

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

PATENT OWNER SUR-REPLY

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EXHIBIT LIST	
2001	Declaration of Nathan Lowenstein in Support of Motion for <i>Pro Hac Vice</i> Admission
2002	Declaration of Colette Woo in Support of Motion for <i>Pro Hac Vice</i> Admission
2003	Declaration of Samuel H. Russ, Ph.D. [Russ-1 st -Decl.]
2004	Monarch Innovation, “Embedded System: Exploring Advantages and Disadvantages” (Jan. 30, 2023) (available at https://www.monarch-innovation.com/embedded-system-advantages-and-disadvantages) [Monarch]
2005	The IoT Academy, “What Are The Top Advantages And Disadvantages Of Embedded Systems” (Apr. 27, 2023) (available at https://theiotacademy.medium.com/what-are-the-top-advantages-and-disadvantages-of-embedded-systems-98e882f48ba4) [IoT]
2006	USPTO SAS Q&A, June 5, 2018 [Post-SAS-Office-Guidance]
2007	Declaration of Kenneth Weatherwax [SERVED ONLY]
2008	Second Declaration of Samuel H. Russ, Ph.D. [Russ-2 nd -Decl.]
2009	Deposition Transcript of Dr. Sayfe Kiaei [Kiaei-Depo.]
2010	Rohde & Schwarz, “DOCSIS Technology” (available at https://www.rohde-schwarz.com/us/technologies/cable_tv/docsis/docsis-technology/docsis_technology_55513.html) [Rohde-Schwarz]
2011	Data-Over-Cable-Service Interface Specifications DOCSIS 2.0 Operations Support System Interface Specification [DOCSIS-2.0]
2012	Samual H. Russ “Signal Integrity: Applied Electromagnetics and Professional Practice” 2d Edition [Signal-Integrity]

2013	<i>Cox Comms., Inc. v. Entropic Comms., LLC</i> , IPR2024-00579, Paper 9 (Decision Denying Institution) [579-DDI]
2014	Declaration of Colette Woo [SERVED ONLY]
2015	Second Deposition Transcript of Dr. Sayfe Kiaei [Kiaei-2 nd -Depo.]

The POR demonstrated Petitioner’s failure to make its case in the Petition. The Reply confirms that failure. Indeed, the Reply barely even challenges Patent Owner’s arguments or Dr. Russ’s analysis. Petitioner deposed Dr. Russ but did not ask a single question about Rabenko—Petitioner’s primary reference—and the transcript is not even mentioned in the Reply. Rather than attack Patent Owner’s actual arguments or Dr. Russ’s actual analysis, Petitioner directs its ire towards strawmen, as discussed below.

I. “DOCSIS CONTROLLER” (ALL CLAIMS, ALL GROUNDS).

The Petition failed to explain what a “DOCSIS controller” is or why Rabenko’s voice and data processor (“VDP”) qualifies as one. POR, 7-11. Under its plain meaning, a “DOCSIS controller” must control at least one DOCSIS function. *Id.*, 11-14. Rabenko’s VDP, however, does not perform any DOCSIS functions. Instead, the VDP processes VoIP signals to a Plain Old Telephony System (“POTS”) telephone (*id.*, 14-20). But the ’775 distinguishes DOCSIS functionality from VoIP functionality. *Id.*, 13-14; Ex. 1001, 2:21-24. Dispositively, the ’775 distinguishes a DOCSIS controller from a voice DSP (like Rabenko’s VDP). *See* Section I.B.1, *infra*.

Although the Board misunderstood the POPR’s claim construction position, the fully-developed record confirms Petitioner’s failure to prove that Rabenko’s VDP is a DOCSIS controller. Petitioner does not dispute that the Petition did not

show that Rabenko’s VDP has any connection to DOCSIS. *Compare* POR, 14-21 with Reply, 1-8. Petitioner instead misstates Patent Owner’s “DOCSIS controller” construction to attack it. *See* Section I.A. Petitioner, moreover, fundamentally fails to prove that Rabenko’s VDP controls or implements any DOCSIS functions. Critically, Petitioner fails to explain why Rabenko’s VDP—a voice DSP—would be a “DOCSIS controller” when the ’775 patent also discloses a voice DSP which is **not** the DOCSIS controller and outside of the CME altogether. *See* Section I.B.

A. Petitioner Misstates Patent Owner’s Construction Of “DOCSIS Controller.”

Under its plain meaning, a “DOCSIS controller” must control or implement one or more DOCSIS functions. POR, 11-13. The ’775 identifies exemplary DOCSIS functions. Ex. 1001, 3:26-34.

Tellingly, Petitioner does not attack Patent Owner’s actual construction. Instead, Petitioner inserts a clause specifying that the DOCSIS functions must be “unrelated to VoIP” and then attacks its own strawman:

Petitioner Misstates Patent Owner’s “DOCSIS Controller” Construction	
Actual Construction	Petitioner’s Misstatement
“A ‘DOCSIS controller’ must control at least one or more DOCSIS functions” POR, 11.	“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 ” Reply, 1.

There is no clearer sign of the reasonableness of Patent Owner’s construction than the fact that Petitioner must change it to attack it.

Not satisfied with merely misstating Patent Owner’s construction, Petitioner would have the Board write “DOCSIS controller” out of the claim, arguing a “DOCSIS controller” has no “limit” other than that which is expressly recited in the claim. Petitioner states:

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.

Reply, 2. Petitioner, thus, contravenes the principles that all claim terms must be “giv[en] effect”¹ and are “presumed to have meaning.”² Petitioner accuses Patent Owner of “confus[ing] rather than clarify[ing]” (Reply, 4) but it is Petitioner who refuses to give any effect or meaning to “DOCSIS controller.”

Petitioner accuses Patent Owner of “gerrymandering” VoIP out of DOCSIS,

¹ *Becton Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1257 (Fed. Cir. 2010) .

² *Innova/Pure Water, Inc. v. Safari Water Filtration Sys.*, 381 F.3d 1111, 1119 (Fed. Cir. 2004) .

but this is precisely backwards. It is Petitioner who is trying to shove VoIP into DOCSIS when the '775 patent clearly distinguishes DOCSIS functions from VoIP functions. POR, 13-14; Ex. 2008 [Russ-2nd-Decl.] ¶¶47-48; Ex. 1001 ['775] 2:21-24 (“DOCSIS **and** VoIP functionality is provided by a cable modem engine.”); 3:26-38 (“Controller 116 implements the following DOCSIS (blocks 200-212) functions:...”).

And this distinction exists for good reason; DOCSIS is its own standard while VoIP is implemented through separate standards including PacketCable. *Compare* Ex. 2011 [DOCSIS-Standard] *with* Ex. 1025 [PacketCable-Standard]. In accord, the '775 also distinguishes DOCSIS functions from PacketCable functions. *Compare* Ex. 1001 ['775] 3:26-35 (listing DOCSIS functions) *with* 3:39-47 (“controller 116 **also** implements all PacketCable functionality.”).

Petitioner reads the '775's statement that the CME “incorporate[s] a variety of functions beyond the traditional cable modem, including ... VoIP” which “utilize DOCSIS... services” to mean that DOCSIS encompasses VoIP. Reply, 2 (citing Ex. 1001, 1:20-25). But this merely indicates that VoIP may **utilize** DOCSIS when implemented by the inventive cable modem, not that VoIP functions are DOCSIS functions.

Petitioner also conflates DOCSIS with PacketCable (Reply, 3), but, again, PacketCable and DOCSIS are separate standards (Ex. 1025 [PacketCable-

Standard]; Ex. 2011 [DOCSIS-Standard]), and the '775 patent expressly distinguishes DOCSIS functions from both VoIP and PacketCable functions. This is undisputed and, as Dr. Kiaei confirmed, “PacketCable has *its own specification*” separate from DOCSIS. Ex. 2009 [Kiaei-1st-Depo.] 29:22-30:8.

Petitioner relies upon DOCSIS specification’s statement providing “for dynamically-created Service Flows, for example, created by an embedded PacketCable Multimedia Terminal Adapter, to manage VoIP signaling.” Reply, 3 (citing Ex. 2011, 52). But this does not support Petitioner. In its mapping of Rabenko, Petitioner does not identify “provid[ing] for service flows to manage VoIP” as a DOCSIS function; it identifies the VoIP service itself as such a function. Reply, 5. Petitioner never argues that Rabenko’s VDP has anything to do with “Service Flows” or implements any PacketCable functions. See Reply, 1-8. And for good reason. Rabenko’s VDP merely processes signals to-and-from a POTS telephone. See POR, 15-20. The fact that DOCSIS provides functionality that can be used to *manage* VoIP does not make the overlying VoIP functionality itself a DOCSIS function. See Ex. 2008 [Russ-2nd-Decl.] ¶¶46-47.

Moreover, the phrase Petitioner cites is the only discussion of PacketCable or VoIP throughout the 348-page DOCSIS specification. See Ex. 2011 [DOCSIS-Standard] *generally*. And the DOCSIS specification never explains how to implement VoIP or PacketCable. *Id.* Rather, PacketCable and VoIP are merely

“example[s]” of applications that can use a Service Flow provided by DOCSIS. *See id.*, 51-52. Just as a trolley car utilizes a track built upon an existing road, PacketCable utilizes DOCSIS to implement VoIP. But just as the trolley car is distinct from the road, so too are VoIP and PacketCable distinct from DOCSIS.

Petitioner argues that all signals, regardless of destination, enter the residential gateway as DOCSIS-compliant signals. Reply, 5-7. But within the gateway, after the DOCSIS MAC/PHY has processed the incoming packets to an internal (rather than DOCSIS) format, the VDP’s function is to convert packets into analog signals for the POTS telephone. POR, 16-17; Ex. 1005 [Rabenko] Fig. 1b, [0032], [0034], [0045].

Petitioner also faults Patent Owner for allegedly not providing a “clear distinction of which functions ... are DOCSIS functions and which are not, except to surmise that VoIP-related functions are not.” Reply, 3. But the term is clear on its face: DOCSIS functions are functions in the DOCSIS protocol—which notably do **not** include VoIP. Ex. 2008 [Russ-2nd-Depo.] ¶47. Further, the ’775 patent lists exemplary DOCSIS functions (Ex. 1001, 3:26-38) that are distinct from separately listed PacketCable and VoIP functions (*id.*, 3:39-46). Dr. Kiaei similarly testified that the ’775’s exemplary DOCSIS functions “are carried out in the DOCSIS protocol” (Ex. 2009, 24:12-27:11) while PacketCable functions relate to “operations and specifications within the PacketCable” protocol (*id.*, 30:13-35:17).

As the PacketCable standard/protocol (Ex. 1025) is distinct from the DOCSIS standard/protocol (Ex. 2011), the Board need not determine the metes and bounds of “DOCSIS functions” to discern that functions governed by the PacketCable standard/protocol and not in the DOCSIS standard/protocol are not included.

Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co., 868 F.3d 1013, 1017 (Fed. Cir. 2017) (Board “need only construe terms that are in controversy, and only to the extent necessary to resolve the controversy”) (cleaned up). Again, this is particularly true when the ’775 itself distinguishes DOCSIS functions from VoIP/PacketCable functions.

B. Petitioner Fails To Show That Rabenko’s VDP Controls Any DOCSIS Functions.

Petitioner continues to insist that Rabenko’s voice and data processor is a “DOCSIS controller.” But Rabenko’s VDP is a voice digital signal processor (“DSP”) that directly corresponds to the ’775 patent’s own “Voice DSP.” Critically, however, the ’775’s “Voice DSP” is **not** the DOCSIS controller. Moreover, it is outside of the CME altogether.

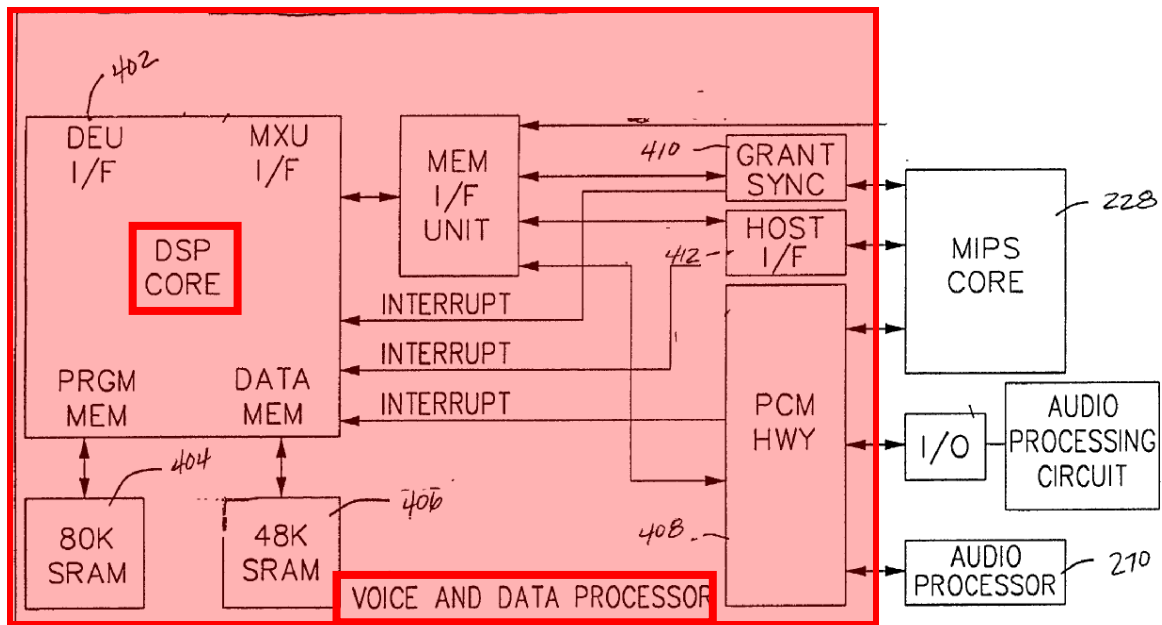
Petitioner has no explanation for why Rabenko’s voice DSP is a DOCSIS controller when the ’775’s corresponding voice DSP is shown in the patent itself to not be one. Section I.B.1. Further, to point to any DOCSIS functions, Petitioner’s Reply improperly modifies its ground such that Rabenko’s VDP includes the proxy

gateway and then also includes Rabenko's MTA call client. But the Petition relied upon the proxy gateway being implemented by MIPS "core 228," not the VDP. Moreover, even if Petitioner could now argue the proxy gateway were a part of the VDP, there is no reason that the MTA call client 502 is part of the VDP or the proxy gateway. Section I.B.2.

1. Rabenko's VDP Corresponds To The '775 Patent's "Voice DSP," Not Its "DOCSIS Controller."

The Petition, again, provided no basis for concluding that Rabenko's VDP is a DOCSIS controller. Instead, Petitioner now resorts to an expansive, limitless construction of "DOCSIS controller" to include Rabenko's VDP. See Section I.A, *supra*. Petitioner's conclusory assertion that a VDP is a "DOCSIS controller," however, does not withstand scrutiny. Rabenko's VDP is a voice DSP which corresponds to the voice DSP in the '775 patent. As the '775 makes clear, however, the voice DSP is not a DOCSIS controller and is not even a part of the CME.

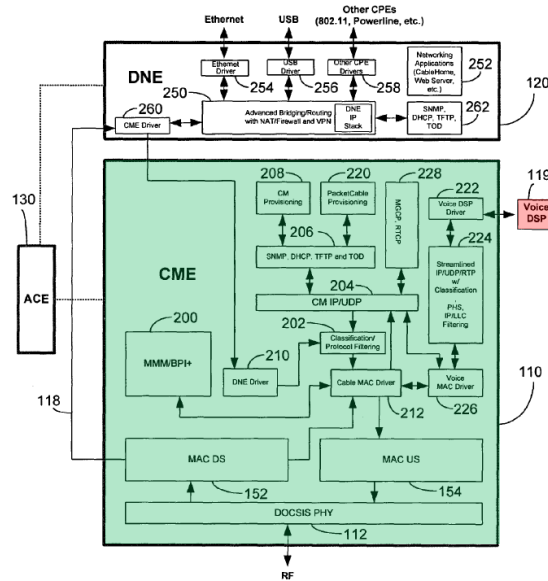
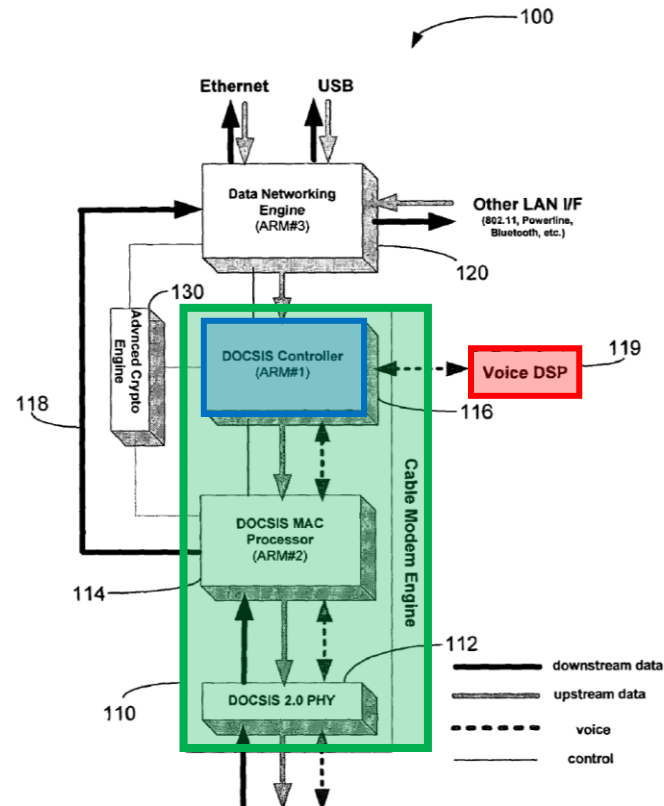
Rabenko's VDP is a voice DSP. Indeed, Rabenko refers to the VDP as the "voice processor DSP" and describes its VDP as a "DSP based voice and data processor." Ex. 1005 [Rabenko] [0011], [0097]-[0098]; Ex. 2015 [Kiaei-2nd-Depo.] 13:17-20. In accord, Figure 4 confirms the VDP has a "DSP core":



Ex. 1005 [Rabenko] Fig. 4, [0011]; see also [0089], [0075].

The '775 patent also discloses a voice DSP, but it is not a DOCSIS controller. The '775's “**Voice DSP 119**” is a separate element from **DOCSIS controller 116**, and is outside of the **CME** altogether:

'775's **Voice DSP**: Distinct From **DOCSIS Controller**, External To **CME**



Ex. 1001, Figs. 1-2. The corresponding description confirms that the DOCSIS controller 116 “interface[s] with **external** [Voice] DSP 119.” *Id.*, 3:44-47.

Thus, Petitioner would have us believe that Rabenko’s VDP (a voice DSP) is a DOCSIS controller even when the ’775 patent discloses a voice DSP that is clearly **not** the DOCSIS controller and not even a part of the CME. Petitioner provides no explanation for why a POSITA would understand Rabenko’s voice DSP to be a DOCSIS controller when the ’775 patent’s voice DSP is not a DOCSIS controller. Petitioner’s position, thus, does not withstand logical scrutiny.

2. Petitioner Fails To Prove Its Untimely Theory That Rabenko’s VDP Controls DOCSIS Functions Via The MTA Call Client.

Petitioner, again, cannot prove that Rabenko’s voice DSP is a “DOCSIS controller” when the ’775 patent expressly distinguishes the DOCSIS controller from its own voice DSP. Petitioner further fails to prove that Rabenko’s voice DSP controls any DOCSIS functions.

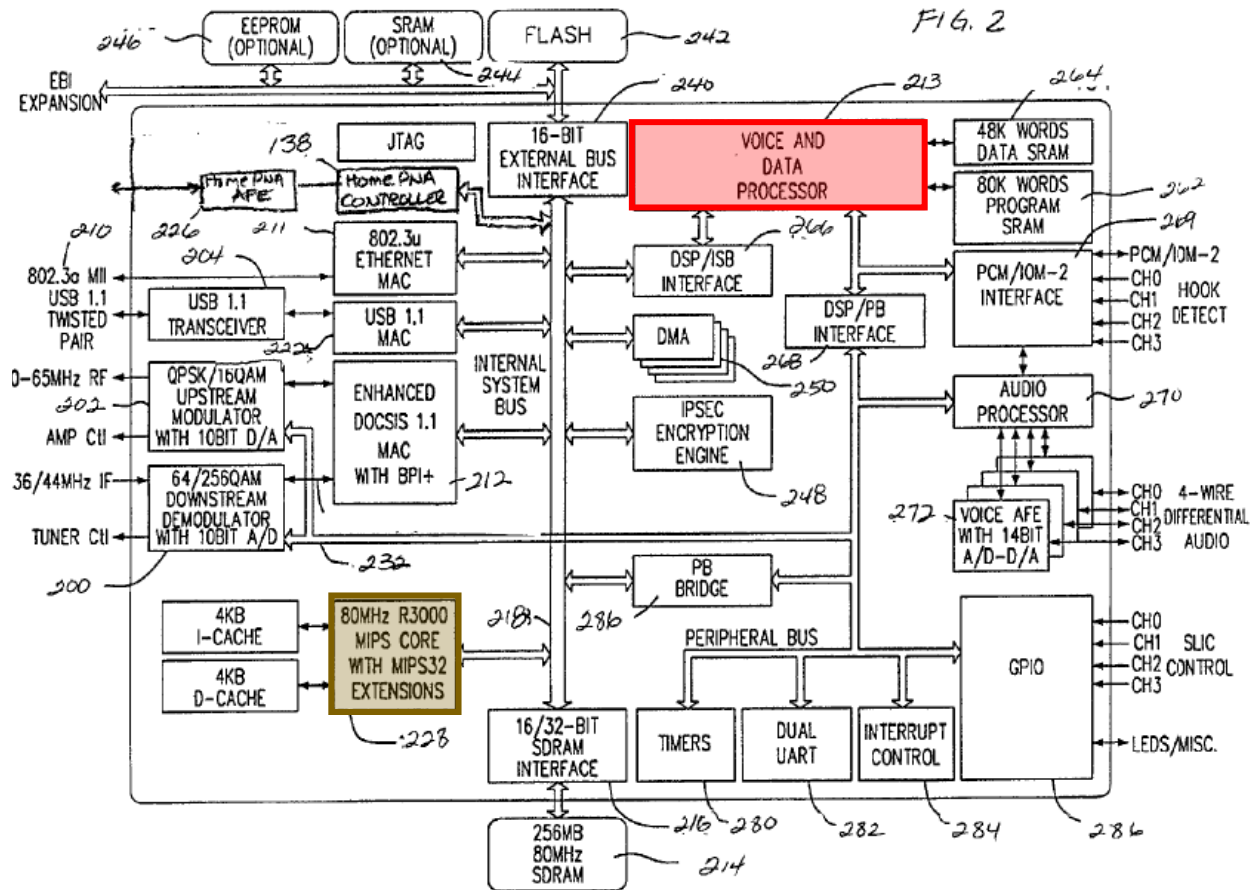
The Petition did not attempt to demonstrate that Rabenko’s VDP performed any DOCSIS function. POR, 14-21. The Reply attempts to make up for this shortcoming but its arguments all hinge upon functions performed by the “MTA call client 420,” not the VDP. Petitioner attempts to justify this sleight-of-hand by alleging the MTA call client is part of the “proxy gateway functions” that

“implemented” in the VDP and that the MTA call client is itself “located within the VDP”:

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.

Reply, 7-8, 5 (“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.’”). Thus, Petitioner’s arguments that Rabenko’s VDP performs DOCSIS functions require that Rabenko’s MTA call client be “located within the VDP.”

Petitioner’s argument fails for two reasons. First, Petitioner’s new reply-argument is contrary to the Petition-argument which relied upon the proxy gateway functions (allegedly including the MTA call client) being “implemented by” **MIPS core 228**, rather than the VDP to satisfy limitation 18[c]. Pet., 25 (“Cable modem **functions implemented by the proxy gateway 142 would be implemented by core 228** using software.”). Nor were these functions or the MTA call client identified in the Petition either. *Compare* Reply, 5, 7-8 with Pet., generally. Rabenko shows that the **MIPS core** is plainly a separate element from the **VDP**:



Ex. 1005 [Rabenko] Fig. 2; Fig. 4. But “[s]hifting arguments” in this fashion “is foreclosed by statute, [the Federal Circuit’s] precedent, and Board guidelines.”

Wasica Fin. GmbH v. Cont’l Auto. Sys., Inc., 853 F.3d 1272, 1286-7 (Fed. Cir. 2017).

Second, even if Petitioner could shift its theory to the proxy gateway being implemented by the VDP (rather than the MIPS core), Petitioner still cannot show that the MTA call client is part of Rabenko’s VDP. For starters, Rabenko never says **all** proxy gateway functions can be implemented in the VDP. Rather, it

merely says that **some** proxy gateway functions and, more specifically, those relating to Fig. 1b (*i.e.*, routing voice packets to the HomePNA controller or the POTS telephone) can be implemented in the VDP. Ex. 1005, [0044]-[0046], [0074]. These functions do not include the MTA call client functions Petitioner alleges are DOCSIS functions. *See* Reply, 5, 7-8 (relying upon Ex. 1005, [0097]-[0098], [0103]-[0105])

Moreover, contrary to Petitioner’s position, Rabenko never says that the MTA call client may be implemented in either the VDP or the proxy gateway. Rabenko merely teaches that the “proxy gateway function is implemented ... at the applications layer.” Ex. 1005 [Rabenko] [0097]. While the “applications layer also “includes an MTA call client 520,” two functionalities can be implemented at the same layer without one being part of the other, or indeed, without there being any particular relationship between them. Rabenko does not state that the call client is a part of the proxy gateway. *Id.* Rather, both are in the applications layer and the “MTA call client 520 ... provides overall control.” *Id.*

Thus, Petitioner’s untimely theory relies upon the alleged proxy gateway functions relating to the MTA call client being implemented in the VDP and further assumes that the MTA call client is a part of the proxy gateway. But that is not what Rabenko says. Rabenko only says that some, discrete proxy gateway functions may be implemented in the VDP. And while both the proxy gateway and

the MTA call client are a part of the “applications layer,” the MTA call client is not a part of the proxy gateway; rather, it provides “overall control” within the applications layer. *Id.* Thus, the MTA call client is not a part of the proxy gateway; if anything, it controls the proxy gateway.

In accord, Rabenko’s disclosure further confirms that the MTA call client is not “located on the VDP.” As Figure 5b illustrates, the **MTA call client 520** is identified separately from [voice] **DSP 523** and the two communicate via an interface, **HAPI 522**:

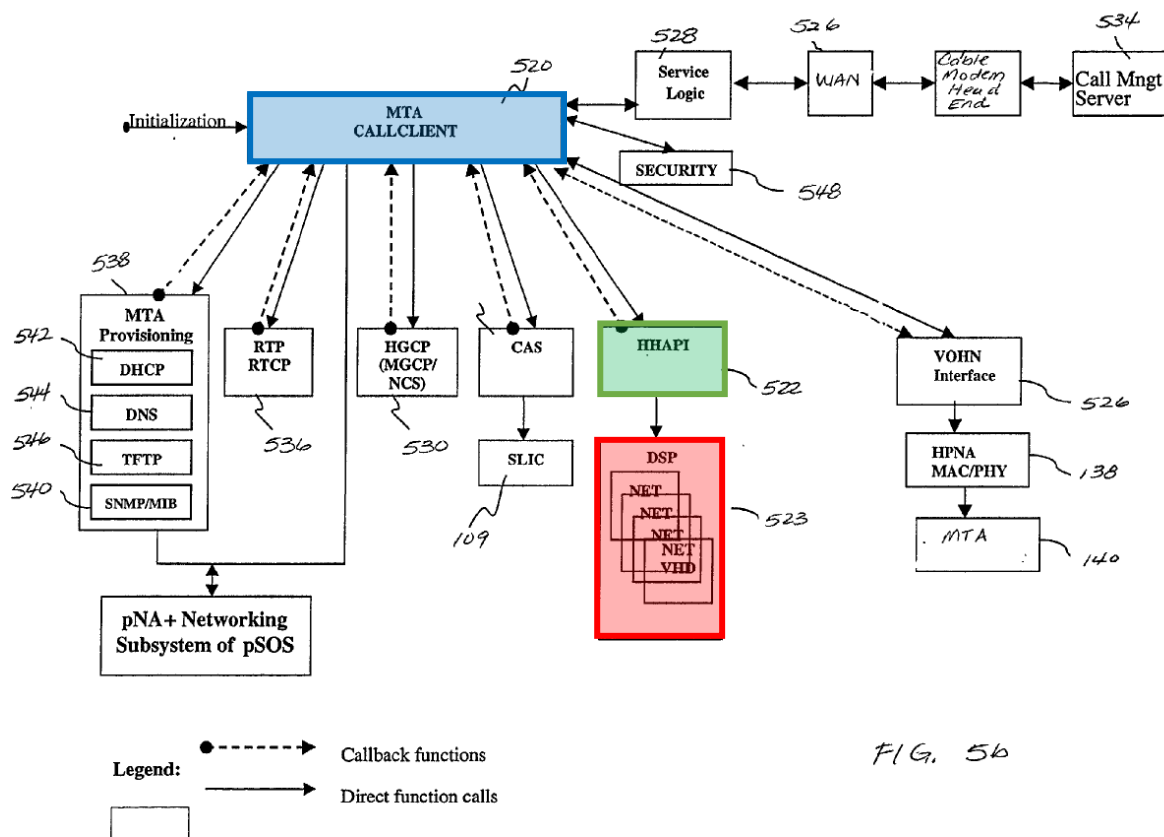


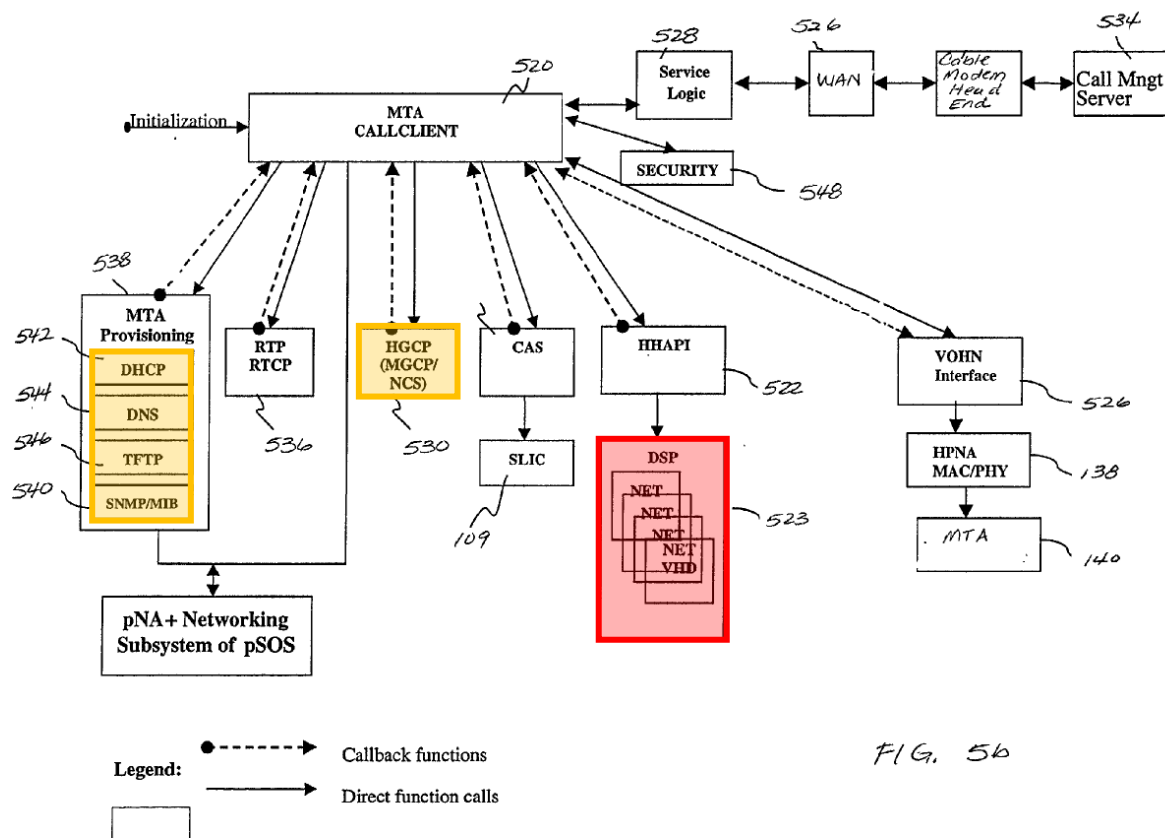
FIG. 5b

Ex. 1005, Fig. 5b.

Further, the attendant description suggests that regardless of where the proxy gateway functions are implemented, the MTA call client is implemented by the MIPS core, not the VDP. Rabenko states that “HAPI 522”—interposed in Fig. 5b between the MTA call client and the VDP—“provides a software messaging interface between the **MIPS core 228** in the residential gateway (see FIG. 2) and the voice processor DSP.” *Id.*, [0097]; *id.* (“The HAPI 522 facilitates the issuing of **commands from the MIPS core to the voice processor DSP** as well the **sending of events from the voice processor DSP to the MIPS core.**”); Ex. 2015 [Kiaei-2nd-Depo] 10:2-11:4 (Figure 5b depicts HAPI 522 “providing a messaging [] between various things and MIPS core processor 228”).

Rabenko, thus, teaches that the MTA call client is implemented by the MIPS core and communicates with the VDP, not that it is a part of the VDP. Dr. Kiaei’s deposition testimony only confirms Petitioner’s failure to substantiate its untimely argument. Although the Reply extensively relies upon Rabenko at [0097]-[0098] to allegedly prove that the MTA call client is part of the VDP (Reply, 5, 7-8), Dr. Kiaei repeatedly insisted that he had not performed “software analysis” on the MTA call client and refused to answer questions about the very paragraphs and figures in Rabenko he and Petitioner rely upon. *E.g.*, Ex. 2015 [Kiaei-2nd-Depo.] 15:14-24, 15:25-16:10, 16:16-17:10, 17:11-23, 22:7-23:2, 24:7-20.

Further, even if, counterfactually, Rabenko's VDP implemented some of the MTA call client's functions, there is no reason to believe that the alleged DOCSIS functions are performed by the VDP. Specifically, Petitioner newly relies upon "GCP logic 530," "SNMP logic 540," "DHCP logic 542," and "TFTP logic 546" as allegedly performing DOCSIS functions. Reply, 5, 7-8. But these "**logic[s]**" are separate from and never interface with the **DSP (i.e., VDP)**:



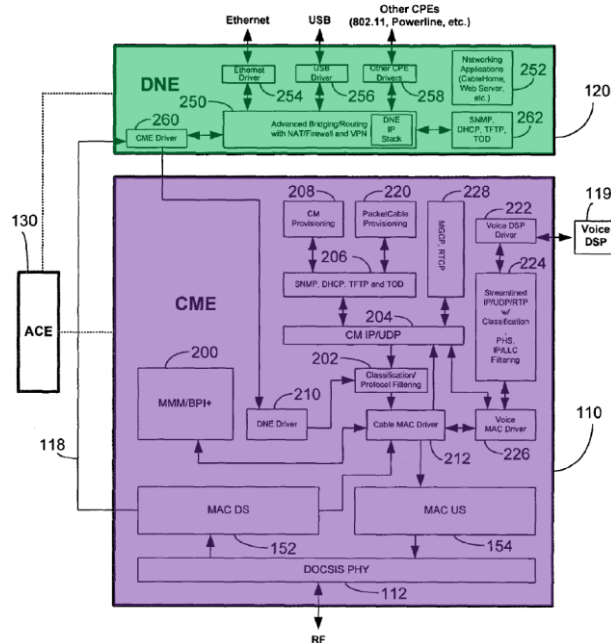
Ex. 1005 [Rabenko] Fig. 5b (annotated). Nor does Rabenko ever describe these logics as being implemented in the VDP. Rather, "[t]he GCP logic 530 controls the voice processor DSP, via the MTA call client 520[] and the HAPI interface

522...” *See id.*, [0098]; [0103] (no mention of VDP). By contrast, when Rabenko wanted to disclose that certain functionalities could be implemented in either the VDP or the MIPS core, it did so explicitly. For instance, Rabenko specifies that “CAS logic 538” which performs functions relating to POTS such as “ring generation, hookswitch detection, and battery voltage control,” “can be implemented in the [VDP], or alternatively be resident on the MIPS core.” *Id.*, [0102].

Petitioner, thus, fails to substantiate its untimely reply-theories that the VDP implements DOCSIS functions via the MTA call client. Consequently, Petitioner fails to demonstrate that Rabenko’s VDP controls any DOCSIS functions.

II. DNE AND CME IN “SEPARATE” “CIRCUITS” WITH “COMPLETELY PARTITIONED” FUNCTIONS (ALL CLAIMS, ALL GROUNDS).

The ’775 patent is substantially directed towards implementing a DNE and a CME in separate, functionally partitioned circuits. POR, 21-23. The ’775’s division between the **DNE** and the **CME** is undeniable:



Ex. 1001 [’775] Fig. 2; POR, 3-4; Ex. 2008 [Russ-2nd-Decl.] ¶34.

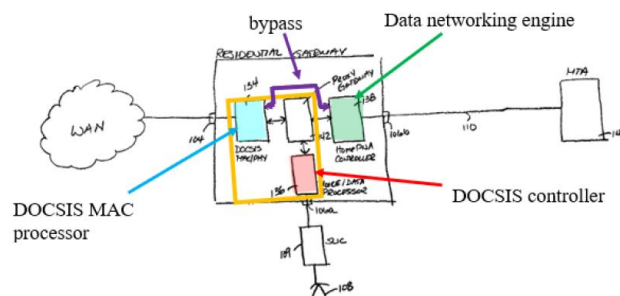
Rabenko, however, has no such disclosure. It identifies no DNE nor CME, much less ones that are functionally partitioned. POR, 23-35. To fill this gap, Petitioner baselessly identifies various elements as comprising the DNE and CME, respectively. *Id.* But Petitioner’s *ex post facto* identification does not arise from Rabenko’s disclosure. What is more, Rabenko’s VDP is not in the same circuit as the DOCSIS MAC/PHY but, rather, is in its own separate circuit, at least under Petitioner’s understanding of a “circuit.” *Id.*, 26-28. That Rabenko’s VDP is not on the same circuit as the DOCSIS MAC/PHY is unsurprising, given that the VDP processes signals for a POTS telephone. *Id.*

The Reply largely repeats the Petition’s arguments, entirely ignoring Patent Owner’s demonstration that there is no reason Rabenko’s VDP would be

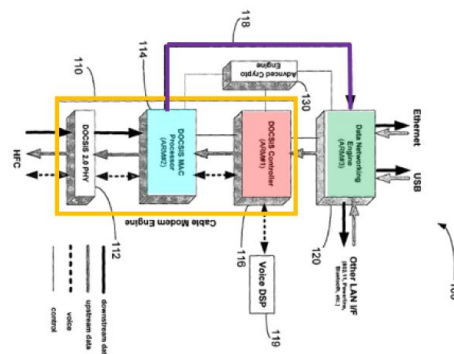
considered part of the same circuit as the DOCSIS MAC/PHY. Reply, 8-11. The POR's showing is, therefore, undisputed. Moreover, the few responsive reply-arguments presented fail.

Petitioner alleges that “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.” Reply, 10. But, per Figure 2 above and its attendant disclosure, the ’775 patent clearly depicts a partitioned DNE and CME that are “completely decoupled” from each other. *E.g.*, Ex. 1001 [’775] Fig. 2, 2:13-15.

Petitioner further attempts to draw a parallel between Rabenko’s Figure 1b and the ’775 patent’s Figure 1 to justify its mapping:



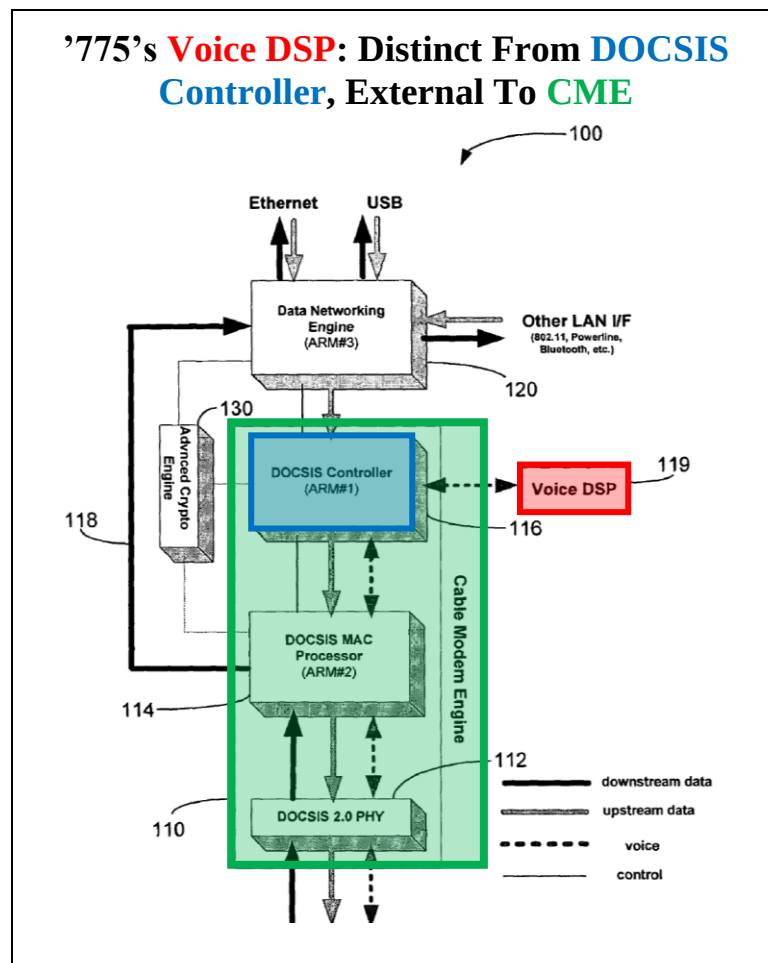
Ex. 1005, Fig. 1b (annotated)



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

Reply, 14, 16.

But Petitioner's comparison is rooted in the false assumption that Rabenko's VDP is a DOCSIS controller and, thus, part of a CME. Again, however, Rabenko's VDP corresponds to the '775 patent's "**voice DSP 119**," not the **DOCSIS controller**, and the voice DSP is *not* in the CME. Section I.B.1.

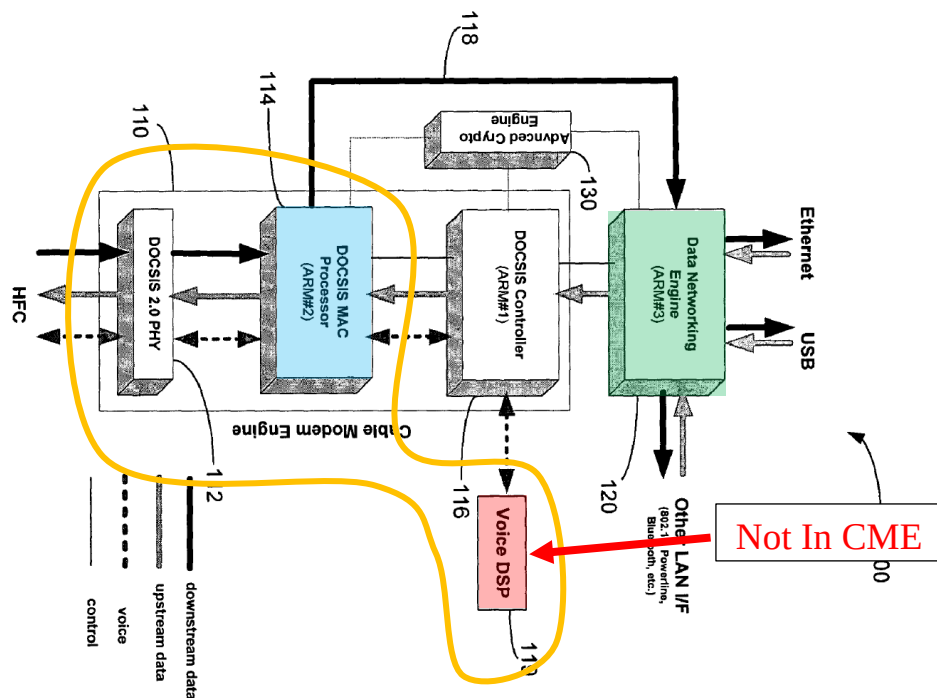
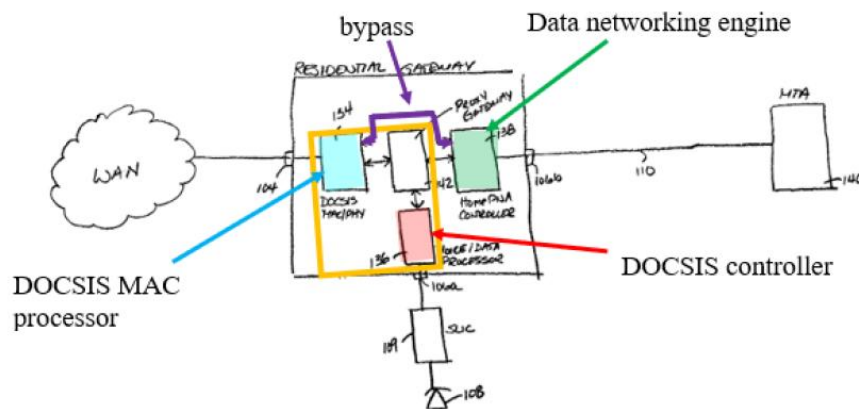


Ex. 1001, Figs. 1-2; 3:46-47 (controller 116 “interface[s] with *external voice DSP* 119.”). As Dr. Kiaei confirms, the **voice DSP 119** is “out of the” **CME**. Ex. 2009

[Kiaei-1st-Depo.] 32:5-15 (“I notice that *voice DSP ... was clearly shown in [Figure 2] out of the cable modem.*”).

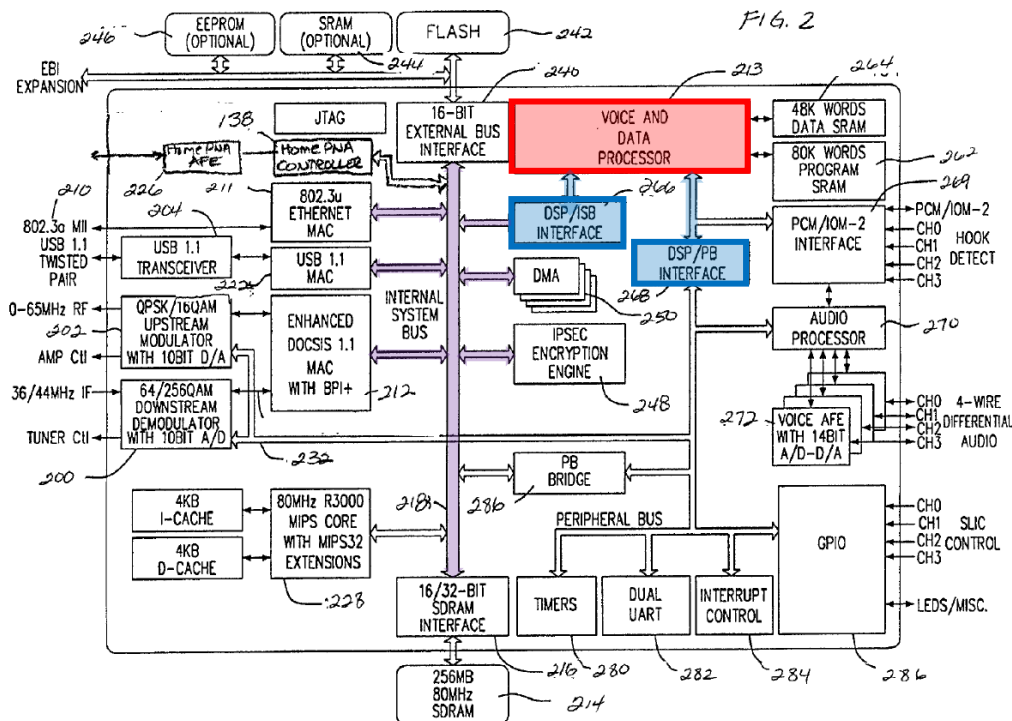
Thus, an accurate apples-to-apples comparison between the figures only confirms that Rabenko lacks a DOCSIS controller, forcing Petitioner to arbitrarily shoehorn a voice DSP into the CME, contrary to the '775's disclosure:

Apples-to-Apples Comparison: Rabenko's VDP Is Not A Part Of A CME



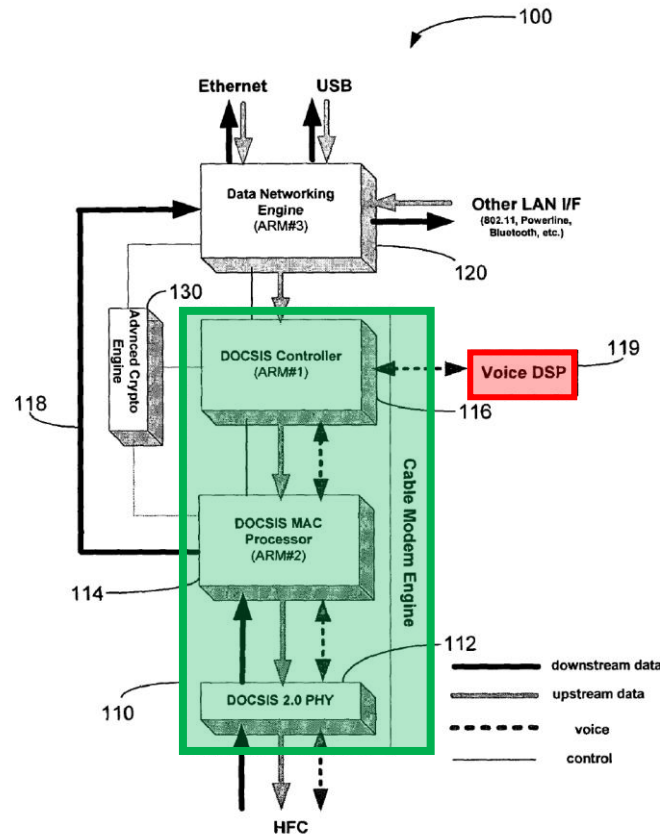
Ex. 1001, Fig. 1 (annotated). Thus, Rabenko lacks the claimed CME “including a DOCSIS controller,” much less one that is separate and functionally partitioned from a DNE.

Like the '775's voice DSP, Rabenko's VDP is also external to any circuit the DOCSIS MAC/PHY may be in. Indeed, as can be seen in Rabenko's Figure 2, the VDP is not directly connected to the **internal system bus** that the DOCSIS MAC/PHY and the HomePNA controller are directly connected to:



Ex. 1005 [Rabenko] Fig. 2 (annotated). Rather, the **VDP** can only communicate with the DOCSIS MAC/PHY through the **DSP/ISB (internal system bus)**

interface 266 or the DSP/PB (peripheral bus) interface. *Id.*, [0075]. Rabenko's VDP, thus, is separate and apart from the CME, just like the '775's voice DSP:



Petitioner has no answer for why Rabenko's VDP and DOCSIS MAC/PHY are in their own circuit separate from the circuit with the HomePNA controller. There is no reason, therefore, to believe Petitioner's arbitrary mapping that Rabenko's VDP is part of or in the same circuit as the CME.

III. CME "CONFIGURED TO ENABLE [INDEPENDENT] UPGRADES TO ITS SOFTWARE" (ALL CLAIMS, ALL GROUNDS).

The Petition failed to demonstrate that Rabenko alone or Rabenko-Kim disclose or render obvious a CME "configured to enable upgrades to its software

... independent of upgrades to the software of the” DNE.³ POR, 37-57. The Reply fails to salvage either theory.

1. Rabenko-Kim.

Again, the Rabenko-Kim combinations failed to 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. POR, 38-46. Kim concerns a DNE with modular components, not a CME, and Petitioner fails to explain how Rabenko would be modified so that the components of its CME would be modular. *Id.*, 39-40. Moreover, Kim concerns replacing hardware, not upgrading software. *Id.*, 41. Finally, even if replacing hardware entailed upgrading software, that would not satisfy the claims which do not merely require upgrading software but, rather, a CME “**configured to** enable upgrades to **its** software.” *Id.*, 41-46.

The fully-developed record confirms Petitioner’s failure of proof. Petitioner does not dispute that Kim has nothing to do with a CME but nonetheless contends that Kim would “motivate a POSITA to design Rabenko’s already-existing components, including its CME, modularly, to ensure independent upgradeability.” Reply, 17-18. No reference, however, suggests that a CME has modular or

³ Petitioner does not contend that Rabenko-Gaspar satisfies this limitation.

See Reply, 17; *see also* POR, 56-57.

replaceable components. See Reply, 17-18. That one thing may be replaced does not suggest that all things are replaceable. Indeed, Kim only teaches that two specific controllers can be replaced, not that any component in any engine can be designed modularly. Knee replacement surgery does not suggest brain replacement surgery. Similarly, replacing modular HomePNA or ADSL controllers which “are detachably connected to the system controller through a predetermined interface” (Ex. 1007 [Kim] [0014]) does not suggest that Rabenko’s CME (which is not taught to be detachably connected) is modularly replaceable.

Nor is evidence provided that Rabenko’s CME would be modularly replaceable. Rabenko’s Figure 2—which Petitioner relies heavily upon—is “implemented in a single chip.” Ex. 1005 [Rabenko] [0050]; Pet., 24, 35, 46-47. Petitioner does not explain how a POSITA would be motivated **to remove discrete aspects of Rabenko’s IC** much less with a reasonable likelihood of success. At best, a POSITA might replace the entire chip, but, even if that were incorrectly deemed a software “upgrade,” it would not be independent of the DNE located on the very same chip.

Petitioner next argues that to perform its functions, Kim’s “controllers would be comprised of hardware and software, and that upgrading the controllers would comprise upgrading the hardware and software.” Reply, 19. Petitioner argues that “it beggars belief that a skilled artisan would fail to understand that upgrading

hardware would not also involve updating the associated software.” *Id.* Here, Petitioner invokes inherency but its indignant bluster does not demonstrate that replacing Kim’s DNE hardware ***necessarily*** entails upgrading its software. *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002). Kim simply does not teach upgrading software. POR, 41.

Critically, Petitioner ignores that the claims require a CME “***configured to*** enable upgrades to ***its*** software.” Even if, *arguendo*, replacing the CME’s hardware results in new software, it would not disclose a CME configured to enable “upgrades to its software” but, rather, one that is physically removed. POR, 41-44. Contrary to Petitioner’s physical replacement theory, the ’775 discloses software-partnering models that upgrade software without physical “support depend[ent] on the cable modem provider.” *Id.*, 44-46; Ex. 1001 [’775] 4:24-36. Ex. 2008 [Russ-2nd-Decl.] ¶98. In this same vein, the ’775 makes repeated reference to upgrading software “independently” and never suggests software would be “upgraded” by replacing hardware. Ex. 1001, 1:29-40, 3:58-62, 4:25-40.

Petitioner also argues that “[t]he components in Kim and the ’775 Patent *enable* independent upgrades in the same way – a partitioned modular design structure.” Reply, 19. But Kim mentions neither software upgrades nor partitioning of functions, only that certain controllers are modular and can be replaced. See Ex. 1007 [Kim] Abstract, [0001], [0006]-[0010], [0014], [0026]-

[0028], [0061], [0062]. By contrast, independent software upgrades are a critical feature of the '775 patent and its claimed inventions, facilitated by functional partitioning and separating the DNE and CME onto different circuits. Ex. 1001 ['775] 4:25-40; 1:30-40.

2. Rabenko Alone.

Rabenko alone is even further afield and does not suggest a CME configured to enable independent upgrades to its software. POR, 46-55. Petitioner relies on Rabenko's boilerplate statement that its system can be implemented in combinations of hardware and/or software. *Id.*, 46-47. Rabenko, however, does not suggest **any** software upgrades, much less a CME configured to implement independent software upgrades. Nonetheless, Petitioner insists that independent software upgrades "would have been obvious to try" because it is one of only two ways of upgrading software. *Id.*, 46-52. But the limitation-at-issue undisputedly goes to the heart of the claimed invention, and Petitioner's arguments fall well short of the high bar for establishing obviousness in the face of a significant missing limitation. *Id.*, 48-52 (citing *Arendi*, *KS HMPP*, and *DSS*); Reply, 22. Nor did Petitioner establish that it would be "obvious to try" independent software upgrades as Rabenko has embedded software and does not contemplate software upgrades at all. POR, 52-55.

The Reply does not dispute that Petitioner did not identify any prior art teaching independently upgrading software for one module of a system. See Reply, 21-24. Petitioner alleges that it “provided both ‘evidence and a reasoned explanation’” in the Petition but repeats its citation to Rabenko’s boilerplate and its conclusory “obvious to try” theory. *Id.* Petitioner thus fails to rebut the POR’s showing that Petitioner’s “obvious to try” theory fell well short of the elevated standard for a critical missing limitation. POR, 49-52 (citing *Arendi*, *KS HMPP*, and *DSS*). Rather, Petitioner’s theory impermissibly relies upon hindsight. Obviousness cannot be shown based on a mere disclosure that the “possible arrangement[] existed in the prior art.” *Virtek Vision Int’l ULC, v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 887 (Fed. Cir. 2024). Moreover, “obvious to try” theories fail “where vague prior art does not guide an inventor toward a **particular solution**.” *Bayer Schering Pharma AG v. Barr Labs., Inc.*, 575 F.3d 1341, 1347 (Fed. Cir. 2009); *In re Kubin*, 561 F.3d 1351, 1359 (Fed. Cir. 2009). Petitioner does not address or dispute the POR’s showing.

Petitioner also argues that a POSITA would have recognized that Rabenko’s components are standard-compliant, requiring “frequent costly and time-consuming updates to maintain compliance with evolving standards,” and thus “would have recognized the need to enable convenient upgrades of those devices.” Reply, 21. But Petitioner provides no evidence of required “frequent” updates,

much less ones that would motivate a POSITA to independently update the software of a particular module.

Instead, Rabenko recognized that the industry standard was to either upgrade the entire system software or not upgrade the software at all because Rabenko uses embedded software. POR, 52-55; Ex. 1005 [Rabenko] [0074]-[0075], [0089], [0091], [0097], [0122]; *e.g.*, Ex. 1021 [Russ-Depo.] 24:20-26:4 (Scientific Atlanta Explorer 4200 only compliant with one version of DOCSIS, any software upgrades would be to “the entire software.”). Embedded software, again, is generally not upgradeable. POR, 53-54; Ex. 2006 [IoT], Ex. 2004 [Monarch]. Indeed, although Petitioner suggests that Patent Owner’s expert conceded that embedded software can be upgraded (Reply, 24), that is not true. Dr. Russ testified that “[u]pgrading ‘embedded’ software (at least without changing the hardware that is used) generally **is impossible** or at least difficult,” which suggests the opposite. Ex. 2008 [Russ-2nd-Decl.] ¶¶105-106. Gaspar too recognizes this industry standard by only addressing software upgrades “**during the design process**,” *i.e.*, before a device exists and has gone to the market. Ex. 1006 [Gaspar] [0005]. There is no reason a POSITA would have found it “obvious to try” upgrading embedded software.

Petitioner also argues that “using non-embedded software is already contemplated by Rabenko.” Reply, 24 (citing Ex. 1005 [Rabenko] [0074]). But Rabenko at [0074] confirms the VDP “**may be implemented with** a variety of

technologies including, by way of example, ***embedded communications software*** that enables transmission of voice over packet based networks.” Thus, Rabenko does not suggest non-embedded software, let alone non-embedded software that is independently upgradeable.

IV. “ALL DOCSIS FUNCTIONS ARE LOCALIZED” IN “CABLE MODEM ENGINE” (CLAIMS 2, 19, GROUNDS A-D).

The POR demonstrated that Petitioner fails to show “all DOCSIS functions” are “localized in” Rabenko’s purported CME because Petitioner fails to account for Rabenko’s QPSK out of band downstream demodulator 206 (“QPSK demodulator”), which performs DOCSIS functions but is not even alleged to be a part of the CME. POR, 58-62. Petitioner thus failed to “make [its] case in [the] petition.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016).

Petitioner’s Reply does not dispute that the QPSK demodulator performs DOCSIS functions. See Reply, 25-27. Petitioner argues that it did identify the QPSK demodulator as part of the CME. *Id.*, 25-26 (citing Pet., 21-22). But Petitioner only cites an unexplained block quote to support the proposition that Rabenko’s cable modem functions are according to DOCSIS. Pet., 21-22. Petitioner simply did not identify the QPSK demodulator as part of the CME. *Id.*, 21-26.

Petitioner also contends, but fails to substantiate, that “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.” Reply, 26. Indeed, Petitioner and Dr. Kiaei do not cite any evidence demonstrating that QPSK demodulator 206 is a physical layer component or that DOCSIS MAC/PHY includes Figure 2’s physical layer components. See Reply, 26; Ex. 1018 [Kiaei-2nd-Decl.] ¶71. Indeed, Rabenko never says as much and, notably, depicts DOCSIS MAC/PHY as a separate component from the physical layer components in Figure 2. Ex. 1005 [Rabenko] Fig. 2.

Petitioner also argues that claim 19 only requires that “as between the two engines in claim 18, all DOCSIS functions are localized within the CME” because the ’775’s specification describes an “advance crypto engine 130” outside the CME that provides hardware support for crypto functions including those required by the baseline DOCSIS link-layer security. Reply, 26-27. But the ’775 patent explicitly teaches that the crypto functions of “DOCSIS link-layer DES encryption and decryption” are implemented by DOCSIS processor 114. Ex. 1001 [’775] 3:1-7. That another element provides some hardware support that can be generally used across cryptographic applications does not mean that the DOCSIS function-in-question is not localized to the CME.

V. “THE DOCSIS MAC PROCESSOR IS AN ARM9TDMI-BASED RISC PROCESSOR” AND “THE DOCSIS CONTROLLER IS AN ARM940-BASED RISC PROCESSOR” (CLAIM 12, GROUNDS I-P).

The Board correctly noted in the ID that none of Rabenko, Gaspar, or Kim specifically recite an ARM9TDMI-based or ARM940-based processor and questioned “whether Petitioner has sufficiently demonstrated that the [limitations-at-issue] would have been an obvious design choice in view of the teachings of Rabenko, Gaspar, Kim, and Lu.” ID, 41. The POR further demonstrated Petitioner’s shortcoming by showing that Petitioner failed to provide any evidence of any DOCSIS MAC processor implemented as an ARM9TDMI-based RISC processor or any DOCSIS controller implemented as an ARM940-based RISC processor. POR, 62-66. Moreover, Petitioner’s tertiary references, Klein and Kim ’678, are not even analogous art. *Id.*, 64-65. Despite the Board’s skepticism and the POR’s demonstration, Petitioner does not even attempt to remedy its shortcomings. Instead, Petitioner merely repeats its Petition arguments. Reply, 27-28. Thus, the POR’s showing is un rebutted.

VI. CONCLUSION

Petitioner fails to demonstrate by a preponderance of the evidence that any of the claims are invalid.

Respectfully submitted,

/ Kenneth J. Weatherwax /
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Nathan Lowenstein, *pro hac vice*
Colette Woo, *pro hac vice*
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Date: April 29, 2025

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Sur-Reply (the “Sur-Reply”) consists of 5,592 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The Sur-Reply complies with the type-volume limitation of 5,600 words as mandated in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Respectfully submitted,

/ Colette Woo /

Date: April 29, 2025

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the following documents were served
by electronic service, by agreement between the parties, on the date below:

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EXHIBIT 2015

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Date: April 29, 2025