, 15:11-17; *see further* Ex. 1002, Appx. A at 5. Mr. Bertonis' background focused on DOCSIS implementation into products, which is a "cable standard for internet over the cable television system" and is "just a cable with a wireless system in the middle." Ex. 2002, 17:16-18, 22:6-8. In his own testimony he admits that the implementation for DOCSIS he was working on was meant for communication over wireless paths. *Id.*, 22:18-23:3. The product Mr. Bertonis developed was used to allow wireless connection without the need for a cable connection. *Id.*, 22:18-23:3. In these types of wireless communication schemes, Mr. Bertonis admits that the modulation schemes are not controlled by the devices themselves and are instead controlled by the cable operators. *Id.*, 36:21-37:5.

Because of his lack of knowledge in the coaxial field, Mr. Bertonis misses fundamental issues regarding his proposed combinations and analysis of the prior art.

Conversely, Patent Owner's Expert, Mr. Garrett, has years of experience with coaxial cable through his work with MoCA and is uniquely positioned to opine on coaxial specific issues. Ex. 2001, ¶¶ 8-13. Mr. Garrett, the sole expert with the requisite coaxial experience to opine about what an actual POSITA would and would not have found obvious, is better positioned to provide helpful testimony.

For example, during Mr. Bertonis' deposition, it became clear that his interpretation of the prior art was based on a cursory review at best.<sup>7</sup> Ex. 2002, 70:5-

---

<sup>7</sup> Mr. Bertonis' deposition transcript (Ex. 2002) includes timestamps, showing the amount of time spent reviewing the primary references of his opinions before answering basic questions. Mr. Bertonis was unable to answer even straightforward questions without repeatedly taking lengthy delays to review the declaration and references. (*See* Ex. 2002, 50:11-13, 57:18-58:2, 59:13-19, 71:7-14, 73:22-74:2, 87:20-88:6, 91:14-92:3, 98:13-18, 109:19-21, 111:22-112:6, 116:22-117:1, 118:21-119:8, 121:22-122:2).

71:10, 71:12-73:6, 74:22-75:5, 77:6-16.<sup>8</sup>

Moreover, Mr. Bertonis had no professional knowledge of multi-carrier modulation schemes and instead was “fascinated by it,” embarking on a hobby-type mission triggered by his friend’s startup. Ex. 2002, 42:11-18. He spent years attempting to learn about multicarrier, far more time than a POSITA would have been able to spend in the limited amount of experience (under either party’s proposal), confirming that a POSITA would not have been able or motivated to make the change proposed by Mr. Bertonis (as it took him years longer than the experience a POSITA would have had). *Id.*, 44:7-10. Instead, as the more relevant declarant Mr. Garrett explains, a POSITA would not have made the proposed combination. Ex. 2001, ¶ 54.

Finally, Mr. Bertonis has already made significant sums of money by working

---

<sup>8</sup> In addition to his lack of knowledge for the references, Mr. Bertonis was unable to articulate what he meant by “predictable results” for arriving at the proposed combination of *Afshary* and *Mirfakhraei*. Ex. 2002, 122:9-20 (noting his “predictable result” to be the “benefit of adding bit loading” and this would lead to a broad improvement).

with Petitioner, calling into question the helpfulness of his testimony.<sup>9</sup>

As confirmed by Mr. Garrett, a POSITA would not have found *Mirfakhraei* to be analogous art to the '518 Patent. Ex. 2001, ¶¶ 52-53. Moreover, as Mr. Garrett opines, a POSITA would not have been motivated to combine *Afshary* and *Mirfakhraei*. *Id.*, ¶¶ 54-55.

**B. The Petition Erroneously Relies on Hindsight Bias to Combine *Afshary* and *Mirfakhraei***

It is undeniable that there is no instance of any bit loading on a coaxial network in any reference in this proceeding, other than the '518 Patent itself. Ex. 2001, ¶¶ 118-19. While it may *seem* straightforward to simply add multi-carrier technology and bit loading to a coaxial local area network, there is nothing in the evidence in this proceeding to suggest the concepts of the '518 Patent were obvious or present in anyone's mind prior to the '518 Patent. *Id.* *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351 (Fed. Cir. 2001) (cautioning against viewing the art through a hindsight lens when the art is seemingly simple).

---

<sup>9</sup> Even if Mr. Bertonis is considered a POSITA, Mr. Bertonis' opinion is infected with bias as he has already had major dealings with Petitioner regarding his prior inventions. Ex. 2002, 28:21-29:1, 29:15-20.

The Petition is fraught with the prejudice of hindsight bias, as it overlooks that the “genius of invention is often a combination of known elements which in hindsight seems preordained.” *Power Integrations, Inc. v. Fairchild Semiconductor Int’l, Inc.*, 711 F.3d 1348, 1368 (Fed. Cir. 2013). While the ’518 Patent does not propose new processing of signals, it is the only reference in the proceeding that recognized the issues of ISI in coaxial networks and addresses specific impairments that previously restricted high bandwidth communication between devices over *on-premises coaxial cabling* over coaxial splitters. Section I.C.1.

Indeed, in cases like this, it is incredibly important to focus on what a POSITA would have been *motivated* to do, not simply what a POSITA would have been *able* to do. *Polaris Indus.*, 882 F.3d at 1068-69. The Petition’s over-reliance on unsupported and conclusory expert opinions is a clear sign of hindsight bias. *InTouch Techs., Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014) (concluding that a party’s expert “succumbed to hindsight bias in her obviousness analysis” where such analysis “primarily consisted of conclusory references to her belief that one of ordinary skill in the art *could* combine these references, not that they *would* have been motivated to do so”). This is exactly what Mr. Bertonis provides. *See e.g.* Ex. 1002, ¶ 140 (“[I]t is my opinion that a POSITA would have

understood that Mirfakhraei’s DMT bit loading scheme *could* be implemented over a variety of mediums, including coaxial cable.”).

The Petition, instead of being grounded in any disclosure of the prior art, combines disparate technology (*Afshary*’s coaxial network with *Mirfakhraei*’s conventional telephone DMT/DSL-based bit loading), through a reliance on cursory and generic “motivations,” that eschew the actual teachings of the prior art.

1. Ground A Fails Because *Afshary* Already Addresses the Alleged Impairments Identified by the Petition

The Petition identifies two alleged shortcomings in *Afshary*’s coaxial cables as alleged motivations to combine: (1) the variable frequency response of the cable medium and (2) the addition of *Mirfakhraei*’s DMT adds reliability and robustness to communications within *Afshary*’s system. Petition, 41-42. As reinforced by Mr. Garrett’s analysis, a POSITA would have recognized that *Afshary* already solves for each alleged “shortcoming” that the Petition identifies. Ex. 2001, ¶ 120; *see further Stryker Corp. v. Karl Storz Endoscopy America, Inc.*, IPR2015-00764, Paper 13 at 13 (PTAB Sept. 2, 2015) (“[W]e fail to see, and Petitioner does not adequately explain, why it would be obvious to add a translator to redundantly perform the function that Petitioner maintains is performed by the interconnect devices and network computer.”). These alleged “impairments” and issues are not impairments at all and do not support a motivation to improve *Afshary* with *Mirfakhraei*.

The Petition’s expert alleges that *Afshary* operates in a “harsh” environment as a reason to improve *Afshary* with *Mirfakhraei*. But as Mr. Garrett explains, this assessment is contrary to the explicit disclosures of *Afshary*, which describes its coaxial medium as very clean. Ex. 1006, [0024] (coaxial cables “themselves are a very clear, clean medium”); Ex. 2001, ¶¶ 121-24. In any event, “harshness” is an umbrella term for issues that could affect *all* communication mediums and is far too generic to support the Petition’s combination. Ex. 2002, 113:9-120:21 (Petitioner’s expert confirming that his “harshness” conclusions are not unique to coax, and instead apply to all mediums).

- a. *Afshary* already addresses the alleged impairment of a “variable frequency response” by implementing filters

As stated in the ID, the Petition contends that *Mirfakhraei*’s “increased data transmission rate” and “interference and signal reflections” provide a motivation to combine *Afshary* and *Mirfakhraei*. ID, 17 (“According to Petitioner, implementing *Mirfakhraei*’s DMT bit-loading protocol would increase the data transmission rate in [*Afshary*’s] coaxial cable network, and would also improve reliability and robustness of communications therein.”). But the technical evidence is to the contrary. *Afshary*’s “data transmission rates” and alleged “interference and signal reflections” do not provide a sufficient motivation to combine. Ex. 2001, ¶ 121.

The Petition does not cite any passage from *Afshary* supporting its allegation that *Afshary*'s system includes any "variable frequency response[s] caused by interference and signal reflections." Petition, 41 (citing Ex. 1007, ¶ 3; Ex. 1002, ¶¶ 49-55, 128-138). The Petition instead relies upon *Mirfakhraei* to supplement any alleged deficiency found in *Afshary*'s communication medium. Petition, 41. But *Afshary* already addresses the reflection issues that are present in *Afshary*'s system by including "[f]ilters within the Baseband section 90 [to] filter out such reflected signals." Ex. 1006, [0042]; Ex. 2001, ¶ 122. In other words, *Afshary* discloses a module that addresses reflection issues that could arise, and thus a POSITA would not have viewed this as a problem needing a solution. Ex. 2001, ¶ 122; *see* Ex. 1006, [0042]; *see also* Petition, 47 (acknowledging, "coax cable is an excellent communication medium"); *Polaris Indus.*, 882 F.3d at 1068-69.

Nothing in *Afshary* suggests that its filters would be inadequate to correct for the "reflection" problem, or provide any reason for a POSITA to believe that the filter would be an undesirable solution. Further still, *Afshary*'s use of a simple filter to solve for reflections is consistent with its central goal of cost reduction and simplicity. Ex. 2001, ¶ 122. By contrast, introducing multi-carrier modulation in every device on the network, as the Petition proposes, would be a far more expensive and complicated solution. *Id.*

In sum, the reflection “problem” of *Afshary* was already identified and solved by *Afshary* and in a manner that is more consistent with its core design principles. For these reasons, “reflections” cannot be the basis to modify *Afshary*, and Petitioner cites nothing in *Afshary* that could suggest otherwise. *Id.*, ¶ 121.

b. *Afshary* already achieved a robust and reliable communication system

As a second proposed motivation, the Petition alleges, and the ID improperly found persuasive, that *Mirfakhraei*’s modulation scheme “***could*** be implement[ed] over ... coaxial cable” rather than alleging what a POSITA ***would*** have been motivated to do. Petition, 24; *Virtek Vision Int’l. ULC, v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, Case No. 22-1998 (“*Virtek*”), slip op. at 7, n.2 (Fed. Cir. Mar. 27, 2024) (rejecting conclusory statements regarding what a POSITA ***could*** do as insufficient for motivation to combine). This is improper. A POSITA would not be motivated to make this combination as the transmission rates within *Afshary* already transmit high levels of data without the need for multi-carrier modulation. Ex. 1006, [0012], [0024]-[0025]; Ex. 2001, ¶ 123.

Petitioner generically asserts that increasing “robustness” provides a POSITA with the motivation to combine *Afshary* and *Mirfakhraei*. But Federal Circuit precedent holds that such broad, generic assertions are legally insufficient to provide a motivation to combine. *See ActiveVideo Networks, Inc. v. Verizon Comm’s, Inc.*,

694 F.3d 1312, 1328 (Fed. Cir. 2012). In *ActiveVideo*, the accused infringer’s expert asserted a generic motivation to make a system “more efficient, cheaper, or you wanted a system that had more features,” but did not explain why a POSITA **would** have made the combination. *Id.* Thus, broad assertions of desirable outcomes are not sufficient to establish a motivation to combine. *Rovalma, S.A. v. Bohler-Edelstahl GmbH & Co. KG*, 856 F.3d 1019, 1025-26 (Fed. Cir. 2017) (holding that “the desirability of steels having high thermal conductivity” would not provide a motivation to combine the references). Just like the court in *Rovalma* held, Petitioner’s purported motivation of making a system more “robust and reliable” is a similarly generic assertions of desirable results. *Id.* In fact, “robustness” and “reliability” are even more generic than *Rovalma*’s deficient motivation of “desirability of high thermal conductivity.”

Petitioner cites, and the ID relies on, *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 797 (Fed. Cir. 2021). However, unlike *Intel*’s statements regarding combinability, here the Petition’s position on robustness and reliability are not tied to the references themselves. Ex. 2001, ¶¶ 123-24. Indeed, the court in *Intel* cautions against relying on testimony that has “no relation to any specific combination of prior art elements ... from specific references” and further where there is no testimony regarding **why** a skilled artisan would have combined them “***in the way***

*the claimed invention does.” Intel v. Qualcomm*, 21 F.4<sup>th</sup> at 797. So to here, Mr. Bertonis and the Petition fail to identify why robustness and reliability would motivate a change to *Afshary*’s network that already is a clean, clear medium (Ex. 1006, [0024] (coaxial cables “themselves are a very clear, clean medium”)) that is capable of providing robust reliable data transmission for its in-home networks. Ex. 1006, [0024]-[0025], [0027]; Ex. 2001, ¶¶ 123-24.

*Afshary* utilizes packets with defined headers and preambles to ensure signal transmissions can be reliably received and decoded. Ex. 1006, [0036]-[0037]; Ex. 2001, ¶ 123. These processes additionally include adding bytes to detect corrupted transmissions and a means to correct such errors. Ex. 1006, [0037]. With these safeguards in place, *Afshary* already assures reliable and efficient “data transmission” without the need for further modulation. Ex. 2001, ¶ 123. Therefore, the Petition’s reliance on “increased data transmission” rates as a means to improve *Afshary* with *Mirfakhraei* is unsupported by the teachings of *Afshary*, and a POSITA would not be motivated to seek improved data transmission rates with other references.

Further, *Mirfakhraei*’s bit loading would not improve *Afshary*’s network because *Afshary* already includes bit loading schemes that efficiently transmit signals at an optimal power. Ex. 2001, ¶¶ 123-24; see Petition 43. *Afshary* uses

single carrier signaling as a *robust, cost-effective* method to provide high bandwidth in a “clean” medium, like coaxial cables. Ex. 1006, [0037]. Each signal utilizes a modulation scheme like “Frequency Shift Keying (FSK) modulation or Binary Phase Shift Keying (BPSK) modulation” and other forms of modulation will include “Quadrature Phase Shift Keying (QPSK).” Ex. 1006, [0037]. *Afshary* already encodes in an efficient manner. *Id.*, [0036]; Ex. 2001, ¶ 123. A POSITA would have understood that the bit loading of *Afshary* includes dedicated preambles and other packets ensuring efficient travel through the system. Thus, a POSITA would not be motivated to look to *Mirfakhraei* to add robustness and reliability.

2. A POSITA Would Not Look to *Mirfakhraei*’s Multi-Carrier Modulation Scheme to Improve *Afshary*’s Network

The Petition argues that a POSITA would be motivated to improve *Afshary* with *Mirfakhraei*’s “DMT bit loading scheme.” See Petition, 41 (citing Ex. 1007, [0003]; Ex. 1002, ¶¶ 49-55). To the contrary, a POSITA would have understood that *Afshary* includes the identified “improvements.” Ex. 2001, ¶¶ 125-33. Patent Owner’s new technical evidence demonstrates that *Afshary* uses bit loading schemes, and thus already has “power efficiency” to improve the available bandwidth. Petition, 43 (citing Ex. 1002, ¶¶ 141-144); Ex. 2001, ¶¶ 130-33; Ex. 1006, [0037]; Petition, 25 (citing Ex. 1013, 26:4-20; Ex. 1004, ¶ [0072]). Because *Afshary* already benefits from an efficient “bit-loading scheme,” a POSITA would

not have been motivated to combine the teachings of *Afshary* and *Mirfakhraei* as the Petition suggests. Ex. 2001, ¶ 133.

- a. *Afshary* operates in a clean medium, not a “harsh” environment

The Petition agrees that *Afshary*’s in-home LAN communicates over coaxial cables while *Mirfakhraei* describes an out-of-home system that communicates over conventional telephone lines. Petition, 42. However, the Petition fails to address the fact that *Afshary* differentiates between coaxial cabling and telephone lines and is focused on the coaxial network, which highlights the Petition’s reliance on hindsight to arrive at its proposed combination. Ex. 1006, [0005]-[0006]; Ex. 2001, ¶¶ 126-27. As such a POSITA reading *Afshary* would not have been motivated to look to the disfavored network of telephone lines in an effort to modify the teachings of *Afshary* in order to provide cleaner signal transmissions.

*Afshary* explains that telephone lines suffer from RF interference and RF emission regulations while coaxial cables “are a very clear, clean medium capable of handling operating frequencies of up to 2000 MHz.” Ex. 1006, [0006]-[0024], [0027] (“Coaxial cables can also achieve speeds above 100 Mbps.”); Ex. 2001, ¶ 127. Table 1 of *Afshary* summarizes various limitations for each medium.

| <u>Alternative Mediums</u> |                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------|
| MEDIUM                     | LIMITATIONS                                                                                        |
| AC power-lines             | Unregulated<br>Low bit-rate (Harsh environment)<br>Data security issues<br>Perceived usage hazards |
| Telephone lines            | RF interference<br>RF emissions regulations                                                        |
| Wireless                   | Limited bandwidth<br>Expensive<br>Data security issues<br>Transmission disruption due to movement  |
| New wires                  | Installation costs<br>Maintenance costs                                                            |

Ex. 1006, [0006]. *Afshary's* disclosures explicitly describe coaxial cabling as a medium that is **superior** to alternative mediums and does not suffer from problems encountered by other mediums, like telephone lines. Thus, a POSITA would not be motivated by purported “harshness” to look to address problems in *Afshary's* coaxial cabling (as “harshness” is the opposite of *Afshary's* characterization), let alone look to references related to inferior mediums that encounter different problems.

But the Petition and its expert disregard these disclosures. Instead, Mr. Bertonis opines that “[a] coaxial cable communication medium **can** be a harsh environment for communication as the frequency response of a coaxial cable can vary significantly,” and supports this broad assertion with citations to Jacobsen 94 (Ex. 1018). Ex. 1002, ¶ 54; *see further id.*, ¶ 127. *Afshary* clearly states that the

coaxial “cables themselves are [] very clear, clean medium[s].” Ex. 1006, ¶ [0024]. Mr. Bertonis ignores *Afshary*’s own teachings, in view of a different unrelated reference, to identify a purported “problem” that does not exist in *Afshary*, but which the Petition uses as an erroneous reason to combine *Afshary* with *Mirfakhraei*. Petition, 41-42.

As Mr. Garrett explains when comparing coaxial environments to other transmission environments, such as twisted pair signaling, coaxial cables are a much cleaner medium for communication. Ex. 2001, ¶ 127. This is consistent with the actual disclosure of *Afshary*. See Ex. 1006, [0006], [0024]. *Afshary*’s disclosures that coaxial is a superior medium for transmission would not motivate a POSITA to look to inferior mediums (e.g., telephone lines) to solve “problems” that *Afshary* already solves. Ex. 2001, ¶ 128. The Petition’s purported “motivation” directly contradicts the teachings of *Afshary* itself, which distinguishes coaxial from all other alternatives, which have much greater drawbacks. See Ex. 1006 [0006], [0024]; Ex. 2001, ¶ 128.

Further, even if a POSITA were motivated to modify *Afshary* to “improve” its transmission quality, there is no reason for a POSITA to look to art directed to an ADSL transceiver that operates over *telephone lines*, a medium decidedly different than *Afshary*’s coaxial environment. Ex. 2001, ¶ 128. The Petition’s expert, Mr.

Bertonis, relies on signal interference as a main reason to use multi-carrier modulation techniques. *See* Ex. 1002, ¶ 54. The signal interference referenced by Mr. Bertonis refers to “interference from other signals.” *Id.* But *Afshary* teaches that this interference is a drawback of telephone lines, ***not*** coaxial cables. Ex. 1006, [0006]. *Afshary*, and other coaxial systems, worked around this issue by ensuring bandwidth communication over higher transmission sequences and shielded cables to prevent interference from other sources. Ex. 2001, ¶ 129. This shielding includes shielded cables, protocols for ensuring effective data transmission, and operations at frequencies not used in other systems. Ex. 1006, [0036]-[0037]; Ex. 2001, ¶ 129. Therefore, a POSITA would not be motivated to look to any ADSL reference to address “interference from other signals” in *Afshary* because this is not a problem faced by the coaxial system of *Afshary*.

With the benefit of hindsight, the Petition attempts to combine references with fundamentally different architecture in Ground A. *Afshary* provides a device implemented within a home coaxial system (*i.e.*, on-premises). *Mirfakhraei*, in contrast, concerns data transmission on ***telephone lines*** for a distribution network ***outside of the home*** (*i.e.*, off-premises) using systemic probe messaging that run continuously.

Only through the use of impermissible hindsight would a POSITA have

disregarded all of these clear teachings and understandings to arrive at the claimed combination. These differences illustrate a fatal flaw of the Petition: that Mr. Bertonis' analysis is infected by hindsight bias. His analysis overlooks the complexity of combining communication techniques, ignoring the different and often inconsistent problems and solutions adopted in the drastically different architectures over different communication mediums (*i.e.*, telephone wires and coaxial cables). Ex. 2001, ¶¶ 64-65.

There is simply no basis rooted in the prior art of record to make the modifications proposed by the Petition. Only the '518 Patent itself identifies or solves the problems associated with using probe messages to determine channel characteristics across coaxial splitters. Instead of basing its theories on the prior art disclosures, the Petition resorts to fabrication of unsupportable theories to support its alleged combination.

b. *Afshary* already includes a power-efficient modulation scheme

The Petition attempts to argue that *Mirfakhraei's* "DMT bit loading scheme" would improve *Afshary* by allowing more use of the bandwidths "to transmit more bits onto frequency channels that experience less noise and/or interference." Petition, 43 (citing Ex. 1002, ¶¶ 141-144). This argument fails because *Afshary's* modulation scheme already transmits data on channels with less noise and

interference, and does so using optimal power for its architecture. Ex. 2001, ¶¶ 124, 130; *see* Ex. 1002, ¶¶ 141-146.

*Afshary* uses single carrier signaling as a ***robust, cost-effective*** method to provide high bandwidth in a “clean” medium, like coaxial cables. Ex. 1006, [0037]; Ex. 2001, ¶ 131. Each signal utilizes a modulation scheme like “Frequency Shift Keying (FSK) modulation or Binary Phase Shift Keying (BPSK) modulation” and other forms of modulation will include “Quadrature Phase Shift Keying (QPSK).” Ex. 1006, [0037]; Ex. 2001, ¶ 131. A POSITA would have understood that the modulation used in *Afshary* already ensures efficient communication through the system. Ex. 1006, [0036]; Ex. 2001, ¶ 131.

The Petition ignores the modulation schemes of *Afshary* and their efficiencies in power consumption and data transmission. Instead, it argues that a POSITA would believe the combination of *Afshary* and *Mirfakhraei* would result in improved “power efficiency” in the system by “using more available bandwidth for communicating.” Petition, 43. This is an erroneous conclusion. In the proposed *Afshary-Mirfakhraei* combination, the bit loading schemes are not tied to the specific SNRs profile of the channel to each ***specific*** endpoint in the proposed combination. *See infra* Section V.A.2.b; Ex. 2001, ¶¶ 132-33. This will lead to communication

transmissions that will either encode too many or too few bits for the given SNR profile, either resulting in an inefficient system or loss of data. Ex. 2001, ¶ 132.

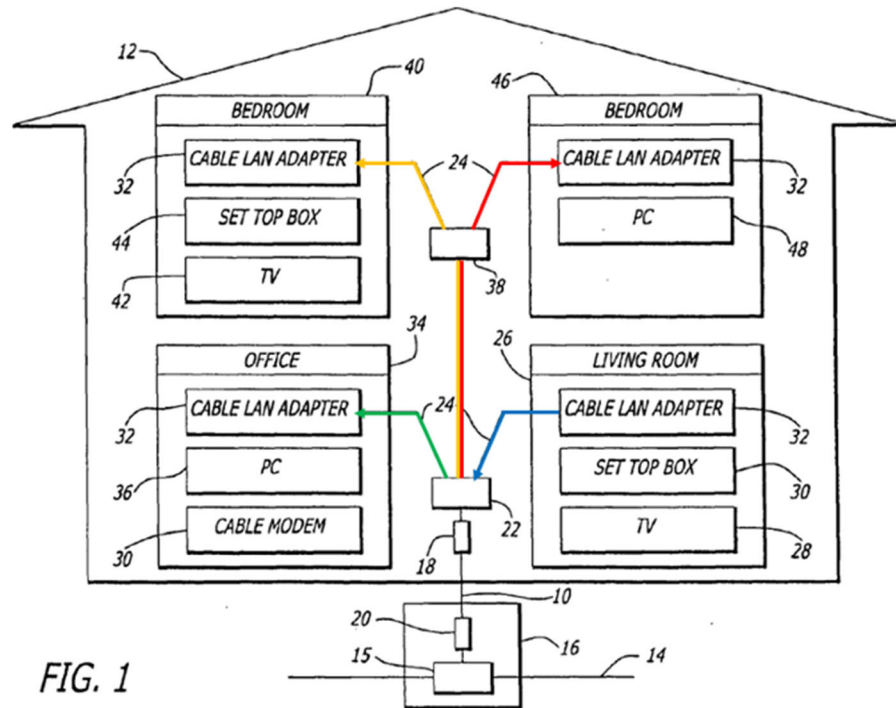


FIG. 1

Ex. 2001, ¶ 108.

As set forth in Mr. Garrett's declaration, using Mr. Bertonis/Petitioner's combination, the SNR profile obtained by the cable lan adaptor 32 of the Living Room 26, would lead to the use of the SNR for the entire in-home coaxial environment rather than specific channel characteristics between each endpoint. Ex. 2001, ¶ 132. Such a system would have an inability to apply or optimize bit loading schemes for the channels between specific nodes. *Id.* Because the transmissions in the proposed combination are not tied to the SNR of the channel for each specific

destination endpoint, the combination would result in inefficient use of power and inefficient transmission of data. *Id.*, ¶¶ 132-33.

The proposed combination fails because (1) *Afshary* already provides an efficient and power-conscious network, and (2) the proposed combination would make transmissions *less* efficient.

C. **Mirfakhraei’s Multi-Carrier Modulation Scheme Operates at a Lower Frequency Than Those Used by *Afshary*’s LAN and Does Not Render Obvious Dependent Claim 3**

Dependent claim 3 of the ’518 Patent requires that “the network shares the cable wiring with a cable television service and the network device up converter translates the modulated data to an RF frequency above the frequency used by cable television service.” ’518 Patent, cl. 3. The ID on page 23 states that “Mirfakhraei discloses that its modem or transceiver may operate on a broadband signal which presumably would include conventional low frequency bands for conventional cable services,” thereby acknowledging the different signal wavelengths used in *Mirfakhraei*. ID, 23. But both the ID and the Petition overlook that *Mirfakhraei* is intended to be used over the exact frequencies avoided by *Afshary*. Ex. 2001, ¶ 134. The Petition’s combination fails to disclose a multicarrier system operating over frequencies higher than those used by cable television services.

A POSITA would not have been motivated to arrive at the specific frequencies in the event the proposed combination were made, because, as set forth in Section V.A.2.c., the frequencies of *Mirfakhraei* are specifically required to be below, not “above the frequency used by the cable television service.” Ex. 2001, ¶¶ 135-37. *Mirfakhraei* provides an ADSL transceiver (*i.e.*, a modem) that communicates over conventional telephone lines on the very frequency that *Afshary*’s adapters ***specifically avoid***. Ex. 1007, [0005], [0015]; Ex. 1006, [0024]-[0025]; Ex. 2001, ¶¶ 135-37.

Notwithstanding the specifically selected frequencies of *Mirfakhraei*, the Petition contends that *Afshary* discloses the limitation of dependent claim 3. Petition, 56-57. According to the Petition, “*Afshary* teaches that the RF & Mixed Signal section 100 translates modulated data to a 1300 MHz center frequency ... which does not overlap” with “conventional cable services.” *Id.* The Petitioner’s expert Mr. Bertonis parrots similar language to that put forth in the Petition. Ex. 1002, ¶¶ 163-64. Petitioner concludes that the *Afshary-Mirfakhraei* combination discloses the limitation of claim 3. This is an erroneous conclusion. Ex. 2001, ¶ 56.

There is no basis to assume that *Mirfakhraei*’s modulation scheme would work at higher frequencies. Ex. 2001, ¶¶ 138-39. *Mirfakhraei* specifically states that modulation schemes over “high[er] frequencies are difficult to accurately

transmit” data. Ex. 1007, [0002]. The Petition assumes that the modulation scheme of *Mirfakhraei* will transmit data accurately over the higher frequencies in *Afshary* without any discussion of **how** the transmissions would work at these higher frequencies. Petition, 56-57. Instead, Petitioner, and Petitioner’s expert, rely on assumptions to meet this limitation while ignoring the plain language disclosed in *Mirfakhraei*.

*Mirfakhraei* discusses the difficulty of transmitting at higher frequencies which is why it was designed to work at lower frequency bands. Ex. 1007, [0002]-[0003]; Ex. 2001, ¶ 140. Meanwhile, *Afshary* only discusses the use of single-carrier modulation schemes to transmit data at these higher frequencies. Ex. 1006, [0026]; Ex. 2001, ¶ 140. Nowhere in *Afshary* is there a discussion of utilizing a multi-carrier modulation scheme at the higher frequency bands above those used by the cable networks. Ex. 2001, ¶ 140. Therefore, Petitioner’s broad assertions and general reliance on frequency ranges in *Afshary* are not supported by the factual record since *Mirfakhraei* was intended to be implemented over low frequency bands. See *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985) (expert testimony based on a lack of factual support offers little probative value). Since Petitioner and Petitioner’s expert do little more than make these broad

assertions about meeting the limitation of dependent claim 3, this argument should bear little weight.

As such, Petitioner's broad assumption that *Afshary*'s disclosure of the higher working bands would work in the combination does not meet their burden of proof by a preponderance of the evidence.

## **VI. PETITIONER'S PURPORTED CLAIM CONSTRUCTIONS**

Petitioner proposes constructions for three claim terms that allegedly invoke 35 U.S.C. §112(¶6): “means for determining signal activity,” “means for producing and transmitting a probe message,” and “means for receiving and analyzing a probe message to determine a bit loading profile used to transmit data.” Petition, 23-27. Petitioner contends that all other claims terms “should be given their ordinary and customary meaning[.]” *Id.*, 23-24. For the purposes of this proceeding, Patent Owner does not dispute the claim constructions proposed by the Petitioner as the claims containing these terms are not part of any infringement allegation in any district court case. *See* Ex. 2001, ¶ 57. Moreover, as no argument advanced by Patent Owner or Petitioner hinges on the construction of these terms, no construction is necessary.

## **VII. GROUND B: CLAIM 2 IS NOT OBVIOUS OVER GROUND A IN VIEW OF *WELLES***

Ground B's additional reference, *Welles*, fails to alter the above deficiencies with regards to the combination of Ground A. *Welles* is only relied upon by the Petition for dependent claim 2 and is not relied upon for the deficient analysis outlined above. As a result, Ground B similarly fails.

## **VIII. CONCLUSION**

Patent Owner's new technical evidence establishes that both grounds of the Petition fail. *Mirfakhraei* is not analogous art to the '518 Patent and therefore cannot serve as the basis for obviousness. Because *Mirfakhraei* is relied on for the sole challenge to Claim 1, this issue is dispositive.

Moreover, a POSITA would not have been motivated to combine *Afshary* and *Mirfakhraei* because they use fundamentally different architectures (local with splitters vs. wide area networks without splitters), mediums (coaxial vs. twisted pair), frequency ranges (higher vs. lower), and design goals (low-cost simplicity vs. costly complexity). Patent Owner's arguments are supported by credible technical evidence grounded in the disclosures of the references themselves. Petitioner's technical evidence, by contrast, ignores the disclosures and the technical problems that the proposed combination would create, exposing the hindsight that infects the Petition.

As a result, the Petition fails to establish any claim is unpatentable.

Dated: December 18, 2024

Respectfully submitted,

By: /Jason A. Engel/  
Jason A. Engel  
Reg. No. 51,654  
K&L Gates LLP

*Counsel for Patent Owner*

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

The undersigned hereby certifies that the foregoing contains 13,978 words according to the word count of the word-processing software used to prepare the foregoing.

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 December 18, 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:

Frederic M. Meeker  
Paul T. Qualey  
Christopher L. McKee  
Wesley W. Jones  
**Banner & Witcoff, Ltd.**  
1100 13th St. NW Suite 1200  
Washington, DC 20005  
fmeeker@bannerwitcoff.com  
pqualey@bannerwitcoff.com  
cmckee@bannerwitcoff.com  
wjones@bannerwitcoff.com  
ComcastIPRservice@bannerwitcoff.com

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