

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CISCO SYSTEMS, INC., DISH NETWORK, LLC,
COMCAST CABLE COMMUNICATIONS, LLC,
COX COMMUNICATIONS, INC.,
TIME WARNER CABLE ENTERPRISES LLC,
VERIZON SERVICES CORP., and ARRIS GROUP, INC.,
Petitioner,

v.

TQ DELTA, LLC,
Patent Owner.

Case IPR2016-01006¹
Patent 7,835,430 B2

Before SALLY C. MEDLEY, TREVOR M. JEFFERSON, and
MATTHEW R. CLEMENTS, *Administrative Patent Judges*.

MEDLEY, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ DISH Network, L.L.C., who filed a Petition in IPR2017-00251, and Comcast Cable Communications, L.L.C., Cox Communications, Inc., Time Warner Cable Enterprises L.L.C., Verizon Services Corp., and ARRIS Group, Inc., who filed a Petition in IPR2017-00420, have been joined in this proceeding.

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Cisco Systems, Inc. (“Petitioner”) challenges claims 1–6 (“the challenged claims”) of U.S. Patent No. 7,835,430 B2 (Ex. 1001, “the ’430 patent”), owned by TQ Delta, LLC (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable. Patent Owner’s Motion to Exclude is *dismissed*.

A. Procedural History

Petitioner filed a Petition for *inter partes* review of claims 1–6 of the ’430 patent. Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). On November 4, 2016, we instituted an *inter partes* review of claims 1–6 of the ’430 patent on the ground that claims 1–6 would have been obvious under 35 U.S.C. § 103(a)² over Milbrandt,³ Chang,⁴ Hwang,⁵ and ANSI T1.413.⁶ Paper 7 (“Dec.”).

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. §§ 102 and 103. Because the ’430 patent has an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of 35 U.S.C. §§ 102 and 103.

³ U.S. Patent No. 6,636,603 B1; issued Oct. 21, 2003 (Ex. 1011) (“Milbrandt”).

⁴ U.S. Patent No. 6,891,803 B1; issued May 10, 2005 (Ex. 1012) (“Chang”).

⁵ U.S. Patent No. 6,590,893 B1; issued July 8, 2003 (Ex. 1013) (“Hwang”).

⁶ “Network and Customer Installation Interfaces – Asymmetric Digital Subscriber Line (ADSL) Metallic Interface,” American National Standards Institution (ANSI) T1.413-1995 Standard (Ex. 1014) (“ANSI T1.413”).

Thereafter, Patent Owner filed a Patent Owner Response (“PO Resp.”). Paper 14.⁷ Petitioner filed a Reply to the Patent Owner Response (“Pet. Reply”). Paper 17. Pursuant to an Order (Paper 21), Patent Owner filed a listing of alleged statements and evidence in connection with Petitioner’s Reply that Patent Owner considered to be beyond the proper scope of a reply. Paper 22. Petitioner filed a response to Patent Owner’s listing. Paper 26.

Patent Owner filed a Motion to Exclude, Paper 30 (“PO Mot. Exc.”), Petitioner filed an Opposition, Paper 34 (“Pet. Opp. Mot. Exc.”), and Patent Owner filed a Reply, Paper 37. Patent Owner filed a Motion for Observation, Paper 32 (“PO Mot. Obs.”) and Petitioner filed a Response to the Motion for Observation, Paper 35 (“Pet. Resp.”).

A consolidated oral hearing for this case and related Cases IPR2016-01007, IPR2016-01008, and IPR2016-01009, was held on August 3, 2017. A transcript of the hearing has been entered into the record. Paper 39 (“Tr.”).

B. Related Proceedings

Petitioner indicates that the ’430 patent is the subject of several pending judicial matters. Pet. 1–2. In addition, a different Petitioner filed a petition for *inter partes* review of the ’430 patent, but we did not institute trial. *See Arris Group, Inc. v. TQ Delta, LLC*, Case IPR2016-00428 (PTAB June 22, 2016) (Paper 8).

⁷ Although the title page of the brief is styled “Patent Owner’s Response Under 37 CFR § 42.120,” the header of each subsequent page is styled “Patent Owner’s Preliminary Response.” We understand the subsequent header to contain a typographical error.

C. The '430 Patent (Ex. 1001)

The '430 patent discloses systems and methods for reliably exchanging diagnostic and test information between transceivers over a digital subscriber line in the presence of disturbances. Ex. 1001, 1:44–47. The systems and methods include the use of a diagnostic link mode in the communication of diagnostic information from a remote terminal (RT) transceiver or modem to the central office (CO) transceiver or modem, where either modem transmits a message to the other modem to enter diagnostic link mode. *Id.* at 2:44–48, 3:19–29. Each modem includes a transmitter section for transmitting data and a receiver section for receiving data, and is of the discrete multitone (DMT) type (the modem transmits data over a multiplicity of subchannels of limited bandwidth). *Id.* at 1:58–62. In diagnostic mode, the RT modem sends diagnostic and test information as bits that are modulated to the CO modem. *Id.* at 3:32–34. One described modulation technique includes Differential Phase Shift Keying (DPSK) on a subset or all the carriers, as specified in ITU standard G.994.1, higher order Quadrature Amplitude Modulation (QAM) (>1 bit per carrier). *Id.* at 3:38–41.

Figure 1 illustrates the additional modem components associated with the diagnostic link mode, and is reproduced below:

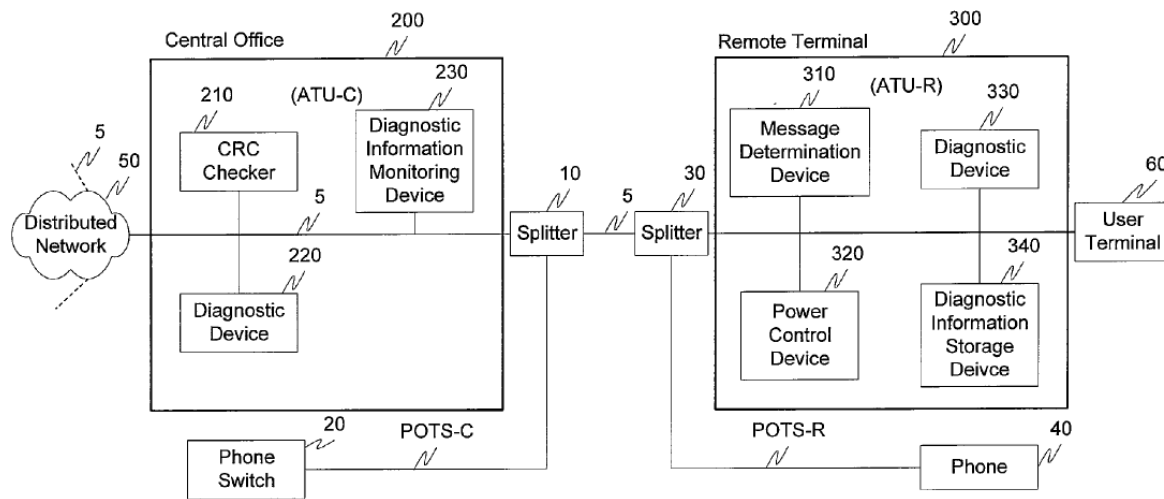


Fig. 1

Figure 1 illustrates a diagnostic mode system, where CO modem 200 and RT modem 300 are connected via link 5 to splitter 10 for a phone switch 20, and a splitter for a phone 40. *Id.* at 4:48–62. CO modem 200 includes CRC checker 210, diagnostic device 220, and diagnostic information monitoring device 230. *Id.* RT modem includes message determination device 310, power control device 320, diagnostic device 330, and diagnostic information storage device 340. *Id.*

D. Illustrative Claim

Claims 1–6 are independent claims. Claim 1 is reproduced below.

1. A transceiver capable of transmitting test information over a communication channel using multicarrier modulation comprising:
 - a transmitter portion capable of transmitting a message, wherein the message comprises one or more data variables that represent the test information, wherein bits in the message are modulated onto DMT symbols using Quadrature Amplitude Modulation (QAM) with more than 1 bit per subchannel and wherein at least one data variable of the one or more data

variables comprises an array representing frequency domain received idle channel noise information.

Ex. 1001, 8:33–44.

II. ANALYSIS

A. *Principles of Law*

To prevail in its challenge to Patent Owner’s claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In that regard, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418; *see also In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259, 1262 (Fed. Cir. 2007).

B. *Level of Ordinary skill in the Art*

Citing its declarant, Dr. Sayfe Kiaei, Petitioner contends that a person having ordinary skill in the art at the time of the invention would have had (1) a Master’s degree in Electrical and/or Computer Engineering, or

equivalent training, and (2) approximately five years of experience working in digital telecommunications. Pet. 10–11; Ex. 1009 ¶ 36. Petitioner also contends that “[l]ack of work experience can be remedied by additional education, and vice versa.” *Id.* at 11.

Patent Owner’s expert, Dr. Douglas Chrissan, opines that a person of ordinary skill in the art would have had (1) a bachelor’s degree in electrical engineering, and (2) at least three years of experience working with multicarrier communication systems. Ex. 2001 ¶ 34.

We determine that no express finding on a specific corresponding level of technical education and experience is necessary. Here, the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

C. Claim Interpretation

The Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide, 77 Fed. Reg. at 48,766. Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See Translogic*, 504 F.3d at 1257.

Petitioner proposes constructions for the following claim terms: “frequency domain received idle channel noise information,” “array,” and “transceiver.” Pet. 8–9. In our Decision to Institute, we interpreted these terms. Dec. 5–8. Neither party has indicated that our interpretations were improper and we do not perceive any reason or evidence that now compels

any deviation from our initial interpretations. *See*, PO Resp. 6 (“Patent Owner does not contest the Board’s express claim constructions.”); Pet. Reply 8 n.2. Accordingly, the following constructions apply to this Decision:

Claim Term	Construction
frequency domain received idle channel noise information	information about the background noise present in each of a plurality of frequency subchannels when the subchannels are not in use
array	an ordered collection of multiple data items of the same type
transceiver	a device, such as a modem, with a transmitter and receiver

D. Asserted Obviousness over Milbrandt, Chang, Hwang, and ANSI T1.413

Petitioner contends that claims 1–6 are unpatentable under 35 U.S.C. § 103(a) as obvious over Milbrandt, Chang, Hwang, and ANSI T1.413. Pet. 24–49. We have reviewed Petitioner’s showing identifying where each limitation allegedly appears in Milbrandt, Chang, Hwang, and ANSI T1.413, along with the testimony of Petitioner’s declarant, Dr. Sayfe Kiaei. *Id.* (citing Ex. 1009). We also have reviewed Patent Owner’s assertions and evidence, including the testimony of Dr. Douglas Chrissan, as to why Petitioner’s showing is deficient. PO Resp.

Milbrandt (Ex. 1011)

Milbrandt describes a system for determining the transmit power of a communication device operating on digital subscriber lines. Ex. 1011, 1:20–23. A communication server, coupled to a first subscriber line and a second subscriber line, includes a communication device that communicates a signal

using the first subscriber line. *Id.* at 2:24–27. The system includes a memory coupled to the communication server that stores noise information and cross-channel-coupling information for the first subscriber line and the second subscriber line. A processor coupled to the memory determines the transmit power of the communication device based on the noise and cross-channel coupling information. *Id.* at 2:26–35. Figure 1 shows details of the system hardware and is reproduced below.

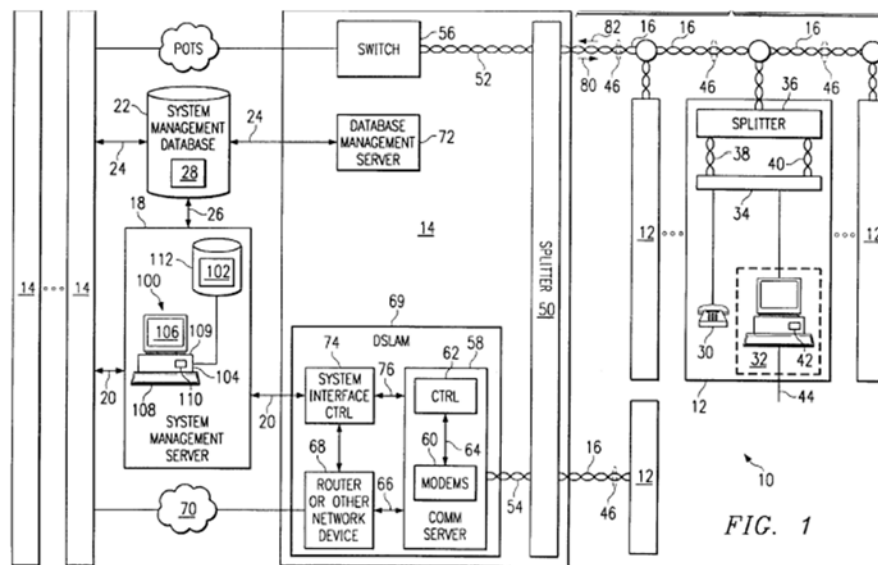


Figure 1 of Milbrandt illustrates a block diagram of a communication system that provides telephone and data service to subscribers

Communication system 10 includes system management server 18 coupled to central offices 14, which are coupled to several subscribers' premises 12 using subscriber lines 16. *Id.* at 4:6–9. Database 22 stores subscriber line information 28 and communication device information 29 defining the physical and operating characteristics of the subscriber lines 16 and communication devices 60. *Id.* at 4:9–15. System management server 18 determines the data rate capacity of selected subscriber lines 16 using subscriber line information 28 stored in database 22, and the optimal

transmit power for a communication device operating on a subscriber line 16. *Id.* at 4:15–21.

Modem 42 extrapolates subscriber line information 28 to central office 14 over any achievable range of sub-frequencies using any suitable communication protocol. *Id.* at 11:45–53. As one described embodiment, subscriber line 16 and components of subscriber 12 and central office 14 support communication using ADSL techniques that comply with ANSI Standard T1.413, such as discrete multi tone (DMT) modulation. *Id.* at 9:31–34. Modem 42 of subscriber 12, receives a data signal that is communicated by modem 60 and determines subscriber line information 28, such as attenuation information, noise information, received signal power spectrum density, or other information describing the physical or operating characteristics of subscriber line 16 at the one or more sub-frequencies over which connection between modems 42 and 60 is established. *Id.* at 11:38–45.

Chang (Ex. 1012)

Chang describes a telecommunications transmission test set for testing digital communications networks. Ex. 1012, 1:6–8. The test set is capable of performing line qualification testing including digital multimeter (DMM) tests, time domain reflection (TDR) test, and line impairment tests. The line impairment tests include insertion loss, signal-to-noise, background noise, and loop resistance. *Id.* at 2:56–61.

Hwang (Ex. 1013)

Hwang describes an adaptive transmission system used in a network. Ex. 1013, 1:6–8. The system includes a computer network including network nodes capable of transmitting and receiving data over a channel

using a transmitter and receiver. *Id.* at 5:1–8. The computer network utilizes discrete multi-tone (DMT) technology to transmit data over the channels. *Id.* at 5:12–14. A DMT-based system utilizes 256 distinct carriers, or tones, where each tone is capable of transmitting up to 15 bits of data on the tone waveform. *Id.* at 5:22–24. Within each carrier, data is encoded using quadrature amplitude modulation (QAM) signals. *Id.* at 3:1–3. Hwang’s techniques provide effective high-speed data communications over twisted pair wiring between customer premises and corresponding network-side units, for example located at a central office of a telephone network. *Id.* at 3:15–19.

ANSI T1.413 (Ex. 1014)

ANSI T1.413 is a standard specification presenting the electrical characteristics of the Asymmetric Digital Subscriber Line (ADSL) signals appearing at a network interface. Ex. 1014, Abstract. The standard provides the minimal set of requirements for satisfactory transmission between the network and the customer installation. *Id.* Among the features of ADSL is the encoding of data into discrete multitone (DMT) symbols. *Id.* at 23–34. Within each DMT subchannel, an ADSL transmitter encodes a variable number of bits of data using a constellation encoder. *Id.* at 43–45.

Analysis

Petitioner contends that claims 1–6 would have been obvious over Milbrandt, Chang, Hwang, and ANSI T1.413. Pet. 24–49. Patent Owner’s arguments are directed to whether a person of ordinary skill in the art would have combined Milbrandt, Chang, Hwang, and ANSI T1.413. PO Resp. 6–28. Patent Owner, however, does not dispute Petitioner’s contentions that

the individual elements of claims 1–6 would be met by the combination of Milbrandt, Chang, Hwang, and ANSI T1.413. *Id.*⁸

We begin our analysis by discussing how the prior art describes each element of each of the challenged claims. Claim 1 recites a “transceiver capable of transmitting test information over a communication channel using multicarrier modulation.” Petitioner contends that Milbrandt describes a modem 42 that “comprises any suitable communication device that transmits and receives data.” Pet. 24 (citing Ex. 1011, 4:64–65). We are persuaded by Petitioner’s showing and find that Milbrandt’s modem 42 is a transceiver.

Petitioner further contends that modem 42 measures received signal power spectrum density per sub-frequency S_f , noise information per sub-frequency, attenuation information per sub-frequency H_f , and communicates this information and other subscriber line information 28 to modem 60 using data line 40, which is part of subscriber line 16. *Id.* at 24–25; Ex. 1011, 5:39–40, 11:20–53, 12:65–13:16. Petitioner contends that the subscriber line information, including the measured values of the power spectrum density per sub-frequency S_f , noise information per sub-frequency, and attenuation information per sub-frequency H_f are test information as

⁸ Although Patent Owner, in its concluding statement at the end of its brief, asserts that Petitioner “failed to show that the asserted references, alone or in combination, disclose every element of the claims” (PO Resp. 29), nothing in Patent Owner’s Response resembles a substantive argument explaining why the claimed elements are not met by the prior art. Accordingly, we understand this conclusory argument to be a typographical error. *See also*, Pet. Reply 6; Tr. 28:23–29:3, 42:2–12.

claimed. Pet. 25; Ex. 1009, 46.⁹ We are persuaded by Petitioner’s showing and find that Milbrandt’s description of measured values of power spectrum density per sub-frequency S_f , noise information per sub-frequency, and attenuation information per sub-frequency H_f meets the claim element of test information transmitted over subscriber line 16 (“communication channel”).

Petitioner directs attention to Milbrandt’s description of how modem 42 employs communication techniques like discrete multi tone (DMT) modulation. Pet. 25; Ex. 1011, 9:31–34. Petitioner also directs attention to Hwang’s description that a DMT signal is the sum of N independently quadrature amplitude modulated (QAM) signals, each carried over a distinct carrier frequency channel. Pet. 25; Ex. 1013, 2:67–3:3. Petitioner argues, with supporting evidence, that a person having ordinary skill in the art would have understood that DMT modulation taught by Milbrandt and Hwang is an example of multicarrier communication that is used by modem 42 to transmit test information. Pet. 25–26; Ex. 1009, 47–49. We are persuaded by Petitioner’s showing and find that Milbrandt and Hwang describe using multicarrier modulation (DMT).

Claim 1 recites “a transmitter portion capable of transmitting a message.” Petitioner contends that Milbrandt describes a modem 42 that transmits and receives data. Pet. 26; Ex. 1011, 4:64–65. We find that a person having ordinary skill in the art would have understood Milbrandt’s modem 42 to contain a transmitter portion capable of transmitting a message. Ex. 1011, 4:64–65. Claim 1 also recites “wherein the message

⁹ In the Petition, Petitioner references page numbers of Dr. Kiaei’s declaration, as opposed to paragraph numbers. Citations are to page numbers, unless otherwise indicated by use of the paragraph symbol (“¶”).

comprises one or more data variables that represent the test information.”

For this limitation, Petitioner contends that Milbrandt describes “subscriber line information 28,” that includes power spectrum density per sub-frequency, attenuation information per sub-frequency, and noise information per sub-frequency. Pet. 27 (citing Ex. 1011, 11:31–43). Petitioner contends, with supporting evidence, and we agree, that it would have been obvious to a person having ordinary skill in the art that the values representing the test information are “one or more data variables.” Pet. 27–28 (citing Ex. 1009, 51–53; Ex. 1011, 11:45–53).

Claim 1 recites “wherein bits in the message are modulated onto DMT symbols using Quadrature Amplitude Modulation (QAM) with more than 1 bit per subchannel.” Petitioner contends that Milbrandt describes that modem 42 supports “communication using ADSL techniques that comply with . . . discrete multi tone (DMT) modulation.” Pet. 28 (citing Ex. 1011, 9:31–34). Petitioner further contends that Milbrandt explains that DMT technology divides a subscriber line into individual “sub-bands or channels,” and “uses a form of quadrature amplitude modulation (QAM) to transmit data in each channel simultaneously.” Pet. 28 (citing Ex. 1011, 10:60–65). Petitioner concludes, with supporting evidence, that a person having ordinary skill in the art would have understood that Milbrandt’s modem 42 transmits a message (including subscriber line information) whose bits are modulated onto DMT symbols using QAM. Pet. 28; Ex. 1009, 53–54. As further support for the contention, Petitioner relies on Hwang for its description that a “DMT signal is basically the sum of N independently quadrature amplitude modulated (QAM) signals, each carried over a distinct carrier frequency channel.” Pet. 28 (citing Ex. 1013, 2:67–3:3) (emphasis

omitted). Hwang further explains, as pointed out by Petitioner, that ANSI standard provides for a total number of 256 carriers or tones where each tone is QAM to carry up to 15 bits of data on each cycle of the tone waveform (symbol). Pet. 28 (citing Ex. 1013, 3:4–12). Petitioner concludes, and we agree, that it would have been obvious to transmit Milbrandt’s message (including subscriber line information) by modulating bits in the message onto DMT symbols using QAM with more than 1 bit per subchannel, as taught by Hwang for the reasons provided and discussed in more detail below. Pet. 28; Ex. 1009, 55.

Claim 1 further recites “wherein at least one data variable of the one or more data variables comprises an array representing frequency domain received idle channel noise information.” Petitioner contends Milbrandt describes that modem 42 determines noise information for a received signal at one or more sub-frequencies. Pet. 29 (citing Ex. 1011, 11:38–45, 12:65–13:16). Petitioner further contends that Milbrandt describes that noise information is stored in a grid as a function of frequency. Pet. 29–30 (citing Ex. 1011, 23:51–57, Fig. 3). Petitioner argues, and we agree, that a person having ordinary skill in the art would have recognized Milbrandt’s grid as an array as claimed. Pet. 30; Ex. 1009, 56–57. Petitioner also contends, and we agree, that Milbrandt describes that determined noise information is transmitted by modem 42 to modem 60. Pet. 31 (citing Ex. 1011, 11:19–24; Ex. 1009, 43–53); *see also* Ex. 1011, 13:11–15. Petitioner accounts for the differences between Milbrandt and the claimed invention. In particular, record evidence supports a finding that Milbrandt describes collecting noise information during operation. Ex. 1011, 12:58–13:3; Ex. 1009 ¶ 90. Petitioner relies on Chang for its description of measuring background noise

on a communication line when no signals are being transmitted, e.g., “idle channel noise information.” Pet. 31; Ex. 1012, Figs. 1, 5, 12:59–66, 13:7–21.

Petitioner contends, with supporting evidence, that a person having ordinary skill would have recognized that Chang measures frequency domain received idle channel noise information (background noise).¹⁰ Pet. 31–32; Ex. 1009, 60–61. Petitioner concludes that it would have been obvious for Milbrandt to measure and evaluate background channel noise, for the purpose of assessing system interactions from different sources of noises and to address any problems. Pet. 32; Ex. 1009, 35–37.

Notwithstanding Patent Owner’s arguments with respect to the combined teachings of Milbrandt and Chang, which we address below, we are persuaded by Petitioner’s showing, and agree that it would have been obvious to combine Chang with the teachings of Milbrandt for the purpose of assessing interactions from other sources. The record evidence supports the conclusion of obviousness, because combining Chang’s teaching of assessing idle channel noise to Milbrandt’s system would have provided a person of ordinary skill in the art additional information, such as assessing interactions from other sources, enabling a person of ordinary skill in the art to have taken remedial measures to address system interactions. Pet. 16 (citing Ex. 1009, 35–36).

Petitioner argues that while Milbrandt teaches that noise information is stored in a grid (array), Milbrandt does not explicitly describe that the information is transmitted as an array. Pet. 33. ANSI T1.413, Petitioner

¹⁰ As set forth above, in the claim interpretation section, and uncontested by the parties, background noise is within the scope of “idle channel noise.”

contends, describes transmitting data variables that have a value for a plurality of frequency sub-carriers. Pet. 33; Ex. 1009, 62–63. Petitioner argues that a person having ordinary skill in the art would have recognized that a frequency sub-carrier in the ANSI T1.413 standard corresponds to Milbrandt’s sub-frequency, and that both of these terms correspond to the claimed “subchannel.” Pet. 33–34; Ex. 1009, 62–63. Petitioner concludes, and we agree, that it would have been obvious to a person having ordinary skill in the art to transmit Milbrandt’s power spectrum density and attenuation information using the same array data format taught by ANSI T1.413, which would have resulted in the benefit of allowing the receiving modem to receive and access the information on a per channel basis, without the need for additional processing or reordering of the received information. Pet. 34; Ex. 1009, 62–63.

Petitioner provides a reasonable rationale for combining Milbrandt, Chang, Hwang, and ANSI T1.413. Pet. 14–24. In addition to the reasons for combining Chang with Milbrandt discussed above, Petitioner further contends that combining Hwang with the Milbrandt/Chang combination would have been obvious. Pet. 20–22. Petitioner explains that Hwang provides additional details about ADSL services, beyond those expressly disclosed in Milbrandt, by explaining that multitone (DMT) symbols are modulated using QAM. Pet. 20. Petitioner contends, and we agree, that a person having ordinary skill in the art would have found it obvious to combine the teachings of Milbrandt and Hwang, because Hwang provides additional details of ADSL communication technology, such as using up to 15 bits for each subchannel for the purpose of transmitting more data on each subchannel. More data per subchannel, Petitioner contends and we

agree, would have been recognized by a person having ordinary skill in the art as resulting in a more efficient system that has higher throughput. Pet. 20–21; Ex. 1009, 39.

Lastly, Petitioner contends that it would be obvious to combine the teachings of Milbrandt, Chang, and Hwang with the teachings of ANSI T1.413, because each reference describes ADSL communications systems, and ANSI T1.413 defines the ADSL communication standard. Pet. 22; Ex. 1009, 40. Petitioner further contends, and we agree, that a person having ordinary skill in the art would have utilized the teachings of ANSI T1.413 in the combined communication system for the purpose of making the system compliant with the ANSI T1.413 standard. Pet. 27; Ex. 1009, 41.

Independent claims 2–6 are similar to claim 1. Petitioner has made a showing with respect to those claims similar to its showing with respect to claim 1. Pet. 34–49. To the extent that claims 2–6 differ from claim 1, Petitioner has accounted sufficiently for such differences. Notwithstanding Patent Owner’s arguments, which we have considered and which we address below, we are persuaded by Petitioner’s showing, which we adopt as our own findings and conclusions, that claims 1–6 are unpatentable as obvious over Milbrandt, Hwang, Chang, and ANSI T1.413.

Patent Owner’s Contentions

Patent Owner argues that the combined teachings of the references, in particular Milbrandt and Chang, do not render obvious transmitting (receiving) a test message comprising “idle channel noise information.” PO Resp. 8. In particular, Patent Owner argues that (1) Milbrandt teaches away from using Chang’s circuitry for measuring background noise (*id.* at 9–16); (2) Petitioner failed to establish a reasonable expectation of success in using

Chang’s concept of measuring background noise in some other manner (*id.* at 16–19); (3) incorporating Chang’s background noise measurement would have improperly changed Milbrandt’s fundamental principle of operation (*id.* at 19–22); and (4) adding any method of measuring background noise to Milbrandt would have been redundant and unnecessary (*id.* at 22–26). Lastly, Patent Owner argues that Dr. Kiaei’s original declaration should be given no weight. *Id.* at 26–28. We address each argument below.

Teaching Away

Patent Owner argues that Milbrandt teaches away from using Chang’s circuitry for measuring background noise. PO Resp. 9–16 (citing “teaching away” case law regarding prior art teaching away from the *claimed invention*). Patent Owner argues that Petitioner only proposed combining Chang’s actual physical equipment, which would require a visit from a technician or “truck roll,”¹¹ into Milbrandt’s system, but that Milbrandt describes that a truck roll is undesirable. PO Resp. 9–11. We disagree. Although the Petition suggests combining Chang’s background noise test circuitry with Milbrandt, the Petition argues that “Petitioner’s combination permits, but does not require, physical incorporation of elements but rather that the combined teachings of the prior art as a whole would have rendered the claim[s] obvious.” Pet. 19; *see also* Ex. 1009 ¶ 98. Patent Owner’s view of Petitioner’s position is too myopic. Because Patent Owner’s entire teaching away argument is premised on the incorrect notion that Petitioner

¹¹ The parties use “truck roll” to mean a service technician visit. *See, e.g.*, PO Resp. 11 (citing Ex. 1011, 2:9–15 “dispatch of a service technician to install communication equipment or to configure the telephone line at the customer premises”); Pet. Reply 6.

proposes only physically incorporating the entirety of Chang’s testing arrangement, which would necessitate using a “truck roll” into Milbrandt, the argument necessarily fails.

In addition, even assuming that Petitioner proposed only combining Chang’s actual physical equipment, which would require a visit from a technician or “truck roll,” into Milbrandt’s system, as Patent Owner alleges, we determine that Patent Owner’s teaching away arguments still would not be persuasive and we disagree that Milbrandt would have discouraged a person of ordinary skill in the art from looking to the teachings of Chang.

A reference does not teach away if it merely expresses a general preference for an alternative invention but does not “criticize, discredit, or otherwise discourage” investigation into the *invention claimed*. *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (emphasis added). Our reviewing court has recently held that “[e]vidence concerning whether the prior art teaches away from a given invention *must relate to and be commensurate in scope with the ultimate claims at issue*.” *Idemitsu Kosan Co. v. SFC Co.*, 2016-2721, 2017 WL 4078964 *4 (September 15, 2017) (citing *MeadWestVaco Corp. v. Rexam Beauty and Closures, Inc.*, 731 F.3d 1258, 1264–1265 (Fed. Cir. 2013); *In re Kahn*, 441 F.3d 977, 990 (Fed. Cir. 2006); *In re Zhang*, 654 F. App’x 488, 490 (Fed. Cir. 2016) (“While a prior art reference may indicate that a particular combination is undesirable *for its own purposes*, the reference can nevertheless teach that combination if it *remains suitable for the claimed invention*.”) (emphasis added).

The claims do not foreclose a “truck roll.” For instance, claim 1 recites a transceiver capable of transmitting test information over a communication channel. Claim 1 further recites that the transceiver

comprise a “transmitter portion capable of transmitting a message” where “the message comprises one or more data variables that represent the test information” and that at least one data variable “comprises an array representing frequency domain received idle channel noise information.” Thus, claim 1 is directed to a transceiver and the type of message the transceiver is capable of transmitting. There is nothing in claim 1 that specifies how the transceiver message originates or how the test information is measured. While we agree with Patent Owner that the Specification of the ’430 patent describes that dispatching a technician to a remote site to perform testing, e.g., a “truck roll,” is time consuming and expensive (PO Resp. 12 (citing Ex. 1001, 1:21–23)), we find that there are described embodiments of the invention that include a truck roll. Ex. 1001, 6:31–38 (“If the CRC checker 210 does not determine a correct CRC at the maximum power level and the diagnostic link mode [cannot] be initiated then other methods for determining diagnostic information are utilized, *such as dispatching a technician to the remote site, or the like.*”) and 3:12–14 (“[t]he systems and methods of this invention can *enter the diagnostic link mode manually*, for example, *at the direction of a technician* or a user after completing a portion of initialization.”). For these reasons, the claimed invention does not preclude a truck roll. In any event, as discussed above, the claims are not directed to how test information is obtained or measured. Accordingly, even if Patent Owner is correct that Milbrandt discourages a truck roll *for its own purposes*, we find the combined teachings of Milbrandt and Chang are relevant because the combination remains suitable for the *claimed invention*.

Reasonable Expectation of Success

Patent Owner argues that even if Petitioner had proposed incorporating Chang's teaching of measuring background noise into Milbrandt without using Chang's physical equipment, Petitioner failed to show any reasonable expectation of success in doing so. PO Resp. 16–18. Patent Owner also argues that Petitioner failed to address, or present any evidence, to show that a person having ordinary skill in the art would have known how to combine Chang with Milbrandt without a technician visit or truck roll. *Id.* at 19. We are not persuaded by Patent Owner's arguments.

Petitioner relies on Milbrandt for teaching transmitting test information (message) over subscriber lines. Thus, a person having ordinary skill in the art at the time of the invention knew how to transmit, and thus, receive or obtain, test information without a truck roll. Ex. 1011, 11:38–45. Petitioner relies on Chang for its teaching of transmitting a particular kind of test information. Petitioner explains, with supporting evidence, why a person having ordinary skill in the art would have wanted to include Chang's type of test information in the information transmitted by Milbrandt's system. In particular, Petitioner argues that measurements of idle channel noise information represent noise, such as thermal noise, cross talk, and impulse noise. Pet. 14–15 (citing Ex. 1020, 109). Petitioner further argues that such noises are independent of data signals transmitted on a subscriber line and are most readily and directly measured when there are no data signals on the line. Pet. 15 (citing Ex. 1009, 33–34). Petitioner concludes that it would have been obvious to a person having ordinary skill in the art at the time of the invention to combine the teachings of Chang with those of Milbrandt for the purpose of assessing interactions from other

sources, including thermal effect, inductive coupling, and power spikes so as to take appropriate remedial measures to minimize system interactions and to address the noise source. Pet. 16 (citing Ex. 1009, 35–36), 32 (citing Ex. 1009, 35–37). Based on the record before us, that was all that was required from Petitioner.

We disagree with Patent Owner (PO Resp. 19) that Petitioner needed to provide technical details for how a person of ordinary skill in the art would have measured idle channel noise information and transmitted that information using Milbrandt's system, e.g., without a truck roll. In making its arguments, Patent Owner fails to take into account the level of skill that a person of ordinary skill would have had in this art. The involved patent itself does not provide specific details on how to measure idle channel noise information, indicating that at the time of the invention, measuring idle channel noise, with or without a truck roll, would be within the skill set of a person of ordinary skill in the art. Moreover, Petitioner persuasively argues that both experts agree that a person having ordinary skill in the art would have known how to measure idle channel noise information without a truck roll. Pet. Reply 14–15 (citing Ex. 1100 ¶ 73; Ex. 1110, 136:4–137:9); *see also* Pet. Reply 11; Ex. 1100 ¶ 77 (explaining that a person having ordinary skill in the art would have known how to include Chang's circuitry in Milbrandt's modem).¹² For all of the above reasons, we are not persuaded by Patent Owner's arguments.

¹² Patent Owner lists several portions of Petitioner's Reply and evidence allegedly beyond the scope of what can be considered appropriate for a reply. *See* Paper 22. We have considered Patent Owner's listing, but disagree that the cited portions of Petitioner's Reply and reply evidence are beyond the scope of what is appropriate for a reply. Replies are a vehicle for

Improperly Changing Milbrandt's Principle of Operation

Patent Owner argues that Chang's background noise measurement is incompatible with the purpose of Milbrandt's transmitted test information. PO Resp. 19–20. Patent Owner argues that because Chang teaches terminating a line in order to measure background noise (idle channel noise), that that teaching is incompatible with transmitting the same parameter over the line from one modem to another modem. *Id.* at 21 (citing Ex. 2001 ¶ 81). We are not persuaded by Patent Owner's arguments. First, Patent Owner's arguments are premised on the notion that Petitioner proposes a total incorporation of Chang into Milbrandt's system, which for reasons discussed above are not persuasive. Second, Patent Owner's arguments are not particularly relevant to the claimed invention, as none of the claims are directed to how test information is obtained or measured. The claims are directed only to the kind of test information transmitted (or received).

In addition, Patent Owner's arguments are misplaced. A person having ordinary skill in the art at the time of the invention would have understood that idle channel noise is obtained during idle times, when the subchannel is not in operation. Ex. 1009 ¶¶ 48, 91; Ex. 1110, 133:12–

responding to arguments raised in a corresponding patent owner response. Petitioner's arguments and evidence that Patent Owner objects to (Paper 22, 1) are not beyond the proper scope of a reply because we find that they fairly respond to Patent Owner's arguments raised in Patent Owner's Response. *See Idemitsu*, 870 F.3d 1376, 1381 (Fed. Cir. 2017) (“This back-and-forth shows that what Idemitsu characterizes as an argument raised ‘too late’ is simply the by-product of one party necessarily getting the last word. If anything, Idemitsu is the party that first raised this issue, by arguing—at least implicitly—that Arkane teaches away from non-energy-gap combinations. SFC simply countered, as it was entitled to do.”).

134:15. Thus, Patent Owner’s argument that “there is simply no compatible way to incorporate Chang’s background noise measurement as a transmitted test measurement in Milbrandt” is misplaced because it assumes that the transmission of the resultant measurement would be done at the same time that all other measurements are taken and transmitted, e.g., when the subchannel is in operation. PO Resp. 21. Dr. Kiaei testifies that a person having ordinary skill in the art would have understood that idle channel noise measurement would be performed either during initialization or during periods when the modem is idle, and “that after the idle channel/background noise measurement completes, signals can continue to be transmitted from the remote modem to the central office modem in accordance with Milbrandt’s teachings.” Ex. 1100 ¶ 82. Dr. Chrissan’s testimony on the matter (Ex. 2001 ¶ 81) is based on bodily incorporating Chang into Milbrandt without considering what the combined teachings of Chang and Milbrandt would have suggested to a person having ordinary skill in the art. *In re Keller*, 642 F.2d 413, 425 (Fed. Cir. 1981). Accordingly, we are not persuaded by Patent Owner’s arguments that Chang is incompatible with Milbrandt.

*Adding Chang’s Teachings to Milbrandt
would have been Unnecessary*

Patent Owner argues that Milbrandt “was already able to do all of the same things that Petitioners claim would have been beneficial by using total noise measurements rather than background noise.” PO Resp. 22. Patent Owner’s arguments are not persuasive.

Petitioner argues, in the Petition, that a person having ordinary skill in the art would have recognized that it is important to measure and evaluate

noise present on the subscriber line when the subchannel is not in operation for assessing interactions from other sources and to take remedial measures to address the noise source. Pet. 14–15, 32; Ex. 1009 ¶¶ 48, 91. Petitioner also gives examples of the type of background noise that may be present. Pet. 15; Ex. 1009 ¶ 91; Ex. 1017, 613; Ex. 1020, 109. Petitioner further explains that background noise sources are independent of data signals transmitted on a subscriber line and that the time to measure idle noise is when no data signals are transmitted on the line. Pet. 15; Ex. 1009 ¶ 91.

In its Response, Patent Owner makes the assumption that Petitioner’s arguments as to benefit and desirability for measuring background noise only amounts to *increasing signal strength* as a remedial measure in response to the degree of such noise in Chang, because the type of noise is not determinable. PO Resp. 23–24 (citing Ex. 2001 ¶¶ 82–83). As Petitioner points out, however, measuring noise without transmitting a signal from a transceiver over a subscriber line eliminates possible sources of noise, e.g., the transceiver, and, thus would be beneficial for assessing system interactions and the source of noise. Pet. 32; Pet. Reply 20 (citing Ex. 1100 ¶¶ 85–89). Thus, we disagree that there would be no benefit of measuring background noise. We find that measuring background noise would have provided a person having ordinary skill in the art a more complete picture of the origin of the noise. Ex. 1100 ¶¶ 85–89, 91; Ex. 1110, 134:8–15.

No Weight Should be Given to Dr. Kiaei’s Declaration

Patent Owner argues that no weight should be given to Dr. Kiaei’s declaration because he lacks knowledge about basic concepts at issue in the proceeding. PO Resp. 26. In support of the argument, Patent Owner directs

attention to portions of Dr. Kiaei’s cross examination testimony where he allegedly (1) paused too long when answering a few questions, (2) was unfamiliar with certain terms or concepts, and (3) was incorrect from a technological standpoint. *Id.* at 27–28.

We have reviewed the arguments provided by Patent Owner and determine such arguments are insufficient to have Dr. Kiaei’s declaration excluded in its entirety. Rather, it is within our discretion to assign the appropriate weight to be accorded evidence. *See* 37 C.F.R. § 42.65(a); *see also, e.g., Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (holding the Board has discretion to give more weight to one item of evidence over another “unless no reasonable trier of fact could have done so”); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations.”); and *Velander v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) (“In giving more weight to prior publications than to subsequent conclusory statements by experts, the Board acted well within [its] discretion.”). Based on the record before us, we are not persuaded that we should give the entirety of Dr. Kiaei’s declaration no weight.

E. Patent Owner’s Motion to Exclude

Patent Owner moves to exclude Exhibits 1103 and 1109. PO Mot. Exc. Exhibit 1103 is styled “Declaration of Robert Short” and Exhibit 1109 is styled “FCC Filing for Alcatel Model 1000 ADSL Modem, 1999.” Pet. Reply 4–5. Patent Owner argues that we should exclude Exhibit 1103 and Exhibit 1109 as hearsay, and that Exhibit 1109 should be excluded further as irrelevant. PO Mot. Exc. 2–4. Although Dr. Kiaei cites Exhibits 1103 and

1109 in his second declaration (Ex. 1100 ¶¶ 7, 10, 39), Exhibits 1103 and 1109 were not cited or discussed in any way in Petitioner's Reply. Moreover, we did not rely on Exhibits 1103 or 1109, or Dr. Kiaei's statements with respect to Exhibits 1103 and 1109 in rendering our decision. We did not and need not consider Exhibits 1103 and 1109. We have determined that Petitioner has demonstrated, by a preponderance of the evidence, that the challenged claims are unpatentable, without considering the specific objected to evidence or the portion of Dr. Kiaei's statements that discuss Exhibits 1103 and 1109. Accordingly, we *dismiss* Patent Owner's Motion to Exclude.

F. Motion for Observations

Patent Owner also filed a Motion for Observations (Paper 32, "PO Mot. Obs."), to which Petitioner filed a Response (Paper 35, "Pet. Resp."). To the extent Patent Owner's Motion for Observations pertains to testimony purportedly impacting Dr. Kiaei's credibility, we have considered Patent Owner's observations and Petitioner's responses in rendering this Final Written Decision, and accorded Dr. Kiaei's testimony appropriate weight in view of Patent Owner's observations and Petitioner's response to those observations. *See* PO Mot. Obs. 1–6; Pet. Resp. 1–7.

III. CONCLUSION

Based on the evidence and arguments, Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 would have been obvious over Milbrandt, Hwang, Chang, and ANSI T1.413 under 35 U.S.C. § 103(a).

IV. ORDER

Accordingly, it is:

ORDERED that claims 1–6 of the '430 patent have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed*; and

FURTHER ORDERED that, because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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