

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'S PRELIMINARY RESPONSE

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	SUMMARY OF THE '518 PATENT	5
III.	ORIGINAL PROSECUTION OF THE '518 PATENT	9
IV.	THE PETITION FAILS TO SHOW THAT THERE IS A REASONABLE LIKELIHOOD THAT THE PETITIONER WILL PREVAIL ON A SINGLE CLAIM.....	10
	A.Ground 1 Fails to Render Obvious the Challenged Claims.....	11
	1. Overview of <i>Afshary</i>	12
	2. Overview of <i>Mirfakhraei</i>	18
	3. The Petition Fails to Establish that <i>Mirfakhraei</i> Is Analogous Art	21
	a. <i>Mirfakhraei</i> and the '518 Patent Do Not Share the Same Field Of Endeavor.....	22
	b. The Petition Does Not Demonstrate That <i>Mirfakhraei</i> Is Reasonably Pertinent to the Problems That the '518 Patent Addresses.....	26
	4. The Proposed Combination of <i>Afshary</i> and <i>Mirfakhraei</i> is based on Improper Hindsight Reconstruction.....	27
	a. The Petition Fails to Sufficiently Address the Differing Communication Mediums of <i>Afshary</i> and <i>Mirfakhraei</i>	29
	b. A POSITA Would Not Be Motivated to Combine the Differing Systems of <i>Afshary</i> and <i>Mirfakhraei</i>	32
	c. The Petition Fails to Sufficiently Address the Differing Modulation Schemes of <i>Afshary</i> and <i>Mirfakhraei</i>	35
	d. The Petition's General Reference to "Impairments" Fails to Save its Motivation to Combination Incompatible References.....	38
	5. The Implementation of <i>Mirfakhraei</i> 's Multi-Carrier Signaling Would Frustrate the Goals of <i>Afshary</i>	41
V.	CONCLUSION	46

I. INTRODUCTION

Patent Owner, Entropic Communications, LLC (“Entropic” or “Patent Owner”), submits this Patent Owner Preliminary Response pursuant to 37 C.F.R. § 42.107(a) to the *Inter Partes* Review petition (“Petition”) filed by Comcast Cable Communications, LLC (“Petitioner”) for Claims 1-4 (the “Challenged Claims”) of U.S. Patent 7,295,518 (the “’518 Patent”).

The ’518 Patent provides a novel on-premises network implemented over existing coaxial cables. Ex. 1001, Abstract, 4:19-33. The ’518 Patent’s data network addresses impediments that previously restricted high bandwidth communication between terminal devices, including splitter tap port isolation and multipath signals. *Id.*, 2:27-34, 3:5-10. To solve these impediments, the ’518 Patent’s network devices transmit and analyze channel probe messages to determine channel characteristics and select bit loading for intra-terminal device communication. *Id.*, Cl. 1.

While prior art solutions addressed communications between on-premises units and a cable head end or central office (*i.e.*, data communication ***outside*** a network in a home or building over greater distances), these solutions failed to address the impairments present in the ***on-premises*** wiring that restrict high bandwidth communication between terminal devices in a broadband local area data

network using coaxial cable wiring over shorter distances with a greater concentration of other electrical activities. *Id.*, 4:19-33; *id.*, Abstract.

The Petition and its references reflect nothing more than the '518 Patent's own description of the prior art. *See id.*, 3:25-4:33 (detailing the prior art). In Ground 1, the only ground challenging an independent claim, the Petition relies on *Afshary*¹ as a base reference to teach on-premises networks that lack key attributes of the Challenged Claims, including the probe messaging for adaptive bit loading that distinguished the claims from the art during prosecution. Then, relying solely on hindsight bias to reconstruct the novel features of the '518 Patent, the Petition adds *Mirfakhraei*² as a secondary reference, relying on *Mirfakhraei*'s teachings of networks that use different transmission mediums, over different operating frequencies for different purposes. As a result, the Petition proposes a combination that fails to render the challenged claims obvious.

Afshary uses a cost-effective coaxial cable network for client device communication. Ex. 1006, Abstract, [0006]-[0007]. *Afshary*, however, fails to provide any disclosure regarding multi-carrier modulation, or the probe signaling

¹ U.S. Pub. No. 2006/0218593 to Afshary et al. (1006).

² EP Pub. No. 1087586A2 to Mirfakhraei (Ex. 1007).

elements that were ultimately added to the claims leading to allowance. Instead, the Petition turns to *Mirfakhraei*, a non-analogous reference that would not have suggested any modification of *Afshary*.

The systems of *Afshary* and *Mirfakhraei* are incompatible, such that a POSITA would not have looked to *Mirfakhraei* to address any alleged problems or make any improvements to the disclosure of *Afshary*. *Afshary*'s system is based on local, on-premises communication over coaxial cables. *Id.*, Abstract, [0006]-[0007]. *Afshary* addresses certain impediments in the local coaxial cable environment, including splitter devices and inter-port isolation issues.

Mirfakhraei describes an entirely different system. *Mirfakhraei* is an ADSL system based on twisted-pair telephone wiring; it is silent with regard to any coaxial cables and fails to recognize or address any coaxial splitter or inter-port isolation issues that form the basis of *Afshary*. Ex. 1007, [0003]-[0005]. *Mirfakhraei* is also silent with regard to any local on-premises network—ADSL connections such as *Mirfakhraei* are the communications link between the entry/exit point at a premises on one side and the infrastructure of the telephone provider on the other. The references exist in very different worlds. Accordingly, a POSITA would not be motivated to look to *Mirfakhraei* to address any alleged problems or make any improvements to the disclosure of *Afshary*.

Even if one ignored the technical differences and considered the generic allegations of combinability the Petition posits, the answer would still be no. *Afshary* already provides a simple, high-bandwidth solution at low costs. Ex. 1006, Abstract, [0006]-[0007]. In contrast, *Mirfakhraei* is saddled with a much narrower bandwidth ADSL communications link over telephone lines, and thus seeks to make the most of the limited bandwidth available to it. Namely, *Mirfakhraei*'s ADSL transceiver characterizes sub-channel capabilities to adjust bit loading. Ex. 1007, [0005], [0014]. The problem the Petition alleges would motivate a POSITA to look to *Mirfakhraei* is already solved by *Afshary* and its teachings of simple on-premises network based on the broad bandwidth of coaxial cables.

Without the advantage of hindsight bias and the predetermined goal to reconstruct the Challenged Claims, a POSITA would not be motivated to combine *Afshary* and *Mirfakhraei*. The Petition fails to establish a motivation to combine *Afshary* and *Mirfakhraei* to arrive at claim 1 or claim 4. Moreover, to the extent that the Petition's combination was attempted, the resulting device would not operate, let alone function as the Challenged Claims.

Ground 2 does not remedy the deficiencies of Ground 1. In Ground 2, the Petition challenges dependent claim 2, which depends from claim 1. The Petition

does not identify any disclosure in *Welles*³ that addresses any deficiencies identified with regard to Ground 1. As such, the Petition does not have a reasonable likelihood of prevailing on either Ground and trial should not be instituted.

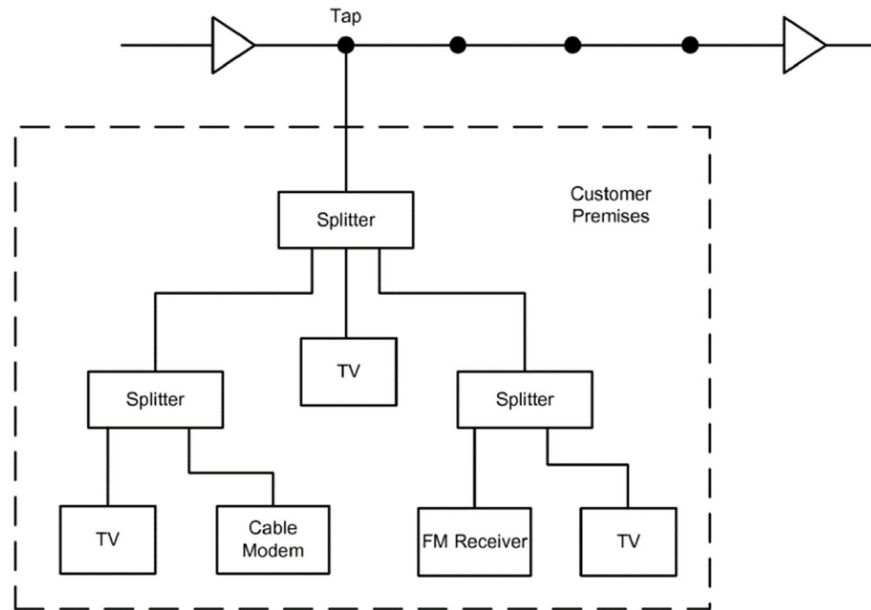
II. SUMMARY OF THE '518 PATENT

The '518 Patent provides a broadband local area network using existing coaxial cable wiring for device communication. Ex. 1001, Abstract. To optimize such communication, the network uses probe messages from one terminal device to another to characterize communication channels to determine optimum multi-carrier bit loading for each channel in the on-premises broadband coaxial local area data network. *Id.*

Figure 1 illustrates a traditional on-premises coaxial signal distribution plan, including signal splitters and network devices (*i.e.*, customer premise equipment). *Id.*, 5:10-11. Signal splitters distribute downstream signals from the point-of-entry to various network devices. *Id.*, 1:40-45. For example, a signal splitter (“splitter”)

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

receives a signal at the input port (e.g., a common port) and splits the power equally between two output ports (e.g., tap ports⁴). *Id.*, 1:53-56, 61-65, Fig. 1.



Ex. 1001, Fig. 1.

A splitter may alternatively include a power-dividing ratio to divide the signal unequally between the two tap ports. *Id.*, 2:17-27. Such splitters can balance signal power between terminal devices when the coaxial cable wiring includes multiple levels of splitters. *Id.*, 2:20-27. Typically, splitters are bi-directional, and thus can function as signal combiners. *Id.*, 2:5-10. When combining signals, the tap ports

⁴ As referenced herein, tap ports are part of a splitter. Figure 1 denotes a “tap” in the cable plant, which is not to be confused with a “tap port” of a splitter.

become input ports and the common port becomes an output port. *Id.* As a signal combiner, the splitter provides a return path for terminal devices to transmit signals back to the cable head end. *Id.*, 2:11-16. Although splitters provide needed functions, prior art cable TV wiring configurations present obstacles for device-to-device communication. *Id.*, 2:28-34, 2:35-48, 4:19-32.

First, a splitter's tap ports are isolated. *Id.*, 2:27-34. Inter-port isolation leads to signal attenuation when terminal devices communicate through the tap ports. *Id.* In a conventional cable TV configuration, inter-port isolation is desirable because terminal devices did not communicate with each other (and instead only received and transmitted signals from/to the head end). *Id.*, 2:28-38. Thus, most on-premises splitters have this isolation. In the described and claimed LAN systems, however, terminal devices are required to communicate with each other, and the signal loss caused by inter-port isolation becomes an undesirable byproduct of the existing design. *Id.*, 2:35-41.

Second, signal attenuation in the on-premises broadband coaxial network is variable across the different paths. *Id.*, 2:41-48. 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. *Id.*, 2:54-56. 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 id.*, 2:54-3:4.

Third, imperfect connection points create micro reflections, which may combine with the dominant main signal to produce a multipath signal. *Id.*, 3:5-10. Multipath signals may be undesirable because they create inter-symbol interference (“ISI”). *Id.*, 3:7-10. ISI degrades the bit error rate (“BER”) performance of the communication channel and impairs the ability to achieve high data rates in a communication network. *Id.*, 3:15-16, 4:23-25.

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. *Id.*, 4:36-47. To transmit data signals through existing coaxial cabling and address the shortcomings of the prior art, the ’518 Patent uses variable multi-carrier modulation. *Id.*, 4:36-40. To provide this variable multi-carrier modulation, the ’518 Patent optimizes the network using probe messages to gather information regarding the channels (signal paths). *Id.*, 4:48-62.

This gathered information (channel characteristics) is then used to select the bit loading scheme applied to the multi-carrier modulation. *Id.*

The '518 Patent explains these channel probe messages are formed using a predetermined bit sequence and length. *Id.*, 4:48-52. The channel probe messages are then transmitted between terminal devices to estimate channel characteristics, which include (1) multipath characteristics and (2) the signal-to-noise ("SNR") profile over the frequency band of interest. *Id.* The receiving device analyzes the channel probe message to determine the channel impairment at each carrier frequency. *Id.*, 4:57-59. Based on this channel estimation, bit loading is adjusted to increase or decrease the modulation order corresponding to the SNR. *Id.*, 4:59-62.

III. ORIGINAL PROSECUTION OF THE '518 PATENT

On December 18, 2002, the '518 Patent was filed as U.S. Patent Application No. 10/322,834. Ex. 1004. The United States Patent and Trademark Office ("Patent Office") issued a restriction requirement against the 10 originally filed claims. *Id.*, 61-66. The Applicant elected claims 1 to 4 and 10 and canceled claims 5 to 9. *Id.*, 68-71. Following the election, Applicant conducted an Examiner Interview and agreed to incorporate the subject matter of claim 2 into independent claim 1, which was allowed. *Id.*, 82. In the Notice of Allowance, the Examiner stated that the prior art fails to disclose: "a network device for communicating data to other network

devices by utilizing unique method step of determining channel characteristics and a bit loading profile used to transmit data by analyzing received probe message signals.” *Id.*, 80. Notably, as is reflected in claim 1, this communication happens “through the cable wiring using multi-carrier signaling.” Ex. 1001, Cl. 1.

Notably, the Examiner cited two prior art references in the Notice of Allowance. Ex. 1004, 80 (citing U.S. Patent No. 6,886,181 and “*Multicarrier Modulation for Data Transmission; An Idea Whose Time has Come*,” by John A.C. Bingham). The first reference identified in the Notice of Allowance discloses components of an on-premises network while the second reference relates to multi-carrier modulation and bit loading. With its combinations, the Petition re-presents this same theory that the examiner already allowed the claims over. The Petition uses a base reference for on-premises networks and, relying on hindsight bias, adds a secondary reference having an incompatible network to teach the novel features of the Challenged Claims. The prior art relied upon in the Petition therefore fails to disturb the findings of the Patent Office.

IV. THE PETITION FAILS TO SHOW THAT THERE IS A REASONABLE LIKELIHOOD THAT THE PETITIONER WILL PREVAIL ON A SINGLE CLAIM

With the benefit of hindsight, the Petition attempts to combine references with fundamentally different architecture in Grounds 1 and 2 (collectively, “Grounds”).

The base reference (*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). These differences render the proposed combination non-obvious and defeat any motivation to combine the teachings of the references as proposed in the Petition. Indeed, 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).

A. Ground 1 Fails to Render Obvious the Challenged Claims

Ground 1 alleges that the Challenged Claims are obvious over the combination of *Afshary* and *Mirfakhraei*. Petition, 28-68. “An obviousness determination generally requires [1] a finding that all claimed limitations are disclosed in the prior art, and [2] that a person of ordinary skill in the art would have been motivated to combine or modify the teachings in the prior art.” *Univ. of Strathclyde v. Clear-Vu Lighting LLC*, 17 F.4th 155, 160 (Fed. Cir. 2021) (citations omitted). Ground 1 fails to satisfy these two requirements because the proffered motivation to combine is insufficient.

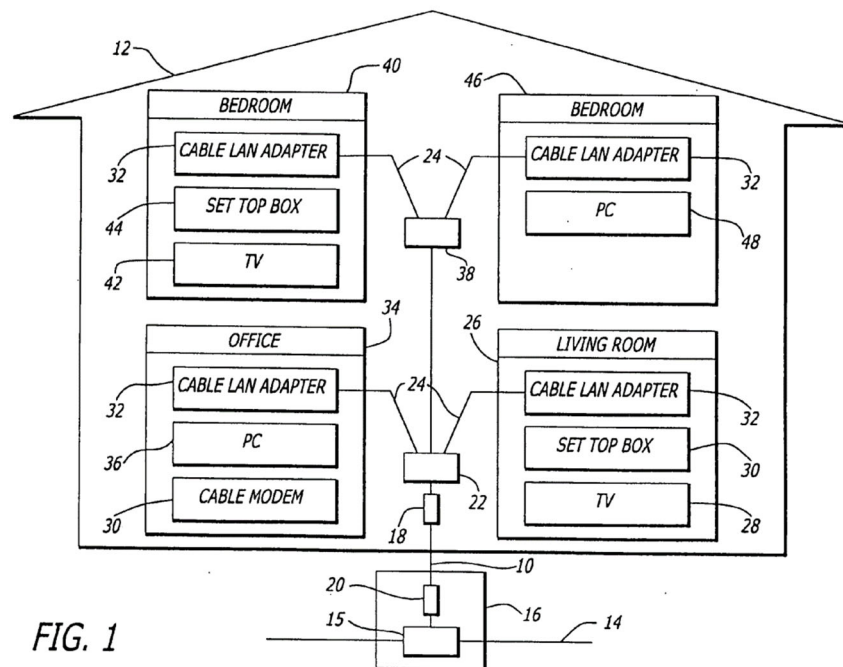
1. Overview of *Afshary*

Conventional home networks include electronic devices that generate and receive data. Ex. 1006, [0004]. In-home local area networks (“LANs”) are used to distribute such data around the home. *Id.* As LANs become more popular, there is a growing need to transmit high-bandwidth data. *Id.* Current solutions suffer from various disadvantages. *See id.*, [0005]. Namely, solutions that do not require new wiring (*i.e.*, AC power lines, telephone lines, and wireless communication) suffer from low bandwidth. *Id.* Solutions that require new wiring and provide high bandwidth are expensive and rely on unproven technology. *Id.* Table 1 summarizes various limitations for each medium. *Id.*

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

Ex. 1006, [0006].

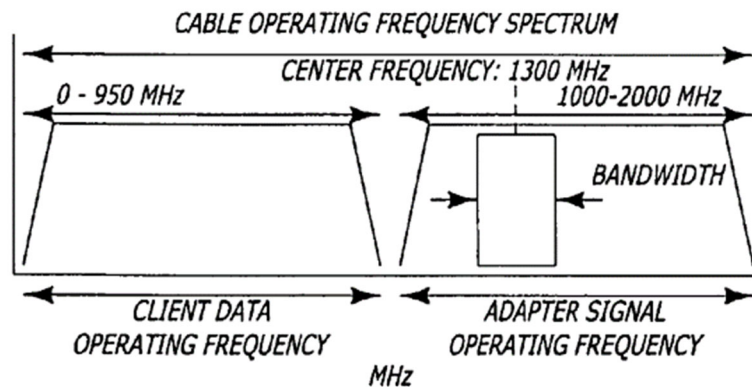
Afshary discloses a cost-effective coaxial cable LAN for client device communication. *Id.*, Abstract, [0006]-[0007]. In particular, the LAN uses adapters, which communicate with both clients and other adapters to facilitate client device communication. *Id.*, Abstract. The adapters, which connect through coaxial cables, generate and communicate data signals between client devices. *Id.*, [0007]. Figure 1 illustrates *Afshary's* in-home coaxial cable LAN in accordance with an embodiment of the invention. *Id.*, Fig. 1 (reproduced below), [0008].



Ex. 1006, Fig. 1.

In Figure 1, a signal travels down the drop cable 10 into the home 12 and through a cable LAN isolator (*i.e.*, low pass filter 18). *Id.*, [0014]-[0015]. A splitter

22 then divides the signal, which permits more than one client device to receive identical data. *Id.*, [0018]. Each cable wire 24 is routed to different rooms with corresponding client devices. *Id.* For example, living room 26 includes a television 28 having a set top box 30. *Id.*, [0019]. In each room, an adapter is 32 coupled between cable wire 24 and the client devices. *Id.*, [0018]-[0019], Fig. 1.



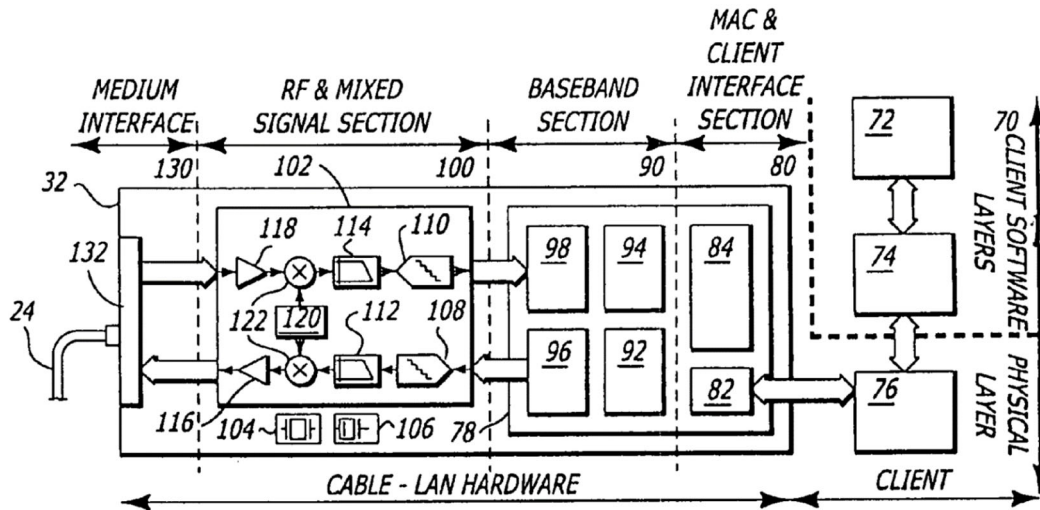
Ex. 1006, Fig. 3.

Importantly, the adapters use an “operating frequency spectrum not used by conventional cable services.” *See id.*, [0025]. Figure 3 illustrates the operating frequency of the client data versus the adapter signals. *Id.*, [0024]. The lower region (*i.e.*, zero to 950 mHz) is used by conventional TV, digital cable TV, and cable modems (like the modem of *Mirfakhraei*). *Id.*, [0024]. The cable LAN uses the higher region (*i.e.*, 1000-2000 mHz) with a center frequency of 1300 mHz. *Afshary* explains that the adapter signal operating frequency can be adjusted to take advantage of frequency ranges that are not used by the client data. *See id.*, [0028].

However, in each situation, the adapters only use frequencies that *are not* used by the client data. *Id.* With different frequency bands, *Afshary's* system allows the adapters to communicate without interfering with lower frequency client data. *Id.*

As explained below in Section IV.A.2, *Mirfakhraei* discloses an ADSL transceiver that adjusts bit loading in sub-channels to communicate more efficiently. Ex. 1007, [0005], [0014]. *Mirfakhraei's* transceiver communicates over conventional telephone lines. *Id.*, [0015]. ADSL has predetermined upstream and downstream frequency bands, which *Afshary's* adapters avoid. *See* Ex. 1006, [0024]-[0028]. Because *Mirfakhraei's* transceivers use a completely different frequency band than *Afshary's* adapters for different competing goals, a POSITA would not look to *Mirfakhraei* to modify *Afshary*.

Figure 2 illustrates a schematic illustration of *Afshary's* coaxial cable LAN. *Id.*, Fig. 2 (reproduced below), [0009]. As shown in Figure 2, a client interface 66 couples each adapter 32 to a respective client. *Id.*, [0021]. The adapter 32 connects the client devices to the network of cable wires 24. *Id.* In operation, a first client (e.g., PC 62) communicates digital data to a first cable LAN adapter 32 through the client interface 66. *Id.*, [0023]. The adapter 32 then processes the data before transmission to a second cable LAN adapter 32. *Id.* The second adapter 32 further



Ex. 1006, Fig. 4.

The MAC & Client Interface section 80 communicates data to the Baseband Section 90, which is a part of broadband ASIC 78. *Id.*, [0035]. The Baseband Section 90 encodes and modulates the data. *Id.* The adapter uses a Forward Error Correction (“FEC”) encoder 92, and, preferably, the FEC encoder 92 is a Reed-Solomon Error Correction Code (“R-S ECC”) encoder. *Id.*, [0036]. The RS ECC encoder may be reused in the FEC decoder 94, simplifying the syndrome calculation to reduce the processing speed burden on the syndrome block. *Id.*

The encoded data is transmitted to the modulator 96. *Id.*, [0037]. “[I]n order to *keep costs low and the system robust*, the architecture design of adapter 32 uses a digital modulation scheme such as Frequency Shift Keying (FSK) modulation or

Binary Phase Shift Keying (BPSK) modulation.” *Id.*⁵ “Other acceptable modulation schemes include Quadrature Phase Shift Keying (QPSK) digital modulation.” *Id.* *Afshary* does not adjust between these modulation schemes but rather implements one, and only one, scheme in its adapter.

2. Overview of *Mirfakhraei*

In contrast to *Afshary*’s LAN network implemented over coaxial cables, *Mirfakhraei*’s disclosure relates to a system implemented over conventional telephone lines—a medium that *Afshary* distinguishes from the coaxial cabling used for its home network. Ex. 1007, [0014]-[0015]; *see* Ex. 1006, [0004]. Further, *Mirfakhraei*’s disclosure outlines a clear problem and solution when communicating over conventional telephone lines with discrete multi-tone (“DMT”) protocol—a protocol that is not used in *Afshary*. Ex. 1007, [0002]-[0005].

DMT protocol increases the data transmission rate over conventional telephone lines by simultaneously using multiple carrier frequencies that each corresponds to a sub-channel. *Id.*, [0003]. In operation, the sending modem breaks data into packets to be transmitted on the separate sub-channels. *Id.* The receiving modem then separates sub-channel signals by carrier frequency, demodulates the separate sub-channel signals, and reassembles the data. *Id.*

⁵ All emphasis herein is added unless stated otherwise.

When using the DMT protocol, *Mirfakhraei* explains that the sub-channels may be able to carry more or less data. *Id.*, [0004]. Despite these difference, DMT protocols employ a conventional quadrature amplitude modulation (“QAM”) scheme for modulating data on each sub-channel. *Id.* With a default modulation scheme, which is independent of a sub-channel’s capability, data transmission may be inefficient. *Id.* To increase the transmission efficiency, the modulation scheme should be adjusted to suit each sub-channel accordingly. *Id.*

Mirfakhraei provides an ADSL transceiver that characterizes the capabilities of the sub-channel and adjusts the bit loading accordingly. *Id.*, [0005], [0014]. Figure 1 illustrates *Mirfakhraei*’s transceiver for adapting sub-channel bit loading depending on sub-channel capabilities. *Id.*, [0014]. The ADSL transceiver includes a transmitter 110 and a receiver 190 connected to a telephone line. *Id.*

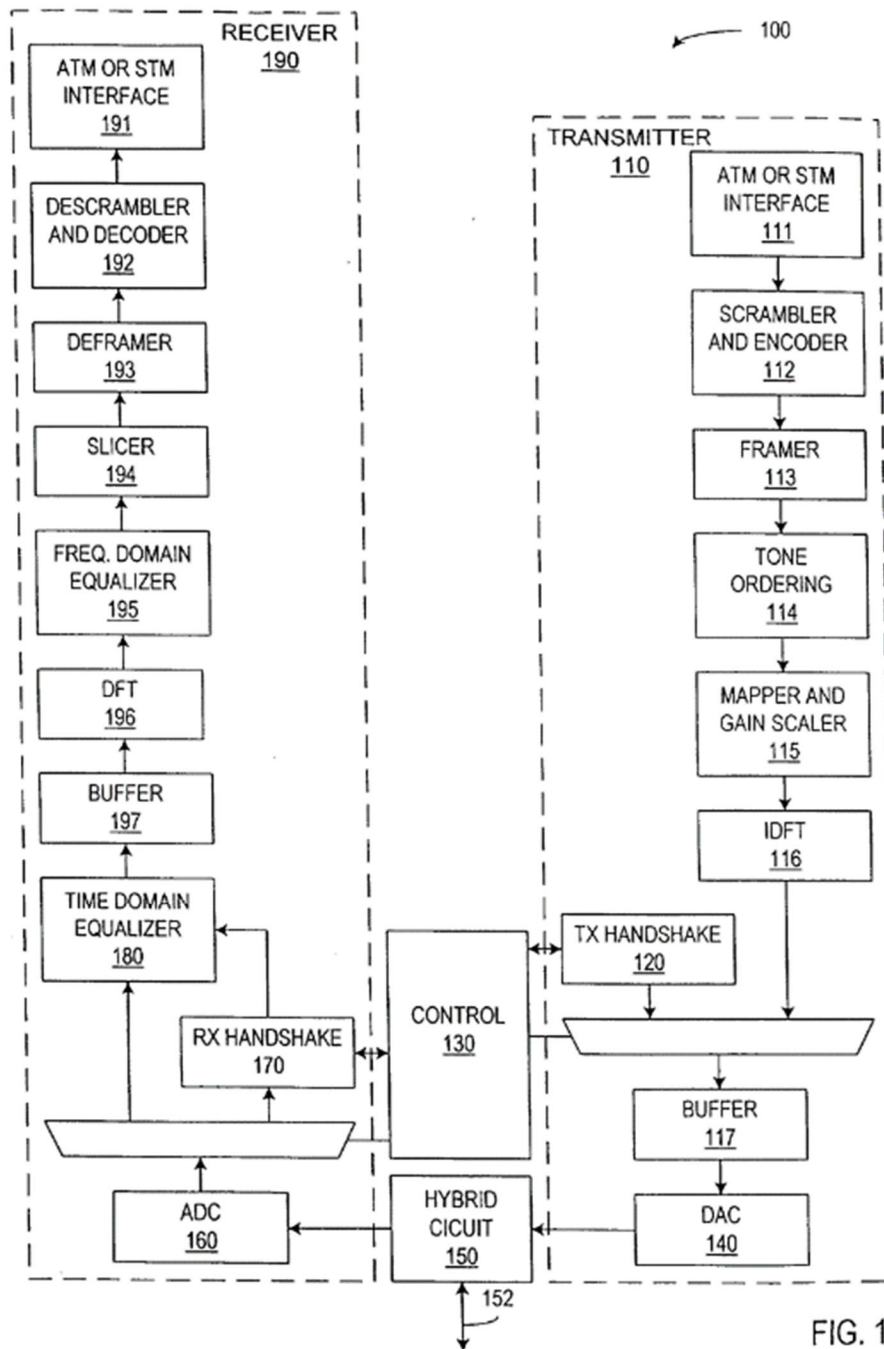


FIG. 1

Ex. 1007, Fig. 1.

A scrambler and encoder 112 encode received data, and a framer 113 breaks the encoded data stream from encoder 112 into bit sets. *Id.*, [0017]. Each bit set is

assigned to a sub-channel. *Id.* A tone ordering block 114 then orders the bit sets for a constellation mapper 115. *Id.* A constellation mapper 115 determines a QAM symbol for each bit set for the QAM of the assigned sub-channel. *Id.*, [0018]. An IDFT block 116 receives the QAM symbols (which constitute a DMT symbol) and perform inverse Fourier transforms to convert the symbols into a sequence of time domain samples. *Id.*, [0019]. A buffer 117 provides samples to DAC 140, which are sent to the hybrid circuit 150 for transmission to telephone lines 152. *Id.*

3. The Petition Fails to Establish that *Mirfakhraei* Is Analogous Art

The Petition initially 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 (P.T.A.B. Aug. 20, 2014) (explaining that the Petitioner bears to burden 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 prove that *Mirfakhraei* is analogous under either prong.

First, the '518 Patent and *Mirfakhraei* are not from the same field of endeavor. The '518 Patent concerns an on-premises broadband network implemented over existing coaxial cables. *See* Section IV.A.3.a. *Mirfakhraei*, in contrast, provides an ADSL transceiver, which is an out-of-home facing device that communicates over conventional telephone lines. Petition, 42. *Mirfakhraei* does not discuss broadband networks or existing on-premises coaxial cables—key aspects of the '518 Patent.

Second, *Mirfakhraei* is not pertinent to the problem solved by the '518 Patent. 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. In one 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 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 a on-premises local network like the communication network of the '518 Patent.

a. *Mirfakhraei* and the '518 Patent Do Not Share the Same
Field Of Endeavor

The '518 Patent's field of endeavor—as confirmed by its title, abstract, technical field, background, and claims—is an on-premises local area broadband

coaxial cable network. *Mirfakhraei*, by contrast, has nothing to do with broadband networks, coaxial cables, or local area networks. Rather, *Mirfakhraei*'s field is multi-carrier network communications using a DSL transmission over conventional telephone lines outside the home, lines that are twisted copper wires known as "twisted pair." Such field is far removed from the '518 Patent's local area broadband coaxial networks.

To discern the field of endeavor, the Federal Circuit has often looked to a patent's "background of invention" and "field of the invention" sections. *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."). Additionally, a patent's title, claim preamble, and function and structure of the claimed inventions may also bear upon the field of endeavor. *Id.* at 1380-81 (affirming Board's finding of field of endeavor based on "the title of the [] patent and the preamble of a ... claim").

These traditional sources for identifying a field of endeavor confirm that the '518 Patent's field is local area broadband coaxial cable networks. First, the '518 Patent is entitled, "**Broadband network for coaxial cable** using multi-carrier modulation." Ex. 1001, Cover. Second, the abstract is consistent with the title, stating "A broadband **local area data network** uses **coaxial cable** wiring for

interconnection of terminal devices.” *Id.*, Abstract. Third, the ’518 Patent’s “technical field” identifies that this “invention relates to **broadband communication networks** and specifically to communications using **coaxial cable building wiring**.” *Id.*, 1:27-29. Fourth, the background focuses on **local broadband coaxial networks** and the issues present in such networks. *See generally id.*, 1:33-4:33. Within this background, the ’518 Patent intentionally differentiates on-premises networks with out-of-home systems. *See id.*, 4:19-33. Fifth, this field of endeavor is integrated into the claims, which recite a specific data communication network implemented over coaxial cables. *See, e.g., id.*, Cl. 1.

The Petition agrees that “[t]he ’518 patent is directed to a coaxial cable local area network (LAN).” Petition, 1; *see also* Ex. 1002, [0058] (stating that the ’518 Patent “relates to ‘broadband communication networks and specifically to communications using coaxial cable building wiring.’”) (citing Ex. 1001, 1:27-29). Yet the Petition fails to make any showing that *Mirfakhraei* is of a similar field.

Mirfakhraei does not mention “coaxial cables” at all. *See generally* Ex. 1007. Nor is “broad band” mentioned aside from a solitary reference to a “broadband signal.” *See id.*, [0024]. This failure to discuss coaxial cable local area network logically follows from *Mirfakhraei* problem and solution—which is specific to multi-carrier communications over conventional telephone lines. *Id.* at [0002]-

[0005]. In other words, *Mirfakhraei* addresses issues in communication systems that do not include coaxial cables and are not implemented on-premises. Based on these fundamental differences in the communication systems, *Mirfakhraei* and the '518 Patent are from different fields of endeavor.

Rather than address the differences between *Mirfakhraei* and the '518 Patent, the Petition's expert, Mr. Bertonis, simply concludes that "Mirfakhraei is in the field of network communication and therefore in my opinion analogous to the '518 patent." Ex. 1002, [0088] (citing Ex. 1007, [0001]). Mr. Bertonis' limited, and conclusory, analysis fails to save the Petition because he fails to mention, let alone address, the main focus of the '518 Patent and, instead, provides an improperly broad characterization of *Mirfakhraei* in an attempt to encompass the '518 Patent.

In making his assertions, Mr. Bertonis makes no mention of "broadband," "coaxial cable," or "local area" networks, which are the overwhelming focus of the '518 Patent's disclosures and claims. Because *Mirfakhraei* does not concern any of these topics, Mr. Bertonis is forced to broadly characterize *Mirfakhraei* as in the "field of *network communication*." Ex. 1002, [0088]. This approach is improper.

In one example, the Federal Circuit found that semiconductor "memory" was too broad of a field. *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 864-65 (Fed. Cir. 1993). The court explained that the references were not in the same field of

endeavor “merely because it relates to memories.” *Id.* Rather, the cited references involved memory circuits having replaceable modules of varying sizes; the challenged patents related to compact modular memories. *Id.*; *see also Amazon.com Inc. et al v. ZitoVault*, IPR2016-00021, Paper 8, 33 (P.T.A.B. Apr. 15, 2016) (recognizing that the Petitioner’s characterization of the field of endeavor as “encrypted, distributed network communication”). Even in the face of the Petition’s overly broad characterization, it is clear that the ’518 Patent and *Mirfakhraei* do not share the same field of endeavor, and thus are not analogous art under this prong.

b. The Petition Does Not Demonstrate That *Mirfakhraei* Is Reasonably Pertinent to the Problems That the ’518 Patent Addresses

Neither Petitioner nor Mr. Bertonis establishes that *Mirfakhraei* is reasonably pertinent to the problem the inventors of the ’518 Patent were trying to solve. The background of the ’518 Patent lays out a clear problem and solution. Namely, the ’518 Patent addresses impediments that previously restricted high bandwidth communication between terminal devices over on-premises coaxial cabling. Ex. 1001, Abstract, 4:19-33.

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. *Id.*,

2:27-34, 2:41-48, 3:5-16, 4:23-25. In other words, each issue that the '518 Patent addresses is unique to components of an on-premises coaxial cable network. *Mirfakhraei* is not (and cannot be) pertinent to these problems because *Mirfakhraei*'s system does not include the network components that are causing these issues, and thus *Mirfakhraei*'s system does not suffer from these issues.

Mirfakhraei is directed to an entirely different problem. *Mirfakhraei* explains that DMT protocol increases the data transmission rate over conventional telephone lines by using multiple carrier frequencies that each correspond to a sub-channel. Ex. 1007, [0003]. However, in conventional systems, sub-channels differ in the amount of data they can carry. *Id.*, [0004]. Despite these difference, DMT protocols employ the same QAM scheme for each sub-channel, leading to transmission inefficiency. *Id.* *Mirfakhraei*'s system attempts to address this issue by adjusting the modulation scheme for each sub-channel. *Id.*

4. The Proposed Combination of *Afshary* and *Mirfakhraei* is based on Improper Hindsight Reconstruction

It is only through impermissible hindsight that a POSITA would modify *Afshary* as the Petition describes. This use of hindsight is improper, and thus the Petition does not provide a reasonable likelihood that it will prevail on Ground 1. *See, e.g., Mylan Labs. Ltd. v Aventis Pharma*, IPR2016-00627, Paper 10 (P.T.A.B. Aug. 23, 2016) (denying institution when the Petition relies on impermissible

hindsight bias, ignoring the references' teachings); *see also* *Nautilus Hyosung Inc. v. Diebold Selfservice Sys. Div. of Diebold*, IPR2016-00633, Paper 9, 21 (P.T.A.B. Aug. 22, 2016) ("An assertion that something could be done does not articulate a reason why something would be done," raising the issue of hindsight bias.). A POSITA would not modify *Afshary* as the Petition describes because *Afshary* and *Mirfakhraei* are incompatible references. *See infra* Sections IV.A.4.a to IV.A.4.c.

First, *Afshary* and *Mirfakhraei* are different network types and operate over differing mediums. *Afshary* provides an in-home LAN; *Mirfakhraei* provides the premises-to-infrastructure link from customer to the telephone provide using ADSL. *Afshary* communicates over high bandwidth coaxial cables; *Mirfakhraei* uses bandwidth-constrained twisted pair telephone lines. Notably, *Afshary* explicitly differentiates coaxial cables and telephone lines and highlights the issues present in using telephone lines. Ex. 1006, [0005]-[0006]. Thus, a POSITA would not have been motivated to look to, let alone use, *Mirfakhraei* to modify *Afshary*. *See infra* Section IV.A.4.a.

Second, *Afshary* and *Mirfakhraei* operate in incompatible environments. *Afshary*'s local network adapters communicate over frequencies above those used by conventional cable services to avoid interference. *See* Ex. 1006, [0007]. In contrast, *Mirfakhraei*'s ADSL transceiver communicates over the low frequency

bands avoided by *Afshary*. Compare *id.* with Ex. 1007, [0002]-[0003]. In view of the differences, a POSITA would not be motivated to make the non-obvious combination of *Afshary* and *Mirfakhraei*. See *infra* Section IV.A.4.b.

Third, *Afshary* and *Mirfakhraei* use differing signaling technology. *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]. Saddled with low frequency bands on low bandwidth telephone cables, *Mirfakhraei* instead tries to optimize ***multi-carrier signaling*** to overcome issues for ADSL communications over long distances. Ex. 1007, [0002]-[0006]. Rather than address the differing signaling architectures that (as a result of operating in the differing architectures) express concerns in tension, the Petition generically alleges that a POSITA would be motivated to use *Mirfakhraei*’s optimized multi-carrier signaling to “improve” *Afshary*’s adapters, despite the fact that *Afshary* intentionally uses single carrier signaling. To the contrary, a POSITA would not be motivated to combine *Afshary* and *Mirfakhraei*. See *infra* Section IV.A.4.c.

a. The Petition Fails to Sufficiently Address the Differing
Communication Mediums of *Afshary* and *Mirfakhraei*

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* intentionally differentiates between coaxial cabling and telephone lines and favors the coaxial network, which highlights the Petition’s reliance on hindsight to arrive at its proposed combination. Ex. 1006, [0005]-[0006]. 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*.

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.” *Id.*, [0006]-[0024], [0027] (“Coaxial cables can also achieve speeds above 100 Mbps.”).

Instead, the Petition contends that a POSITA would use *Mirfakhraei* to address the “harsh coaxial cable medium” of *Afshary*. *See* Petition, 41–42. This motivation directly contradicts the teachings of *Afshary* itself, which calls coaxial cables a “very clear, clean medium” and distinguishes it from all other alternatives, which have much greater drawbacks. *See* Ex. 1006 [0006], [0024]. Thus, contrary to the Petition’s arguments, a POSITA would not be motivated to modify *Afshary* in view of its disclosure and characterization of other mediums.

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

Bertonis, relies on signal interference as a main reason to use multi-carrier modulation techniques. *See* Ex. 1002, [0054]. But *Afshary* explicitly states that it is telephone lines—not coaxial cables—that suffer from RF interference issues. *See* Ex. 1006, [0006]. Starting with the disclosure of *Afshary* a POSITA would not look to any ADSL reference because *Afshary* teaches away from using it.

Even ignoring the differing mediums, a POSITA would not have looked to *Mirfakhraei* because *Mirfakhraei* contains no teachings whatsoever on sending or receiving data over communication channels that traverse the tap ports of splitters, as in *Afshary*. *Mirfakhraei* does not mention—let alone discuss in detail—any of the important aspects of these channels, including reflection, attenuation, and isolation. Neither the Petition nor Mr. Bertonis addresses these issues. Instead, both simply conclude that *Mirfakhraei*'s DMT protocol could be implemented over a coaxial cable. *See* Petition, 42 (citations omitted); Ex. 1002, [0140].

At best, the Petition simply alleges, deficiently, 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.*, ___ F.4th ___, 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).

b. A POSITA Would Not Be Motivated to Combine the Differing Systems of *Afshary* and *Mirfakhraei*

Afshary and *Mirfakhraei* are designed to operate in different settings with competing goals, as their systems function over completely different frequencies. Therefore, a POSITA would not be motivated to make the non-obvious combination of *Afshary* and *Mirfakhraei*. *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]; *see also* Section IV.A.1. For example, if conventional cable services communicate from 0 to 950 mHz, the adapters use frequencies from 1000 to 2000 mHz. Ex. 1006, [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]. This functionality is made possible by the coaxial cable's ability to support high frequencies. *Id.*

Conversely, *Mirfakhraei* provides an ADSL transceiver (*i.e.*, a modem) that communicates over conventional telephone lines on a frequency that *Afshary*'s adapters ***specifically avoid***. Ex. 1007, [0005], [0015]. *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]. As

Mirfakhraei provides an ADSL system adapted for long range transmission over telephone lines, *Mirfakhraei* functions over low frequency bands. *Id.*

Mirfakhraei's low frequencies are exactly the band that *Afshary* avoids in an effort to not conflict with existing CATV signals. As such, the teachings of *Mirfakhraei* would not suggest any modification of *Afshary* to a POSITA. *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]. Notably, Figure 1 includes a cable modem 30 (highlighted) with an operating frequency of zero to 950 MHz. *Id.* The cable modem 30 may be an "asymmetric digital subscriber loop (ADSL) modem" to provide internet access to the personal computer 36. *Id.*, [0018].

combination of *Afshary* and *Mirfakhraei* is actually “nothing more than an obvious combination of known elements.” Petition, 43. As this section highlights, the Petition does not even attempt to address an issue as fundamental as differing operating frequencies, based on different transmission goals, within its purported combination.

c. The Petition Fails to Sufficiently Address the Differing Modulation Schemes of *Afshary* and *Mirfakhraei*

Afshary and *Mirfakhraei* use differing modulation schemes because they have incompatible goals. *Mirfakhraei* provides a specific solution for **optimizing** multi-carrier signaling to overcome the impairments for ADSL communication over long distances. Ex. 1007, [0002]-[0006]. *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]. The Petition ignores these competing goals and, instead, argues that a POSITA would be motivated to use *Mirfakhraei*, which **optimizes** multi-carrier signaling and is silent with regard to any splitters, to improve a device (*i.e.*, the adapter of *Afshary*) that does not even use multi-carrier signaling and relies on these splitters. In particular, *Afshary*’s splitters divide downstream signals, allowing more than one client device to receive identical data. *Id.*, [0018]. *Mirfakhraei*’s system, however, is point-to-point and thus does not include splitters like the in-home system of *Afshary*.

The disclosure of each reference is also instructive. *Mirfakhraei* explains that, while high frequency carriers allow higher data transmission, high frequencies are difficult to transmit over conventional lines. Ex. 1007, [0002]. Further, frequency dependent attenuation distorts communication signals having large bandwidths. *Id.* DMT protocols (*e.g.*, ADSL) were developed to increase the transmission rate over conventional telephone lines and therefore over greater distances. *Id.*, [0003]. DMT protocols, however, use sub-channels with varying carrier frequencies. *Id.*, [0004].

Mirfakhraei's problem and solution are not applicable to *Afshary*. Limited bandwidth and frequency limitations of conventional lines drove the development of the multi-carrier signaling of ADSL.⁶ *Id.*, [0002]-[0004]. The coaxial cabling of *Afshary*, in contrast, provide “a very clear, clean medium capable of handling operating frequencies of up to 2000 MHz.” Ex. 1006, [0024]. These higher carrier frequencies are allowed in the *Afshary* environment where the distance travelled is

⁶ While *Afshary* briefly mentions ADSL (Ex. 1006, [0018]), it only does so to explain that the home can receive input signals from different sources that provide internet to the home; the single reference does not provide a basis to look to this delivery network (which includes ADSL signals) to improve the in-home network. See Ex. 1006, Fig. 1.

much shorter. In other words, the motivations between each reference are completely different—which match the competing problem and solutions of the respective references.

Mirfakhraei uses a medium (*i.e.*, telephone lines) with frequency dependent attenuation, which distorts signals having large bandwidths, limiting data rates. Ex. 1007, [0002]. Logically, *Mirfakhraei* provides a system for optimizing communication in view of these obstacles. *Id.*, [0005]-[0014]. *Afshary* uses a medium (*i.e.*, coaxial cabling) that supports high frequency data transmission, providing ample bandwidth at the expense of signal loss over distance. Ex. 1006, [0024], [0027] (“A significant advantage of this invention is the large bandwidths that may be applied in transmitting data.”). With such a medium, *Afshary* is not concerned with complex optimization (like *Mirfakhraei*) but rather providing a cost-effective and robust system. *Id.*, [0005]-[0007]. As such, *Afshary* implements ***single-carrier modulation schemes*** within its adapters. *Id.*, [0037]; *see also* Section IV.A.5 (explaining that replacing *Afshary*’s single-carrier modulation scheme would frustrate *Afshary*’s goals).

The Petition does not accurately address these differences; instead, the Petition generally discusses the references without regard to their specific teachings to mask the Petition’s reliance on hindsight bias. The different signaling techniques

is just one more example that demonstrates that the proposed combination is impermissible hindsight reconstruction solely aimed at the '518 Patent claims without any adequate motivation to combine. The Petition's limited analysis regarding motivation to combine fails to disturb this conclusion. *See In re Gorman*, 933 F.2d 982, 987 (Fed. Cir. 1991) ("It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from the references to fill the gaps.").

d. The Petition's General Reference to "Impairments" Fails to Save its Motivation to Combination Incompatible References

Broad, generic references to "impairments" and increased data transmission rates fails to save the Petition's motivation to combine *Afshary* and *Mirfakhraei*. *See* Petition, 40-41. Such generic concerns are a concern of nearly every communications system in existence, not motivation to combine *particular* bits of technology. A cursory review of the reference undercuts these arguments made by the Petition. *Id.* As introduced in Section IV.A.4.a, the Petition's motivation section is premised on a POSITA's understanding that "a coaxial cable ... is a harsh medium for communication." Petition, 40-41 (citing Ex. 1006, Abstract, [0007], [0012]-[0020], Fig. 1; Ex. 1002, [0049]-[0055]). *Afshary*, however, explains that coaxial cabling is "a very clear, clean medium capable of handling operating frequencies of

up to 2000 MHz.” Ex. 1006, [0024]. The Petition’s reliance on Mr. Bertonis’ opinion fares no better.

Mr. Bertonis states that “a coaxial cable communication medium *can be* a harsh environment for communication as the frequency response of a coaxial cable can vary significantly.” Ex. 1002, [0054] (citing Ex. 1018, 305-306). Mr. Bertonis cites Jacobsen⁹⁴—a reference that is wholly inapplicable to the coaxial medium of *Afshary*. First, Jacobsen⁹⁴ simulates an out-of-home network as the basis for its conclusions—not an in-home network as *Afshary* provides. Ex. 1018, 307. Second, Jacobsen⁹⁴ uses a “6-MHz slot from 30-36 MHz as [the] simulated channel,” which is logical for the out-of-home system as most CATV systems provide an upstream channel that operates from, for example, 5 to 40 MHz. *Id.* However, *Afshary*’s in-home network uses completely different frequency bands for its coax-based communication; notably while coax might be a harsh medium at the low frequencies of Jacobsen⁹⁴, at the high frequencies *Afshary* operates, coax is “a very clear, clean medium,” a fact Mr. Bertonis ignores. *See* Section, IV.A.1.

Like the Petition, Mr. Bertonis applies findings of Jacobsen⁹⁴, which concern data transmission outside-of-home using different frequency bands than those of *Afshary*’s system. *See* Ex. 1018, 307 (“[W]e selected the 6-MHz slot from 30-36 MHz as our simulated channel.”). Again, Mr. Bertonis’ reliance on data

communications outside the home funnels back to what was already known in the art, which was explained in the background of the '518 Patent. *See* Ex. 1001, 3:25-4:33 (detailing existing prior art solutions address communications between a cable head end and in-home units—*not within the home*).

Other than what might be (Mr. Bertonis' statement is quite equivocal) a “harsh environment” of coaxial cabling, the Petition argues that a POSITA would be motivated to implement *Mirfakhraei* within *Afshary's* system because collective data rates would increase. Petition, 41. *Afshary*, however, specifically touts the high bandwidth of its system without the use of multi-carrier signally. *See, e.g.*, Ex. 1006, [0027] (“A significant advantage of this invention is the large bandwidths that may be applied in transmitting data.”). Accordingly, a POSITA would not be motivated to further increase the bandwidth of *Afshary's* system with *Mirfakhraei*, especially in the face of the actual teachings.

Finally, the Petition fails to address the differing communication mediums between *Afshary* and *Mirfakhraei* in its motivation to combine section. *See* Section IV.A.4.a (detailing the differences between *Afshary's* network implemented on coaxial cabling with *Mirfakhraei's* system implemented on conventional telephone lines). The Petition simply concludes that “a POSITA would have understood that

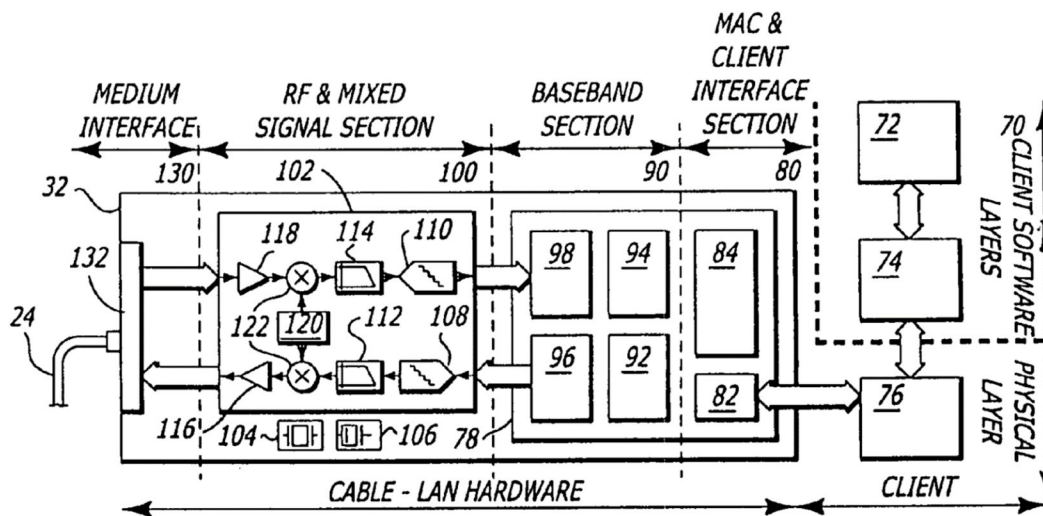
Mirfakhraei's DMT bit loading scheme *could* be implemented over a variety of mediums, including coaxial cable." Petition, 42.

This is not the standard. *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 391 F.3d 1195, 1068-69 (Fed. Cir. 2004) (holding that the Board erred in "focus[ing] on what a skilled artisan would have been *able* to do, rather than what a skilled artisan would have been *motivated* to do." (citing *InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014))). *Mirfakhraei* does not reference coaxial cables, let alone provide any motivation to implement its system over coaxial cabling. *See generally* Ex. 1007. Moreover, *Afshary* distinguishes coaxial cabling from telephone lines. *See* Ex. 1006, [0006], [0024] (describing coaxial cables as "a very clear, clean medium" while listing "RF interference" and "RF emissions regulations" as limitation to telephone lines). Based on the teachings of the references, a POSITA would not be motivated to implement the system of *Mirfakhraei* in *Afshary*'s home network.

5. The Implementation of *Mirfakhraei*'s Multi-Carrier Signaling Would Frustrate the Goals of *Afshary*

By inserting *Mirfakhraei*'s multi-carrier signaling functionality into *Afshary*'s adapters, the Petition's combination frustrates the goal of *Afshary* in providing a *cost-effective*, in-home LAN for distributing data. Ex. 1006, [0004]-[0005]; *see* Petition, 42-43; Section IV.A.1. *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”). 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. *Sharkninja, Inc. et al v. Dyson Tech. Ltd.*, IPR2023-01322, Paper 7, 25 (P.T.A.B. Feb. 27, 2024) (“A reference teaches away from a claimed invention if it ‘criticizes, discredits, or otherwise discourages’ modifying a reference to arrive at the claimed invention.” (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004))).

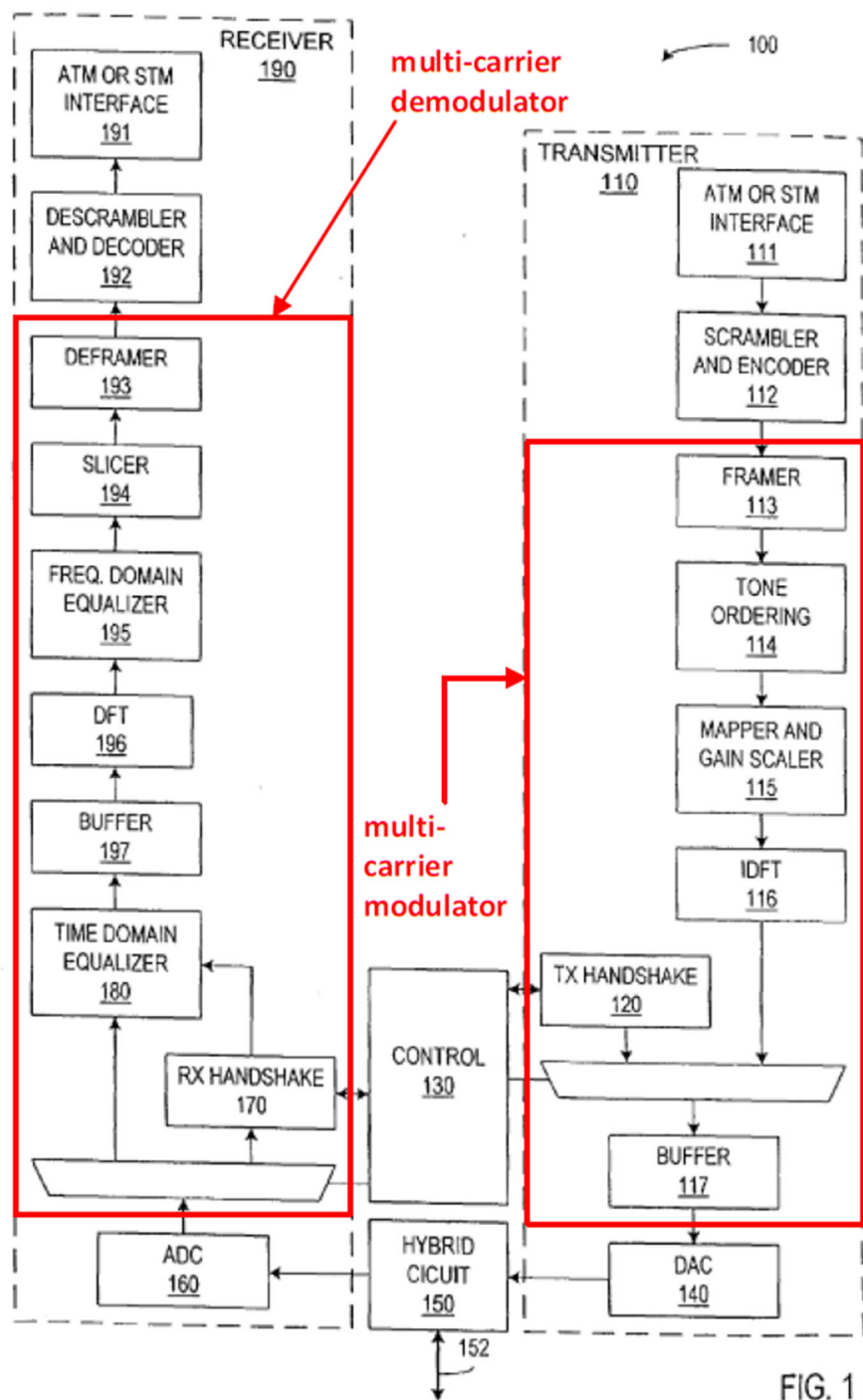


Ex. 1006, Fig. 4.

In particular, *Afshary* designs its adapters to provide robust communication with cost-effective components. *Id.*, Fig. 4 (reproduced above), [0029]-[0042]. 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. *Id.* “[I]n order to **keep costs low** and the system robust,” the adapters use a specific digital modulation scheme. *Id.* 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.

The Petition contends that a POSITA would ignore this 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, attempting to designate the multi-carrier modulation and demodulator. Petition, 39.



Petition, 39 (annotations added by the Petition).

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]. Within the transmitter, the scrambler 112 encodes data, which is broken into a data stream by the framer 113. *Id.*, [0017]. A tone ordering block 114 then orders the bit sets for a constellation mapper 115, which determines a QAM symbol for each bit set. *Id.*, [0018]. An IDFT block 116 receives the scaled QAM symbols and performs inverse Fourier transforms. *Id.*, [0019]. The identified process is equally complicated in demodulator. Petition, 39.

This investigation highlights the unavoidable and clear differences between the references combined by the Petition. *Afshary* is concerned with costs while *Mirfakhraei* is concerned with optimization. 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 understood that the modulators of *Mirfakhraei* would frustrate the goals of *Afshary*. *Polaris Indus.*, 391 F.3d at 1068-69 (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)).

V. CONCLUSION

For the reasons set forth above, the IPR should not be instituted.

Dated: June 10, 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 8,141 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 June 10, 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