

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'S PRELIMINARY RESPONSE

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2003	Declaration of Samuel H. Russ, Ph.D.
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”)

I. INTRODUCTION

The '775 Patent envisions a “future **gateway cable modem** (CM)” that “will incorporate a variety of functions beyond the traditional cable modem[.]” Ex. 1001 [’775] 1:13, 1:20-22. As the Patent then observes, when it comes to this gateway cable modem of the future,

[p]artitioning these functions along with other cable modem functions among different computational agents **is an essential issue** in designing a gateway cable modem.

Id. 1:27-29. The Patent then describes a variety of goals the inventors set out to achieve in arriving at the architecture of the invention, including flexibility:

Flexib[i]lity. The architecture of the gateway cable modem should be flexible enough to allow independent software development and field-upgrade of gateway value-added services and basic DOCSIS cable modem services.

Id. 1:30-33, *see also* 1:33-40. It discusses detailed targets to provide benefits in the areas of “Performance,” “Cost” and “Software Re-Use.” *Id.* 1:41-55. It explains that its novel disclosed architecture achieves these various goals:

The present invention provides a gateway cable modem architecture that meets all of these objectives.

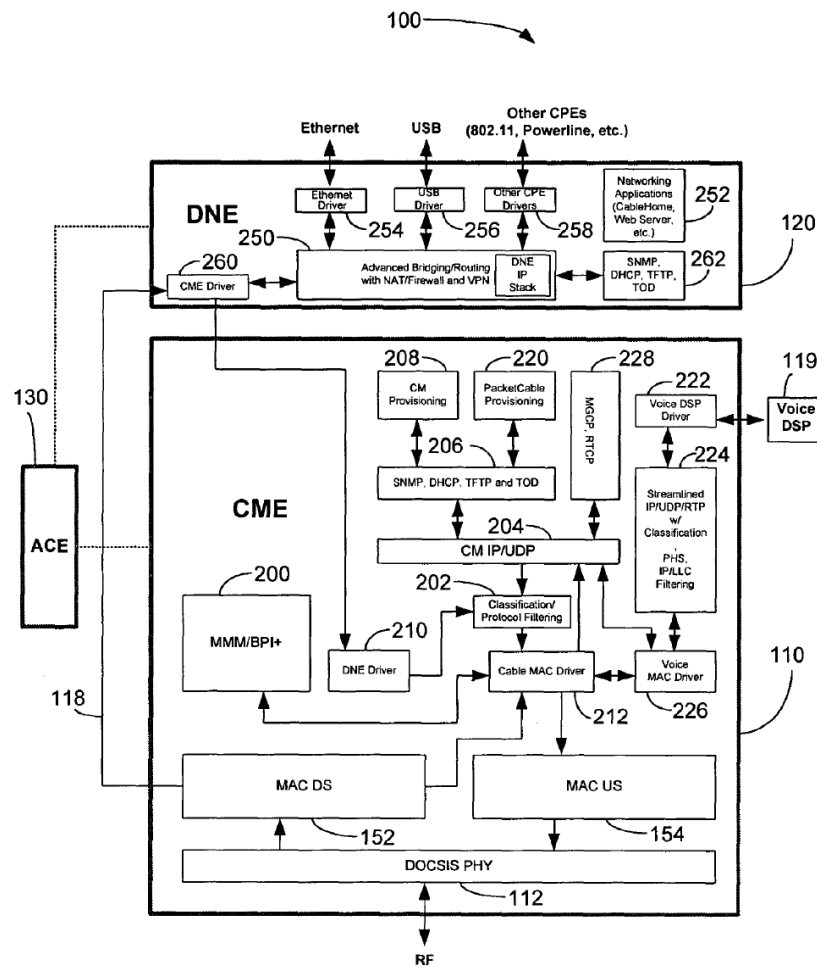
Id. 1:56-57.

The '775 Patent's inventive gateway modem architecture is centrally based on two separate “engines” into which the various functions are allocated. First is a

data networking engine (“DNE”) responsible for the home networking functions—in short, for the part of the cable modem that will interface into networks on-premises. Second is a cable modem engine (“CME”) responsible for the cable modem functions—the interface to communication outside the premises to the cable operator and on to the internet. This interface is expected to implement the DOCSIS set of standards, and the CME includes both a DOCSIS MAC processor and a DOCSIS controller.

Each of the DNE and CME are implemented in respective circuits, each including at least one processor. The DNE and CME are functionally partitioned from each other as claimed, “the cable modem functions performed by the cable modem engine [CME] are completely partitioned from the home networking functions performed by the data networking engine [DNE].” Ex. 1001, cl. 18, 8:24-27. This partitioning is accompanied by independent software upgradeability as claimed, “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...” *Id.*, 8:13-16. (Indeed, it is the Patent that disclosed that the decoupling and implementation with different processors of “the data networking and cable modem functions” is what makes “independent software upgrading and maintenance of these functions . . . feasible.” *Id.*, 3:58-62, 4:25-40.). The Patent’s careful partitioning of functions is reflected in its FIG. 2, which shows the claimed

functions of the gateway cable modem partitioned into DNE and CME:



Id., FIG. 2.

The claimed CME comprises a “DOCSIS MAC processor” and a “DOCSIS controller,” for carrying out or controlling different portions of the functionality

relating to DOCSIS-based communication.¹ The inventive architecture allows for the DOCSIS MAC processor to forward downstream packets directly to the DNE without the involvement of the DOCSIS controller, to boost downstream throughput. *Id.*, 8:18-22. This is illustrated in the figure by path 118, over which downstream packets may flow from downstream DOCSIS MAC 152 to the DNE without passing through any other component of the CME. *Id.*, 3:14-16, FIG. 2.

In sum, the challenged claims require a specific architecture with both structural and functional requirements expressly recited in the independent claims. The Petition struggles to find some combination of puzzle pieces in the prior art to reconstruct the claimed architecture. It resorts to repetitive and excessively numerous combinations, as if in the hope that if it tries enough different references in enough different combinations, it will eventually find something that appears to be close enough. But the task is too much, and the multiplicity of its **40** proposed combinations, *see infra* Section III, is a sign of weakness rather than of strength. The prior art did not recognize that the goals of the Patent (1:19-55) are

¹ Exemplary DOCSIS MAC functions in the CME are represented in FIG. 2 as blocks 152 and 154. *Id.*, 3:19-20. Exemplary DOCSIS controller functions in the CME are blocks 200-212. *Id.*, 3:26-27.

even possible, much less teach them or aim to meet them. Unsurprisingly, this art therefore fails to disclose the carefully chosen and claimed inventive architecture.

Simply put, there is nothing in Rabenko (Petitioner's principal reference) or any other reference that describes anything like the claimed "data networking engine" and "cable modem engine." The lack of disclosure forces the Petition to, using the claims as its needed roadmap, select certain isolated components in Rabenko and group them in ways that are unsupported and internally inconsistent. This ultimately leads the Petition to a convoluted, multi-stage approach to reconstructing the claimed invention, each new step depending shakily upon the prior conclusion. However, the lack of the proper pieces with disclosure of any arrangement into anything resembling the claimed DNE and CME is too great a burden for the Petition. This case is a paradigmatic failure of proof.

There are numerous ways to illustrate the Petition's failure to demonstrate obviousness. For purposes of this Preliminary Response to it, Patent Owner will focus on three that are each easy to illustrate.

- Petitioner relies exclusively upon Rabenko's voice and data processor as the claimed "DOCSIS controller." But there is no proof that Rabenko's "voice and data" processor controls DOCSIS functions, and Rabenko never describes it as doing so. Instead, as its name

suggests and Petitioner admits, it processes voice data (voice over IP, or VoIP, for example). *See* Section II.A.

- Petitioner relies exclusively on Rabenko for the claimed DNE, CME, and associated structural limitations including the claimed partitioning of functions. But the Petition must invent this partitioned organization from whole cloth: Rabenko’s Figure 2 shows ***anything but*** the partitioning of the Patent, and Rabenko lacks any ***textual support*** for the Petition’s selection and agglomeration of scattered pieces of Figure 2 into these features, in hindsight pursuit of a “DNE,” “CME,” and associated architecture that are not there. *See* Section II.B.
- As Petitioner concedes, Rabenko does not teach independent software upgradeability of the alleged DNE and CME (which, as just noted, are themselves contrivances of the Petition in the first place). But neither Rabenko nor its combinations with Gaspar and Kim disclose ***independently*** upgradeable software. The Petition’s last resort to an “obvious to try” theory fails for many reasons, even beyond the fatal fact that there are no DNE and CME to begin with. *See* Section II.C.

These three exemplary failures are not the only ones from which the Petition’s grounds suffer. But each furnishes an independently sufficient basis for denying institution.

Finally, the Board should not even reach the merits. The Petition’s 40 different grounds—based on 8 different references—are voluminous and excessive. Under *Adaptics*, this excessive number of different arguments in this Petition is a clear basis to exercise discretion to deny institution. Section III.

II. PETITIONER’S GROUNDS FAIL TO SHOW A REASONABLE LIKELIHOOD OF OBVIOUSNESS (ALL CLAIMS AND GROUNDS).

A. Rabenko’s Voice/Data Processor Is Not A “DOCSIS Controller” (1[c]/14[c]/18[e], All Claims, All Grounds).

All challenged claims require that the CME “includ[es]” “a DOCSIS controller”. Ex. 1001 [’775] cls. 1[c], 14[c], 18[e].^{2,3} “DOCSIS” is a standard relating to cable television networks. Ex. 2003 [Russ-Decl.] ¶ 40. In each of its grounds the Petition asserts that Rabenko “discloses” the claimed “DOCSIS controller,” relying upon Rabenko’s “voice and data processor.” Pet., 31.⁴ But Rabenko’s “voice and data processor” is not shown to be, and is not, a “DOCSIS

² For the limitations discussed, the Petition presents arguments as to claim 18, then relies on those same arguments as to the other two independent claims. Compare Pet., 13-39 (claim 18), with *id.*, 41-49 (claim 1), and 61-63 (claim 14).

³ This paper follows the Petition’s claim-limitation numbering convention.

⁴ The Petition does not assert that it would have been obvious to modify Rabenko to add the “DOCSIS controller.” *Id.*

controller.” It controls no DOCSIS functions. Instead, as its name indicates, it processes voice packets—but whether a processor is a DOCSIS controller does not turn on whether or not it includes voice packet functionality. In fact, there is no disclosure of Rabenko’s voice and data processor participating in DOCSIS operation at all.

In accord, the Petition fails to locate any disclosure in Rabenko (or anywhere else) about Rabenko’s voice and data processor relating to DOCSIS in either name or function. *See* Pet., 31. Instead, Petitioner relies solely on the argument that, “[l]ike the ‘DOCSIS controller’ of the ’775 patent, Rabenko’s voice and data processor 136/213 is used for processing and transporting voice over packet based networks.” *Id.* This argument is erroneous on its face. It misses the point. The Petition identifies nothing in Rabenko describing its voice/data processor as a DOCSIS controller or suggesting that its voice and data processor even participates in any DOCSIS functions, let alone controls any of them. That it simply processes and transports voice over a packet based network does not in any fashion make it a “DOCSIS controller.” Ex. 2003 [Russ-Decl.] ¶¶ 42-45.

What does being “used for” “processing and transporting voice over packet based networks” (Pet., 31) have to do with ***controlling DOCSIS functions?*** Nothing. There are myriad components in innumerable systems that are “used for” processing and transporting voice over packet based networks but have nothing to

do with DOCSIS and do not involve controlling any “DOCSIS” functions. Ex. 2003 [Russ-Decl.] ¶ 42. By the Petition’s logic, every voice and data processor involved in packet networks would be a “DOCSIS controller.” Under the Petition’s argument, because an iPhone can support VoIP, an iPhone SoC thus contains a DOCSIS controller, despite having nothing to do with DOCSIS—which, again, is a standard relating to cable television networks. The logic of the Petition’s rudimentary argument is fatally flawed and incomplete. Ex. 2003 [Russ-Decl.] ¶¶ 42-45.

In legal terms, the Petition’s argument is conclusory and unsupported. Few principles are more fundamental in AIA proceedings than that, “[t]o satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements.” *E.g., In re Magnum Oil Tools*, 829 F.3d 1364, 1380 (Fed. Cir. 2016); *see, e.g., Virtek Vision Int’l. ULC, v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 889 (Fed. Cir. 2024) (reversing IPR obviousness determination) (“conclusory assertions in [the petitioner’s expert] declaration do not provide substantial evidence for finding a motivation to combine”); *Google, Inc. v. SimpleAir, Inc.*, CBM2014-00054, Paper 19, 15, 2014 Pat. App. LEXIS 2958, *17 (May 13, 2014) (denying institution). Yet that is all it offers here.

Nor does the Petition attempt to argue that a DOCSIS controller is somehow inherent or implicit in Rabenko’s disclosures. The Petition was correct to avoid this

line of argument, especially given the high bar of inherency in the obviousness context. *See PAR Pharm., Inc. v. TWi Pharms., Inc.*, 773 F.3d 1186, 1195-1196 (Fed. Cir. 2014) (“the concept of inherency must be limited when applied to obviousness, and is present only when the limitation at issue is the ‘natural result’ of the combination of prior art elements,” or in other words “necessarily present”).

Petitioner cites six paragraphs of Dr. Kiaei’s declaration, but does not quote, discuss, or apply anything said in them. Pet., 31 (citing Ex. 1002 [Kiaei] ¶¶134-139). Aside from being unhelpful to the Board and of no assistance to carrying the Petition’s burden, *see Virtek*, 97 F.4th at 887, this failure to even discuss the cited testimony renders the citation an impermissible attempt to incorporate-by-reference outside the rules. *See* 37 C.F.R. § 42.6(a)(3). The Board should decline to consider it. *3M Co. v. Evergreen Adhesives, Inc.*, 860 Fed. App’x. 724, 725-728 (Fed. Cir. 2021) (Board properly declined to consider improperly incorporated testimony); *see also Promptu Sys. Corp. v. Comcast Cable Comm’ns, LLC*, 92 F.4th 1384, 1386 (Fed. Cir. 2024) (*per curiam*) (holding that improper attempts to exceed the word count through incorporation by reference are “not only an inefficient use of this Court’s resources, but unfair”).

Even if those six undescribed paragraphs of Dr. Kiaei’s declaration were proper to consider, their lack of substance only underscores Patent Owner’s position. The best that even Dr. Kiaei can do is offer no more than the same

unsupported conclusion as the Petition: to simply parrot the claim that Rabenko's voice and data processor is a DOCSIS controller simply because it processes and transports voice over packet-based networks. Ex. 1002 [Kiaei] ¶¶134-139.

Unsupported and conclusory testimony such as this cannot establish obviousness.

But as we explained above, these statements are insufficient, and are no more persuasive coming from an expert witness, rather than the Petition, without some additional reasoning and explanation. See *Perreira v. Dep't of Health and Human Serv.*, 33 F.3d 1375, 1377 n.6 (Fed. Cir. 1994) ("An expert opinion is no better than the soundness of the reasons supporting it.").

GSI Tech., Inc. v. Cypress Semiconductor Corp., IPR2014-00121, Paper 46, 13, 2015 Pat. App. LEXIS 3541, *14 (PTAB Apr. 9, 2015) (rejecting all grounds); accord, e.g., *Rhone-Poulenc Agro, S.A. v. DeKalb Genetics Corp.*, 272 F.3d 1335, 1358 (Fed. Cir. 2001) ("In an obviousness determination, some evidentiary support must be offered beyond an expert's conclusory opinion."); *Corning Inc. v. DSM IP Assets B.V.*, IPR2013-00052, Paper 88, 20-21 (PTAB May 1, 2014) (expanded panel) ("An expert's opinion is only as good as the facts upon which it is based. Dr. Winningham, in rendering his opinion, pointed to no factual support and gave no explanation.") (confirming claims).

Dr. Kiaei provides no explanation of the logic supposedly leading to that

conclusion. *Id.* Nor could he: as already noted, the logic is hopelessly flawed. Dr. Kiaei certainly never explains how, if Rabenko’s voice and data processor were a DOCSIS controller simply because it processes and transports voice in a packet-based system, one could avoid the absurd result that every voice and data processor in every system using DOCSIS on Earth would be a DOCSIS controller. Ex. 2003 [Russ-Decl.] ¶ 42. Dr. Kiaei’s conclusory evidence cannot prove obviousness. See *DSS Tech. Mgmt. v. Apple Inc.*, 885 F.3d 1367, 1376 (Fed. Cir. 2018); *Koito Mfg. Co. v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1152 (Fed. Cir. 2004) (“General and conclusory testimony, such as that provided by Dr. Kazmer in this case, does not suffice as substantial evidence of invalidity.”); *ActiveVideo Networks, Inc. v. Verizon Communs., Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (expert testimony that “is generic and bears no relation to any specific combination of prior art elements” was not substantial evidence of obviousness).

The Petition’s failure to show that Rabenko’s “voice and data processor” constitutes the claims’ “DOCSIS controller” not only dooms the Petition’s proof as to the “DOCSIS controller” limitation itself; it sends other cards in the Petition’s house of cards tumbling down at the same time. The Petition’s argument for limitation 18[f] (and corresponding limitations 1[f] and 14[e]), that Rabenko is “forward[ing] the processed packets directly to the data networking engine *without the involvement of the DOCSIS controller*,” as claimed, depends on showing that

Rabenko's voice and data processor is the claimed "DOCSIS controller": the Petition relies on a supposed "bypass communication path" (identified by Petitioner in **purple** on Rabenko's Figure 1b below) running from a component of the Petition's alleged CME (identified by Petitioner in **blue**) **directly to** a component of the alleged DNE (identified by Petitioner in **green**) to show "forward[ing]" of "the processed packets" from the **"DOCSIS MAC Processor"** to the **"cable modem engine"** **"directly to the data networking engine"**:

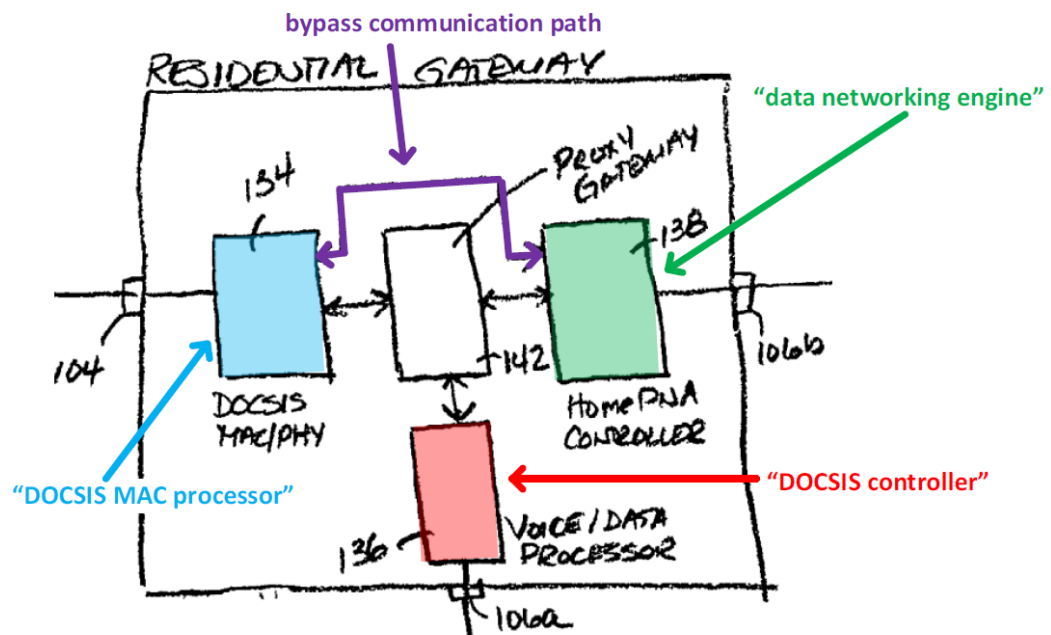


Figure 1b of Rabenko [Ex. 1005]
(as excerpted and annotated by Petitioner, Pet., 32-33)

How does Petitioner allegedly prove that this is done "without the involvement of the DOCSIS controller," as claimed? Because, says Petitioner, "Fig[ure] 1b shows that voice/data processor 136/213 (**red**) (*the claimed 'DOCSIS controller'*) is

bypassed” by data packets sent “directly to (via the control flow line in **purple** . . .) HomePNA controller 138 (**green**) (part of the claimed ‘data networking engine’).” Pet., 32 (color emphasis in original, underlining added). Thus, since Petitioner has failed to show that voice/data processor 136 on Figure 1b of Rabenko is the “DOCSIS controller,” the Petition’s arguments involving the purple “**control flow line**” on that figure are beside the point because, without that proof, the Petition cannot show that there is any forwarding of processed packets directly to the DNE “without the involvement of the DOCSIS controller.” *Id.* Again, Rabenko is like a jigsaw puzzle with some pieces ill-fitting and others removed. Failure to find this one piece makes it impossible to fit other pieces together: no matter what you do it falls apart somewhere or even everywhere.

The total failure of proof is sufficient for the Board to stop here. However, although it is not Patent Owner’s burden to do so, Patent Owner provides below several examples of why the Petition is substantively wrong.

First, Petitioner fails to show that Rabenko’s voice and data processor “controls” a DOCSIS MAC/PHY or its functions. As Dr. Russ explains, there is “no indication that Rabenko’s voice and data processor ‘controls’ any DOCSIS functions in Rabenko.” Ex. 2003 [Russ-Decl.] ¶¶ 42-44. Furthermore, he continues,

[a]s is indicated in the name, the DOCSIS controller must “control” DOCSIS functions. The Patent provides examples of such control, including the processing of management messages to/from the DOCSIS MAC, and MAC address learning. Ex. 1001 [’775] 3:26-38.

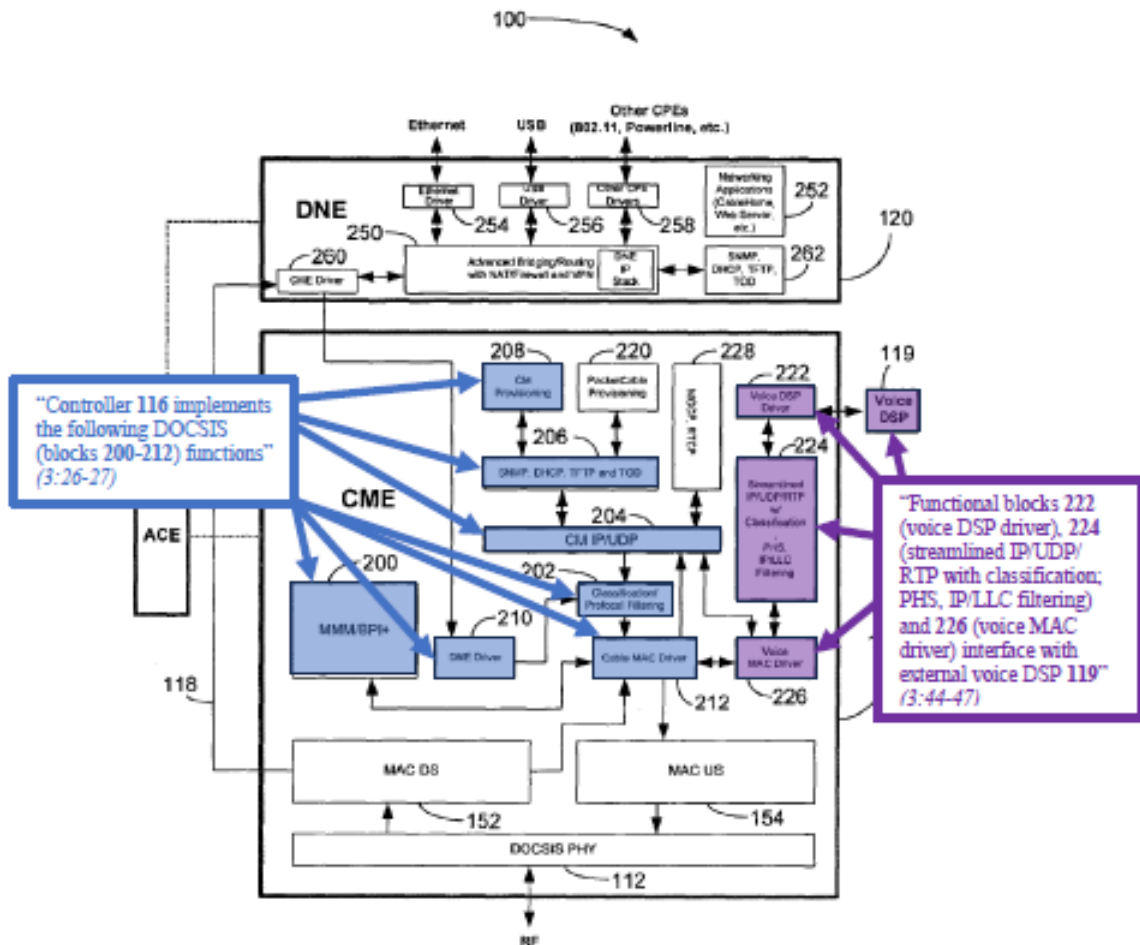
The Petition points to no disclosures indicating that Rabenko’s voice and data processor “controls” anything, much less any DOCSIS functions or the DOCSIS MAC. These disclosures do not point to any “control” aspect of the voice and data processor.

Ex. 2003 [Russ-Decl.] ¶¶ 43-44.

Second, the fact that Rabenko’s voice and data processor is not a DOCSIS controller is further shown by the fact that the ’775 Patent distinguishes between voice processing functions on the one hand, and DOCSIS control functions on the other. The ’775 Patent discloses that for advantageous performance, VoIP (voice over IP) functionality may be relocated within the Cable Modem Engine. Ex. 1001 [’775] 4:19-24. Specifically, “to minimize the latency and jitter of voice packets,” the VoIP functions may be added to the DOCSIS controller. *Id.*, 3:39-41. This is sensible—tight integration reduces processing and travel time for these real-time voice packets, or as the Patent puts it, “the data path for voice packets is laid entirely within cable modem engine 110 and is optimized to reduce delay and jitter.” *Id.*, 4:55-57. But adding VoIP processing to a preexisting CME or DOCSIS controller does not convert a processor that only performs voice functions and not

DOCSIS functions into a DOCSIS controller. Otherwise, as already noted, every VoIP processor becomes a DOCSIS controller. Ex. 2003 [Russ-Decl.] ¶ 45.

Instead, the Patent illustrates that the DOCSIS control functions are not VoIP functions, and vice versa. Exemplary DOCSIS control functions are blocks 200-212 in Figure 2. *Id.*, 3:26-27 (“Controller 116 implements the following DOCSIS (blocks **200-212**) functions”). Meanwhile the VoIP functions are blocks 222, 224, 226 and external DSP 119. *Id.*, 3:44-47 (“Functional blocks 222 (voice DSP driver), 224 (streamlined IP/UDP/RTP with classification; PHS, IP/LLC 45 filtering) and 226 (voice MAC driver) interface with external voice DSP 119”).



Ex. 1001 [’775] Fig. 2 (annotated). There is no showing that these separately shown DOCSIS and voice functional blocks have any overlap supporting the notion that Rabenko’s voice and data processor could implicitly be a DOCSIS component, let alone a DOCSIS controller.

Dr. Russ confirms these points:

The ’775 patent discloses that the DOCSIS controller in an embodiment, “implements the following **DOCSIS** (blocks 200-212) **functions**.” Ex. 1001 [’775] 3:26-48. Separately from this disclosure of “DOCSIS functions” (citation omitted), it additionally discloses

that the “controller also implements all PacketCable functionality ... represented by functional blocks 220-228,” including “blocks 222 (voice DSP driver), 224 ... and 226 (voice MAC driver) [which] ***interface with external voice DSP 119.***” Ex. 1001 [’775] 3:26-48.

The “PacketCable VoIP functionality” that may be implemented by the DOCSIS controller in this embodiment is not necessary for the DOCSIS controller to be a DOCSIS controller. It is a DOCSIS controller regardless of whether it performs any voice packet processing. The patent discloses that this additional functionality is added to improve performance by “miniz[ing]” “latency and jitter of voice packets,” *Id.*, 4:20-24. Thus, VoIP functionality is not a requirement of the DOCSIS controller, but is an addition to the “DOCSIS functions” it performs.

Ex. 2003 [Russ-Decl.] ¶¶ 47-48. Thus, there is no evidence that voice packet processing are among the “DOCSIS” functions of the claimed invention’s “DOCSIS controller.”

For these reasons, Petitioner has not shown that Rabenko’s voice and data processor is the claimed “DOCSIS controller.” Because Rabenko is the only reference that any of the Petition’s laundry list of grounds relies on to meet this limitation, this failure alone is sufficient reason to deny institution.

B. Rabenko Does Not Disclose A “Data Networking Engine” And “Cable Modem Engine” Having Their Own Programmable “Processors” In “Separate” “First” And “Second” “Circuits” With “Completely Partitioned” Functions (1[b],[c],[e]/14[b],[c],[d]/18[b],[c],[g], All Claims, All Grounds).

The claims recite a “data networking engine” (“DNE”) implemented in a “first circuit” and a “cable modem engine” (“CME”) implemented in a “second circuit,” “the second circuit being separate from the first circuit.” Ex. 1001 [’775] cls. 1[b]-[c], 14[b]-[c], 18[b]-[c].⁵ “[T]he home networking functions” performed by the DNE are “completely partitioned” from “the cable modem functions” performed by the CME. *Id.*, cls. 1[e], 14[d], 18[g]. Further aspects of the architecture are discussed in detail in the Sections above and below. Sections II.A, *supra*, II.C., *infra*.

The partitioned architecture claimed in the Patent has numerous advantages including enabling independent software development and upgrades (*id.*, 3:58-62, 4:25-40), increased performance (*id.*, 4:41-57), and less delay and jitter for voice packets where applicable (*id.*, 4:19-24); *see also, e.g., id.*, 3:11-16; Ex. 2003 [Russ-Decl.] ¶¶ 56-59; Sections II.A, *supra*, II.C, *infra*. The claimed architecture thus accomplishes (*id.*, 1:55-56) the design intentions set forth by the Patent from the outset (*id.*, 1:20-55). Ex. 2003 [Russ-Decl.] ¶ 60. *see* Section I, *supra*.

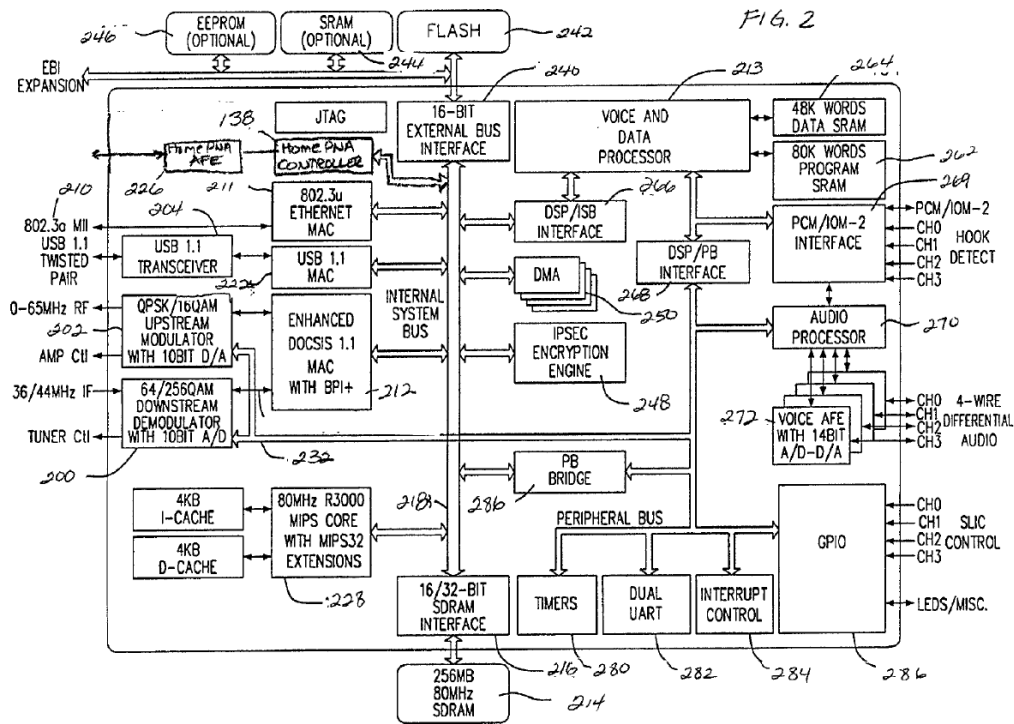
⁵ This paper follows the Petition’s claim-limitation numbering convention.

Rabenko discloses a very different architecture from what the '775 Patent claims. As discussed below, Rabenko's different architecture and lack of disclosure prevent the Petition from showing that Rabenko discloses a DNE in a "first circuit" and separately a CME in a "second circuit," let alone that they are "functionally partitioned" as claimed.⁶

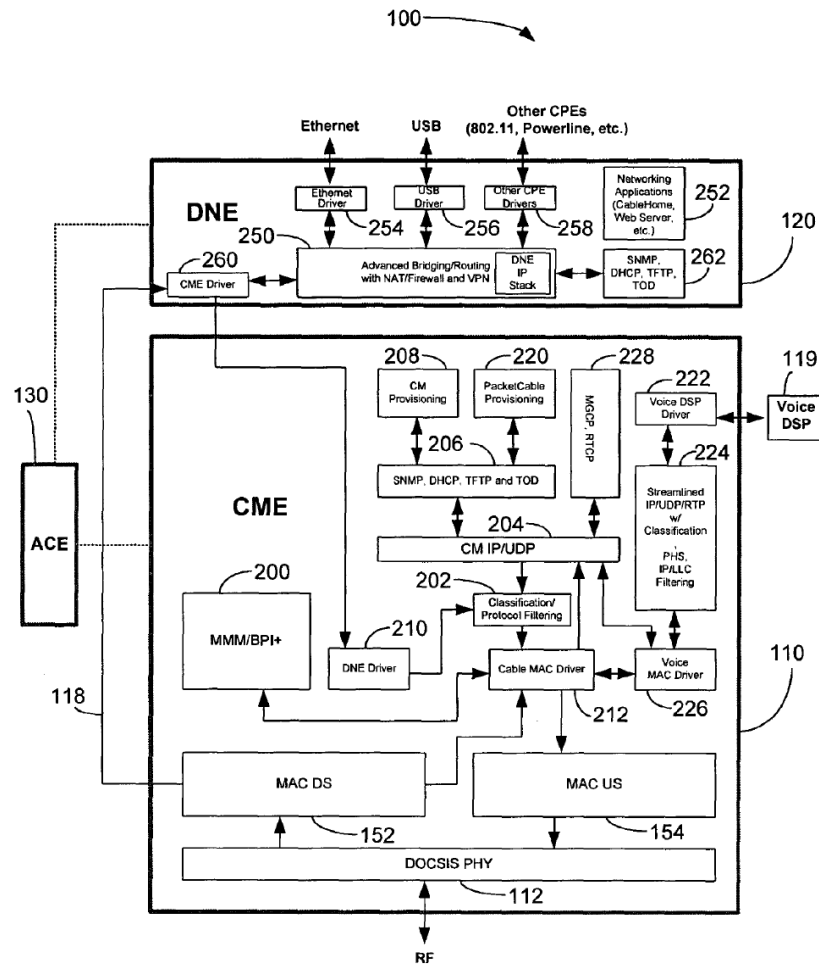
Rabenko discloses a communications system including a plurality of media terminal adapters, a telephone line, and a gateway configured to exchange voice and data packets between a network and each of the media terminal adapters over the telephone line, which may include a residential gateway with a cable modem. Ex. 1005 [Rabenko] [0004], [0033]. Rabenko focuses upon "supporting multiple voice channels" on "a single wire pair." *Id.*, title (capitalization altered), [0003]-[0005], [0036], [0041].

Rabenko arrives at an architecture disclosed in its Figure 2, on which the Petition relies heavily in its reliance on Rabenko. *See, e.g.*, Pet., 24, 35, 46, 47, 51, 52, 74. Rabenko's Figure 2 does not disclose any division into structures (i.e., engines at all, let alone the specific two engines disclosed and claimed in the Patent:

⁶ Petitioner relies on Rabenko's alleged disclosure, and does not contend it would be obvious to modify Rabenko to add these limitations. Pet., 14-16, 21-26.

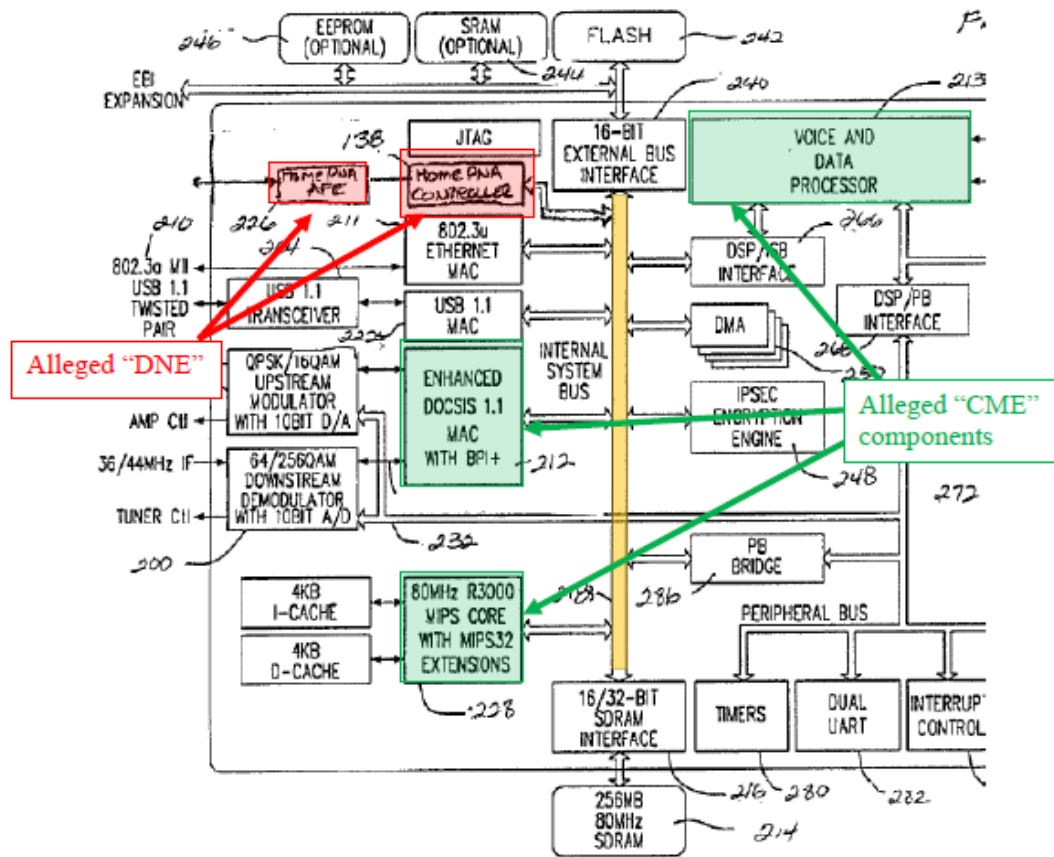


Ex. 1005 [Rabenko] Fig. 2. Rabenko stands in stark contrast to the '775 Patent's FIG. 2 in this regard, which clearly depicts and discloses a DNE in a first circuit partitioned from a CME in a second circuit:



Ex. 1001 [’775] Fig. 2.

Undeterred by Rabenko’s lack of these claimed engines, the Petition arbitrarily imposes its own, selecting with no significant explanation a handful of scattered components and declaring them to match the claimed DNE (**red**), and CME (**green**):



Ex. 1005 [Rabenko] Fig. 2 (annotated to show the Petition’s division of components); see Pet.,14, 21, 24.

Tellingly given the facts here, the Petition avoids characterizing the remaining components. For example, the Petition offers no reason that the POSITA would either learn or find it obvious that Rabenko’s voice and data processor 213 is part of a “cable modem engine” that also includes MIPS R3000 core 228, pictured on Figure 2 almost as far as possible from processor 213, yet being considered separate from HomePNA controller 138, pictured on Figure 2 almost as

close as possible to processor 213. In the Petition’s ill-fitting jigsaw puzzle, the pieces that do not fit the guidance of the inventors of the ’775 Patent are discarded, whether there is a technical basis for that or not. Regardless of reasons, however, the Petition’s imposition of this structure on Rabenko is not supported by Figure 2. Nor does the Petition identify other disclosures in Rabenko suggesting or supporting the divisions—because there are none. At bottom, Rabenko simply lacks the partitioned architecture of the Patent.

The clear difference between Rabenko and the Patent can also be shown in another way. As just noted, the Petition collects some of the Rabenko components, each of which is illustrated separately, together as a “DNE,” and others as a “CME,” to attempt to satisfy certain claim elements. Pet., 14 (DNE), 21 (CME). To satisfy **other** elements, however, the Petition must reverse course and, instead of declaring grouping, declare separation: that is, that the “DNE” and “CME” are “separate” and “completely partitioned.” Pet., 23. Its only articulated basis for doing so? That the constituent components are “shown in Fig. 1b” of Rabenko as separate (Pet., 23)—a fact which, so far as the Petition’s offer of proof is concerned, posed no obstacle when the Petition wanted to **group** those same “separate” components into supposed structures or “engine[s]” to meet **those** requirements of the claims.

If Rabenko’s text had described these components as having the relationships or partitioning the Petition imposes, that would be one thing. Ex. 2003 [Russ-Decl.] ¶ 69. But it does not: nothing in Rabenko suggests that the components the Petition identifies collectively as part of the CME should be grouped for that purpose, to meet the claim limitation that they must together constitute an “engine,” and yet separate from the components Petitioner groups together as the DNE, to meet the further claim limitation that the two collections must be mutually separate. Ex. 2003 [Russ-Decl.] ¶ 69. In the absence of any such disclosure—and none is identified or exists—the Petition fails to show that the POSITA would distill from Rabenko the imagined collections of different components in Figure 2 into a “DNE” and “CME” as the Petition does. Ex. 2003 [Russ-Decl.] ¶ 69.

Petitioner cannot have it both ways. If Rabenko’s so-called separate descriptions of these components and depictions of them as separate boxes in its Figures 1b and 2 are meaningful boundaries to the POSITA—without any need for an explanation in the Petition as to why—then the Petition’s assertion that they are combined or grouped in circuits corresponding to a DNE and CME fails. And if they are not such meaningful boundaries, then by the same token, no indication has been shown that the components making up the purported engines are separate.

To be clear, the issue is not how Rabenko’s Figures 1b and 2 choose to

physically position the various components in their logical diagrams; it is that nothing in Rabenko's description (or anywhere else) is shown to furnish any support or suggestion that the components in these figures actually operate as groups, engines, or circuits as the Petition suggests. Rather, these groupings are simply superimposed by the Petition without any meaningful explanation upon disclosure that does not support them. At bottom, the problem is that Petitioner's arguments are untethered from the disclosures of Rabenko, and nothing in the actual disclosure of Rabenko is shown to teach the separate circuits and partitioning required by the challenged claims. Rabenko describes each component that Petitioner claims makes up its DNE and CME *separately*, but is never shown to teach to the POSITA that these components, as disclosed in Rabenko, make up a data network engine or a cable modem engine *collectively*. Ex. 2003 [Russ-Decl.] ¶ 71.

While the Petition has failed at the threshold to meet its burden to show that the architecture of the claimed inventions with its engines on separate circuits and complete partitioning of functions is found in Rabenko, Patent Owner notes from a technical point of view that there are many reasons why Petitioner's groupings are unsupported, a few of which are mentioned below.

First, the components of Rabenko that Petitioner identifies as forming the CME engine are described by Rabenko itself as functionally separated from each

other. If they are functionally separated from one another, and there is no demonstration of disclosure to the contrary treating them as a group, how can those components form a CME? For example, both MIPS core 228 and voice and data processor 213 are grouped into the alleged CME by the Petition. But Rabenko explicitly discloses—in passages the Petition avoids—that these components are functionally partitioned with respect to one another. As Dr. Russ explains:

Rabenko teaches partitioning between several of its components that allegedly comprise the CME. I note the Petition does not cite or rely on these teachings in Rabenko; indeed, it conspicuously does not even mention them when discussing the claims’ separate circuit and partitioning limitations.

As noted above, the Petition asserts that several components collectively make up the purported CME, including the voice and data processor and MIPS core 228 (the latter of which the Petition asserts is part of Rabenko’s proxy gateway). Pet., 21-26. However, Rabenko teaches “functional partitioning of the voice and data processor 213 and the MIPS core 228,” suggesting partitioning these components from one another. Ex. 1005 [Rabenko] [0074] (“***functional partitioning of the voice and data processor 213 and the MIPS core 228*** can take on various forms ...”). Thus, Rabenko teaches partitioning between what the Petition asserts are components that “collectively” make up the CME on its required separate “second circuit.” See Pet., 21 (addressing components of claimed CME), 24-25 (discussing MIPS core 228 as part of CME). And, as already

discussed, it has no teaching of implementing or partitioning these components together, or in a circuit separate from that of the alleged DNE components.

Ex. 2003 [Russ-Decl.] ¶¶ 72-73. Tellingly, the Petition does not rely on or even acknowledge these actual functional partitioning teachings in Rabenko. This failure to grapple with the entirety of the reference's relevant teachings reinforces that the Petition's groupings are not aligned with Rabenko's disclosure.

Second, Rabenko indicates that at best (meaning "best" from the Petition's perspective), there is an intermixing of data networking and cable modem functions by its voice and data processor 213, which is in grave tension with the Petition's placement of voice and data processor 213 in the CME. Rabenko teaches that its voice and data processor supports voice compression and decompression for communications over Rabenko's HomePNA LAN (local area network). The Petition identifies no reason to exclude this function in Rabenko from being considered a **data networking** function. But the Petition nevertheless alleges that voice and data processor 213 performs **cable modem** functions, and thus is part of the "cable modem engine" (CME). Thus, either voice and data processor 213: (1) performs only data networking, such that Petitioner is wrong to include it in the CME; or (2) it performs both cable-modem functions (as Petitioner alleges), but also data networking functions, seemingly in grave tension with the claimed

requirement of “complete partition[ing]” between the cable modem functions CME and the home networking functions of the DNE. *See* Section II.C, *infra*.

Indeed, the Petition’s only basis for asserting that Rabenko discloses “complete[] partition[ing]” is that Rabenko allegedly teaches that “the respective functions are localized in respective processors,” and “performs only home networking functions by the processor in the HomePNA controller 138 . . . and only cable modem functions by the DOCSIS MAC 134/212, core 228, and voice/data processor 136/213. . . .” Pet., 38. As discussed *infra*, Section II.C, however, there is no indication that the functions of the aforementioned components of the purported DNE and CME are even partitioned from one another. The Petition further contends that,

should it be determined that the claim construction for this term from the case against Charter Communications noted above in Section V.E applies, Rabenko still describes that “the cable modem engine and the data networking engine are not necessarily physically separate but are ***functionally separate such that the cable modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine***” (Ex. 1011, p. 17) as described above in Sections VI.A.1.b-VI.A.1.c.

Id. But this is just an assertion, made without support or specific citations to Rabenko. And the voice and data processor’s role in performing local networking

functions in Rabenko has not been shown to offer any support or proof of Petitioner's argument under the "functionally separate" construction: Rabenko is not shown to disclose that the DNE home networking functions and CME cable modem functions are exclusively handled by different processors, or that the cable modem functions are performed only by the cable modem engine and the home networking functions are performed only by the data networking engine. As Dr. Russ explains:

Rabenko discloses that its voice and data processor supports voice compression and decompression for communications made over the HomePNA LAN. *See* Ex. 1005 [Rabenko] [0247] ("the voice and data processor 213 ... could be used to support voice compression and decompression for communications over the HomePNA LAN ..."). The POSITA would understand the HomePNA LAN to self-evidently perform home networking functions. A "LAN" is a local data network. And the Petition appears to agree that the HomePNA LAN performs home networking functions. Pet., 14; *see also* Pet., 5-6 (agreeing that "home networking functions" includes when "[a]ny packet destined for a HomePNA device connected to HomePNA LAN is sent to HomePNA controller 138" in Rabenko). The Petition nowhere explains how Rabenko's use of its voice and data processor (supposedly in its CME) to provide compression and decompression in support of communications over the data network of its HomePNA LAN (supposedly in its DNE) can be reconciled with the position that

Rabenko “completely partition[s]” the “CME” cable modem functions from the “DNE” home networking functions.

Ex. 2003 [Russ-Decl.] ¶ 85. It is error to ignore these portions of Rabenko pointing away from the Petition’s obviousness grounds. In obviousness, prior art ““must be considered in its entirety, *i.e.*, as a whole, including portions that would lead away from the invention in suit.”” *LG Innotek Co. Ltd., v. Lexington Luminance LLC*, IPR2017-00052, Paper 9, 5-6 (May 25, 2017) (emphasis altered) (quoting *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568 (Fed. Cir. 1987)).

In sum, because Rabenko fundamentally does not match the structure of the Patent, every move the Petition makes to categorize or characterize a component for one element causes inconsistencies and logical problems somewhere else, with no explanation offered for how these difficulties might be overcome by the Petition’s grounds. Components within the Petition’s CME seem to be functionally separated from one another. Meanwhile, a component within the CME seems to share functionality with the data networking of Rabenko’s system. If Rabenko explicitly stated otherwise, or offered evidence upon which to base conclusions about categorization or partitioning, etc., the situation might be different. But Rabenko does not have, and the Petition, in any event, does not identify statements justifying the liberties it takes with what Rabenko does illustrate.

In short, the Petition fails to show that Rabenko discloses a CME and DNE

on separate first and second circuits respectively as claimed, or that the CME “cable modem functions” are “completely partitioned” from the DNE “home networking functions.”

C. Rabenko, Gaspar, And Kim Do Not Render Obvious The “Cable Modem Engine Configured To Enable Upgrades To Its Software ... *Independent* of Upgrades To The Software Of The Data Networking Engine” (1[d]/14[c]/18[d], All Claims And Grounds).

Next—and not surprisingly, given the architectural differences discussed above—neither Rabenko nor any of the secondary references cited in the Petition discloses the claimed “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.” Ex. 1001 [’775] cls. 1, 14, 18.

The Petition concedes that Rabenko does not disclose this limitation. Pet., 26. The Petition asserts, however, that it would be obvious to modify Rabenko to add independent upgradability of the CME and DNE software in view of Rabenko alone (*id.*), or alternatively in view of Gaspar (*id.*, 26-28) or Kim (*id.*, 28-31). However, Petitioner fails to show a motivation to modify Rabenko in this way, or to combine it with Gaspar or Kim, with a reasonable expectation of success.

At the outset, every flavor of Petitioner’s argument for this argument fails because it is based upon the false premise disproved above: that Rabenko discloses completely partitioned engines, one a data networking engine (DNE) and one a

cable modem engine (CME), each with their own respective circuits that “includ[e] at least one processor.” As discussed in detail above, the Petition fails to prove these elements. *See* Section II.B. But even aside from that fatal threshold difficulty, it is not shown that it was obvious to enable the upgradeability of the software of the alleged CME components taught in Rabenko with the requisite expectation of success. And even if upgradeability were obvious, the concept of independent upgradeability for the CME and DNE is not, particularly without a disclosed DNE and CME. Section II.C.1, *infra*. Finally, adding Gaspar (Section II.C.2, *infra*) and Kim (Section II.C.3, *infra*) do not overcome these difficulties. Accordingly, all grounds in the Petition must fail this additional reason as well.

1. Rabenko Does Not Disclose And/Or Render Obvious Upgradability Of Software, Much Less Independent Upgradability Of CME Software As Is Claimed.

The Petition admits that the required configuration of a cable modem engine to enable upgrades to its software in a manner that is independent of upgrades to the software of a data networking engine is a limitation missing from Rabenko. Pet., 26. So the Petition first contends that Rabenko itself renders it obvious to add it by making its purported CME configurable to “**enable upgrades** to its software . . . **independent of upgrades** to the software of the” DNE. Pet., 26-27. But the Petition fails to show that adding this missing limitation was obvious. The missing upgradeability limitations are an important aspect of the claimed invention. The

'775 Patent discloses that the specific partitioned architecture claimed provides the “highly desirable” advantages of “allow[ing]” the claimed independent software upgradeability claimed, because it is the claimed architecture’s decoupling and implementation with different processors of “the data networking and cable modem functions” in this arrangement that make “independent software upgrading and maintenance of these functions . . . feasible.” Ex. 1001 ['775] 1:30-40, 3:58-62, 4:25-40.

To find that it was obvious to add a “missing limitation” important to the claimed invention requires a “searching” analysis that cannot be supplied by conclusory statements or general conclusions about “basic knowledge” or “common sense.” *Arendi S.A.R.L. v. Apple, Inc.*, 832 F.3d 1355, 1362-63 (Fed. Cir. 2016); *see K/S HIMPP v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1366 (Fed. Cir. 2014) (“the Board cannot accept general conclusions about what is ‘basic knowledge’ or ‘common sense’ as a replacement for documentary evidence for core factual findings in a determination of patentability.”) (citation omitted); *DSS*, 885 F.3d at 1374-75 (“common sense” can supply a missing limitation “only when ‘the limitation in question was unusually simple and the technology particularly straightforward.’”). It is also critical not to allow the state of the art today, with software upgrades now seemingly ubiquitous in all manner of devices, to infect the analysis of obviousness at the time the Patent was filed in 2003, which must as a

matter of law “proceed[] without any hint of hindsight.” *Star Scientific, Inc., v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375 (Fed. Cir. 2011).

The Petition relies precisely on such a forbidden appeal to generalized common knowledge and sense. The Petition asserts that it would have been “obvious to try” modifying Rabenko to add the independent upgradeability of CME software that is missing. Pet., 26-27. The Petition points to Rabenko’s general statement that “[s]killed artisans recognize the interchangeability of hardware and software under these circumstances, and how best to implement the described functionality for each particular application.” *Id.* (quoting Ex. 1005 [Rabenko], [0268]). Petitioner does not explain, however, why a reference to hardware and software being interchangeable with one another (as means of implementation) renders obvious, or has anything to do with, software upgradeability, much less upgradeability of software of a cable modem function engine of the gateway cable modem independently of a data networking engine of the gateway cable modem. And in fact this generic notion of hardware and interchangeability does not suggest this independent software upgradeability. Swapping out a piece of hardware for software does not imply that the software itself is upgradeable. And none of this indicates anything about permitting software of a CME to be upgradeable independently of that of a DNE. Ex. 2003 [Russ-Decl.] ¶ 92. The Petition’s conclusory appeal to alleged common knowledge and

an inapplicable portion of Rabenko fails as a matter of law to establish obviousness.

Moreover, Petitioner fails to substantiate its “obvious to try” conclusion with any substantive citations to Rabenko’s technical disclosure. The Petition cites only its boilerplate statements that its teachings “may be implemented in any number of ways including electronic hardware, computer software, or combinations of both ... depend[ing] upon the particular application and design constraints imposed on the overall system” and, as noted above, the generic tenet that “[s]killed artisans recognize the interchangeability of hardware and software,” as noted above. Pet., 26-27 (citing Ex. 1005 [Rabenko] [0268]). This conclusory analysis is legally insufficient. *See Magnum Oil Tools*, 829 F.3d at 1380.

Nor do the Petition’s citations to Petitioner’s declarant Dr. Kiaei (Pet., 27, citing Ex. 1002 [Kiaei] ¶¶122-123), assist. The Petition does not apply, or even set forth, Dr. Kiaei’s reasoning. This is therefore another improper attempt to incorporate-by-reference Dr. Kiaei’s declaration into the Petition by mere citation. *See* 37 C.F.R. § 42.6(a)(3). The Board should decline to consider it. *See 3M*, 860 Fed. App’x at 725-728 (Board properly declined to consider improperly incorporated testimony); *see* Section II.A, *supra* (discussing inherency and collecting cases). Regardless, the cited portions of Dr. Kiaei’s declaration, even if they could properly or fairly be considered, fail to support the conclusion that it

would be obvious to modify Rabenko such that its purported CME and DNE could be upgraded independently. Dr. Kiaei merely parrots the Petition and concludes that “a POSITA would have understood” that the engines “should be separately upgradeable.” Ex. 1002 [Kiaei] ¶123. Once again, ““these statements are insufficient, and are no more persuasive coming from an expert witness, rather than the Petition, without some additional reasoning and explanation.”” *GSI Tech.*, IPR2014-00121, Paper 46, 13, 2015 Pat. App. LEXIS 3541, *14 (quoting *Perreira*, 33 F.3d at 1377 n.6); *see, e.g., DSS*, 885 F.3d at 1376; *Koito*, 381 F.3d at 1152; *ActiveVideo*, 694 F.3d at 1328.

Furthermore, Petitioner’s “obvious to try” argument rests upon a further false premise: that Rabenko supposedly teaches to the POSITA that the software of its supposed DNE and supposed CME would be upgradeable in the first place. Pet., 26-27 (arguing that the “only . . . options” for upgrading the software of Rabenko’s alleged DNE and CME were whether “to configure them to be updated together or separately”). But Rabenko nowhere discloses such software upgradeability, and for good reason: its components that form its purported CME include “embedded” software. Ex. 1005 [Rabenko], [0074], [0097]. At the time of the ‘775 Patent, the POSITA would have not understood this embedded software to be disclosed to be

upgradeable, let alone to be “independent[ly]” upgradable as claimed.⁷ As Dr. Russ explains:

The Petition asserts that Rabenko may be modified to upgrade the software of its purported DNE and CME independent from one another. Pet., 26-27 (“A POSITA would have understood that it would have been obvious to try because, when faced with implementing the upgradability of Rabenko’s data networking engine and cable modem engine, there are only a few finite options: to configure them to be updated together or separately.”). However, this assertion assumes that Rabenko indicates to the POSITA that its software is upgradeable in the first place.

The Petition ignores that the components that supposedly make up the claimed CME in Rabenko include “embedded” software, which as of the time of Rabenko and of the ‘775 Patent was generally not upgradable, let alone independently upgradable. Rabenko discloses that the voice and data processor and the proxy gateway of the purported CME use “embedded software.” Ex. 1005 [Rabenko] [0074] (“The **voice and data processor 213** may be implemented with a variety of technologies including, by way of example, ***embedded***

⁷ Petitioner articulates no argument that upgradable software is inherent in Rabenko, which would have legally required that it be necessarily present or the natural result of the disclosure, a high bar conceded to not be met. See Section II.A.

communications software that enables transmission of voice over packet based networks.”), [0097] (“In the described *exemplary embodiment*, the *proxy gateway function* is implemented with *embedded software* at the applications layer.”). Indeed, the Petition itself concedes that Rabenko’s voice and data processor as being implemented with “embedded communications software.” Pet., 25 (emphasis omitted).

Ex. 2003 [Russ-Decl.] ¶¶ 94-95.

Rabenko’s teachings that its voice and data processor and proxy gateway components of its purported CME are implemented via “embedded” software not only fail to teach that these components’ software is upgradable, but suggest the opposite. As Dr. Russ further explains:

As was well-known at the time, upgrading “embedded” software (at least without changing the hardware that is used) generally was impossible or at least difficult, depending on details of the system in question. For instance, “key features of embedded systems” may include the following:

For their *lifetime*, they *perform the same duty*. For example, an MP3 player will only play MP3s.

...

Users are *unable to change or update embedded systems*. They must have good dependability and stability

ratings. The user shouldn't have any problems using them for extended periods.

Ex. 2005 [IoT][⁸] 2-3.

Such “embedded” software is generally rigid and fixed, incapable of being upgraded without replacing or modifying the accompanying hardware. *Id.*, 2 (“An embedded system is an integration of programmable software and hardware that may have **fixed capabilities**.”), 4 (“Because embedded systems are sometimes related to certain hardware platforms, **upgrading the system without changing the hardware can be difficult**.”); Ex. 2004 [Monarch][⁹] 6 (“Once an embedded system is developed [y]ou are **not able to alter, enhance or upgrade**.”).

In short, there was a clear reason Rabenko does not state that these components have software that can be upgraded: Rabenko expressly describes them as having embedded software, and such software generally could not be upgraded. Thus, the POSITA would not be taught that Rabenko's voice and data processor and proxy gateway, components of the purported CME, would be software-upgradable at all. Nor is any reason provided why the POSITA would have been motivated to modify Rabenko to make these components upgradable, even assuming that was possible.

⁸ <https://theiotacademy.medium.com/what-are-the-top-advantages-and-disadvantages-of-embedded-systems-98e882f48ba4>

⁹ <https://www.monarch-innovation.com/embedded-system-advantages-and-disadvantages>

Furthermore, for Rabenko to have this software upgradeable feature would have seemingly required a facility for accessing (today, presumably downloading), verifying, extracting, and installing the upgraded software. At the time the POSITA would have understood these facilities to use (and therefore require) another processor and other software, or possibly special hardware or a specialized software “bootloader.” Such upgrades generally interrupt normal operation of the software in question while they occur and require careful design and testing.

Ex. 2003 [Russ-Decl.] ¶¶ 97-100. None of these aspects of software or upgradeability are discussed or noticeably acknowledged by the Petition. Thus, no reason is shown why a POSITA would be motivated to modify Rabenko to allow for the claimed independent upgradability, or how that could be done with a reasonable likelihood of success.

Moreover, as noted above, Rabenko teaches that the functionality of the purported “DNE” components and the purported “CME” components are intermixed. *Supra* Section II.B. The Petition offers no explanation for why or how the POSITA would have known how such functionally intermixed components would be amenable to software upgrades independent of each other’s software upgrades, as claimed, and therefore, no explanation of why the POSITA would have found it obvious to embark on modifying these components to be independently upgradeable with a reasonable expectation of success. Ex. 2003

[Russ-Decl.] ¶ 101.

In sum, even if Rabenko had a DNE and CME in the first place, which it does not, no evidence is offered that the POSITA would have been motivated to modify Rabenko to configure the CME to enable upgrades to its software in a manner that is independent of upgrades to the software of the DNE with a reasonable likelihood of success. Rabenko does not disclose or render obvious configuring its purported CME to enable upgrades to its software in a manner that is independent of upgrades to the software of the purported DNE.

Petitioner’s “obvious to try” argument for Rabenko fails for still another reason. Pet., 26-27. Its assertion that “there are only a few finite options” as to how to update software in Rabenko is expressly based on the premise that Rabenko is partitioned into a DNE and CME that are functionally separate to begin with. *Id.* As explained above, however, that is not the case: the supposed DNE and CME of Rabenko are of the Petition’s own creation. The Petition thus improperly engages in a piecemeal obviousness analysis where the architecture of the claimed invention is superimposed upon Rabenko, then used as a stepping-off point to then declare the claimed independent upgrade of the software of one engine of that nonexistent architecture obvious. This is legal error: as a matter of statutory text, obviousness must be judged for the “claimed invention **as a whole**,” not by picking off pieces of the claimed invention once at a time, and declaring that each one on

its own was obvious and, in turn, made the next one obvious. *See Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed. Cir. 2005) (“in making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention ‘as a whole.’”) (quoting pre-AIA 35 U.S.C. § 103(a)). This approach of chipping away one limitation at a time, with elements being alleged to be obvious only assuming the existence of allegedly obvious predicate pieces, in the Petition is legally improper.

“Obvious to try” also cannot show obviousness if it is merely a proposal to “vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of **which parameters were critical** or **no direction** as to **which of many possible choices is likely to be successful**.” *Princeton Biochemicals*, 411 F.3d at 1337 (citing *In re O’Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988)). When the prior art lacks such direction, it results in “hindsight claims of obviousness” that “courts should not succumb to.” *In re Kubin*, 561 F.3d 1351, 1359 (Fed. Cir. 2009). The Petition relies on just such hindsight, simplifying the ’775 Patent’s innovations to two “finite options” of “configur[ing] [Rabenko’s DNE and CME] to be updated together or separately.” Pet., 27. But the argument that there are only this pair of options once again expressly relies upon premises that are not shown to be true: (i)

that the Petition’s arbitrary grouping of Rabenko’s components into a CME and DNE are found in Rabenko, and (ii) that the supposed CME and DNE are disclosed to be “separate and independent.” Pet., 26-27. As already discussed, Section II.B *supra*, Rabenko does not disclose a DNE or CME, much less in “separate” circuits or with “completely partitioned” functions. So rather than the “finite” set of only two options that the Petition asserts exist, based on the supposed presence of the DNE and CME, the correct “obvious-to-try” analysis is that there were many—perhaps uncountable—possible combinations of Rabenko’s many components, illustrated in its Figure 2, which could be grouped together in innumerable ways, each of which could be upgradeable or not and, if upgradeable, upgradeable in various ways. And none of Petitioner’s combinations gives any “indication of which parameters were critical” to allow for independent upgradability under an “obvious to try” theory, nor provide any “direction as to which of many possible choices is likely to be successful.” *Kubin*, 561 F.3d at 1359.

For these reasons, the Petition fails to show that it was obvious to modify Rabenko to have a CME configured to enable upgrades to its software in a manner that is independent of upgrades to the software of a DNE, as claimed.

2. Adding Gaspar Does Not Meet This Limitation.

In the alternative, the Petition argues that it was obvious add the independently-upgradeable software limitation to Rabenko in light of Gaspar. First,

this argument suffers all of the same legal defects outlined above—the Petition assumes the presence of a functionally partitioned DNE and CME as a predicate step, and then asserts it would be obvious to try relying on that premise. Pet., 28 (arguing that in light of Gaspar (Ex. 1006) “a POSITA would have found it obvious that the partitioned components in Rabenko (DOCSIS MAC/PHY, proxy gateway, voice/data processor on the one hand, and HomePNA controller and AFE 226 on the other) be independently modifiable”). But the Petition does not show that adding Gaspar surmount the problems with Rabenko alone, described above.

Gaspar does not disclose a DNE or CME, nor does the Petition rely on it for such. Gaspar merely teaches upgrading its HomePNA controller. Gaspar does not contribute to the combination any teaching or suggestion of upgrading software for *any* components that the Petition claims make up the CME—which is critical here, given that Rabenko lacks any such teachings. Section II.C.1, *supra*. Gaspar also does not teach upgrading embedded software, so adding Gaspar to Rabenko cannot help the Petition overcome the fact that such software was not generally considered upgradeable. *Id.* And given Gaspar’s complete lack of discussion of components of a cable modem engine, Gaspar cannot be shown to disclose any such software upgrades being performed independently of software upgrades to its HomePNA controller, or anything else. Gaspar, thus, does not rectify any of the problems already identified above with Rabenko alone.

Petitioner argues that adding Gaspar to Rabenko renders it obvious to add upgradable CME software independent of the DNE software because Rabenko's HomePNA supposedly "would have to be frequently updated or replaced" and Gaspar's supposed DNE HomePNA controller has components "independently modifiable" from CME components. Pet., 27-28. But neither Gaspar nor Rabenko says these things, and there is no showing that Gaspar in combination with Rabenko yields these things. Gaspar's cited disclosure of "partitioning the MAC and PHY circuits" in its "HPNA controller" so "the controller circuit can be debugged or upgraded by modifying the MA circuit, leaving the PHY circuit intact," Ex. 1006 [Gaspar] [0014] (cited at Pet., 28), is at most a teaching about upgrading different parts of one component of the DNE independently, not upgrading the software of the CME independently from that of the DNE as claimed. Contrary to the Petition's argument (Pet., 28), the first disclosure of making the software of the CME independently upgradeable from that of the DNE is in the '775 patent. *See* Ex. 1001 ['775], *e.g.*, 1:30-40. And even if the prior art did teach updating software on an element the Petition claims to be part of a DNE independently from the CME, which it does not, that cannot be a reason for modifying Rabenko's teachings in view of Gaspar to add upgradeability of the software of a CME not found in either, much less independently of the software of a supposed DNE. Even if Gaspar taught a general desire to upgrade software of

components, which it does not, that is not enough, especially where Gaspar itself does not provide any teachings or support for modifying Rabenko such that its CME could be upgraded independent of the DNE. *See, e.g., Kubin*, 561 F.3d at 1359 (not “obvious to try” where prior art gave only general guidance as to form of claimed invention or how to achieve it). As Dr. Russ explains:

Petitioner appears to use Gaspar to provide a “motivation to modify” Rabenko to enable upgradability of the **HomePNA controller**, a component of the DNE. *See* Pet., 27-28. Even if, *arguendo*, Gaspar’s teachings were applied to Rabenko, this does not even address the issue that, as discussed above, several of Rabenko’s **CME** components are embedded and do not provide for upgradability. Gaspar only discusses upgrading its “HPNA controller” of, supposedly, the DNE, not the CME (though neither appears in Gaspar, nor, as I have explained, in Rabenko), and there is no indication that its teachings could be applied to a CME in combination with Rabenko.

Ex. 2003 [Russ-Decl.] ¶ 109.

Even assuming it were “obvious” in the abstract to desire to modify Rabenko’s components to become independently upgradable,

[a] “desire” to do something does not furnish a way to do it. Such a way is lacking here, even or perhaps especially with the addition of Gaspar.

As discussed, Gaspar does not teach altering embedded components (*e.g.*, voice and data processor or proxy gateway) such that they are upgradable, much less teaching that components be configured to be independently upgradable from other components in a system. Gaspar solely concerns, at the very most and generously assuming the Petition's premises are correct, partitioning the DNE's HomePNA controller itself "[b]y partitioning the MAC and PHY circuits" and independently upgrading those portions of it. Ex. 1006 [Gaspar] [0014].

Ex. 2003 [Russ-Decl.] ¶¶ 112-113. Thus, Gaspar does not teach upgrading the HomePNA controller in a manner independent from the software of any other component, let alone anything resembling what the Petition calls the CME in particular.

Gaspar thus cannot offer either a motivation or a reasonable expectation of success for modifying Rabenko to configure its purported CME to meet the claims. *See* Ex. 2003 [Russ-Decl.] ¶¶ 109-116.

3. Adding Kim Does Not Meet This Limitation.

As a second alternative, Petitioner asserts that adding yet a third reference, Kim, to Rabenko and Gaspar would render it obvious to add "upgrades to [the CME's] software in a manner that is independent of upgrades to the software of the [DNE]" as claimed. But Kim is even further afield than Gaspar: instead of having anything to do with **upgrading software**, Kim instead concerns **replacing** modular

pieces of **hardware**. In Kim’s system, a HomePNA controller or an ADSL controller—both modular pieces of **hardware**—may allegedly be replaced independently. Ex. 1007 [Kim] [0026]. The Petition never addresses this distinction.

If anything, Kim illustrates non-obviousness. The POSITA armed with Kim has an alternative to performing software upgrades **at all**. With swappable hardware modules (including associated firmware/embedded software, which apparently is how Kim works as the new modules are plug-and-play, Ex. 1005 [Kim] [0026]), the ability to update software itself can be dispensed: why bother upgrading software when the entire functional module is expected to be replaceable? The Petition’s combination unwittingly teaches away from the invention, if anything, and in the process illustrates why the POSITA would not obviously try the claimed upgradeable software.

In fact, Kim’s “modular” (and hence allegedly easily **replaceable**) HomePNA controller and ADSL controller do not render it obvious to add independent upgradeability of the combination’s alleged CME software as claimed, for the additional reason that nothing in the combination of Rabenko, Gaspar and Kim is shown to teach upgradeability of CME software. Rabenko’s embedded software is not shown to be upgradable at all. Section II.C.1, *supra*. Gaspar is not cited on this point. Pet., 27-28; Section II.C.2, *supra*. And in Kim,

the “upgrades” are to a HomePNA controller (which the Petition includes in the DNE), with no indication of allowing “upgrades” to anything that might plausibly be related to the CME. Pet., 28 (citing Ex. 1007 [Kim] [0026]). In sum, the claims require enabling upgrades of software associated with a CME, while Kim concerns, if anything, replacing modular hardware associated with a DNE. Pet., 28-30.

The Petition points to Kim’s teaching of a ““modular-type home gateway system”” and the phrase ““improving the performance of HomePNA [*sic*] controller or ADSL controller.”” Pet., 29-30 (quoting Ex. 1007 [Kim], [0026]). Again, however, “improving the performance” in Kim refers to replacing hardware, not replacing or upgrading software. *Id.* Kim states that its “modular-type” HomePNA controller and ADSL controller are “detachably connected” to the system and can be “replaced.” Ex. 1007 [Kim] [0001], [0014]; *id.*, Abstract. Petitioner does not point to anything in Kim addressing replacing or upgrading *software*.

Even assuming for the sake of argument that Kim’s replacement of hardware modules somehow taught or corresponded to upgrading software, there is no showing that Rabenko could be obviously and successfully modified to allow Kim’s hardware replacements. This would require much more than the “minor ... modifications” to Rabenko that Petitioner claims. Pet., 30-31 (asserting that the

POSITA would have been successful in modifying Rabenko to use Kim's teachings on the basis that "Rabenko's component [would] be partitioned and independently upgradable," because the modification would only "require[] ... minor hardware, software, and/or firmware modifications."). As Dr. Russ explains:

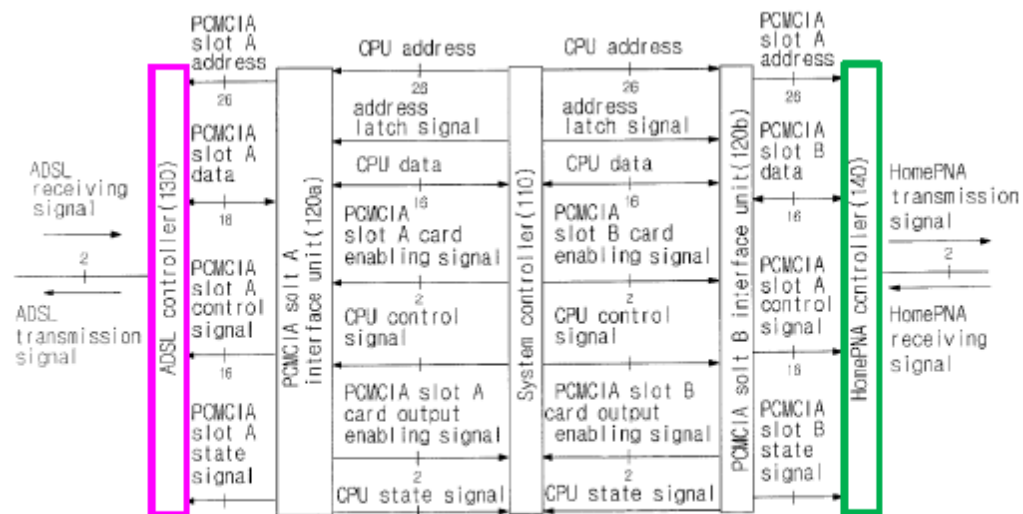
... [A]pplying Kim's teachings to Rabenko as the proposed combination would do would require much more than "minor" (as the Petition terms them, Pet., 30-31) modifications.

Only two components of Kim's system are "modular," and only one of those components, the HomePNA controller, is a common component shared between Kim and Rabenko's disclosures. Pet., 30; *compare* Ex. 1005 [Rabenko] Fig. 2 (illustrating DOCSIS MAC/PHY, voice/data processor, **HomePNA controller**, proxy gateway, AFE) *with* Ex. 1007 [Kim] [0026] ("The modular-type home gateway system has a small-sized and economical structure by making the **HomePNA controller and the ADSL controller** as a modular type controller having a PCMCIA interface").

Ex. 2003 [Russ-Decl.] ¶¶ 124-125. Petitioner does not explain why it would supposedly be a "minor" modification to apply Kim's modular nature of the HomePNA controller or ADSL controller to Rabenko's purported **CME**—which Petitioner asserts comprises not only multiple components such as the DOCSIS MAC/PHY, voice/data processor, proxy gateway, and MIPS core 228, but also two separate embedded components of the voice/data processor and MIPS core 228.

Pet., 21-24, 31. Petitioner does not offer any explanation as to why such modifications in view of Kim of these components in Rabenko would be “minor.” There is no reason shown that they would be minor, and there are numerous reasons suggested in the record that they would be anything but minor. As Dr. Russ explains:

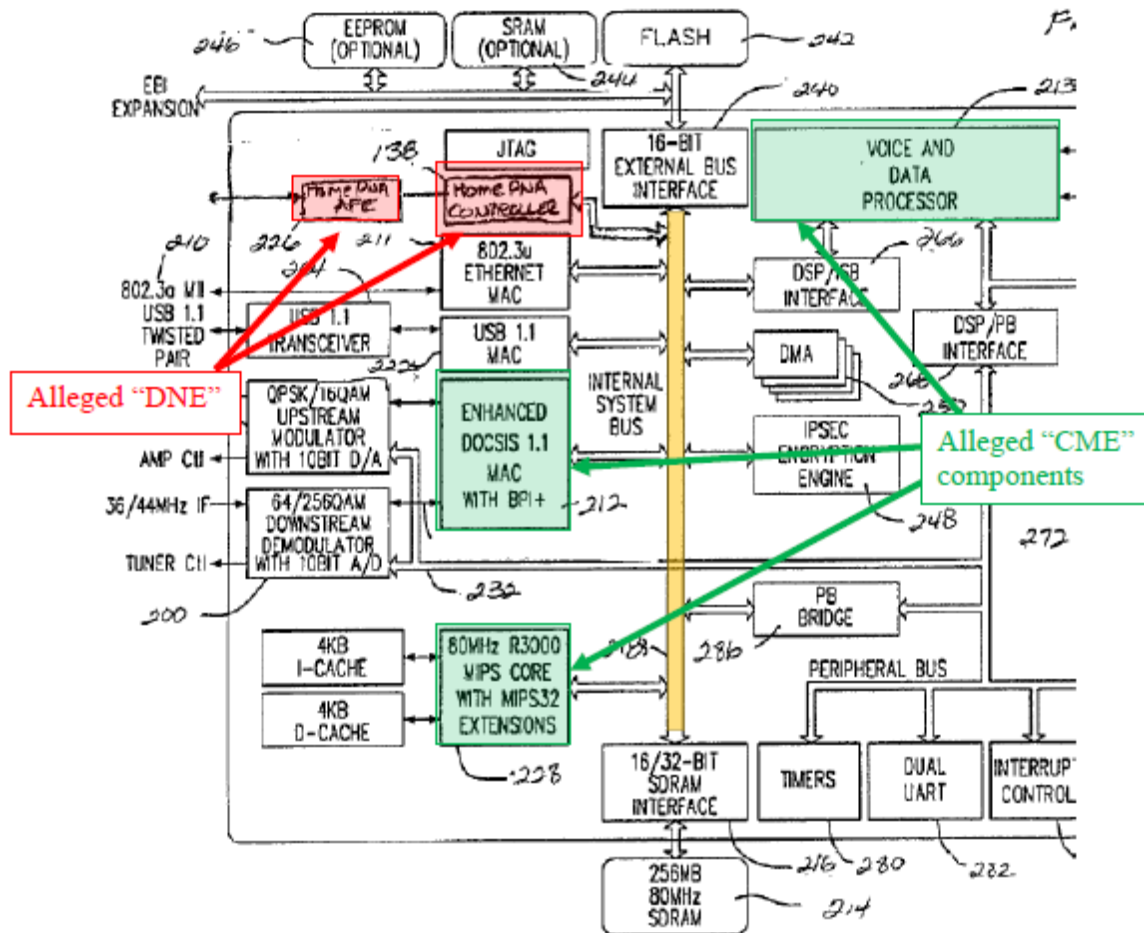
Kim’s hardware is arranged such that the modular components of Kim’s system are located on the outer edges of the system to allow for easy replacement, shown in Petitioner’s annotated Fig. 3 below:



Ex. 1007, Fig. 3 (annotated)

Pet., 29. Kim’s Figure 3 shows that only the marked components, the ADSL controller “connected to an outdoor telephone line” (Ex. 1007 [Kim] [0012]) and HomePNA controller “connected to a prior home telephone line” (*id.*, [0011]) are modular. None of the other components in Kim’s home gateway system may be so replaced.

Meanwhile, recall that the components the Petition calls the CME are scattered:



Ex. 1005 [Rabenko] Fig. 2 (annotated); *id.*, [0009]. For the modular swapping of Kim to be applied to Rabenko, the POSITA would not only be faced with serious implementation challenges, but with significant unclear choices before even undertaking the effort. The Petition seems to argue that the POSITA would know to place DNE components (red) on one circuit board, and place the CME

components on another, but what about all the remaining components? Which of those would be located where? And how would these assemblies connect? Kim is the effort of its authors to invent a hardware arrangement permitting modular replacement. Rabenko's hardware is not arranged for that at all, and it would be far more than obvious, routine activity for a POSITA to decide what Rabenko components to place where (and then go about making it work).

Ex. 2003 [Russ-Decl.] ¶ 127. Thus, given the differences between Kim's and Rabenko's components, the Petition does not show a reasonable expectation of success in modifying the combination's embedded software to be independently upgradable as claimed.

Furthermore, "independent" upgradability, if any, of these components of Rabenko would not yield any advantages in the combination, for Rabenko does not separate and partition components or functions the way the invention does. As Dr. Russ explains:

Even if Rabenko's system could be modified to enable upgrades to the CME software in a manner independent of the DNE's software, the modification would not be expected to bring the advantages that this limitation provides in the claimed invention. As I discussed previously at ¶¶ 56, 91, the independent upgradability is an important aspect of the claimed invention which is possible and desired because the "data networking and cable modem functions are decoupled," allowing the

implementation of the PacketCable E-MTA “with ***minimum impact on the cable modem.***” Ex. 1001 [’775] 4:25-40. But, as I again previously discussed at ¶¶82-86, in Rabenko there is overlap in functions between the purported DNE and purported CME, so any upgrades to one engine, which may make it inoperable, would not have a “minimum impact on the cable modem.” Instead, any upgrade would be prone to affecting the cable modem’s functionality as a whole. Furthermore, Rabenko’s embedded CME components are not designed to be upgradable and, as I discussed earlier, their embedded nature actually provides benefits to Rabenko’s system. See ¶¶ 95-98.

Thus, in my opinion the POSITA is not shown to have had a reasonable expectation of success in achieving the claimed invention with the addition of Kim’s teachings to Rabenko.

Ex. 2003 [Russ-Decl.] ¶¶ 129-130.

Petitioner improperly relies on hindsight and generic boilerplate for its argument that an obvious combination with Rabenko would yield the claimed independent upgradeability. Petitioner argues the combination would “us[e] known techniques ... to improve similar devices,” and relies again on Rabenko’s disclosure at [0268] that “[s]killed artisans recognize the interchangeability of hardware and software ..., and how best to implement the described functionality for each particular application.” Pet., 30-31. Such an *ex post* assertion that it was obvious to add modularity-type characteristics ***to all*** of Rabenko’s components

“would discount the value of combining various existing features or principles in a new way to achieve a new result—often the essence of the invention.” *Princeton Biochemicals*, 411 F.3d at 1337. There is no showing that the POSITA would have had either a reason to apply, or an expectation of success in applying, such modularity to other aspects of Rabenko that were not taught with such modularity in any cited art.

For the reasons above, the Petition has failed to show any grounds achieve the “independent upgradability” as required by the claims.

III. THE PETITION SHOULD ALSO BE DENIED BECAUSE ITS 40 GROUNDS ARE VOLUMINOUS AND EXCESSIVE.

The Office has stated that if a petition raises “voluminous or excessive grounds,” the Board may deny institution:

- Q. In view of the Office’s policy to institute on all challenges or none, how will the Board handle petitions that contain voluminous or excessive grounds for institution in light of the Office’s policy of instituting on all claims?
- A. The panel will evaluate the challenges and determine whether, in the interests of efficient administration of the Office and integrity of the patent system ... the entire petition should be denied under 35 U.S.C. § 314(a).

Ex. 2006¹⁰ [Post-SAS-Office-Guidance] 8.

Following this guidance, the Board has routinely rejected petitions that raise voluminous and excessive grounds. The Board’s informative-designated *Adaptics* decision on petitions raising “voluminous and excessive grounds” is instructive. *Adaptics Ltd. v. Perfect Company*, IPR2018-01596, Paper 20, 18 (Mar. 6, 2019) (informative) (“*Adaptics*”) (“we agree with Patent Owner that the Petition suffers from a lack of particularity that results in voluminous and excessive grounds.”); *see also Uber Technologies, Inc. v. Surgetech LLC*, IPR2023-00738, Paper 8 (Oct. 23, 2023) (“Following *Adaptics*, the Board has consistently denied petitions that asserted inordinately large numbers of ambiguous grounds.”) (collecting cases). There, the Board found that even if the petitioner raised just “seventeen possible combinations,” that would “yield[] an unduly burdensome number of combinations.” *Adaptics*, 19 (“...Petitioner’s contention encompasses nine combinations with Bendel and another eight distinct combinations with Sartorius, **for a total of seventeen possible combinations**. Even that conservative interpretation of Petitioner’s contention **yields an unduly burdensome number of combinations**.”); *see also Energysource Minerals, LLC, v. Terralithium LLC*,

¹⁰ Also available at: https://www.uspto.gov/sites/default/files/documents/sas_qas_20180605.pdf; *see also* <https://go.usa.gov/xU7GP>.

IPR2019-01607, Paper 10, 13 (May 4, 2020) (similar).

Thus, under *Adaptics*' precedent even "seventeen possible combinations" may be "an unduly burdensome number." Here, however, Petitioner more than doubles that number, raising at a minimum **40 separate grounds** (grounds "A" through "NN"), involving eight separate references, challenging claims 1-20. See Pet., 9-10. All these grounds must be instituted for review, or none. See *SAS Inst., Inc. v. Iancu*, 584 U.S. 357, 363 (2019). This "voluminous and excessive" number of grounds is an independently sufficient reason to deny institution. *Adaptics*, 18.

IV. CONCLUSION

Institution should be denied because it is not shown that the Petition's grounds render the claims obvious. Institution should also be discretionarily denied because it raises 40 "voluminous or excessive grounds" against the claims.

Respectfully submitted,

/ Kenneth Weatherwax /
Kenneth J. Weatherwax (Reg. No. 54,528)
Nathan Lowenstein, *pro hac vice* to be filed
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Date: June 10, 2024

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Preliminary Response (the “POPR”) consists of 11,608 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The POPR complies with the type-volume limitation of 14,000 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,

/ Robert Pistone /

Date: June 10, 2024

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:

PATENT OWNER PRELIMINARY RESPONSE

EXHIBITS 2003-2006

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Date: June 10, 2024