

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 IPR2024-00446
Patent 8,223,775

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE UNDER
37 C.F.R. §42.23**

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EXHIBITS

Previously Submitted:

- Ex. 1001: U.S. Patent No. 8,223,775 (“the ’775 Patent”)
- Ex. 1002: Expert Declaration of Dr. Sayfe Kiaei
- Ex. 1003: Curriculum Vitae of Dr. Sayfe Kiaei
- Ex. 1004: Certified Prosecution History of the ’775 Patent
- Ex. 1005: U.S. Pub. No. 2002/0006137 (“Rabenko”)
- Ex. 1006: U.S. Pub. No. 2004/0004974 (“Gaspar”)
- Ex. 1007: U.S. Pub. No. 2002/0091861 (“Kim”)
- Ex. 1008: Harry Newton, *Newton’s Telecom Dictionary*, (CMP Books, 18th ed. Feb. 2002)
- Ex. 1009: U.S. Pub. No. 2004/0125754 (“Johnson”)
- Ex. 1010: U.S. Pub. No. 2002/0065935 (“Koperda”)
- Ex. 1011: *Entropic Communications, LLC v. Charter Communications, Inc.*, No. 2:22-cv-00125-JRG (E.D. Tex. June 26, 2023) (Claim Construction Memorandum Opinion and Order)
- Ex. 1012: U.S. Pub. No. 2002/0078249 (“Lu”)
- Ex. 1013: U.S. Pub. No. 2002/0012343 (“Holloway”)
- Ex. 1014: Andrew S. Tanenbaum, *Computer Networks*, (4th ed. 2003)
- Ex. 1015: U.S. Pub. No. 2002/0138678 (“Kim ’678”)
- Ex. 1016: U.S. Pub. No. 2004/0019765 (“Klein”)

Served (Not Filed):

- Ex. 1017: Expert Declaration of Sylvia Hall-Ellis, Ph.D

Filed Herewith:

- Ex. 1018: Reply Declaration of Dr. Sayfe Kiaei in Support of Petitioner's Reply
- Ex. 1019: Alan Freedman, Excerpt from *The Computer Glossary: The Complete Illustrated Dictionary* (AMACOM, 9th ed. 2001)
- Ex. 1020: Excerpt from *IEEE Standard Dictionary of Electrical and Electronics Terms*, (The Institute of Electrical and Electronics Engineers, Inc., 2nd ed. 1997)
- Ex. 1021: Deposition Transcript from Deposition of Dr. Samuel H. Russ
- Ex. 1022: David Fellows et al., DOCSIS™ Cable Modem Technology, (IEEE Communications Magazine, Mar. 2001)
- Ex. 1023: Entropic Communications, LLC v. Cox Communications, Inc., No. 2:23-cv-01049-JWH-KES (C.D. Cal. filed May 17, 2024) (Entropic's Opening Claim Construction Brief)
- Ex. 1024: CableLabs, *Data-Over-Cable Service Interface Specifications: Operations Support System Interface Specification*, SP-OSSIV1.1-I04-010829 (Aug. 29, 2001)
- Ex. 1025: CableLabs, *PacketCable™ Multimedia Specification*, PKT-SP-MM-I01-030627 (June 27, 2003)
- Ex. 1026: CableLabs, *PacketCable™ Multimedia Architecture Framework Technical Report*, PKT-TR-MM-ARCH-V01-030627 (June 27, 2003)

I. INTRODUCTION

Comcast Cable Communications, LLC (“Petitioner”) respectfully submits this reply brief in support of its Petition for *inter partes* review of claims 1-20 of U.S. Patent No. 8,223,775 (“the ’775 Patent”) (Ex. 1001).

The Petition set forth multiple grounds demonstrating that every claim is unpatentable. In response, Patent Owner (“PO”) largely rehashes its previously-considered arguments from the POPR. These arguments continue to mischaracterize both the prior art and the grounds set forth in the Petition, and thus remain unpersuasive.

Accordingly, the Board should find that all claims of the ’775 Patent are unpatentable.

II. ARGUMENT

A. **The Board Should Continue to Give “DOCSIS controller” its Plain and Ordinary Meaning, as Opposed to Requiring it to Perform Certain (Undefined) DOCSIS Functions other than VoIP-related Functions**

PO reiterates an incorrect and gerrymandered claim construction that the “DOCSIS controller” must specifically control DOCSIS functions—but only the DOCSIS functions that are unrelated to VoIP, no doubt because Rabenko discloses its voice and data processor 136/213 (VDP) performing those VoIP-related DOCSIS functions. POR 6-7, 11-14; POPR 7-18. The Board was correct in declining to adopt PO’s construction. ID 14 (quoting *SuperGuide Corp. v. DirecTV Enterprises, Inc.*,

358 F.3d 870, 875 (Fed. Cir. 2004)). The Board should continue to apply the ordinary and customary meaning. ID 12-15, 34; Ex. 1018, ¶ 6.

At the District Court, PO's construction of DOCSIS controller had no Rabenko-induced carve-out, whereby certain functions are DOCSIS functions that render a controller a "DOCSIS controller" but anything related to VoIP is not. *See generally*, Ex. 1023; Ex. 1018, ¶ 7. This was with good reason, since the intrinsic evidence does not support the carve-out. Claim 18 does not recite "DOCSIS functions" or limit the "DOCSIS controller" beyond that it is part of the cable modem engine and is bypassed in order to boost downstream throughput. Ex. 1001, claim 18; Ex. 1018, ¶ 8. PO incorrectly dissociates VoIP (such as is implemented by Rabenko's VDP) and DOCSIS because some DOCSIS networks have no VoIP services, and VoIP can be implemented outside of DOCSIS. POR 13-14. But, even though the '775 Patent describes that the cable modem provides "DOCSIS and VoIP functionality" (Ex. 1001, 2:21-24, 2: 6-11; POR 13) it does not create the clear carveout PO suggests, as the '775 Patent recognizes that DOCSIS functions include those related to VoIP: "[t]he gateway cable modem will incorporate a variety of functions ... including ... **VoIP. These functions need to utilize DOCSIS ... services.**" Ex. 1001, 1:20-25 (emphasis added); Ex. 1018, ¶ 9.

PO argues that the Board misapprehends its position as seeking to limit the "DOCSIS controller" to "the specific functions identified in the '775 Patent

Specification.” POR 6-7. Rather, PO asserts, the “DOCSIS controller” “must ‘control’ some ‘DOCSIS’ functions and the specific DOCSIS functions identified in the specification [(functional blocks 200-212)] are merely exemplary.” POR 7. But PO can provide no clear distinction of which functions, then, are DOCSIS functions and which are not, except to surmise that VoIP-related functions are not. Ex. 1018, ¶ 10.

As noted above, this exclusion of VoIP is not supported by the intrinsic evidence. Nor is it supported by the DOCSIS standard, which does not use the term “DOCSIS controller” or purport to define what “DOCSIS functions” are, but which does provide service flows to manage VoIP signaling. *Id.* ¶¶ 11-12. More specifically, the DOCSIS specification provides for dynamically-created Service Flows, for example, created by an embedded PacketCable Multimedia Terminal Adapter, to manage VoIP signaling. Ex. 2011, 52. The PacketCable™ Multimedia Specification describes that the PacketCable project is a framework that provides access to the DOCSIS network mechanisms for IP services such as VoIP. Ex. 1025, 1-2. Thus, when VoIP is implemented in a DOCSIS network, for example, via PacketCable and as taught by Rabenko, it is a DOCSIS operation. Ex. 1018, ¶¶ 12-15.

The purpose of claim construction is to aid understanding. *See Funai Elec. Co. v. Daewoo Elecs. Corp.*, 616 F.3d 1357, 1366 (Fed. Cir. 2010). PO’s proposed

construction only serves to confuse the issue. PO circularly argues that a “‘DOCSIS controller’ *controls DOCSIS functions*.” POR 11. But, other than identifying blocks 200-212 as example DOCSIS functions, to which PO expressly does not wish to limit the claims (POR 7, 13-14), PO never states what a DOCSIS function is. Instead, PO declares: “VoIP is not a DOCSIS function. Indeed, the DOCSIS specification does not define or provide for any VoIP functionality.” POR 13. As explained above, both the intrinsic evidence and the DOCSIS standard refute this contention. Thus, PO’s construction only serves to confuse rather than clarify. Ex. 1018, ¶ 16.

The Board should therefore reject PO’s construction and use the ordinary and customary meaning which does not exclude VoIP-related functions. Ex. 1018, ¶¶ 11-16.

B. Rabenko Teaches the Claimed “DOCSIS Controller”

Whether given its ordinary and customary meaning or PO’s construction, Rabenko’s voice and data processor 136/213 (VDP) teaches the claimed “DOCSIS controller” because it controls “DOCSIS functions.” *Id.*, ¶ 17.

1. Rabenko’s VDP Processes the Packet-Based DOCSIS Signals Received from Port 104 and Routed to it

Ignoring the ID’s preliminary findings that “Rabenko’s [VDP] teaches the ‘DOCSIS controller’ recited in limitation [18E] **and** performs DOCSIS functions”

(ID 38 (emphasis added)), PO argues that “Petitioner fails to even prove that Rabenko’s [VDP] has **anything** to do with DOCSIS.” POR 7-8. PO is wrong.

Rabenko’s gateway 102 is configured to exchange voice and data packets via DOCSIS. Pet. 4-5, 21-26, 31; Ex. 1005, [0002], [0004]-[0005], [0034], [0045]-[0047], [0074], [0098], [0122]. Rabenko describes that the VDP “is used for processing and transporting voice over packet based networks” and that the VDP “supports the exchange of voice ... between the POTS telephone 108 ... and the cable head end.” Pet. 31, 21-26; Ex. 1005, [0074]. Furthermore, Rabenko describes that the MTA call client (located within the VDP) provides all signaling required to support voice over the DOCSIS network and “receives and mediates call-signaling information between the DOCSIS network and a PSTN.” Ex. 1005, [0097]-[0098]. Rabenko’s VDP is controlling the transmission of voice data in the DOCSIS network, and teaches the claimed “DOCSIS controller.” ID 33-35; Pet. 31, 21-26; Ex. 1018, ¶ 18.

PO makes much ado about the difference between “Plain Old Telephone System” (POTS) and DOCSIS and argues that Rabenko’s “[VDP] has nothing to do with DOCSIS” but “processes signals over [POTS].” POR 15, 16-21. PO’s argument rests on an annotated Figure 1b of Rabenko (reproduced below) that improperly suggests two segregated pathways at port 104 – one for DOCSIS signals

and one for (presumably non-DOCSIS) POTS signals. POR 19-20. This contradicts Rabenko's disclosure.

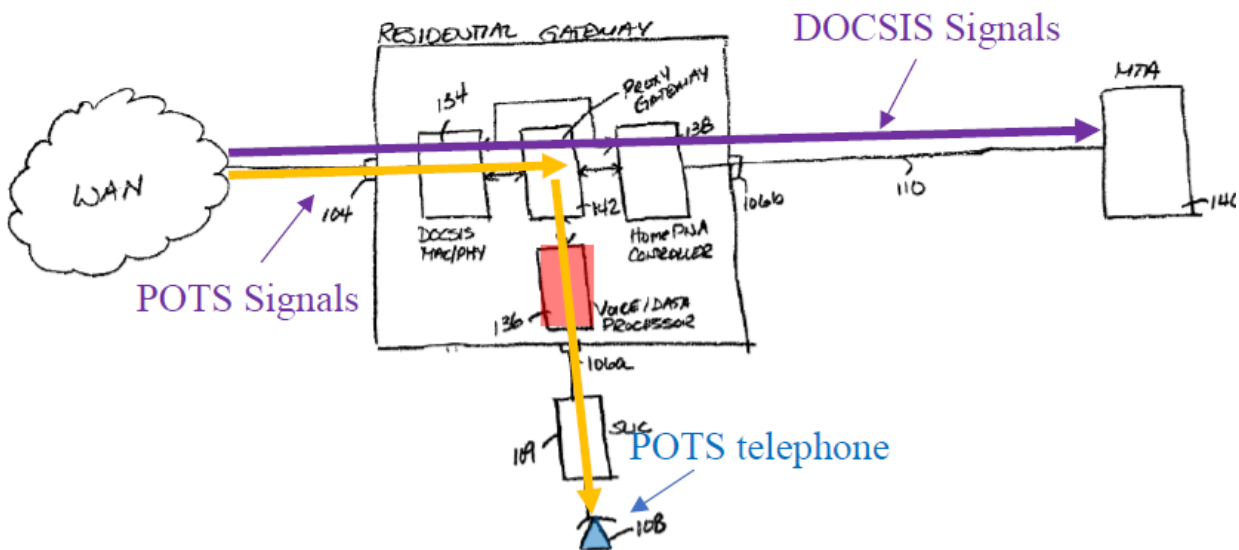


FIG. 1b

Ex. 1005, Fig. 1b (as annotated by PO)

Rabenko does not describe a segregated POTS service input interface at 104, nor analog POTS services arriving at 104. Rabenko describes a single utilities interface—network port 104—for communicating via IP packet-based DOCSIS only. Some of the DOCSIS IP voice packets are converted, via the VDP, to analog signals for delivery to the POTS telephone. Pet. 17-18, 21-23, 25, 31-32, 47, 70; Ex. 1005, [0002] (“The present invention relates ... to telecommunications systems **supporting voice and data services on a shared medium.**”) (emphasis added), [0032]-[0034] (“[T]he exemplary residential gateway 102 may include high voltage

circuits and processing elements to convert packetized voice delivered over IP network[*sic*] to the continuous analog voltages used for POTS.”), [0044]-[0045], [0047], [0050], Figs. 1a, 1b. Ex. 1018, ¶¶ 21-23. In short, the signals arriving at port 104 from the WAN are DOCSIS signals. Some of these DOCSIS signals are routed to the VDP, which then processes them. *Id.* PO is simply wrong when it asserts that the VDP is on an entirely separate path from DOCSIS signals and has nothing to do with DOCSIS. POR 19-20; Ex. 1005, [0003]-[0005], [0032]-[0033], [0041], [0080]; Ex. 1018, ¶¶ 19-25.

2. Even According to PO’s construction of “DOCSIS controller,” Rabenko’s VDP Teaches it

Rabenko’s VDP teaches the claimed “DOCSIS controller” even according to PO’s flawed construction that the “DOCSIS controller” must control DOCSIS functions (other than VoIP). ID 38. Initially, as described above (§ II.A), when VoIP is implemented in a DOCSIS network, for example, via PacketCable, and as described by Rabenko, it is a DOCSIS function. Ex. 1018, ¶ 13. Additionally, PO admits that the ’775 Patent functional blocks 200-212 “list several examples of possible DOCSIS functions.” POR 12-13. One such example is functional block 206 performing “**SNMP, DHCP, TFTP, and TOD** functionality.” Ex. 1001, 3:33-35 (emphasis added). Similarly, Rabenko describes that the “proxy gateway functions can be implemented in the voice and data processor” and can include MTA call client 520. Ex. 1005, [0097], Fig. 5b. MTA call client 520 implemented in the

VDP includes “SNMP logic 540,” “DHCP logic 542,” and “TFTP logic 546.” Ex. 1005, [0103]-[0105], Fig. 5b. Therefore, even according to PO’s flawed construction of “DOCSIS controller,” Rabenko’s VDP still teaches it. Ex. 1018, ¶ 26.

C. Rabenko Teaches The Claimed Engines, Separate Circuits, and Completely Partitioned Functions

PO asserts that Rabenko fails to teach “a DNE [data networking engine] implemented in a ‘first circuit’ and a CME [cable modem engine] implemented in a ‘second circuit,’ ‘the second circuit being separate from the first circuit’ with ‘completely partitioned’ functions.” POR 37; POPR 19-32. PO’s argument fails for the following reasons.

1. The Board’s Preliminary Determination that the Petition Demonstrates Rabenko’s Teachings Was Correct

The Board preliminarily found that Rabenko’s HomePNA controller 138 and AFE 226 teach a DNE which is separate from the remaining residential gateway, including DOCSIS MAC 212, core 228, and VDP 213, the CME. ID 27-28. The Board also noted that “Rabenko teaches ‘the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine’” and notably, “that Rabenko teaches the physical separation recited in claim 18.” ID 38 (citing to ID § III.D.4.c

discussing limitation [18C]). The POR provides no sound basis on which the Board could change its preliminary findings.

PO's central argument is that, "Rabenko simply never mentions or suggests that [the identified components] are a part of any engine or are specific circuits." POR 24-25. Contrary to PO's argument, Rabenko teaches the elements of claim 18, including the DNE (e.g., Pet. §VI.A.1.b, 14-15), the CME (e.g., Pet. §VI.A.1.c, 21-22), the first circuit (e.g., Pet. §VI.A.1.b, 15-16), the second circuit (e.g., Pet. §VI.A.1.c, 21-24), and the partitioned functionalities (e.g., Pet. §VI.A.1.g, 35-38) of claim 18. Ex. 1018 ¶¶ 27-34.

As the Board noted, Petitioner identified HomePNA controller 138 and AFE 226 as forming a DNE. ID 25-26; Pet. 14-15. And, Petitioner identified Rabenko's DOCSIS 1.1 MAC with BPI+ 212, core 228, and voice and data processor 213 as forming a CME. ID 27; Pet. 21-22. Even under PO's view, Rabenko teaches the claimed engines. The HomePNA controller controls the HomePNA LAN. Ex. 1005, ¶¶ [0045], [0080]. Similarly, the DOCSIS MAC/PHY and VDP work together to implement DOCSIS functionalities. *Id.*, ¶¶ [0034], [0097]-[0098], [0103], [0107].

To further support its position that Rabenko does not teach engines, PO argues that "Petitioner resorts to arbitrarily identifying certain elements of Rabenko and proclaiming them to be a DNE and CME, respectively." POR 24. PO and its expert misapprehend the requirements of claim 18. As the Board previously noted in

response to this argument, “[c]laim 18 does not require a division into structures that is identical to Figure 2 of the ’775 Patent and does not require that ‘remaining components’ in Rabenko’s Figure 2 be grouped into one of the two engines.” ID 25; Ex. 1018, ¶¶ 29, 35-36.

2. Rabenko Teaches Two Circuits

PO argues that “Rabenko simply never mentions or suggests that these components are a part of any engine or are specific circuits” (POR 25). However, a POSITA would have understood that Rabenko’s DNE is implemented in a first circuit and programmed with software that causes the DNE to perform the home networking functions. Pet. 14-16; Ex. 1018, ¶ 31. Similarly, a POSITA would have understood that Rabenko’s CME is implemented in a second circuit and programmed with software that causes the CME to perform the cable modem functions. Pet. 25-26; Ex. 1018, ¶ 32. In this regard, Rabenko provides the same level of disclosure of separate circuits as does the ’775 Patent, which never included the word “circuit” in its original disclosure—the language was only added to the claims during prosecution. Ex. 1004, 5-22, 66-72; Ex. 1018, ¶¶ 37-38; Ex. 1019, 3; Ex. 1020, 3. Accordingly, if the ’775 Patent specification describes a first and second “circuit” despite never using the word, then so does Rabenko.

PO also argues that Petitioner fails to “provide a foundation upon which to reach its conclusions.” POR 25. This is incorrect. The Petition explains that the

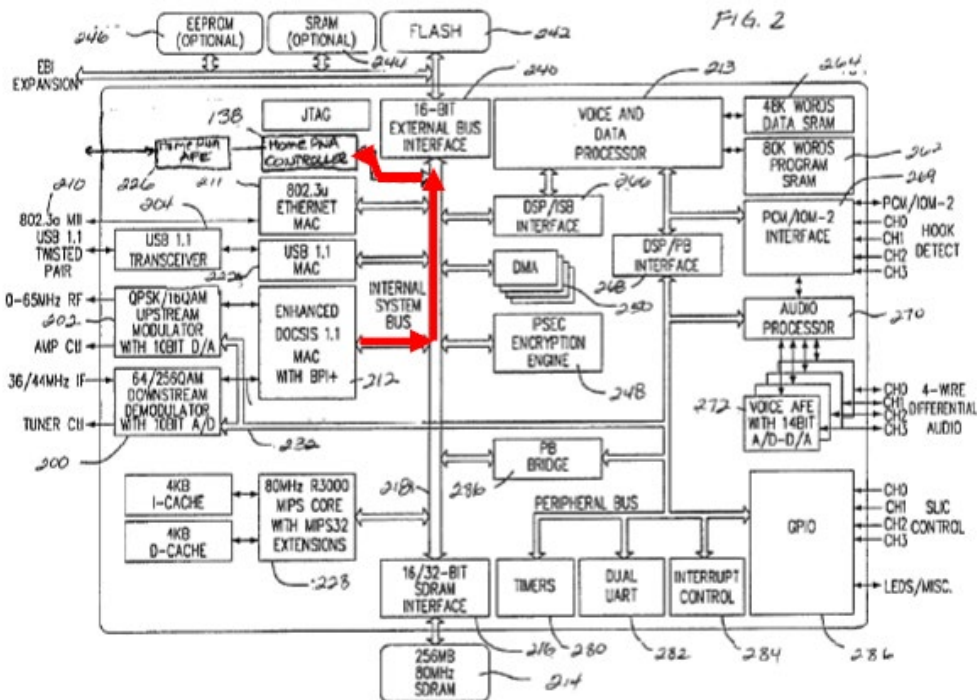
claimed DNE and CME are present in Rabenko in separate circuits. The DNE is implemented in a first circuit that includes at least one processor and performs home networking functions including interfacing with customer provided equipment. Pet. 14. The Petition identifies that Rabenko's DNE performs the recited functions. Pet. 14-15. The CME is implemented in a second circuit that includes at least one processor and performs cable modem functions including interfacing with cable media. Pet. 21. The Petition identifies Rabenko's CME performing the recited functions. Pet. 21-26. That is the foundation upon which the Petition's conclusions rest.

Although PO attempts to argue that Dr. Kiaei "asserts in a conclusory fashion and without further explanation that certain components are part of 'separate' 'first' and 'second circuit[s],'" Dr. Kiaei's declaration clearly describes how the identified components in Rabenko's DNE are coupled together, thus comprising a circuit. Ex. 1002, ¶¶ 88, 94-95 (referencing Ex. 1013). Similarly, Dr. Kiaei's declaration notes that "Rabenko's description of 'integrated functions for communicating with a cable head [] end' and/or the configuration 'to receive out of band MPEG-2 encoded messages from the cable head end' teach the claimed 'cable modem functions including interfacing with cable media.' Ex. 1005, [0050], [0052]-[0053]." Ex. 1002, ¶ 110. Dr. Kiaei describes how these functions are performed by the components. Ex. 1002, ¶¶ 106-110.

PO contends that Dr. Kiaei has taken a shifting position on separate circuits. POR 26. Yet, Dr. Kiaei states in his deposition testimony that “a separation is not necessarily physically separate, but they are functionally separate as also was -- my understanding is that that was also part of the claim construction.” Ex. 2009, 97:2-6. As Dr. Kiaei makes clear, he is accounting for the claim construction adopted by the District Court in a case involving the '775 Patent just like he did in his first declaration. Pet. 12-13, 38; Ex. 1002, ¶¶ 46-47, 156.

PO argues that under Dr. Kiaei’s interpretation of Rabenko’s Figure 2, it “would depict thousands upon thousands of possible separate circuits.” POR 26 (quoting Ex. 2008, ¶ 68). Dr. Kiaei has never made any statement or interpretation stating this. Ex. 2009, 96:10-21. But this is beside the point, all that matters for the issues presently before the Board is that Rabenko teaches the two claimed separate circuits.

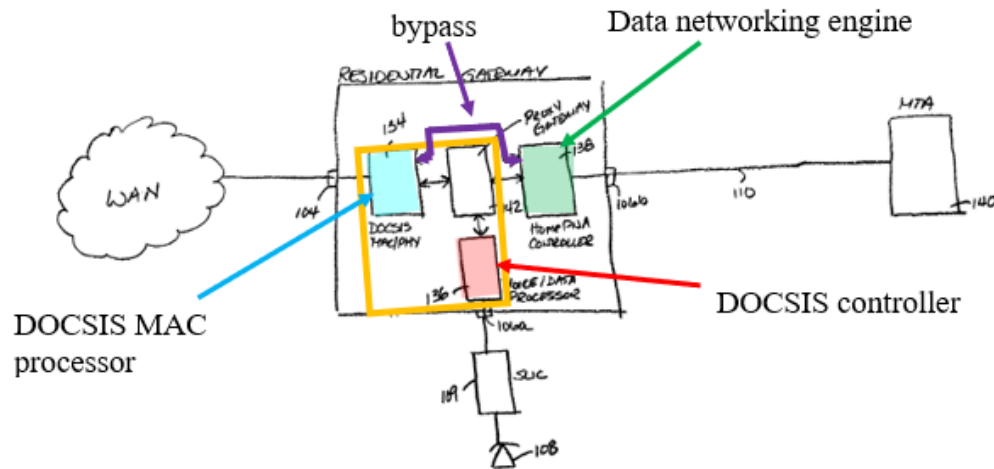
PO also argues that Rabenko’s Figure 2 shows a direct path between the DOCSIS MAC 212 and the HomePNA 138 and that such a “logic suggests that the HomePNA controller is also part of the second circuit.”



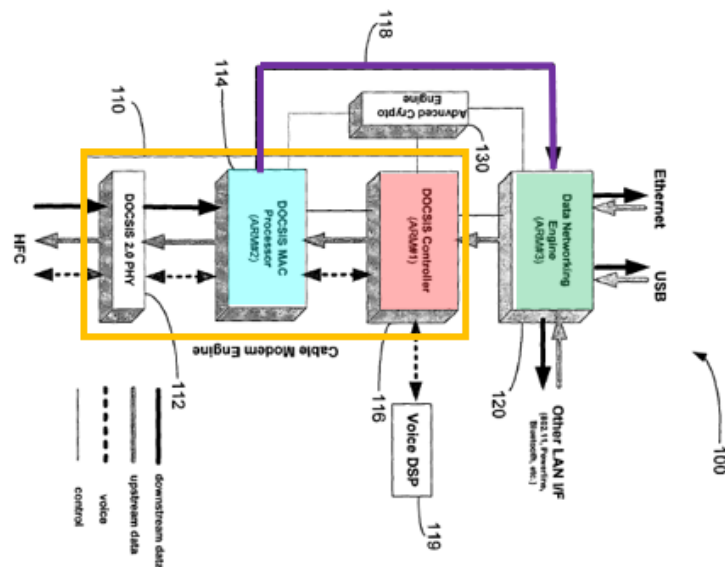
POR 31. PO and Dr. Russ simply fail to understand the operation of Rabenko and the teachings of the '775 Patent.

First, Figure 2 in Rabenko (like Figures 1 and 2 of the '775 Patent) is expressly described as a block, not circuit, diagram so the arguments about “a more direct path” are not applicable. POR 31; Ex. 1005, [0009]; Ex. 1001, 2:42-45. Second, the above noted **red** line in Rabenko is the path taken when the DOCSIS MAC 212 processes downstream PDU packets and forwards the processed packets directly to the HomePNA controller 138 without the involvement of the voice and data processor 213 (“DOCSIS controller”). Pet. 32-34. The Petition showed this bypass path in **purple** with respect to Rabenko’s Figure 1b. Third, in the '775 Patent, two sets of electrical components are not part of the same “circuit” just because they are

connected. For example, the '775 Patent which also includes a direct path (a connection) between the MAC processor of the CME and the DNE, even though the claim recites that these are separate circuits. Ex. 1001, Figures 1, 2; Ex. 1018, ¶¶ 39-43.



Ex. 1005, Fig. 1b (annotated)



Ex. 1001, Fig. 1 (rotated and annotated)

Pet. 37.

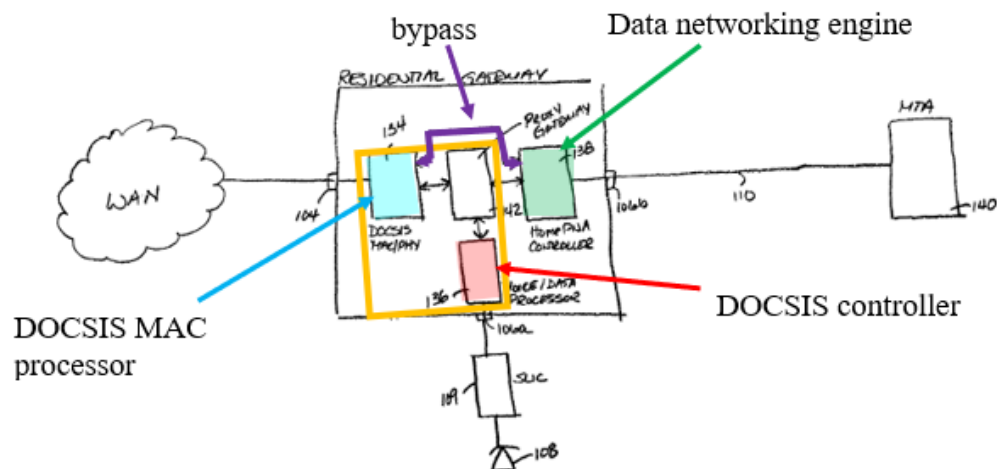
3. PO's Strawmen Carry No Weight

PO alleges that Dr. Kiaei is not credible since he indicated that Rabenko's Figure 2 "could represent 'purely [] software.'" POR 33 (emphasis added). Yet neither Dr. Kiaei nor the Petition ever argues that Rabenko's components within Figure 2 may be utilized as "purely [] software" in teaching the circuits of claim 18. Dr. Kiaei only opined that a system block diagram may be hardware, software, or a combination of both among other possibilities and that a POSITA knows this from Rabenko's paragraph [0268]. Ex. 2009, 40:24-41:9, 41:14-42:5; Ex. 1018, ¶ 44.

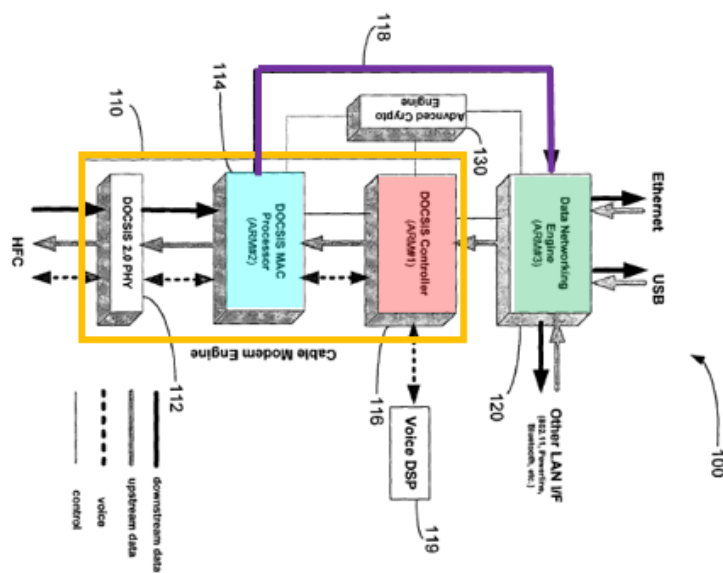
Another strawman erected by PO is the allegation that "[Rabenko's] Figure 1b in fact reveals a direct connection between the DOCSIS MAC/PHY (allegedly a part of the CME) and the proxy gateway (allegedly a part of the DNE)." POR 34 (emphasis added). The Petition never contended that Rabenko's proxy gateway was a part of the DNE – it consistently explained that HomePNA controller 138 and AFE 226 comprise the DNE. Pet. 21, 23, 26; Ex. 1018, ¶¶ 45-46.

PO then questions, "[w]hy would a POSITA conclude [Rabenko's DOCSIS MAC/PHY 134 and HomePNA controller 138] are on separate circuits that are partitioned from one another in view of these direct connections?" POR 35. PO provides no evidence that the separation of circuits is dictated by direct/indirect connections – because there is none. The '775 Patent itself has a similarly direct connection between the DOCSIS MAC and the DNE (shown in **purple** below). Data

bus 118 directly connects DOCSIS MAC processor 114 (part of claim 18's CME) with DNE 120. *Id.*; Ex. 1018, ¶ 47.



Ex. 1005, Fig. 1b (annotated)



Ex. 1001, Fig. 1 (rotated and annotated)

Pet. 37.

4. PO's "Different Problem" Argument Is Irrelevant

PO argues that Rabenko does not disclose the required separate circuits because it and the '775 Patent address different problems. POR 36. But art is analogous so long as it is "from the same field of endeavor, regardless of the problem addressed." *See, e.g., Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000-1001 (Fed. Cir. 2016). Rabenko is from the same field of endeavor and teaches the engines, circuits, and completely partitioned functions.

D. Rabenko-Kim and Rabenko Each Render Obvious a CME "Configured to Enable Upgrades to its Software in a Manner that is Independent of Upgrades to the Software of the" DNE

1. Rabenko-Kim Renders Obvious This Limitation

Rabenko's residential networking system comprises a CME and a DNE. Pet. 21-33. Kim's residential networking system uses partitioned modular components to enable independent upgrades of those components. Pet. 36. PO's argument that Rabenko-Kim does not render this limitation obvious fails for multiple reasons. Ex. 1018, ¶¶ 48-51.

a. Petitioner Does Not Rely on Kim to Teach a CME

PO argues that the Rabenko-Kim combination fails because Kim "suggests nothing at all with respect to its alleged CME." POR 39-40. Yet, Petitioner's combination does not rely on CME teachings in Kim because Rabenko already teaches a CME. Pet. 21-33. Kim's teachings, as applied to Rabenko, would motivate

a POSITA to design Rabenko's already-existing components, including its CME, modularly, to ensure independent upgradeability. Pet. 30; Ex. 1018, ¶ 52.

b. Petitioner Contends that Rabenko's Components Would Be Independently Upgradeable in Rabenko-Kim

PO argues that the Petition contends only that Rabenko's HomePNA controller is independently upgradeable and thus does not explain how Rabenko-Kim "render[s] obvious a CME 'configured to enable upgrades to its software.'" POR 40. But the Petition explicitly states: "[i]ncorporating the modular design of Kim would allow the efficient updating of any of Rabenko's partitioned components" and "it would have been obvious to a POSITA to use Kim's technique of enabling the independent updating of its partitioned controllers to improve Rabenko in the same way by configuring Rabenko's separate components to be similarly independently updateable." Pet. 30-31. Thus, the Petition lays out a combined system in which Rabenko's components (including but not limited to its CME) would be independently upgradeable based on the teachings of Kim. Ex. 1018, ¶¶ 53-54.

c. Kim's Teachings Are Not Limited to Hardware Upgrades

PO argues that Kim has nothing to do with updating software. POR 41. Kim teaches a modular design to enable its programmatically controlled components, such as its ADSL controller and HomePNA controller, to be independently upgraded

via replacement, thereby improving the overall performance of the device. Pet. 29-31; Ex. 1007, [0001]. The HomePNA controller and ADSL controller are described as performing a plurality of functions, including analog digital conversion, demodulation, transmission convergence, and the like. Ex. 1007, [0034], [0042]. A POSITA would have understood that in order to perform these functions, the controllers would be comprised of hardware and software, and that upgrading the controllers would comprise upgrading the hardware and software. Ex. 1018, ¶¶ 55-57. Indeed, it beggars belief that a skilled artisan would fail to understand that upgrading hardware would not also involve updating the associated software.

d. Replacing Some or All of Rabenko's CME Satisfies the Claim Limitation

PO argues that Kim's teaching of replacing a CME is not a teaching of "configured to enable upgrades to its software." POR 42. PO is wrong because Kim's replacing is specifically performed to "improv[e] the total performance of the home gateway device" – *e.g.*, upgrading. Ex. 1007, [0001]; Ex. 1018, ¶ 56.

The components in Kim and the '775 Patent *enable* independent upgrades in the same way – a partitioned modular design structure. *Compare* Ex. 1007, Abstract, [0001] ("...either the modular-type HomePNA controller or ADSL controller is replaced, thereby improving the total performance of the home gateway device."), [0006]-[0010], [0014], [0026]-[0028], [0061], [0062] *with* Ex. 1001, 4:25-29 ("Since the data networking and cable modem functions are decoupled and

implemented in different processors [], independent software upgrading...is feasible.”), 3:57-61; Ex. 1002, ¶ 121; Ex. 1018, ¶¶ 58-60.

In Rabenko-Kim, Rabenko’s components, including the CME, are implemented via a modular partitioned design structure to allow for independent upgrades. Pet. 30. Thus, Rabenko-Kim’s CME is “configured to,” “designed to,” and/or “programmed to” *enable* independent upgrades by virtue of that modular partitioned design, just as taught in the ’775 Patent. Ex. 1001, 4:25-29, 3:57-61; Ex. 1018, ¶¶ 58-60. This renders inapposite the cases cited by PO. POR 43-44.

PO further argues that “replacing the hardware of the CME in some undefined way would [not] result in a CME that is ‘configured to’ enable upgrades to its software.” POR 44. Yet Kim teaches replacing its controllers which include both hardware and software. *See* Section D.1.c; Ex. 1018, ¶¶ 55-60. Moreover, Kim’s controllers are specifically designed to function within a modular design structure so as to *enable* independent upgrades of those controllers.

Finally, PO’s attempt to draw a distinction between replacing hardware and configuring a CME to upgrade its software in view of the ’775 Patent’s specification fails. Ex. 1018, ¶¶ 58-60. Per PO’s own admission, the “flexibility” in the ’775 Patent’s specification arises from the ability to upgrade the CME independent of the DNE. POR 44-45. This is the same flexibility that arises in Rabenko-Kim: independent upgrading of Rabenko’s components. That the ’775 Patent

specification suggests that this flexibility may further arise from “different software-partnering models” is irrelevant because these features are not recited in the claim. *SuperGuide Corp.*, 358 F.3d at 875; *Sjolund v. Musland*, 847 F.2d 1573, 1582 (Fed. Cir. 1988).

2. Rabenko Also Renders Obvious a CME “Configured to Enable Upgrades to its Software in a Manner that is Independent of Upgrades to the Software of the” DNE

Despite PO’s argument to the contrary (POR 46), the Petition explains in detail how Rabenko implicitly teaches this feature. The Petition explained that because Rabenko teaches that some of its components, such as its HomePNA controller, are standard-compliant and because a POSITA would have understood a standard-compliant device to require frequent costly and time-consuming updates to maintain compliance with evolving standards, the POSITA would have recognized the need to enable convenient upgrades of those devices. Pet. 26-28; Ex. 1002, ¶¶ 122-123; Ex. 1005, [0034]; Exhibit 2011, §7.2.3; Ex. 1018, ¶¶ 61-62. Thus, a POSITA would have implemented Rabenko’s system such that its partitioned components would be independently upgradeable. Pet. 26-28. And as evidence that a POSITA would have implemented independently upgradeable components as a result of recognizing that the standard-compliant devices would need frequent costly and time-consuming updates, the Petition cites to the teachings of Gaspar. Pet. 27-28 (citing Ex. 1006, [0005]-[0006], [0014]); Ex. 1018, ¶¶ 63-64. This discussion

directly refutes PO's argument that "[n]owhere does Petitioner explain why a POSITA would be motivated to modify Rabenko in this manner..." POR 50.

Petitioner further explained that because Rabenko's CME and DNE are implemented on different, partitioned circuits and Rabenko emphasizes that its system can be flexibly implemented by a POSITA based on the particularities of the application and the design constraints imposed on the overall system, a POSITA would have understood that upgrading of these components is limited to "only a few finite options: to configure them to be updated together or separately." Pet. 27-28; Ex. 1005, [0268]; Ex. 1018, ¶ 65; *see also* Ex. 1001, 3:49-62 (describing that independent upgradeability flows from the logical partitioning of the CME and DNE). The Petition explains that "[a] POSITA, recognizing these are different, partitioned circuits, would have understood that upgrades to software of any of DOCSIS MAC 134/212, proxy gateway 142, or voice/data processor 136/213 would be independent of upgrades to software of the HomePNA controller 138 and AFE 226." Pet. 27. Thus, the Petition provided both "evidence and a reasoned explanation." *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363 (Fed. Cir. 2016).

PO further argues that the Petition did not explain sufficiently how Rabenko would be modified. POR 50-51. Specifically, PO contends that "there were many—perhaps uncountable—possible combinations of Rabenko's many components which could be grouped together in innumerable ways, each of which could be

upgradeable or not and, if upgradeable, upgradeable in various ways.” POR 51. Rabenko’s system does indeed include components outside of its CME and DNE, but those components are irrelevant to the analysis required for this particular limitation. Ex. 1018, ¶ 66. Claim 18 is only concerned with the independent upgradeability of the claimed DNE and CME, and thus the Petition correctly posits that there are only two ways that these components can be upgraded – together or separately (*i.e.*, independently). The Petition provides a clear rationale as to why the latter would be used by a POSITA specifically within the particular context of Rabenko’s system – to offset the frequent, costly, and time-consuming updates required of standard-compliant devices. Pet. 27-29; Ex. 1018, ¶ 66.

PO argues that “there is no reasonable expectation of success in adding this independent upgradability based on Rabenko’s teachings.” POR 52. The Federal Circuit has found that “[a] party does not need to use the phrase ‘reasonable expectation of success,’ ‘likelihood of success,’ or some other set of magic words, to establish a reasonable expectation of success.” *Juniper Networks, Inc. v Correct Transmission, LLC*, No. 2023-1046, 2024 WL 3517862 (Fed. Cir. July 24, 2024); *Elekta Ltd. v. ZAP Surgical Sys., Inc.*, 81 F.4th 1368, 1376 (Fed. Cir. 2023). Here, a POSITA would have found a reasonable expectation of success because the Petition correctly posits that Rabenko’s CME and DNE can be upgraded only in one of two ways (together or separately) and provides clear rationale as to why the latter

would be used by a POSITA specifically within the particular context of Rabenko's system. Pet. 27-29; Ex. 1018, ¶ 67.

Finally, PO argues that Rabenko's CME "includes 'embedded' software that is not upgradeable, let alone modifiable." POR 49, 52-55. First, PO's evidence refutes its own argument. Both PO's expert and exhibits admit that upgrading embedded software is possible, albeit difficult. Ex. 2008, ¶¶ 105-106 (describing certain facilities that enable upgrading embedded software); Ex. 2004, 8 ("Many modern embedded systems support over-the-air (OTA) updates, allowing for reprogramming without physical access to the device"); Ex. 2005, p. 4 (admitting that even embedded systems that depend on certain hardware platforms can be upgraded). Second, Rabenko's embedded software is optional and described merely as one of "a variety of technologies" that may be used to implement system components. Ex. 1005, [0074]. Thus, PO's argument that "there is no reason to modify Rabenko such that it does not use embedded software" is baseless because using non-embedded software is already contemplated by Rabenko and thus no such "modification" is needed. POR 54; Ex. 1018, ¶ 67.

E. Rabenko Discloses "All DOCSIS Functions Are Localized In the" CME for Claim 19

PO argues that the Rabenko combinations fails to teach claim 19 because "all DOCSIS" functions were not shown to be localized in the CME. In particular, PO asserts that Rabenko's QPSK demodulator performs a "DOCSIS function." POR 58-

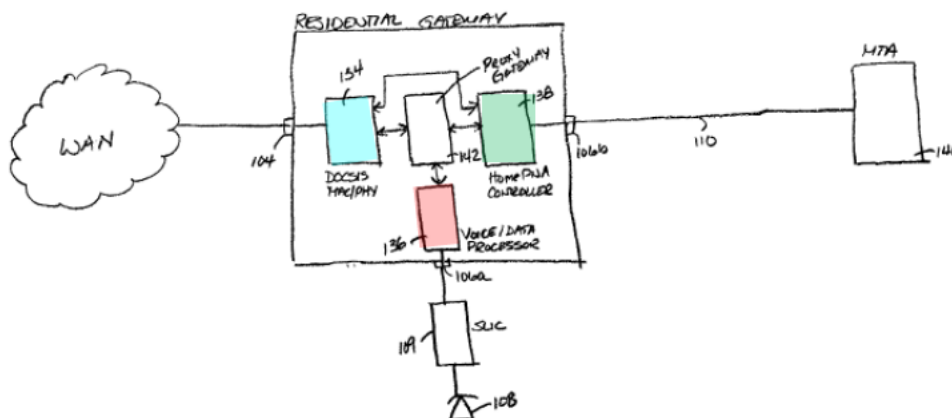
62. However, as explained below, the QPSK demodulator DOCSIS function is part of the CME. Moreover, PO appears to be interpreting claim 19 so as to exclude the '775 Patent's own embodiments.

1. The Petition Does Account for Rabenko's QPSK Out of Band Demodulator

The only DOCSIS function that PO specifically identifies as purportedly not being part of Rabenko's CME is the QPSK demodulator. POR 60. Yet the initial Petition and Dr. Kiaei's declaration prove the opposite.

Section VI.A.1.c. of the Petition states,

Rabenko discloses DOCSIS MAC 134/212 (blue), a proxy gateway 142 and voice/data processor 136/213 (red) (collectively, the claimed "cable modem engine") which are implemented in a second circuit performing cable modem functions according to the CableLabs Data Over Cable Service Interface Specification (DOCSIS). Ex. 1005, [0034].



Ex. 1005, Fig. 1b (annotated)

Pet. 21. Thereafter, the Petition discusses Rabenko's teaching in paragraph [0050] of QPSK demodulator 206. *Id.*, 22. As noted above, the Petition identifies DOCSIS MAC/PHY 134 of Figure 1b as a part of the claimed CME. DOCSIS MAC/PHY 134 identifies a component having a DOCSIS MAC layer and a DOCSIS PHY layer interface. With respect to Rabenko, a POSITA would have known that DOCSIS MAC/PHY 134 in Figure 1b would include the physical layer components in Figure 2 and thus includes QPSK demodulator 206. Therefore, even assuming that the functions of Rabenko's demodulator 206 would have to be part of the identified CME, the Petition does so. Ex. 1018, ¶¶ 68-71.

2. PO's Position Conflicts With the '775 Patent Specification

As claim 19 recites plural "functions," the Petition identified multiple "DOCSIS functions," all of which are performed by the components of the CME in Rabenko. Pet. 39-40; Ex. 1018, ¶¶ 72-73. In response, PO's argument, citing 2:55-56 and 4:13-16 of the '775 Patent, states that "Petitioner's failure to address what the claims require is, alone, sufficient reason to reject Petitioner's argument." POR 59-60. However, if PO is arguing that all possible DOCSIS functions are localized in the cable modem engine, PO's argument is inconsistent with the '775 Patent specification and claims. Rather, claim 19 is setting forth that, *as between the two engines in claim 18*, all DOCSIS functions are localized within the CME. Otherwise, claim 19 would contradict the specification of the '775 Patent.

Contrary to PO's argument that "the '775 Patent specification is clear that all DOCSIS functions should be localized within the CME" (POR 59-60), the '775 Patent describes an advanced crypto engine that implements a DOCSIS function that is expressly separate from the CME. Ex. 1001, 2:49-52, Figs. 1, 2; Ex. 1018, ¶ 74. "Advanced crypto engine 130 provides hardware support for crypto functions" including "common crypto functions required by the baseline **DOCSIS link-layer security**, PacketCable voice security and data-networking security (e.g., VPN)." *Id.*, 4:4-8 (emphasis added). The separation of the advanced crypto engine 130 from the CME, as well as the DNE, is also in claim 4 of the '775 Patent. Ex. 1001, 5:43-48 ("the advanced crypto engine being separate from both the data networking engine and the cable modem engine").

Thus, PO's position conflicts with both the specification and claims of the '775 Patent. Ex. 1018, ¶¶ 75-76.

F. The Use of Well-Known Processors Does Not Render Claim 12 Non-Obvious

None of Rabenko, Gaspar, Kim, or Lu recites the specific processor models in claim 12. Pet. 56. However, Rabenko teaches that its embodiments may be implemented in any number of ways. Ex. 1005, [0268]; Pet. 56-57. Furthermore, Klein and Kim '678 teach the use of the specific processors recited in claim 12 in similar applications. Pet. 59-60; Ex. 1016, [0008], [0024]; Ex. 1015, [0076], [0193]; Ex. 1002, ¶¶ 227-231. Thus, a POSITA would have understood that implementing

Rabenko's DOCSIS MAC and VDP using the claimed ARM940 processors would have been an obvious design choice considering "how best to implement the described functionality for each particular application." Pet. 58; Ex. 1005, [0268]; Ex. 1018, ¶¶ 77-80.

III. CONCLUSION

Claims 1-20 should be canceled.

Dated: March 18, 2025

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply totals 5524, which is less than the 5,600 allowed under 37 CFR § 42.24(c)(1), as counted by the Word Count feature of Microsoft Word. This total includes 5500 words as counted by the Word Count feature of Microsoft Word and 24 words used in annotations.

Pursuant to 37 C.F.R. § 42.24(a)(1), this count does not include the table of contents, the table of authorities, mandatory notices under § 42.8, the certificate of service, this certification of word count, the claims listing appendix, or appendix of exhibits.

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e)(4), the undersigned hereby certifies that the foregoing PETITIONER’S REPLY TO PATENT OWNER’S RESPONSE UNDER 37 C.F.R. §42.23 was served electronically via e-mail on March 18, 2025 on the following counsel of record for Patent Owner:

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CLAIM LISTING APPENDIX

U.S. Pat. No. 8,223,775

Designation	Claim Language
Claim 1	
[1A]	1. A cable modem system comprising:
[1B]	a data networking engine implemented in a first circuit that includes at least one processor, 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, wherein the at least one processor is a RISC processor;
[1C]	a cable modem engine implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit, the cable modem engine including a DOCSIS PHY layer, a DOCSIS controller, and a DOCSIS controller and 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, the cable modem functions including interfacing with cable media,
[1D]	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; and
[1E]	a data bus that connects the data networking engine to the cable modem engine, 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;
[1F]	wherein 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.
Claim 2	
2	2. A cable modem system as claimed in claim 1, wherein all DOCSIS functions are localized in the cable modem engine.

Designation	Claim Language
Claim 3	
3	3. A cable modem system as claimed in claim 2, wherein VoIP functionality is embedded in the cable modem engine.
Claim 4	
4	4. A cable modem system as claimed in claim 1, and further comprising an advanced crypto engine configured to perform all crypto functions for both the data networking engine and the cable modem engine, the advanced crypto engine being separate from both the data networking engine and the cable modem engine.
Claim 5	
5	5. A cable modem system as claimed in claim 1, wherein the DOCSIS PHY layer includes a hardware transmitter and receiver.
Claim 6	
6	6. A cable modem system as claimed in claim 1, wherein all VoIP functionality is implemented in the DOCSIS controller.
Claim 7	
7	7. A cable modem system as claimed in claim 6, wherein the VoIP functionality is in conformance with the PacketCable specification.
Claim 8	
8	8. A cable modem system as claimed in claim 1, wherein the data networking engine is configured to perform all data networking processing including advanced multi-port bridging routing with NAT/firewall and VPN, and home networking applications.
Claim 9	
9	9. A cable modem system as claimed in claim 8, wherein the data networking engine comprises the entire embedded portal services functionality of the CableHome specification.
Claim 10	
[10A]	10. A cable modem system as claimed in claim 1, wherein with regard to the cable modem engine: the DOCSIS PHY layer includes a transmitter and receiver;
[10B]	the DOCSIS MAC processor is configured to implement real-time MAC functions for both upstream and downstream communications; and

Designation	Claim Language
[10C]	the DOCSIS controller is configured to implement VoIP functionality; and
[10D]	wherein the data networking engine includes a RISC processor configured to implement a majority of data networking processing and home networking applications decoupled from the implementation of the MAC functions and the VoIP functionality of the cable modem engine.
Claim 11	
11	11. A cable modem system as claimed in claim 10, wherein the DOCSIS controller is configured to provide VoIP functionality in accordance with the PacketCable specification, wherein the data networking engine is configured to provide the embedded portal services functionality of the CableHome specification, and wherein the CableHome functionality provided by the data networking engine is completely decoupled from the PacketCable and DOCSIS functionality provided by the cable modem engine.
Claim 12	
12	12. A cable modem system as claimed in claim 11, wherein the DOCSIS MAC processor is an ARM9TDMI-based RISC processor, and wherein the DOCSIS controller is an ARM940-based RISC processor.
Claim 13	
[13A]	13. A cable modem system as claimed in claim 1, wherein the data networking engine includes consumer provided equipment drivers including a USB driver and an Ethernet driver and
[13B]	the data networking engine is configured to provide the embedded portal services functionality of the CableHome specification,
[13C]	wherein the DOCSIS controller is configured to provide VoIP functionality in accordance with the PacketCable specification, and
[13D]	wherein the CableHome functionality provided by the data networking engine is completely decoupled from the PacketCable and DOCSIS functionality provided by the cable modem engine.

Designation	Claim Language
Claim 14	
[14A]	14. A method of cable modem operation comprising:
[14B]	executing, via at least one processor of a first circuit that implements a data networking engine, first software that causes the data networking engine to perform home networking functions including interfacing with customer provided equipment, wherein the at least one processor is a RISC processor;
[14C]	executing, via one or more processors of a second circuit that implements a cable modem engine programmed with second software, the second software to cause the cable modem engine to perform cable modem functions other than the home networking functions performed by the data networking engine, the cable modem functions including interfacing with cable media, 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, wherein the second circuit is separate from the first circuit, and wherein the cable modem engine includes a DOCSIS PHY layer, a DOCSIS controller and a DOCSIS controller;
[14D]	connecting, via a data bus, the data networking engine to the cable modem engine, 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;
[14E]	processing, via the DOCSIS MAC processor, downstream PDU packets and forwarding the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput.
Claim 15	
[15A]	15. A method of cable modem operation as claimed in claim 14, further comprising: providing a flexible and partitioned cable modem gateway comprising:
[15B]	providing data and home networking functionality in the data networking engine;
[15C]	providing DOCSIS and VoIP functionality in the cable modem engine; and

Designation	Claim Language
[15D]	partitioning the data networking engine from the cable modem engine so that the data and home networking functionality is completely decoupled from the DOCSIS and VoIP functionality.
Claim 16	
16	16. A method as claimed in claim 14, further comprising: providing VoIP functionality in accordance with the PacketCable specification in the DOCSIS controller; and providing the embedded portal services functionality of the CableHome specification in the data networking engine; wherein the CableHome functionality provided by the data networking engine is completely decoupled from the PacketCable and DOCSIS functionality provided by the cable modem engine.
Claim 17	
17	17. A method as claimed in claim 14, further comprising: providing the embedded portal services functionality of the CableHome specification in the data networking engine; and providing VoIP functionality in accordance with the PacketCable specification in the DOCSIS controller; wherein the data networking engine includes consumer provided equipment drivers including a USB driver and an Ethernet driver; and wherein the CableHome functionality provided by the data networking engine is completely decoupled from the PacketCable and DOCSIS functionality provided by the cable modem engine.
Claim 18	
[18A]	18. A cable modem system comprising:
[18B]	a data networking engine implemented in a first circuit that includes at least one processor, 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, the second circuit being separate from the first circuit, the cable modem engine

Designation	Claim Language
	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, the cable modem functions including interfacing with cable media, and
[18D]	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,
[18E]	the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor,
[18F]	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
[18G]	a data bus that connects the data networking engine to the cable modem engine, 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.
Claim 19	
19	19. A cable modem system as claimed in claim 18, wherein all DOCSIS functions are localized in the cable modem engine.
Claim 20	
20	20. The cable modem system as claimed in claim 18 wherein the DOCSIS MAC processor is configured to implement real-time MAC functions for both upstream and downstream communications.