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Paper 9
Date: September 25, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COX COMMUNICATIONS, INC.,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

IPR2024-00579
Patent 8,223,775 B2

Before LYNNE H. BROWNE, BARBARA A. PARVIS, and FREDERICK C. LANEY, *Administrative Patent Judges.*

PARVIS, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Cox Communications, Inc. ("Petitioner") filed a Petition (Paper 1 ("Pet.")) requesting *inter partes* review of claims 18 and 19 ("challenged claims") of U.S. Patent No. 8,223,775 B2 (Ex. 1001, "the '775 patent"). Entropic Communications, LLC ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp.").

Under 35 U.S.C. § 314, an *inter partes* review may not be instituted unless the information presented in the petition and any response "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." For the reasons provided below, we determine that Petitioner has not demonstrated a reasonable likelihood that it will prevail in showing the unpatentability of at least one challenged claim. Accordingly, we do not institute *inter partes* review.

II. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Cox Communications, Inc.; Coxcom, LLC; and Cox Communications California, LLC as real parties-in-interest. Pet. 80. Patent Owner identifies itself as real party-in-interest. Paper 7, 1.

B. Related Matters

Both parties identify, as matters currently involving the '775 patent, *Entropic Communications, LLC v. Cox Communications, Inc.*, No. 2:23-cv-01049 (C.D. Cal.) and *Entropic Communications, LLC v. Comcast Corp.*, No. 2:23-cv-01050 (C.D. Cal.). Pet. 81; Paper 7, 1. The parties also identify *Entropic Communications, LLC. v. Charter Communications, Inc.*, No. 2:22-cv-00125 (E.D. Tex.), which was dismissed. Pet. 81; Paper 7, 1.

Patent Owner further identifies *Comcast Corporation v. Entropic Communications, LLC*, IPR2024-00446 (PTAB) ("the '446 IPR"), a second petition challenging the '775 patent, as a related matter. Paper 7, 1.

C. The '775 Patent

The '775 patent is titled "Architecture for a Flexible and High-Performance Gateway Cable Modem." Ex. 1001, code (54). The '775 patent "relates to a cable modem system having a functionally partitioned and flexible architecture." *Id.* at 1:7–10, 1:13–16.

Figure 1 of the '775 patent, reproduced below, is a block diagram of cable modem system architecture 100. *Id.* at 2:49–50.

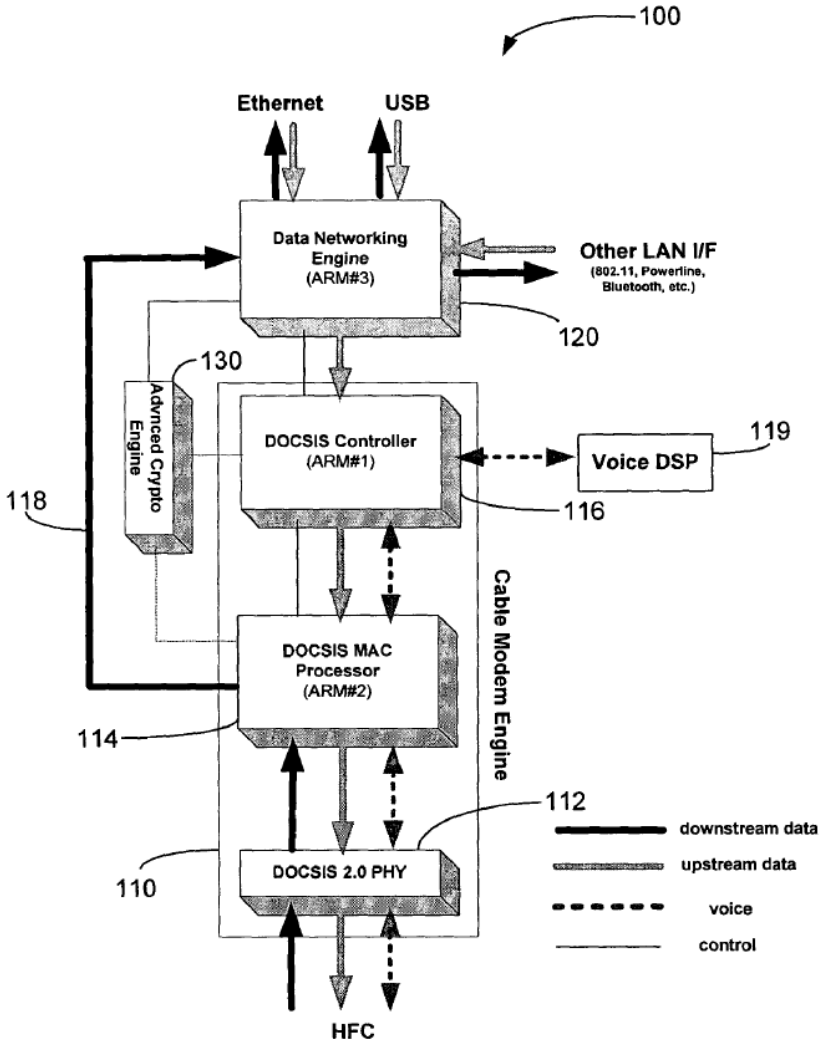

Figure 1

Figure 1 is a block diagram of cable modem system architecture 100. *Id.* at 2:49–50.

Cable modem system architecture 100 shown in Figure 1 includes three major subsystems: cable modem engine (CME) 110, data networking engine (DNE) 120, and advanced crypto engine (ACE) 130. *Id.* at 2:49–54. Cable modem engine 110 is divided into three functional blocks: Data Over Cable Service Interface Specification (DOCSIS) physical (PHY) layer 112,

DOCSIS Media Access Control (MAC) processor 114, and DOCSIS controller 116. *Id.* at 2:55–59.

Figure 2, reproduced below, is a functional block diagram implementing the cable modem architecture of Figure 1. *Id.* at 2:44–45.

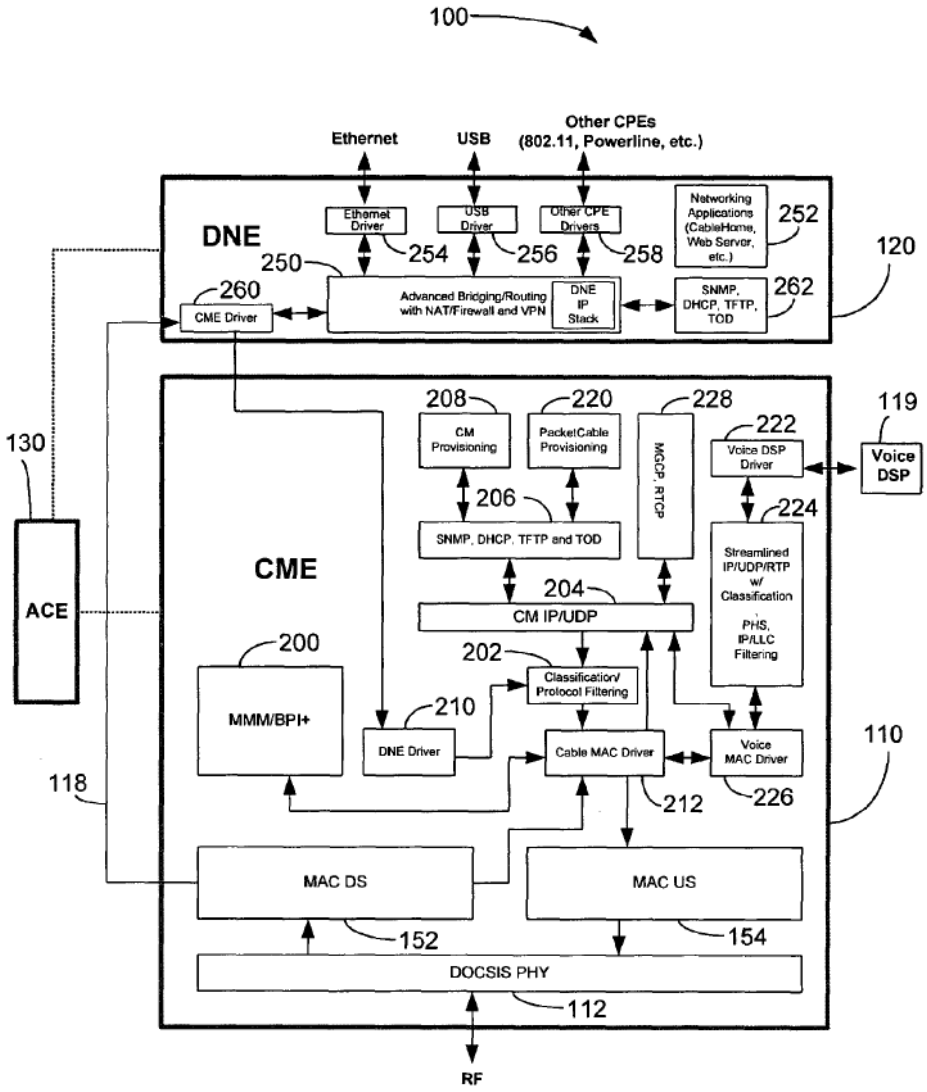

Figure 2

Figure 2 is a functional block diagram illustrating in greater detail cable modem engine 110 and data networking engine 120. *Id.* at 2:53–55.

As shown in Figure 2, processor 114 is represented by MAC downstream (DS) block 152 and MAC upstream (US) block 154. *Id.* at

3:18–20. Controller 116 implements DOCSIS functions as follows: MAC management message (MMM)/(baseline privacy interface) BPI+ (block 200), classification and protocol filtering (block 202), cable modem Internet Protocol (IP)/User Data Protocol (UDP) (block 204), simple network management protocol (SNMP), dynamic host configuration protocol (DHCP), trivial file transfer protocol (TFTP) and time of day (TOD) functionality (block 206), and cable modem provisioning (block 208). *Id.* at 3:25–38.

Controller 116 also implements PacketCable functionality (blocks 220-228). *Id.* at 3:39–42. PacketCable functionality includes provisioning (block 220), voice digital signal processor (DSP) driver (block 222), streamlined IP/UDP/Real Time Transport Protocol (RTP) with classification, PHS, IP/Logical Link Control (LLC) filtering (block 224), and voice MAC driver (block 226). *Id.*

Data networking engine 120 is responsible for data networking processing including advanced multi-port bridging/routing with network address translation (NAT)/firewall and virtual private network (VPN) (block 250), and home networking applications (CableHome and Web Server) (block 252). *Id.* at 3:49–53. The entire embedded portal services (PS) functionality of the CableHome specification is contained within data networking engine 120, with the CableHome functionality being decoupled from the PacketCable and DOCSIS functionality provided by cable modem engine 110. *Id.* 3:53–58.

D. Illustrative Claim

Petitioner challenges claims 18 and 19 of the ’775 patent. Pet. 3. Claims 18 is an independent claim and claim 19 depends from claim 18.

Independent claim 18, reproduced below with Petitioner's labels for limitations, is illustrative of the claimed subject matter.

> 18. [preamble] A cable modem system comprising:
>
> [18a] a data networking engine implemented in a first circuit that includes at least one processor, [18b] the data networking engine programmed with software that when executed by the at least one processor of the first circuit causes the data networking engine to perform home networking functions including interfacing with customer provided equipment;
>
> [18c] a cable modem engine implemented in a second circuit that includes at least one processor, [18d] the second circuit being separate from the first circuit, [18e] the cable modem engine programmed with software that when executed by the at least one processor of the second circuit causes the cable modem engine to perform cable modem functions other than the home networking functions performed by the data networking engine, [18f] the cable modem functions including interfacing with cable media, and [18g] the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine, [18h] the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor, [18i] the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput; and
>
> [18j] a data bus that connects the data networking engine to the cable modem engine, [18k] wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine.

Ex. 1001, 7:33–8:27.

E. Evidence

Petitioner relies on the patent references summarized in the table below.

Name	Reference	Exhibit
Schain	US 2003/0161333 A1, published Aug. 28, 2003	1005
Thi	US 2002/0061012 A1, published May 23, 2002	1006
Perlman	US 2002/0091866 A1, published July 11, 2002	1007
Crocker	US 7,769,046 B1, issued Aug. 3, 2010	1008
Fox	US 7,225,240 B1, issued May 29, 2007	1009

Petitioner also relies on the Declaration of Dr. James Martin (Ex. 1003) to support its contentions that the challenged claims are unpatentable. Patent Owner relies on the Declaration of Samuel H. Russ, Ph.D. (Ex. 2003) in support of its contentions that Petitioner has not shown that the challenged claims are unpatentable.

F. Asserted Grounds

Petitioner asserts that the challenged claims of the '775 patent are unpatentable based on the following grounds summarized in the table below (Pet. 3):

Claim(s) Challenged	35 U.S.C. §[1]	References/Basis
18, 19	103(a)	Schain, Thi
18, 19	103(a)	Perlman, Crocker, Fox

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the challenged claims of the '775 patent have an apparent effective filing date before March 16, 2013, the pre-AIA version of § 103 applies.

III. ANALYSIS

A. Legal Standards

A patent claim is unpatentable under 35 U.S.C. § 103(a) when 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 the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *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) when in evidence, objective evidence of nonobviousness, i.e., secondary considerations.[2] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art

> would have had at least i) a bachelor-level degree in electrical engineering or an equivalent subject and three or more years of experience working in the field of cable and/or satellite signal processing and communication systems; ii) a master's level degree in electrical engineering or an equivalent subject and one or more years of experience working in the field of cable and/or satellite television signal processing and communication systems; or iii) a Ph.D.-level degree in electrical engineering or an equivalent subject and at least some experience working in the field of cable and/or satellite television signal processing and/or communication systems.

Pet. 10 (citing Ex. 1003 ¶ 20).

[2] The present record does not include any objective evidence of nonobviousness.

Patent Owner does not challenge the level of ordinary skill in the art proposed by Petitioner's expert. *See generally* Prelim. Resp.

In the related IPR2024-00446 proceeding, Comcast Cable Communications, LLC asserted that a person of ordinary skill in the art

> would have had at least a degree in computer or electrical engineering, computer science, information systems, or a similar discipline, along with three-to-four years of experience with the design and/or implementation of cable modems within network-based content delivery systems. Ex. 1002, ¶¶40-45. Additional education may substitute for professional experience, and significant work experience may substitute for formal education. *Id.*

'446 IPR, Paper 2, 12. Patent Owner also did not challenge that proposed level of ordinary skill in the art. *See generally* '446 IPR, Paper 8. We stated, "[f]or purposes of this Decision, we adopt Petitioner's proposal as reasonable and consistent with the '775 patent specification and the prior art." '446 IPR, Paper 11, 10.

The proposed level of the ordinarily skilled artisan in the instant proceeding is similar to that adopted in the '446 IPR proceeding. Here, Petitioner has not argued that the already-adopted level is wrong or explained why any differences in proposed skill levels impact the outcome of this proceeding.

For purposes of this Decision, we maintain our determination to adopt the proposed level of skill in IPR2024-00446 as that skill level is reasonable and consistent with the '775 patent specification and the prior art. Our analysis and conclusions herein, however, would be the same using Petitioner's proposed level of the ordinarily skilled artisan in the instant proceeding.

C. Claim Construction

We interpret the challenged claims

> using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *Phillips v. AWH Corp*., 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc).

Petitioner states that in the dismissed *Entropic Communications, LLC. v. Charter Communications, Inc.*, No. 2:22-cv-00125 (E.D. Tex.) proceeding, "the court adopted [the] ordinary meaning for all terms except the 'wherein' clause appearing in claim 18." Pet. 11 (citing Ex. 1011). According to Petitioner, "[t]he court's construction of the wherein clause, however, does not help clarify the meaning of the claim term and thus construction in this proceeding is not necessary." *Id.* Petitioner further states "as to the 'wherein' clause of claim 18, the ordinary meaning applies" and "none of the remaining claim terms of the '775 Patent need be construed by the Board." *Id.* (citing Ex. 1003 ¶ 18). Patent Owner does not propose any express claim constructions in the instant proceeding. *See generally* Prelim. Resp.

In the instant proceeding, our analysis of limitations 18d and 18i is dispositive. "The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'"

Realtime Data, LLC v. Iancu, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). For purposes of this Decision, therefore, we do not provide analysis or an express construction of the "wherein" clause recited in claim 18.

In the '446 IPR, we declined to limit the claim term "DOCSIS controller" to a controller performing the specific functions identified by Patent Owner in the '775 patent Specification. '446 IPR, Paper 11, 14 (citing '446 IPR, Paper 8, 17; Ex. 1001, 3:25–38). We further stated that in the '446 IPR, "we use the ordinary and customary meaning of the term and decline to provide further analysis or an express construction to resolve the dispute between the parties." *Id.* at 14–15. In light of the analysis in the instant proceeding, we need not provide an analysis of the term "DOCSIS controller" to resolve a dispute between the parties.

D. Overview of the Asserted Art

1. Schain (Exhibit 1005)

Schain is titled "Broadband Modem Residential Gateway with Efficient Network Traffic Processing." Ex. 1005, code (54). Schain relates "to providing efficient traffic processing in a residential gateway for both local and external traffic." *Id.* ¶ 2. Schain describes "a broadband gateway for a DOCSIS 1.0 and 1.1 compliant cable modem/residential gateway device." *Id.* ¶ 25.

Schain's Figure 3 is reproduced below.

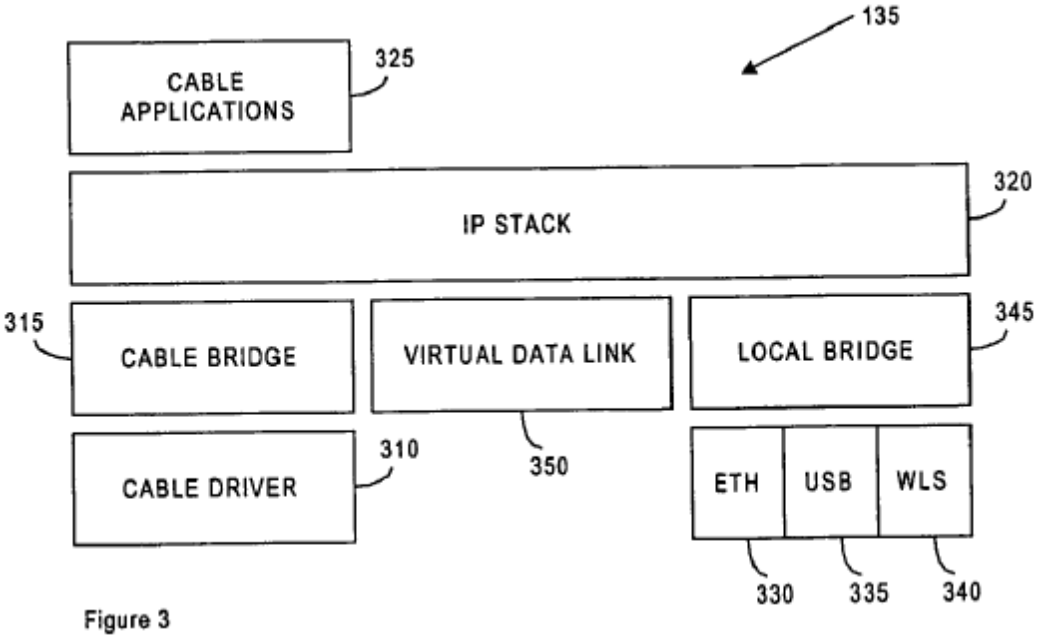

Figure 3 illustrates a logical architecture of dual-bridge, shared module cable broadband gateway 135. *Id.* ¶¶ 20, 45.

Broadband gateway 135 has "two portions, a broadband modem portion and a residential gateway portion, for the specific case of coaxial cabling being the broadband medium." *Id.* ¶ 45. According to Schain, "[t]he logical architecture features two bridges, one for the broadband modem portion (a cable bridge 315) and one for the residential gateway portion (a local bridge 345) of the broadband gateway 135." *Id.*

Schain states, on the one hand, that "cable bridge 315 is responsible for processing external packets received at the cable modem and also provides DOCSIS specified filtering of the external packets" and "local bridge 345, on the other hand, provides address filtering, general filtering, and translating for local packets and packets crossing the interface." *Id.* ¶ 46. Schain further states that "[b]eneath each bridge is a separate driver layer, with the cable modem featuring a cable driver 310 and the residential

gateway various drivers, such as an Ethernet driver 330, an USB driver 335, and a wireless driver 340." *Id.*

Schain describes the use of virtual data link 350 to connect local bridge 345 to cable bridge 315 and transfer packets across the local network and external network interface. *Id.* ¶ 48. According to Schain, "[u]se of the virtual data link 350 permits the logical separation of the two bridges 315 and 345 while permitting the sharing of the same IP stack 320" and "[b]y keeping the two bridges separate, the processing of external and local packets can be kept separate." *Id.* ¶ 51.

Schain's Figure 5 is reproduced below.

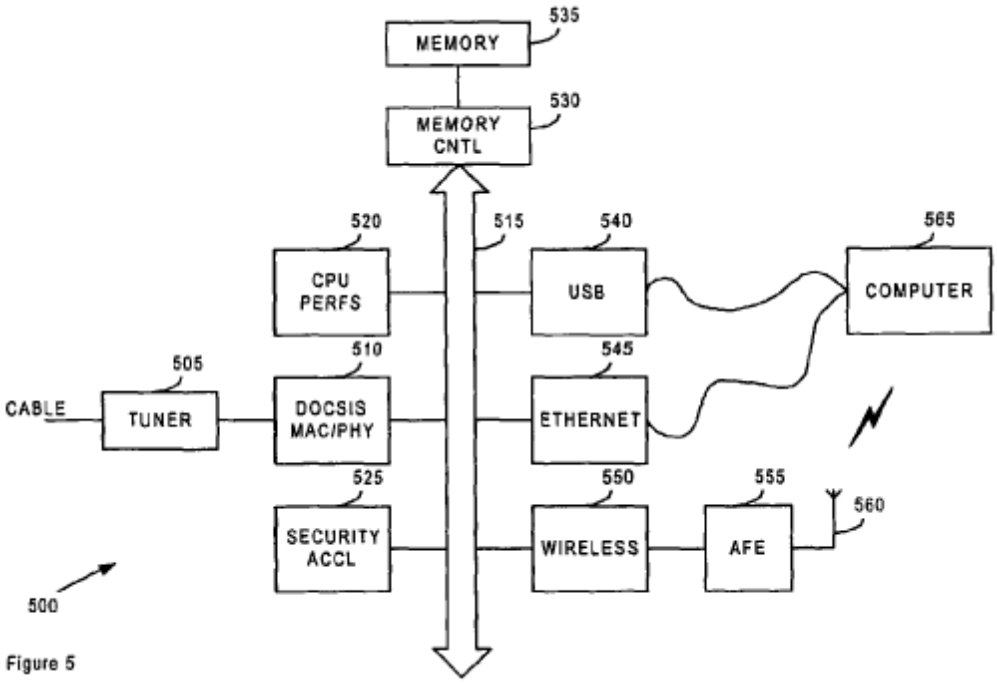

Figure 5 depicts a hardware view of cable broadband gateway 500. *Id.* ¶¶ 22, 59.

Broadband gateway 500 has a coaxial cable that is coupled to tuner 505 that is used to select a communications channel. *Id.* ¶ 59. Schain states that the communications channel carries a data/information stream that "is

forwarded to a DOCSIS MAC/PHY layer processor 510 where the information stream (in its encoded form) is converted into a standardized data format, such as a data packets or even a raw data stream that can be used by the devices connected to the broadband gateway 500." *Id.* ¶ 60. According to Schain, "[t]he converted information stream is provided to a common bus 515 by the DOCSIS MAC/PHY processor 510" and "common bus 515 is used by devices and functional units in the broadband gateway 500 to share and exchange control information and data." *Id.* In addition, central processing unit (CPU) 520 is connected to common bus 515. *Id.* ¶ 61. Schain states that "[t]he CPU 520 is responsible for performing any decoding, high-level error detection and correction, high-level signaling, IP packet processing, address translation, etc." *Id.*

2. Thi (Exhibit 1006)

Thi is titled "Cable Modem with Voice Processing Capability." Ex. 1006, code (54). Thi "relates generally to telecommunications systems, and more particularly, to a system for interfacing telephony devices with DOCSIS compatible networks." *Id.* ¶ 2. Thi describes a network gateway including, among other things, DOCSIS Media Access Controller (MAC) 112, which "extracts DOCSIS MAC frames from MPEG-2 frames, processes MAC headers, and filters and processes messages and data." *Id.* ¶¶ 119, 122, Fig. 3. The network gateway further includes "voice and data processor 160 for processing and transporting voice over packet based networks." *Id.* ¶ 147.

3. Perlman (Exhibit 1007)

Perlman is titled "Selectable Mode Multimedia System." Ex. 1007, code (54). Perlman "relates to a multimedia system capable of selecting

between different network protocols for transmitting and receiving data and multimedia content." *Id.* ¶ 2.

Perlman's Figure 2a is reproduced below.

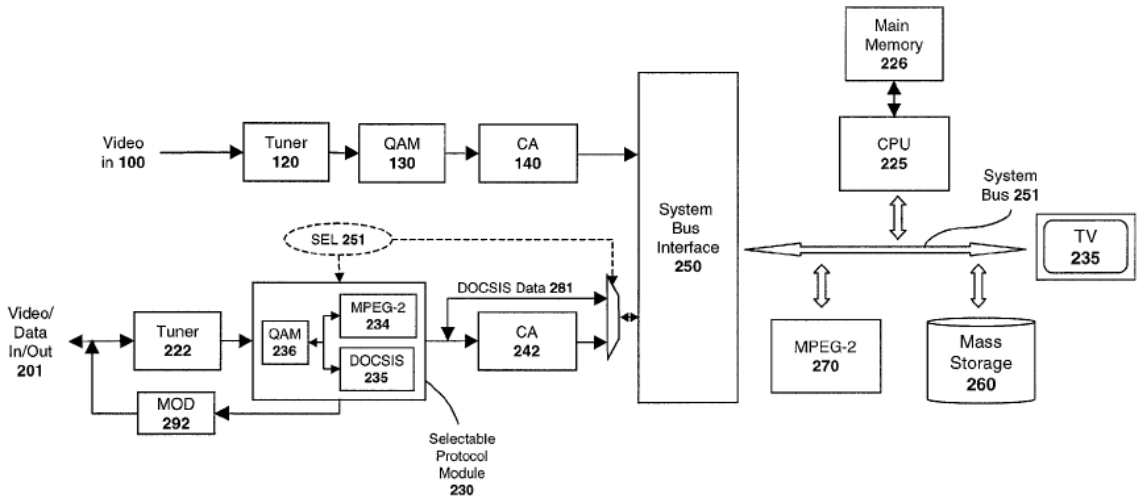

FIG. 2a

Figure 2a depicts a system for receiving and transmitting multimedia content and data. *Id.* ¶ 18.

As shown in Figure 2a, Perlman's system has "a first set of modules for tuning to and decoding a standard multimedia broadcast, including a tuner 120, a QAM module 130, and a CA module 140." *Id.* ¶ 23. Perlman describes that its system also has "selectable protocol module 230 which includes standard MPEG-2 logic 234 for processing multimedia cable/television channels and DOCSIS logic 235 for processing packetized data according to the DOCSIS standard." *Id.* Perlman describes that selection logic 251 selects MPEG-2 logic 234 and QAM logic 236 for processing incoming multimedia content. *Id.* ¶ 24. Selection logic 251 selects DOCSIS module 235 "for communicating DOCSIS-formatted data over the cable provider's network." *Id.* ¶ 25.

Perlman's Figure 2b is reproduced below.

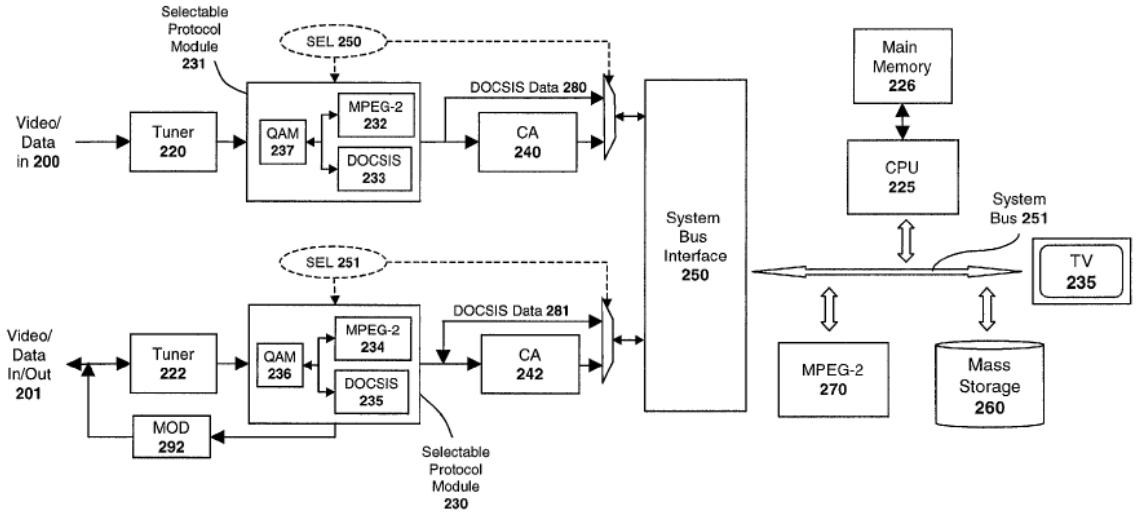

FIG. 2b

Figure 2b depicts another system for receiving and transmitting multimedia content and data. *Id.* ¶ 19.

Figure 2b's embodiment includes "second selectable protocol module 231 which, responsive to selection logic 250, switches between MPEG-2 logic 232 for receiving multimedia content and DOCSIS logic 233 for processing packetized DOCSIS data/content." *Id.* ¶27. Figure 2b's system has two separate communication channels that "process content and data under the DOCSIS standard when selected by selection logic 250-251." *Id.* Perlman states that "[t]he selection logic 250, 251 described herein may be embodied in software executed by the CPU 225 and configured to select between MPEG-2 logic 232, 234 and DOCSIS logic 233, 235 based on the actions of the user." *Id.* ¶ 28.

4. Crocker (Exhibit 1008)

Crocker is titled "Technique for Interfacing MAC and Physical Layers of Access Networks." Ex. 1008, code (54). Crocker "relates generally to communications over a shared-access data network, and more specifically to

a technique for interfacing MAC layers and physical (PHY) layers of access networks." *Id.* at 1:19–22.

Crocker describes a Cable Modem Termination System ("CMTS") in a Head End. *Id.* at 1:50–52. Crocker's Figure 7 is reproduced below.

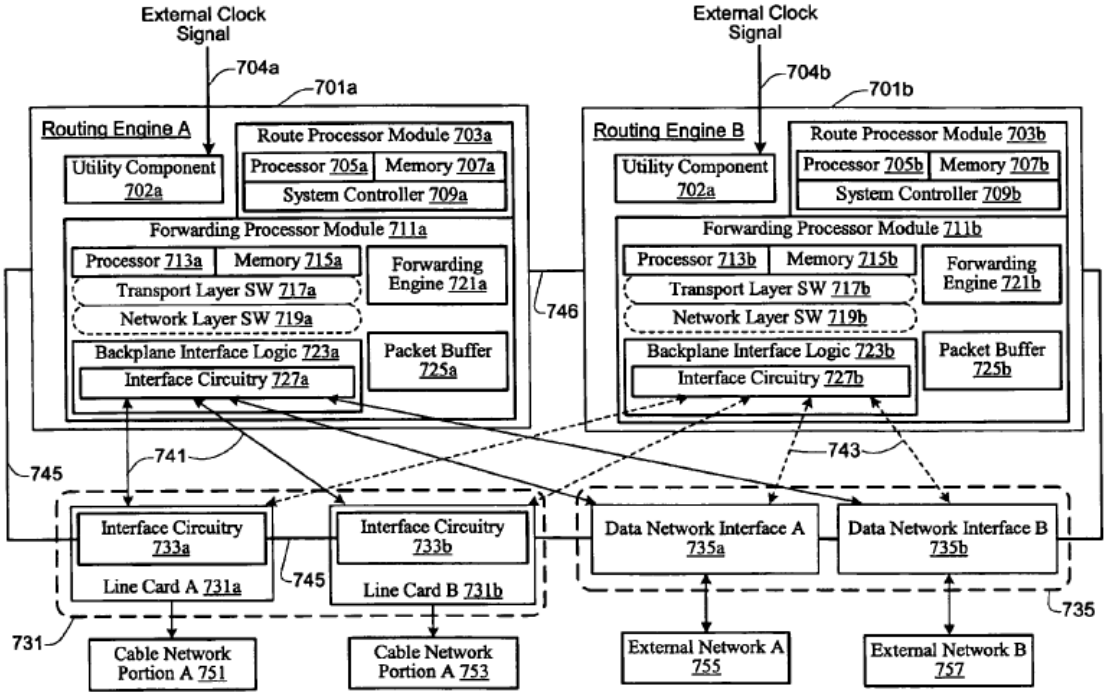

Figure 7 700

Figure 7 shows a block diagram of CMTS 700. *Id.* at 13:52–53.

CMTS 700 includes routing engines 701a, 701b where routing engine A 701a is configured "as a primary or working routing engine" and routing engine B 701b is configured "as a backup or standby routing engine which provides redundancy functionality." *Id.* at 13:55–60. Crocker states that interface circuitry 727a is coupled "to the respective interface circuitry 733a, 733b of line cards 731a, 731b. *Id.* at 14:47–48. Crocker describes that packet buffer 725a stores "low priority data packets while high priority, low latency voice packets are forwarded" by forwarding engine 721a to data network interface 735a. *Id.* at 14:61–15:2. Crocker describes that line cards 731

correspond "to radio-frequency (RF) line cards which have been configured or designed for use in a cable network" and that line cards 735 correspond to "network interface cards which have been configured or designed to interface with different types of external networks." *Id.* at 15:46–51.

Crocker's Figure 8 is reproduced below.

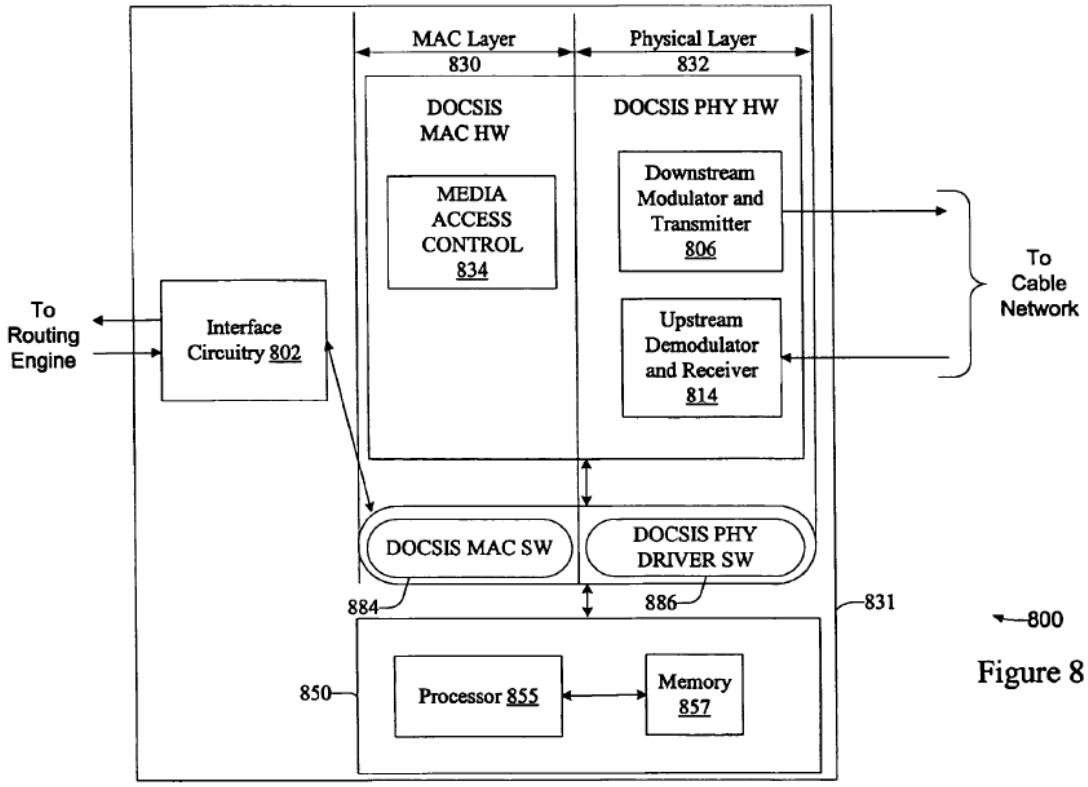

Figure 8

Figure 7 shows line card 800. *Id.* at 4:52–54.

Crocker describes that line card 800 is configured "to implement selected aspects of the DOCSIS functionality which were conventionally implemented by the CMTS, such as, for example, DOCSIS MAC functionality." *Id.* at 17:66–18:3. Specifically, Crocker describes that "line card 800 provides functions on several network layers, including a physical layer 832, and a Media Access Control (MAC) layer 830." *Id.* at 18:4–7. Crocker describes MAC layer 830 as including MAC hardware portion 834

and MAC software portion 884 that operate together to provide DOCSIS MAC functionality. *Id.* at 18:29–34. Crocker states that "MAC controller 834 is dedicated to performing some MAC layer functions, and is distinct from processor 855." *Id.* at 18:34–36.

5. Fox (Exhibit 1009)

Fox is titled "Decoupling Processes from Hardware with Logical Identifiers." Ex. 1009, code (54). Fox describes "a computer system including hardware resources, logical resources and a mapping process for creating a map associating the hardware resources with the logical resources." *Id.* at 2:52–55. According to Fox, "[a] modular software architecture solves some of the more common scenarios seen in existing architectures when software is upgraded or new features are deployed." *Id.* at 4:34-36.

E. Asserted Obviousness over Schain and Thi

Petitioner asserts that claims 18 and 19 are unpatentable as obvious over Schain in view of Thi. Pet. 24–43. Patent Owner disputes Petitioner's showing for independent claim 18. Prelim. Resp. 6–29. The issue of whether Schain teaches or suggests limitation 18d is dispositive. For the reasons given below, we determine Petitioner has not shown sufficiently that Schain teaches or suggests limitation 18d.

1. Independent Claim 18

Limitation 18d recites "the second circuit being separate from the first circuit," which derives antecedent bases from the "first circuit" and the "second circuit" recited in limitations 18a and 18c. Limitations 18a and 18c, more specifically, recite "a data networking engine implemented in *a first circuit* that includes at least one processor" and "a cable modem engine

implemented in *a second circuit* that includes at least one processor" (emphasis added).

Petitioner relies on Schain's local bridge for the first circuit and Schain's cable bridge for the second circuit. Pet. 25 ("Schain discloses element 18a, including a 'local bridge 345' that performs data networking functions'"), 29 ("Schain discloses a 'cable bridge 315 [that] is responsible for processing external packets received at the cable modem'"). For limitation 18d, Petitioner argues the following:

> Schain discloses element 18d, describing the local bridge and the cable bridge as being separate: "By keeping the two bridges separate, the processing of external and local packets can be kept separate." Ex. 1005, ¶51; Ex. 1003, ¶¶75-77. "Beneath each bridge is a separate driver layer, with the cable modem featuring a cable driver 310 and the residential gateway various drivers, such as an Ethernet driver 330, an USB driver 335, and a wireless driver 340." Ex. 1005, ¶46; Ex. 1003, ¶76.

Pet. 30. Dr. Martin's testimony is substantially the same as Petitioner's argument. Ex. 1003 ¶¶ 75–77.

Patent Owner argues that Petitioner has not shown "that Schain discloses more than one 'circuit.'" Prelim. Resp. 26. Patent Owner argues that limitation 18d is not met by the "alleged DNE and CME implemented on the same circuit." *Id.* Patent Owner relies on claim 1 of Schain as support for its arguments that Schain's local bridge and cable bridge are implemented in a single circuit. *Id.* at 23–26.

We find that Petitioner's arguments are not consistent with Schain's disclosure. In particular, Schain discloses that Figure 3, relied on by Petitioner, "illustrates the *logical* architecture of a dual bridge" of broadband gateway 135. Ex. 1005 ¶ 45 (emphasis added). Schain also discloses that Figure 3's "*logical* architecture features two bridges, one for the broadband

modem portion (a cable bridge 315) and one for the residential gateway portion (a local bridge 345) of the broadband gateway 135." *Id.* (emphasis added). Schain's disclosure is of a logical separation, that is a separation in software. *See, e.g.*, *id.* at 45. Claim 18, however, recites "a data networking engine implemented in a first circuit that includes at least one processor," "a cable modem engine implemented in a second circuit that includes at least one processor," and limitation 18d, which is "the second circuit being separate from the first circuit." Petitioner has not shown that Schain's disclosure of its logical architecture teaches or suggests "the second circuit being *separate* from the first circuit" (emphasis added).

Petitioner also relies on Schain's disclosure of "a separate driver layer" that is "[b]eneath each bridge." Pet. 30 (citing Ex. 1005 ¶ 46; Ex. 1003 ¶ 76). Schain discloses that "[t]he driver layer typically includes both hardware and software portions." Ex. 1005 ¶ 31. Schain discloses that "[t]he hardware portion of the drive layer" is "the physical connection, such as Ethernet connections, USB connections, etc." *Id.* Schain does not describe that the hardware portion of the driver layer includes a processor.

For limitation 18a, Petitioner relies on Schain's CPU 520. Pet. 26 (citing Ex. 1005 ¶ 61, Fig. 5). For limitation 18c, Petitioner relies on Schain's disclosure of "cable bridge 315," "broadband bridge" that contains "circuitry," and "DOCSIS MAC/PHY processor 510." *Id.* at 30 (citing Ex. 1005 ¶¶ 25, 46, 60; Ex. 1003 ¶¶ 69, 70, 72, 73). Schain describes that DOCSIS MAC/PHY layer processor 510 processes an incoming or outgoing "data/information stream (typically, a bi-directional stream) that contains actual information being received and transmitted by the computer(s) and digital device(s) connected to the broadband gateway 500." Ex. 1005 ¶ 60.

Petitioner does not identify sufficiently another processor that performs the "cable modem functions" performed by the "cable modem engine" recited in limitation 18c. We find that Petitioner does not explain sufficiently the basis for its argument that Schain teaches "a cable modem engine implemented in *a second circuit that includes at least one processor*" recited in limitation 18c, where "the second circuit" is "*separate from* the first circuit" recited in limitation 18d (emphases added).

For this reason, we determine Petitioner's has not shown that Schain teaches or suggests limitation 18d. Petitioner does not rely on Thi for teaching or suggesting limitation 18d. Pet. 30–31. Accordingly, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claim 18 is unpatentable under 35 U.S.C. § 103 as obvious over Schain and Thi.

2. Dependent Claim 19

Petitioner asserts that claim 19 is unpatentable as obvious over Schain and Thi. Pet. 43. Claim 19 depends from claim 18. Petitioner's analysis for claim 19 does not remedy the deficiency with respect to limitation 18d discussed with respect to independent claim 18.

Accordingly, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claim 19 is unpatentable as rendered obvious over Schain and Thi.

F. Asserted Obviousness over Perlman, Crocker, and Fox

Petitioner asserts that claims 18 and 19 are unpatentable as obvious over the combination of Perlman, Crocker, and Fox. Pet. 43–74. Patent Owner disputes Petitioner's showing for independent claim 18. Prelim. Resp. 29–68. The issue of whether the combination of Perlman and Crocker

teaches or suggests limitation 18i is dispositive. For the reasons given below, we determine Petitioner has not shown sufficiently that the combination of Perlman and Crocker, and Fox teaches or suggests limitation 18i.

1. Independent Claim 18

Limitation 18i recites "the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput." Limitation 18i derives antecedent basis from limitation 18h, which recites "the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor."

For the recitation of "DOCSIS MAC processor," Petitioner relies on Perlman's "DOCSIS logic 233 for processing packetized DOCSIS data/content." Pet. 65 (citing Ex. 1007 ¶ 27; Ex. 1003 ¶ 192); *see also id.* at 66 (citing Ex. 1007 ¶ 27, Ex. 1003 ¶ 197). For the recitation of "DOCSIS controller," Petitioner states

> To the extent the Board finds that Perlman does not explicitly disclose the DOCSIS logic including a controller and MAC processor, Crocker specifies that line card 731 includes
>
> > MAC layer 830 [which] includes a MAC hardware portion 834 and a MAC software portion 884. The MAC layer software portion may include software relating to DOCSIS MAC functionality, etc. The MAC layer hardware and software portions operate together to provide the above-described DOCSIS MAC functionality. In a preferred embodiment, **MAC controller 834** is dedicated to performing some MAC layer functions, and is distinct from **processor 855**.

Pet. 65 (citing Ex. 1008 18:29–36, FIG. 8; Ex. 1003 ¶ 193).

For the requirement in limitation 18i that the DOCSIS MAC processor is configured to "process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput," Petitioner argues the following:

> Crocker also describes forwarding packets to the line card 735 for data networking: "packets are forwarded by the forwarding engine to a data network interface 735a." Ex. 1008, 14:66–15:2; Ex. 1003, ¶¶198–200. Although the forwarding engine is not pictured as part of the line card 731, it would be a trivial modification to have the DOCSIS processor 855 of the line card 731 perform this function. Ex. 1003, ¶200.

Pet. 67. Petitioner argues that a person of ordinary skill in the art would have modified Crocker because "[t]he DOCSIS controller of Crocker performs separate functionality from that of the DOCSIS MAC processor" and "[i]ncluding this unrelated component in the forwarding of PDU packets would unnecessarily create a longer path for the data packets, leading to more latency and a less efficient system." Pet. 67 (citing Ex. 1003 ¶ 201). Petitioner argues "[m]inimizing latencies would create a more efficient system due to reduced delays." *Id.* Petitioner submits Dr. Martin's testimony in support of its arguments. Pet. 65–67 (citing Ex. 1003 ¶¶ 192–193, 197–203).

Dr. Martin testifies as follows:

> Crocker also states that "packets are forwarded by the forwarding engine to a data network interface 735a." *Id.* at 14:66-15:2. Crocker thus discloses forwarding the PDU packets directly to the data networking engine. Although the forwarding engine is not pictured as part of the line card 731, in my opinion it would be a trivial modification to have the DOCSIS processor 855 of the line card 731 perform this function.

Ex. 1003 ¶ 200.

Patent Owner argues "Petitioner admits" that "Crocker's 'forwarding engine' is not shown as part of its line card 731." Prelim. Resp. 51. Patent Owner argues "[t]o bridge this gap," Petitioner "offers only a conclusory assertion that 'it would be a trivial modification to have the DOCSIS processor 855 of line card 731 perform this function.'" *Id.* at 52 (citing Ex. 1003 ¶ 200). Patent Owner argues "missing limitations . . . simply cannot be added in an obviousness analysis based on a bare assertion of trivial[ity]." *Id.* Patent Owner argues "it is well-settled that such missing limitations cannot be supplied by conclusory statements about 'basic knowledge' or 'common sense.'" *Arendi S.A.R.L. v. Apple, Inc.*, 832 F.3d 1355, 1362–63 (Fed. Cir. 2016); *K/S HIMPP v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1366 (Fed. Cir. 2014); *DSS Tech. Mgmt. v. Apple Inc.*, 885 F.3d 1367, 1374–75 (Fed. Cir. 2018).

"[E]xpert testimony cannot take the place of disclosure from patents or printed publications." Patent Trial and Appeal Board Consolidated Trial Practice Guide (2019), ("Consolidated Practice Guide" or "CTPG") 36.[3] Limitation 18i recites "the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput." Petitioner has not shown that any asserted prior art reference teaches or suggests limitation 18i. Petitioner may not rely on the testimony of Dr. Martin to bridge this gap.

After consideration of the arguments and the evidence of record, we determine that Petitioner has not shown sufficiently that limitation 18i is

[3] The CTPG is at https://www.uspto.gov/TrialPracticeGuideConsolidated.

taught or suggested by Perlman or Crocker and Petitioner does not rely on Fox for this limitation. Accordingly, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claim 18 is unpatentable under 35 U.S.C. § 103 as obvious over Perlman, Crocker, and Fox.

2. Dependent Claim 19

Petitioner asserts that claim 19 is unpatentable as obvious over Perlman, Crocker, and Fox. Pet. 72–74. Claim 19 depends from claim 18. Petitioner's analysis for claim 19 does not remedy the deficiency with respect to limitation 18i discussed with respect to independent claim 18.

Accordingly, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in showing that claim 19 is unpatentable as rendered obvious over Perlman, Crocker, and Fox.

IV. CONCLUSION

Based on the arguments and evidence presented by the parties, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to at least one claim of the '775 patent challenged in the Petition. Therefore, we do not institute an *inter partes* review.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is *denied*, and no trial is instituted.

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