

Comcast Communications v. Entropic Communications



IPR2024-00446
U.S. Patent No. 8,223,775

Lowenstein & Weatherwax LLP

Nathan Lowenstein
Colette Woo

K&L Gates LLP

Jason Engel

Exhibit 2016

Petitioner's Grounds Are All Based On Rabenko

Ground	References	Basis	Claims Challenged
A	Rabenko	§103	1-7, 10, 12, 14-15, 18-20
B	Rabenko in view of Gaspar	§103	1-7, 10, 12, 14-15, 18-20
C	Rabenko in view of Kim	§103	1-7, 10, 12, 14-15, 18-20
D	Rabenko in view of Gaspar and Kim	§103	1-7, 10, 12, 14-15, 18-20
E-H	Each of Grounds A-D + Lu	§103	1-7, 10, 12, 14-15
I-P	Each of Grounds A-H + Klein and Kim '678	§103	12
Q-X	Each of Grounds A-H + Koperda	§103	8
Y-FF	Each of Grounds Q-X + Johnson	§103	9
GG-NN	Each of Grounds A-H + Johnson	§103	11, 13, 16-17

Petitioner Fails To Show:

Limitations Not Met	Grounds	Claims
“DOCSIS Controller”	All	All
DNE & CME in “Separate” “Circuits” with “Completely Partitioned” Functions	All	All
CME “Configured to Enable [Independent] Upgrades to its Software”	All	All
“All DOCSIS Functions are Localized” in the CME	A-D	2, 19
“DOCSIS MAC Processor is an ARM9TDMI-Based RISC Processor” & “DOCSIS Controller is an ARM940-Based RISC Processor”	I-P	12

Claims Require A “DOCSIS Controller”

(12) **United States Patent**
Li et al.

(54) **ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM**

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

(21) Appl. No.: **10/675,566**

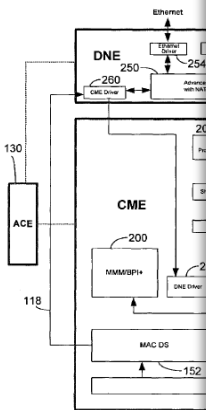
(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**
US 2005/0071492 A1 Mar. 31, 2005

(51) Int. Cl. **H04L 12/46** (2006.01)

(52) U.S. Cl. **370/401; 709/249**

(58) **Field of Classification Search** **709/249**
See application file for complete search history.



18. A cable modem system comprising:
a data networking engine implemented in a first circuit that includes at least one processor, the data networking engine programmed with software that when executed by the at least one processor of the first circuit causes the data networking engine to perform home networking functions including interfacing with customer provided equipment;
a cable modem engine implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit, the cable modem engine programmed with software that when executed by the at least one processor of the second circuit causes the cable modem engine to perform cable modem functions other than the home networking functions performed by the data networking engine, the cable modem functions including interfacing with cable media, and 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, the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor, the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput; and
a data bus that connects the data networking engine to the cable modem engine, wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine.

software of the data networking engine, the cable modem engine including a DOCSIS controller and a

Petitioner: Rabenko’s Voice And Data Processor (“VDP”) Is The “DOCSIS Controller”

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775
Filing Date: September 30, 2003
Issue Date: July 17, 2012
Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

PETITION FOR *INTER PARTES* REVIEW

e. [18E]: “the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor,”

As discussed above in Section VI.A.1.c, Rabenko’s cable modem engine includes voice and data processor 136/213 (“DOCSIS controller”) and DOCSIS MAC 134/212 (“DOCSIS MAC processor”). Ex. 1002, ¶¶134-139. Like 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. Ex. 1005, [0074], [0085], [0087]. Rabenko discloses limitation [18E].

Petitioner: Rabenko's VDP Processes And Transports Voice Packets "Like The 'DOCSIS Controller' Of The '775 Patent"

PETITION FOR *INTER PARTES* REVIEW

- e. [18E]: "the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor,"

As discussed above in Section VI.A.1.c, Rabenko's cable modem engine includes voice and data processor 136/213 ("DOCSIS controller") and DOCSIS MAC 134/212 ("DOCSIS MAC processor"). Ex. 1002, ¶¶134-139. Like 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. Ex. 1005, [0074], [0085], [0087]. Rabenko discloses limitation [18E].



Petitioner's Fallacy: Some Overlap Does Not Suggest Two Things Are The Same



≠



Both carry passengers, but they are not the same thing

The Claim Requires A “DOCSIS” Controller



(12) **United States Patent**
Li et al.

(10) **Patent No.:** US 8,223,775 B2
(45) **Date of Patent:** Jul. 17, 2012

(54) ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM

(56) **References Cited**

U.S. PATENT DOCUMENTS

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

6,944,706	B2 *	9/2005	Schain et al.	709/250
2001/0039600	A1 *	11/2001	Brooks et al.	710/126
2006/0080650	A1 *	4/2006	Winters et al.	717/168

* cited by examiner

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

Primary Examiner — Patrice Winder
(74) Attorney, Agent, or Firm — James Sze; Duane Morris LLP

(21) Appl. No.: 10/675,566

(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**

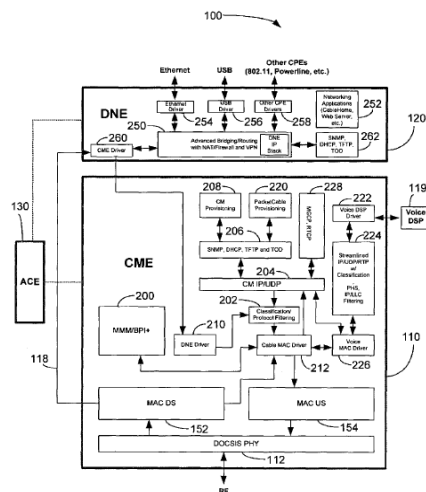
US 2005/0071492 A1 Mar. 31, 2005

(51) Int. Cl.
H04L 12/46 (2006.01)

(52) U.S. Cl. 370/401; 709/249

(58) **Field of Classification Search** 709/249
See application file for complete search history.

20 Claims, 2 Drawing Sheets



1

Comcast, Ex. 1001

software of the data networking engine, the cable modem engine including a DOCSIS controller and a



Controlling DOCSIS Functions Makes It A DOCSIS Controller

Controller 116 implements the following DOCSIS (blocks 200-212) functions: MAC management message (MMM) processing (ranging, registration, UCD, UCC, DCC, DCI, UP-DIS, DSx and BPI+) (functional block 200 of FIG. 2), IGMP, MAC address learning, classification, US protocol filtering (functional block 202 of FIG. 2) and CM IP stack and software downloading. Functional block 204 carries out cable modem IP/UDP functions, functional block 206 carries out SNMP, DHCP, TFTP and TOD functionality and functional block 208 is responsible for cable modem provisioning. Controller 116 also includes a data network engine driver 210 in communication with data network engine 120 and cable MAC driver 212.

In addition, in order to minimize the latency and jitter of voice packets, controller 116 also implements all PacketCable functionality. In FIG. 2, PacketCable functionality is

This is what makes it a DOCSIS controller



This is other stuff it does



Petition's Construction Of “DOCSIS Controller,” Proof That VDP Has Anything To Do With DOCSIS?



Rabenko's VDP Processes Signals For A POTS Telephone

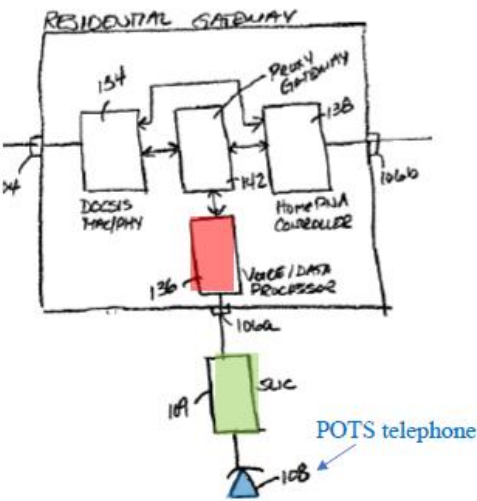


DECLARATION OF SAMUEL H. RUSS, PH.D.

52. Rabenko's voice and data processor 136 is not used for any DOCSIS functionality. Rather, it is used to process the POTS signals to and from a conventional telephone. Ex. 1005 [Rabenko] Fig. 1b, [0032], [0034], [0045]. Specifically, the voice and data processor receives "packets ... destined for the POTS telephone," "decompress[es] and depacketiz[es]" those packets, and "generates an analog voice signal" for the POTS telephone. Ex. 1005 [Rabenko] [0045], [0034]. These functions are not DOCSIS functions. Compare *id.* with Ex. 1001 [775] 3:26-38; see Ex. 2009 [Kiaei-Depo.] 63:6-14 (POTS refers to "conventional telephone system that is a twisted pair").

Rabenko et al.

HomePNA LAN 110 or the POTS telephone 108. If the packet is destined for the POTS telephone, the packet is routed to a voice and data processor 136 for decompression and depacketization in a manner to be described in greater detail below. The voice and data processor 136 generates an analog voice signal from the decompressed signal and delivers the analog voice signal to the POTS telephone 108 via the SLIC 109. If the proxy gateway 142 determines that

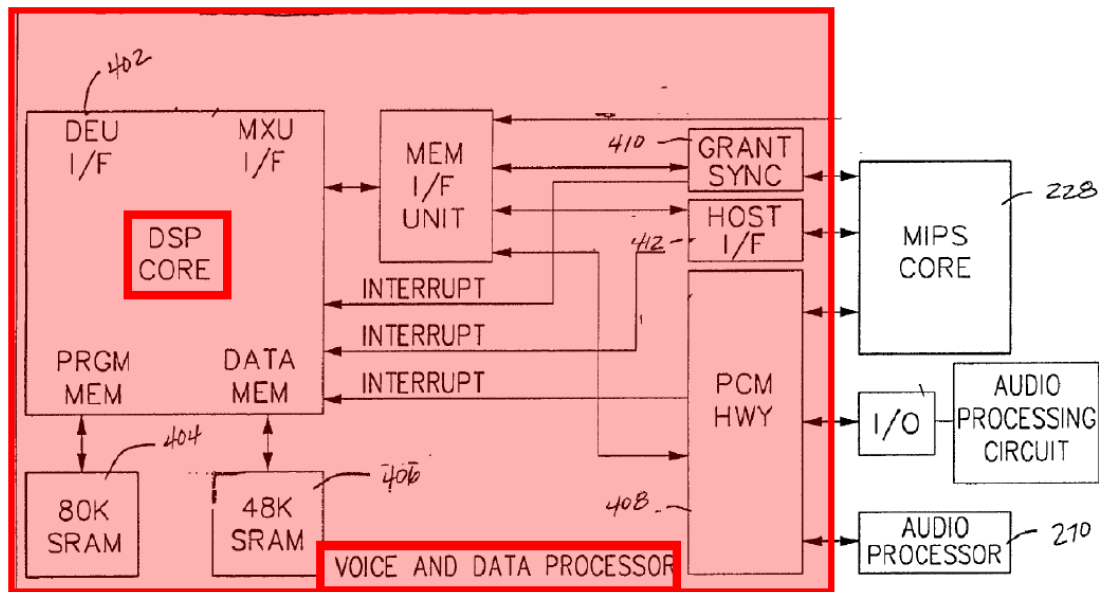


Rabenko's VDP Is A "Voice DSP," So, Is A Voice DSP A "DOCSIS Controller"?

(19) **United States**

(12) **Patent Application Publication**

Rabenko et al.



[0011] FIG. 4 is a system block diagram of an exemplary DSP based voice and data processor;

[0075] The embedded communications software is preferably run on a programmable digital signal processor (DSP). In an exemplary embodiment the voice and data processor 260 utilizes a ZSP core from LSI Logic Core ware library for mid to high end telecommunications applications. The DSP core may include an internal instruction RAM 262 and an internal data RAM 264. The voice and data processor 213 interfaces with the ISB 218 via a DSP/ISB interface 266 and a peripheral bus 232 via a DSP/PB interface 268.

[0089] An exemplary voice and data processor may be implemented with a programmable DSP software architecture as shown in FIG. 4. This architecture includes a high speed DSP 402 with program memory 404, preferably on the order of about a 80K word SRAM, and data memory 406 preferably on the order of about a 48K word SRAM. A PCM highway 408 provides the voice and data processor access to the audio processor optional external audio processing circuits. A grant synchronizer 410 facilitates upstream transmission. The grant synchronizer 410 signals the DSP 402 that a pending grant is about to arrive at the residential gateway from the WAN so as to allow the DSP 402 to synchronize itself to scheduled grants at the residential gateway. A host interface 412 transfers data, control and status messages between the DSP 402 and the MIPS core.

'775: Explicitly Distinguishes Voice DSP From "DOCSIS Controller"



(12) **United States Patent**
Li et al.

(10) **Patent No.:** US 8,223,775 B2
(45) **Date of Patent:** Jul. 17, 2012

(54) ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM

(56) **References Cited**

U.S. PATENT DOCUMENTS

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

6,944,706	B2 *	9/2005	Schain et al.	709/250
2001/0039600	A1 *	11/2001	Brooks et al.	710/126
2006/0080650	A1 *	4/2006	Winters et al.	717/168

* cited by examiner

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

Primary Examiner — Patrice Winder
(74) Attorney, Agent, or Firm — James Sze; Duane Morris LLP

(21) Appl. No.: 10/675,566

(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**

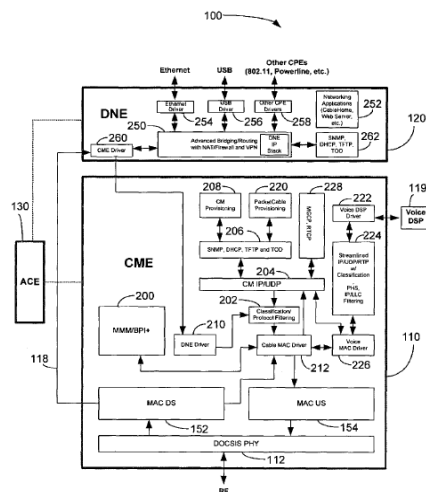
US 2005/0071492 A1 Mar. 31, 2005

(51) Int. Cl.
H04L 12/46 (2006.01)

(52) U.S. Cl. 370/401; 709/249
(58) Field of Classification Search 709/249

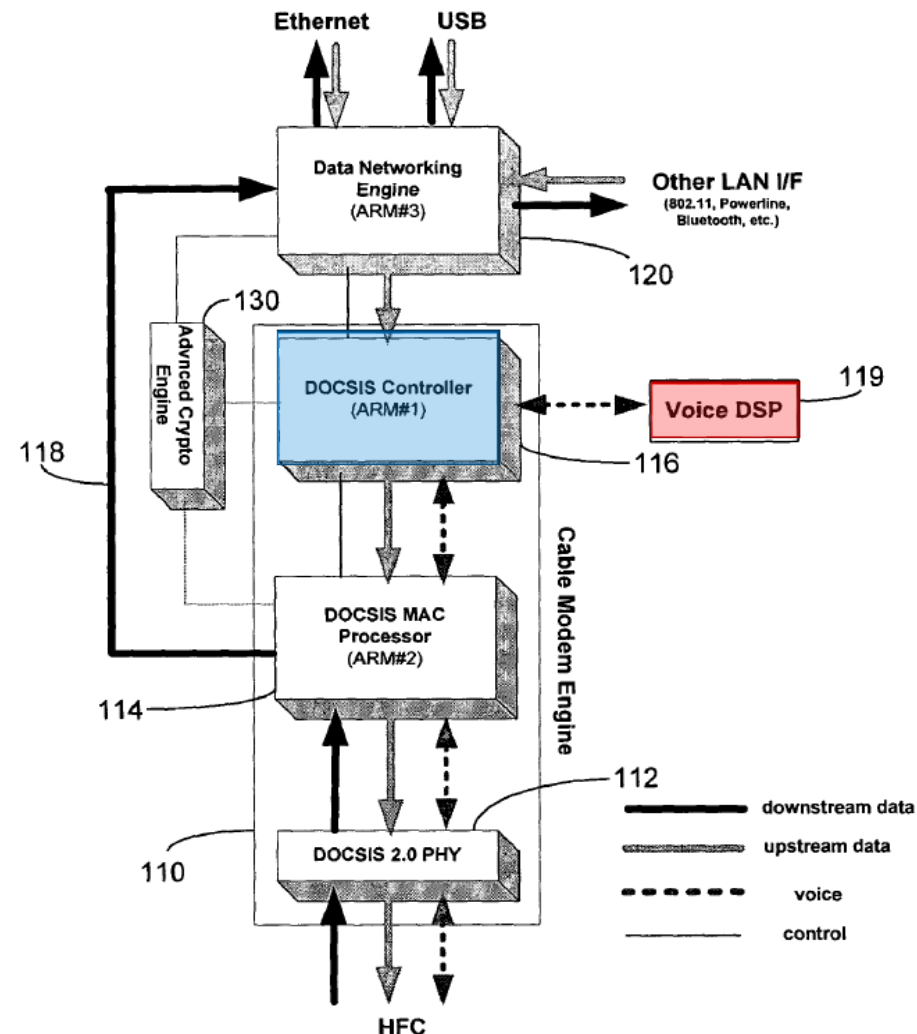
(58) **Field of Classification Search** 709/249
See application file for complete search history.

20 Claims, 2 Drawing Sheets

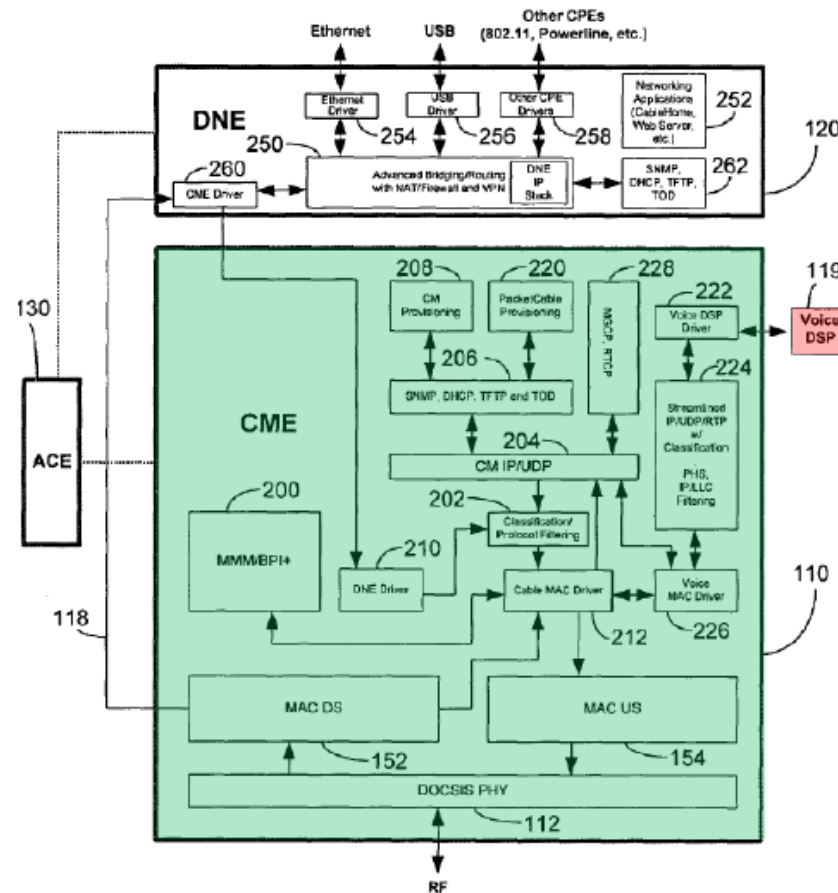
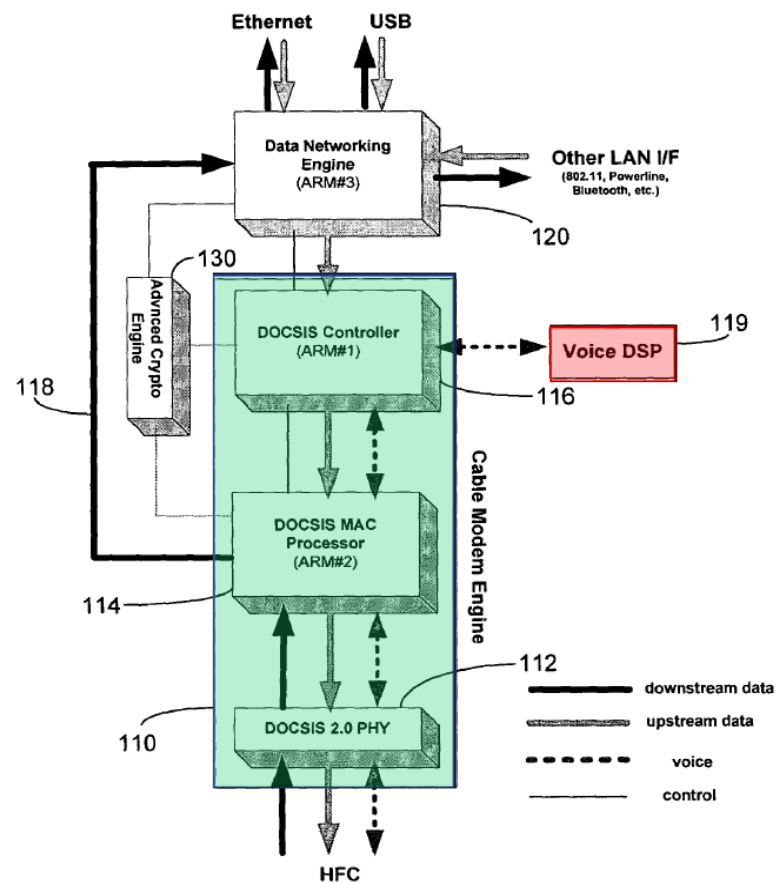


1

Comcast, Ex. 1001



'775: Voice DSP Is Outside Of The CME Altogether



DEPOSITION OF SAYFE KIAEI

A. Now, before I answer that on the voice DSP, in Figure 1 also it shows the voice DSP block 119 which is outside of the cable modem engine that the cable modem engine is interfacing with.

Would you like me to answer your last question now?

Q. Yes, please.

A. Okay. I just wanted to clarify. I notice that voice DSP was also used in -- was clearly shown in that figure out of the cable modem.



Petitioner's Explanation For Why Rabenko's Voice DSP Is A "DOCSIS Controller" When '775's Voice DSP Clearly Is Not A DOCSIS Controller?



Petition's Failure To Prove Rabenko's VDP Is A "DOCSIS Controller" Is Fatal



CORONER'S REPORT CAUSE OF DEATH

- Failure to "make case in petition" (*Intelligent Bio-Systems*)
- No construction
- One fallacious argument
- No showing VDP has anything to do with DOCSIS
- voice DSP clearly not DOCSIS controller
- Unable to resuscitate in reply (*Wasica*)

“DOCSIS Controller” Controls One Or More DOCSIS Functions



DECLARATION OF SAMUEL H. RUSS, PH.D.

(10) **Patent No.:** **US 8,223,775 B2**

43. As the name “DOCSIS controller” itself indicates, a “DOCSIS controller” controls DOCSIS functions. “DOCSIS” stands for “Data Over Cable

44. The '775 patent's disclosure relating to the “DOCSIS controller” is entirely consistent with the plain meaning and further confirms that a “DOCSIS controller” must control DOCSIS functions. The exemplary DOCSIS controller described in the specification “implements the following DOCSIS (blocks 200-212) functions” and then lists several examples of possible DOCSIS functions. Ex. 1001 ['775] 3:26-38. These functions may include “MAC management message

Controller 116 implements the following DOCSIS (blocks 200-212) functions: MAC management message (MMM) processing (ranging, registration, UCD, UCC, DCC, DCI, UP-DIS, DSx and BPI+) (functional block 200 of FIG. 2), IGMP, MAC address learning, classification, US protocol filtering (functional block 202 of FIG. 2) and CM IP stack and software downloading. Functional block 204 carries out cable modem IP/UDP functions, functional block 206 carries out SNMP, DHCP, TFTP and TOD functionality and functional block 208 is responsible for cable modem provisioning. Con-

The Institution Decision Misapprehended Patent Owner's Construction

Patent Owner's Actual Construction

“A ‘DOCSIS controller’ must control **at least one or more DOCSIS functions**”

POR, 11

ID's Misapprehension

“we decline to limit the claim term ‘DOCSIS controller’ to a controller performing **the specific functions identified by Patent Owner in the '775 patent Specification.**”

ID, 14

DOCSIS Functions Listed In '775 Specification Are Exemplary

DECLARATION OF SAMUEL H. RUSS, PH.D.



controller” must control DOCSIS functions. The exemplary DOCSIS controller described in the specification “implements the following DOCSIS (blocks 200-212) functions” and then lists several examples of possible DOCSIS functions. Ex. 1001 [’775] 3:26-38. These functions may include “MAC management message (MMM) processing ..., ICMP, MAC address learning, classification, US protocol filtering ... and CM IP stack and software downloading.” *Id.* These are all typical DOCSIS functions. *E.g.*, Ex. 2011 [DOCSIS-2.0] 7, 16, 286 (describing MAC management messaging); Ex. 2009 [Kiaei-Depo.] 24:12-27:11 (all functions listed in blocks 200-212 relate to functions “that are carried out in the DOCSIS protocol”). Thus, controlling/implementing “DOCSIS functions” is what makes a “DOCSIS controller” a DOCSIS controller. The examples provided in the specification are, in this regard, examples of DOCSIS functions that may be controlled by the “DOCSIS controller.”

(10) Patent No.: US 8,223,775 B2

Controller 116 implements the following DOCSIS (blocks 200-212) functions: MAC management message (MMM) processing (ranging, registration, UCD, UCC, DCC, DCI, UP-DIS, DSx and BPI+) (functional block 200 of FIG. 2), IGMP, MAC address learning, classification, US protocol filtering (functional block 202 of FIG. 2) and CM IP stack and software downloading. Functional block 204 carries out cable modem IP/UDP functions, functional block 206 carries out SNMP, DHCP, TFTP and TOD functionality and functional block 208 is responsible for cable modem provisioning. Con-

EXEMPLARY

Patent Owner's Construction Is So Reasonable That Petitioner Had To Change It To Attack It

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 RESPONSE

2. A "DOCSIS Controller" Must Control At Least One Or More DOCSIS Functions.

Petitioner's failure of proof should be more than sufficient to reject the asserted grounds. If any more were needed, Petitioner's grounds should further be

but only the DOCSIS functions that are unrelated to VoIP"



Again: Petition Had No Showing That Rabenko's VDP Performs Any DOCSIS Functions

PETITION FOR *INTER PARTES* REVIEW

- e. [18E]: “the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor,”

As discussed above in Section VI.A.1.c, Rabenko's cable modem engine includes voice and data processor 136/213 (“DOCSIS controller”) and DOCSIS MAC 134/212 (“DOCSIS MAC processor”). Ex. 1002, ¶¶134-139. Like 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. Ex. 1005, [0074], [0085], [0087]. Rabenko discloses limitation [18E].



Reply: Petitioner Gives No “Limit” To DOCSIS Controller, Effectively Writing It Out Of The Claim

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2024-00446
Patent 8,223,775

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

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

evidence does not support the carve-out. Claim 18 does not recite “DOCSIS functions” or limit the “DOCSIS controller” beyond that it is part of the cable modem engine and is bypassed in order to boost downstream throughput. Ex. 1001, claim 18; Ex. 1018, ¶ 8. PO incorrectly dissociates VoIP (such as is implemented

software of the data networking engine, the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor, the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput; and



“No Limit” Construction Contravenes “Presumption” All Claims “Have Meaning” And “Must Be ... Giv[en] Effect”



software of the data networking engine, the cable modem engine including a ~~DOCSIS~~ cont and a



“[A]ll claim terms are presumed to have meaning in a claim.”

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

“Claims must be interpreted with an eye towards giving effect to all terms in the claim.”

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

Reply: Rabenko's VDP Implements VoIP/PacketCable Which Are DOCSIS Functions

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2024-00446
Patent 8,223,775

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

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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

1-2. Thus, when VoIP is implemented in a DOCSIS network, for example, via PacketCable and as taught by Rabenko, it is a DOCSIS operation. Ex. 1018, ¶¶ 12-15.

'775 Distinguishes Between DOCSIS Functions And VoIP/PacketCable Functions

(10) **Patent No.:** **US 8,223,775 B2**

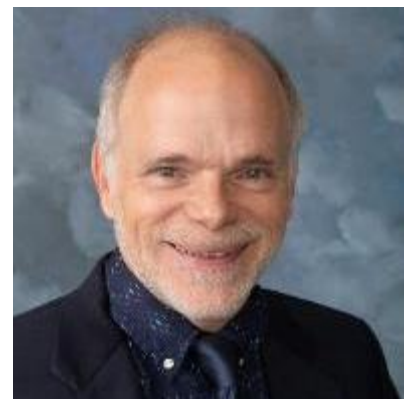
Another embodiment of the invention is a method for providing a flexible and partitioned cable modem gateway. Data and home networking functionality is provided by a data networking engine, and DOCSIS and VoIP functionality is provided by a cable modem engine. The data networking engine is partitioned from the cable modem engine so that the data and home networking functionality is completely decoupled from the DOCSIS and VoIP functionality.



Controller 116 implements the following DOCSIS (blocks 200-212) functions: MAC management message (MMM) processing (ranging, registration, UCD, UCC, DCC, DCI, UP-DIS, DSx and BPI+) (functional block 200 of FIG. 2), IGMP, MAC address learning, classification, US protocol filtering (functional block 202 of FIG. 2) and CM IP stack and software downloading. Functional block 204 carries out cable modem IP/UDP functions, functional block 206 carries out

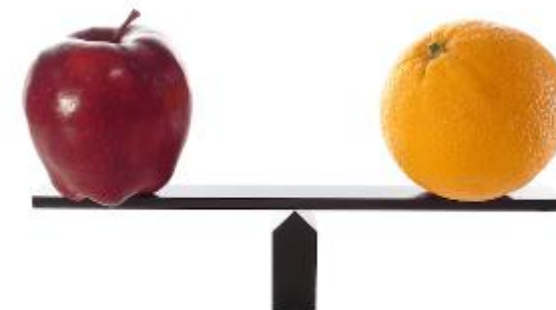
In addition, in order to minimize the latency and jitter of voice packets, controller 116 also implements all Packet-Cable functionality. In FIG. 2, PacketCable functionality is represented by functional blocks 220-228. These Packet-Cable functions include provisioning (block 220), security and signaling. Functional blocks 222 (voice DSP driver), 224 (streamlined IP/UDP/RTP with classification; PHS, IP/LLC filtering) and 226 (voice MAC driver) interface with external voice DSP 119. Additionally MGCP and RTCP functions are provided by functional block 228.

Dr. Russ: DOCSIS And VoIP Are Distinct

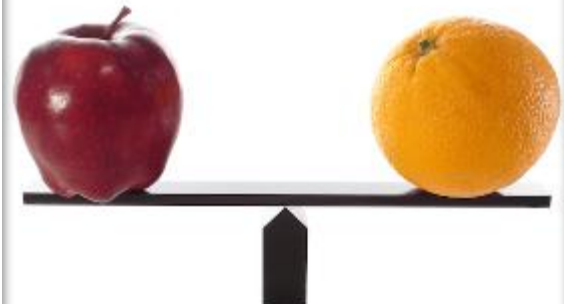


DECLARATION OF SAMUEL H. RUSS, PH.D.

47. VoIP is not a DOCSIS function. Indeed, the DOCSIS specification does not define or provide for any VoIP functionality. *See* Ex. 2011 [DOCSIS-Standard] *generally*. There may be DOCSIS networks—such as a typical home cable television network—that have no VoIP services. Similarly, there may be VoIP networks—such as a wired ethernet network—that does not use the DOCSIS protocol. Put simply, DOCSIS and VoIP are simply two different protocols with different functions.



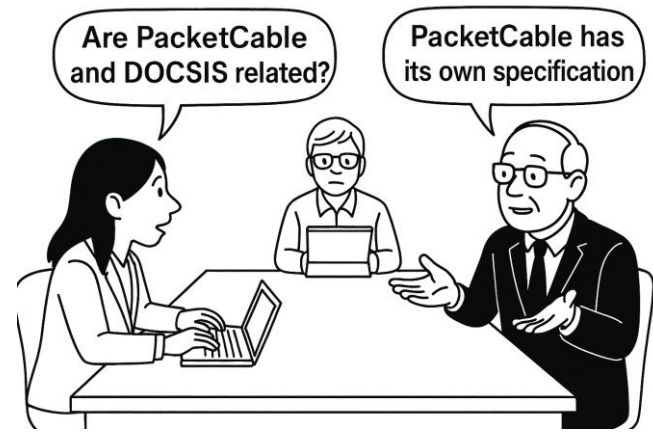
Dr. Kiaei: DOCSIS And PacketCable Are Entirely Different Specifications



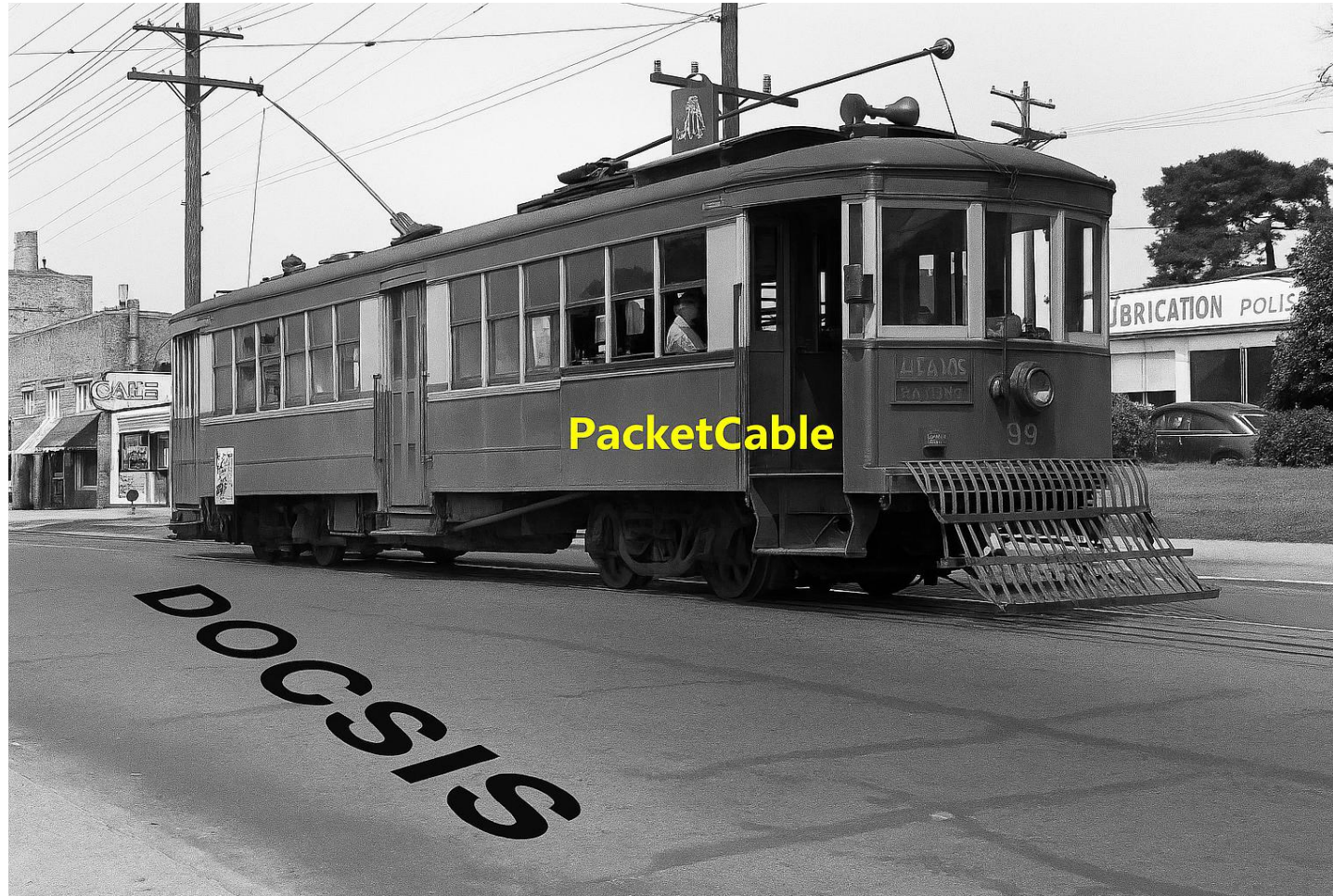
DEPOSITION OF SAYFE KIAEI

So, now, based on your understanding that it's the PacketCable protocol they are talking about, is PacketCable and DOCSIS, are they related?

A. PacketCable has its own specification on what they are, what is the relationship within the PacketCable and DOCSIS in terms of the requirements in the PacketCable, in terms of voiceover IP, and how it relates in DOCSIS and is used in DOCSIS.



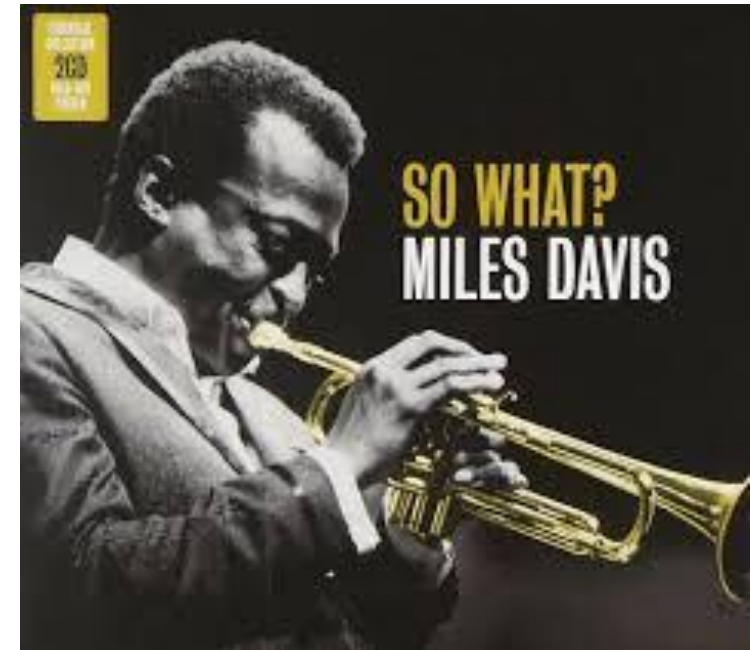
Using DOCSIS ≠ Being DOCSIS



Petitioner: The DOCSIS Specification Mentions Service Flows For VoIP/PacketCable But ... Does Not Argue Rabenko's VDP Implements DOCSIS Service Flows

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

does provide service flows to manage VoIP signaling. *Id.* ¶¶ 11-12. More specifically, the DOCSIS specification provides for dynamically-created Service Flows, for example, created by an embedded PacketCable Multimedia Terminal Adapter, to manage VoIP signaling. Ex. 2011, 52. The PacketCable™ Multimedia Specification describes that the PacketCable project is a framework that provides access to the DOCSIS network mechanisms for IP services such as VoIP. Ex. 1025, 1-2. Thus, when VoIP is implemented in a DOCSIS network, for example, via



Petitioner Identifies One Reference To PacketCable In 300+ Page Specification

DOCSIS Standard

Superseded

Data-Over-Cable Service Interface Specifications
DOCSIS 2.0

Operations Support System Interface Specification

SP-OSSiv2.0-I05-040407

ISSUED
SPECIFICATION

Notice

This document is a cooperative effort undertaken at the direction of Cable Television Laboratories, Inc. for the benefit of the cable industry in general. Neither CableLabs nor any member company is responsible for any liability of any nature whatsoever resulting from or arising out of use or reliance upon this specification by any party. This document is furnished on an "AS IS" basis and neither CableLabs nor its members provides any representation or warranty, express or implied, regarding its accuracy, completeness, or fitness for a particular purpose.

© Copyright 1999-2004 Cable Television Laboratories, Inc.
All rights reserved.

Petitioner's isolated example

The DOCSIS 2.0 RFI specification also provides for dynamically created Service Flows. An example could be a set of dynamic Service Flows created by an embedded PacketCable Multimedia Terminal Adapter (MTA) to manage VoIP signaling and media flows. All dynamic Service Flows must be created using an SCN known to the



PacketCable May Use DOCSIS; It Is Not DOCSIS

DOCSIS Standard

Superseded

Data-Over-Cable Service Interface Specifications
DOCSIS 2.0

Operations Support System Interface Specification

SP-OSSiv2.0-I05-040407

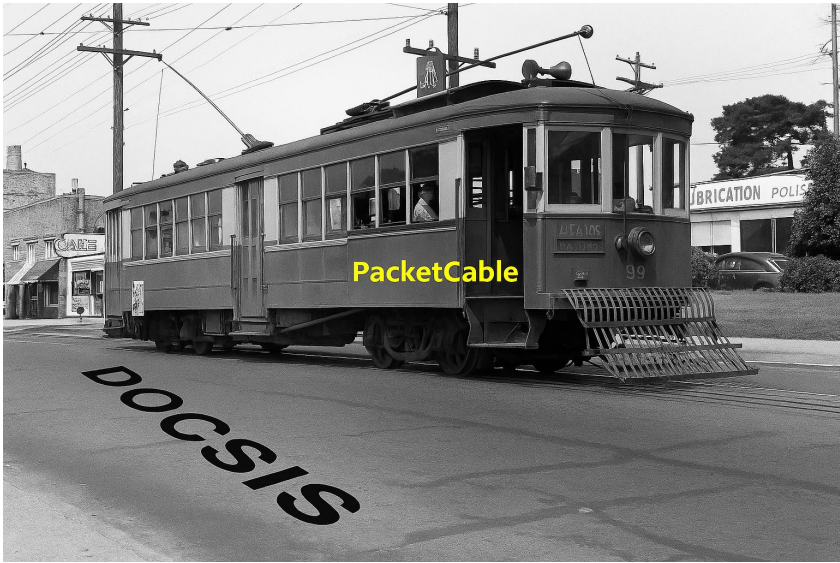
ISSUED
SPECIFICATION

Notice

This document is a cooperative effort undertaken at the direction of Cable Television Laboratories, Inc. for the benefit of the cable industry in general. Neither CableLabs nor any member company is responsible for any liability of any nature whatsoever resulting from or arising out of use or reliance upon this specification by any party. This document is furnished on an "AS IS" basis and neither CableLabs nor its members provides any representation or warranty, express or implied, regarding its accuracy, completeness, or fitness for a particular purpose.

© Copyright 1999-2004 Cable Television Laboratories, Inc.
All rights reserved.

The DOCSIS 2.0 RFI specification also provides for dynamically created Service Flows. An example could be a set of dynamic Service Flows created by an embedded PacketCable Multimedia Terminal Adapter (MTA) to manage VoIP signaling and media flows. All dynamic Service Flows must be created using an SCN known to the



Untimely Reply Argument: Rabenko's VDP Includes Proxy Gateway And MTA Call Client

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

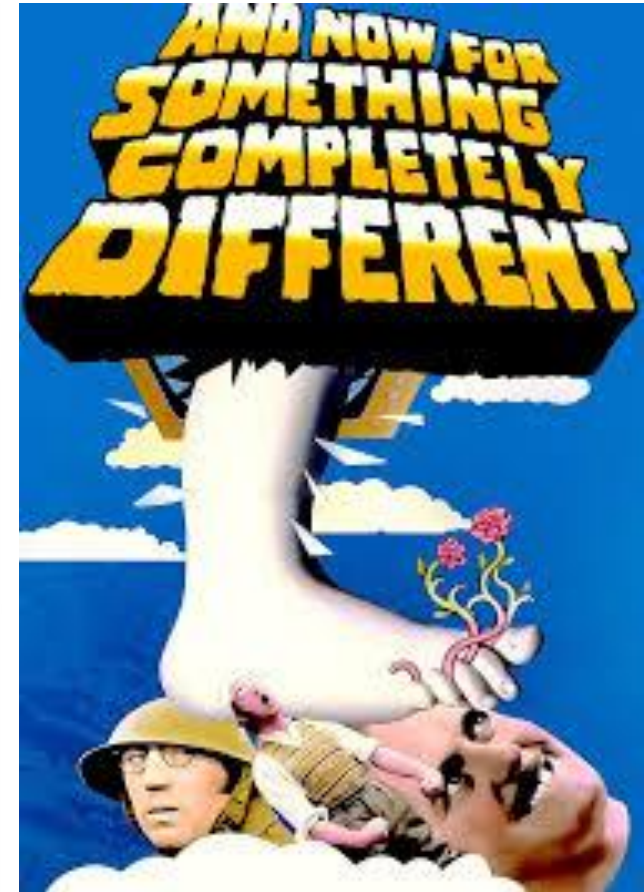
Case IPR2024-00446
Patent 8,223,775

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

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

cable head end.” Pet. 31, 21-26; Ex. 1005, [0074]. Furthermore, Rabenko describes that the MTA call client (located within the VDP) provides all signaling required to support voice over the DOCSIS network and “receives and mediates call-signaling information between the DOCSIS network and a PSTN.” Ex. 1005, [0097]-[0098].

35 (emphasis added). Similarly, Rabenko describes that the “proxy gateway functions can be implemented in the voice and data processor” and can include MTA call client 520. Ex. 1005, [0097], Fig. 5b. MTA call client 520 implemented in the VDP includes “SNMP logic 540,” “DHCP logic 542,” and “TFTP logic 546.” Ex. 1005, [0103]-[0105], Fig. 5b. Therefore, even according to PO's flawed construction of “DOCSIS controller,” Rabenko's VDP still teaches it. Ex. 1018, ¶ 26.



But, The Petition Relied On The Proxy Gateway Being “Implemented By The [MIPS] Core,” Not The VDP

Petition

“Cable modem functions implemented by the **proxy gateway 142 would be implemented by [MIPS] core 228** using software.”

Pet., 25

Petitioner’s Reply

“Rabenko describes that the ‘**proxy gateway functions can be implemented in the voice and data processor**’ and can include MTA call client 520.”

Reply, 1



Petitioner's Reply Theory Is Untimely



“We also are unpersuaded by [petitioner]’s attempts to cure the petition’s deficiencies in its subsequent briefing to the Board and to us. ... ***Rather than explaining how its original petition was correct, [petitioner]’s subsequent arguments amount to an entirely new theory of prima facie obviousness absent from the petition. Shifting arguments in this fashion is foreclosed by statute, our precedent, and Board guidelines.***”

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



Rabenko's Fig. 5b: MTA Call Client Is Separate From, Not In The VDP

Rabenko et al.

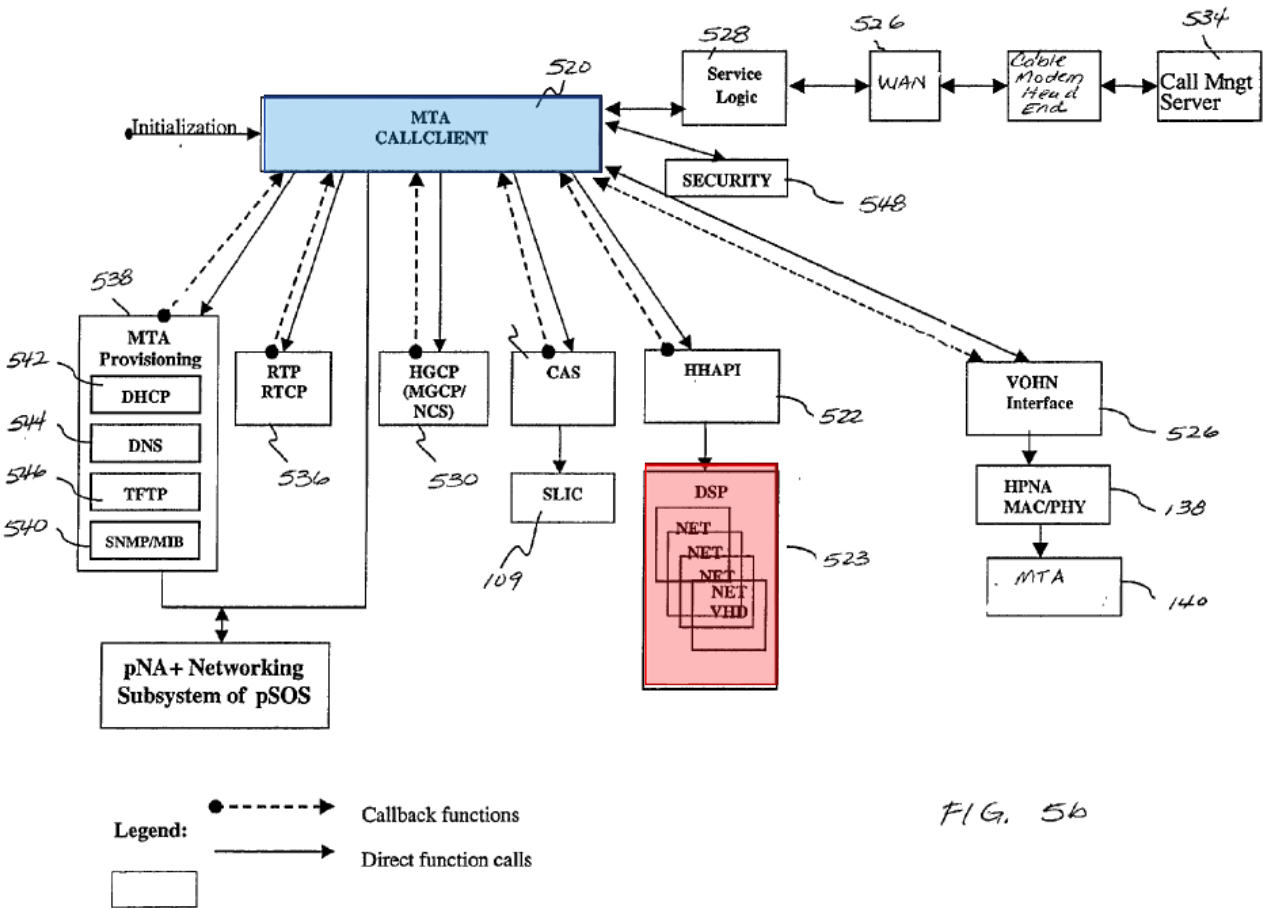
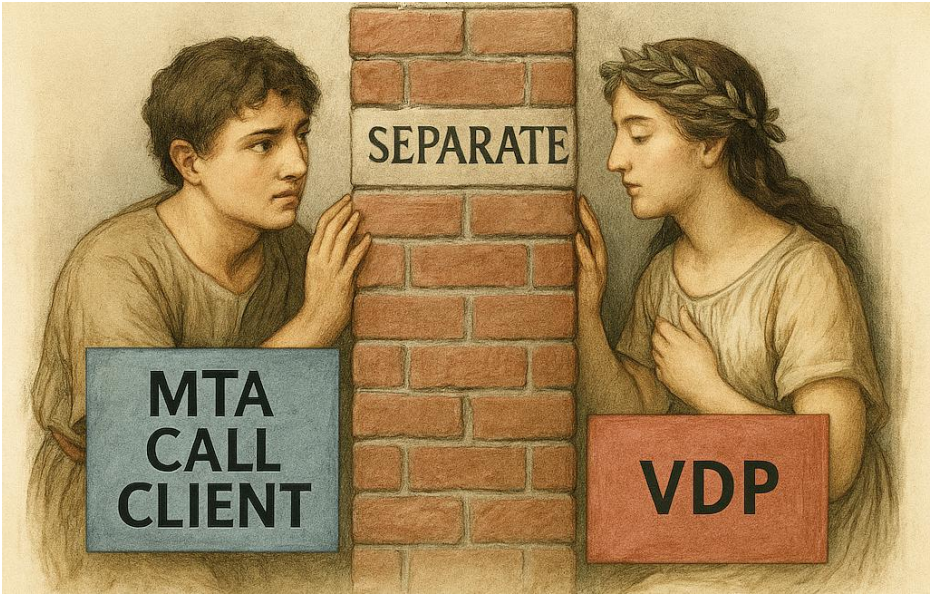


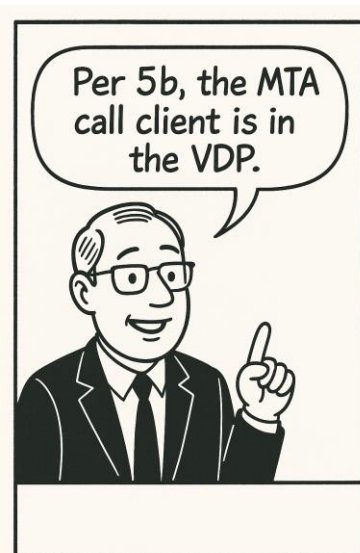
FIG. 5b



Dr. Kiaei In Reply: Relied Upon Fig. 5b To Demonstrate Proxy Gateway And MTA Call Client Are Part Of VDP, But Could Not Answer Questions About It

DECLARATION OF DR. SAYFE KIAEI IN SUPPORT OF PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

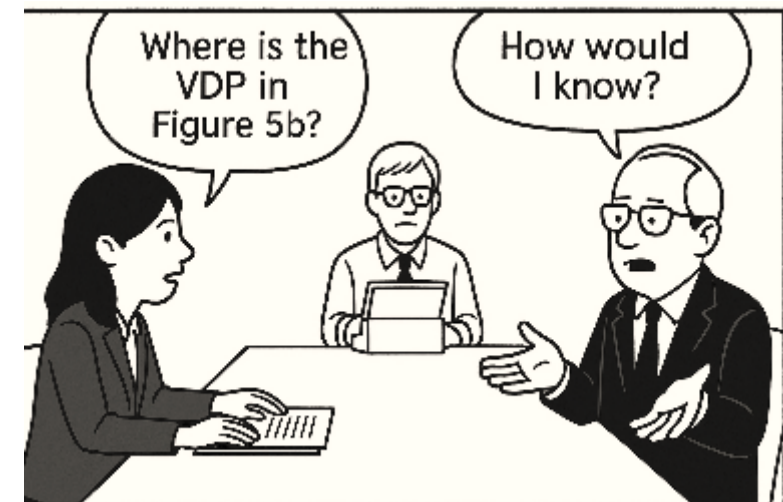
functionality.” Ex. 1001, 3:33-35 (emphasis added). Similarly, Rabenko describes that the “proxy gateway functions can be implemented in the voice and data processor” and can include MTA call client 520. Ex. 1005, [0097], Fig. 5b; Ex. 1002, ¶108. MTA call client 520 implemented in the VDP includes “SNMP logic



DEPOSITION OF SAYFE KIAEI

MS. WOO: Q. Oh, I believe earlier I asked about the MIPS core. Now, I'm specifically asking about the voice and data processor. So same question. Where is the voice and data processor depicted in Figure 5b?

THE WITNESS: Again, I have to sit down and do a lot more analysis on that before I can answer you, and, as I said before when I was mentioning about what I've told you up above, is 5b is the exemplary embodiment for the embedded software in the application layer, et cetera. So I did not go through the analysis of that, and my answer is the same. I need a lot more time to be able to answer you.



Rabenko Suggests MTA Call Client Is A Part Of The MIPS Core, Not The VDP

Rabenko et al.

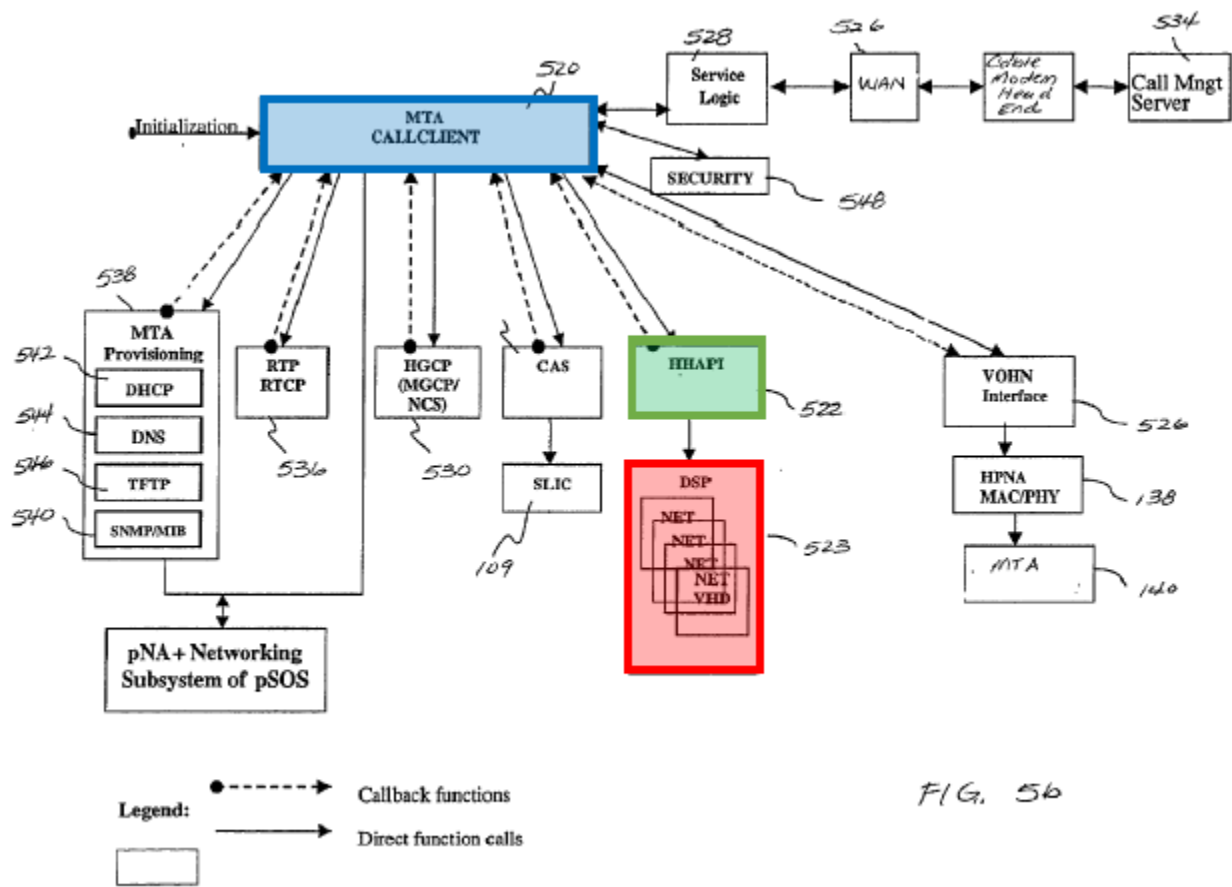
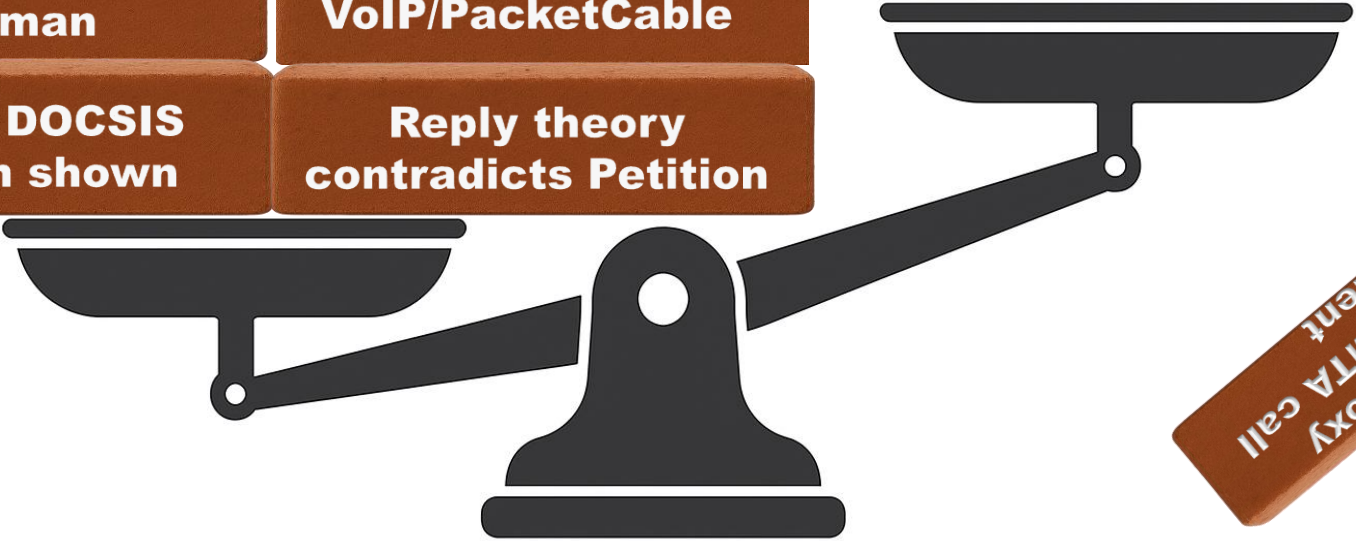


FIG. 5b

cations layer. Referring to FIG. 5b, the applications layer includes an MTA call client 520 which provides overall control. A host application programming interface (HAPI) 522 provides a software messaging interface between the MIPS core 228 in the residential gateway (see FIG. 2) and the voice processor DSP. 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. In addition, the applica-

Petitioner Failed To Prove Rabenko's VDP Is A DOCSIS Controller

No proof in Petition	Petition: logical fallacy
Rabenko's VDP = voice DSP	'775: voice DSP ≠ DOCSIS controller
'775's voice DSP outside CME	Plain meaning
Petitioner attacks strawman	'775: DOCSIS ≠ VoIP/PacketCable
No VDP DOCSIS function shown	Reply theory contradicts Petition



Petitioner's DOCSIS Controller Argument Collapses On Every Front

- Petition:
 - does **not** explain what Rabenko's VDP has to do with DOCSIS
 - **no** showing VDP performs DOCSIS functions
 - Petition does **not** construe "DOCSIS controller"
- Rabenko's VDP:
 - is a voice DSP, but '775 indicates **voice DSP ≠ "DOCSIS controller"** and **voice DSP not even in CME**
 - just processes signals for a **POTS telephone**
- Reply:
 - contends "DOCSIS controller" has **no limit**, contravening construction principles
 - Untimely, failed arguments:
 - places proxy gateway in VDP but Petition placed in MIPS core
 - **MTA call client**, not mentioned in Petition, is **separate from VDP**



Petitioner Fails To Show:

Limitations Not Met	Grounds	Claims
“DOCSIS Controller”	All	All
DNE & CME in “Separate” “Circuits” with “Completely Partitioned” Functions	All	All
CME “Configured to Enable [Independent] Upgrades to its Software”	All	All
“All DOCSIS Functions are Localized” in the CME	A-D	2, 19
“DOCSIS MAC Processor is an ARM9TDMI-Based RISC Processor” & “DOCSIS Controller is an ARM940-Based RISC Processor”	I-P	12

The Claims Require A DNE And CME In Separate Circuits With Functions That Are Completely Partitioned

(12) **United States Patent**
Li et al.

(54) **ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM**

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

(21) Appl. No.: **10/675,566**

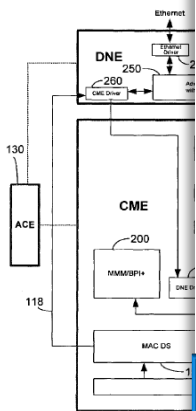
(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**
US 2005/0071492 A1 Mar. 31, 2005

(51) **Int. Cl.**
H04L 12/46 (2006.01)

(52) **U.S. Cl.** **370/401; 709/24**

(58) **Field of Classification Search** **709/24**
See application file for complete search history.



18. A cable modem system comprising:

a data networking engine implemented in a first circuit that includes at least one processor, the data networking engine programmed with software that when executed

by the at least one processor of the first circuit causes the data networking engine to perform home networking functions including interfacing with customer provided equipment;

a cable modem engine implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit, the cable modem engine

programmed with software that when executed by the at least one processor of the second circuit causes the cable modem engine to perform cable modem functions other than the home networking functions performed by the data networking engine, the cable modem functions including interfacing with cable media, and 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, the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor, the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput; and a data bus that connects the data networking engine to the

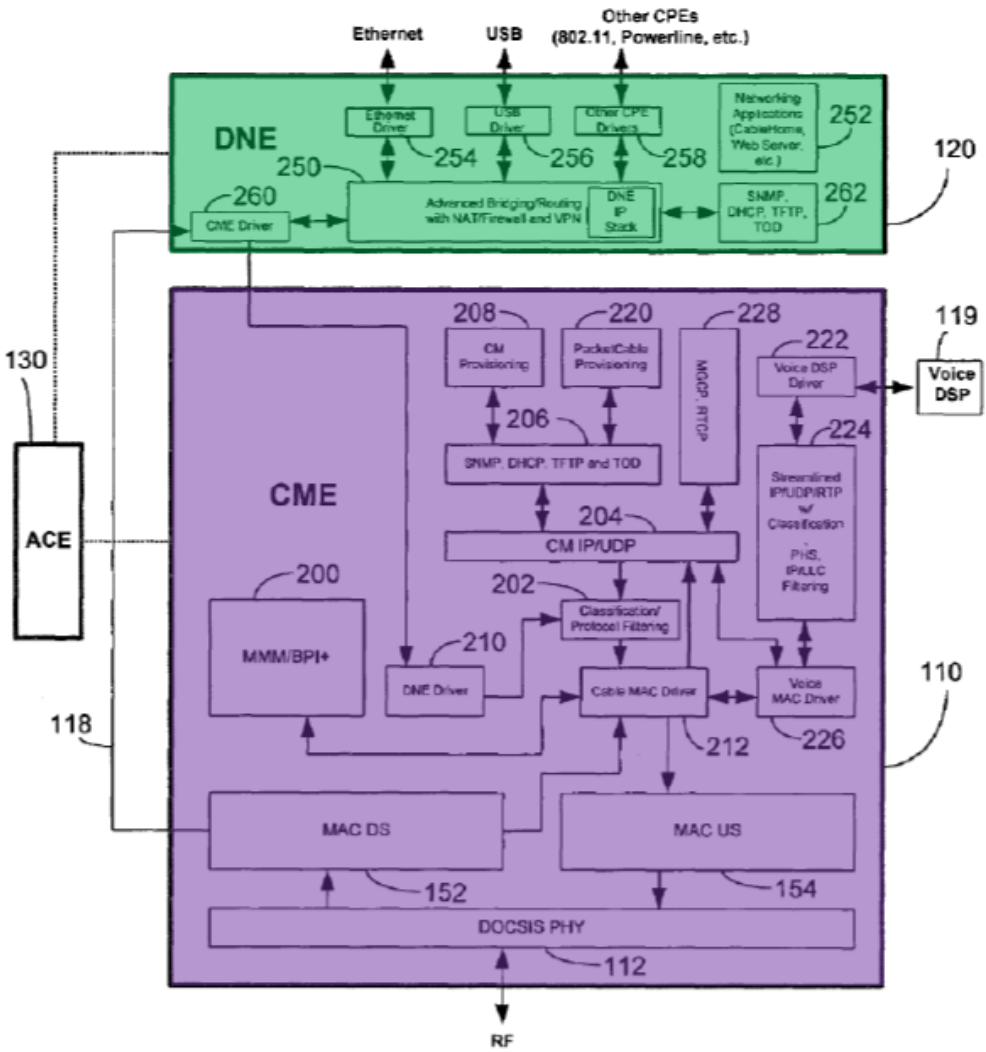
cable modem engine, wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine.

➤ DNE in a first circuit

➤ CME in a second circuit separate from first

➤ CME and DNE functions completely partitioned

'775: Clearly Discloses Separate, Partitioned CME and DNE



US 8,223,775 B2

(57) ABSTRACT

A cable modem system and architecture. A cable modem engine performs all cable modem functions, and a data networking engine performs all data and home networking functions. The cable modem engine is completely partitioned from the data networking engine. DOCSIS and VoIP functionality is implemented in the cable modem engine. The VoIP functionality may be in accordance with the Packet-Cable specification. The data networking functionality provided by the data networking engine may be in accordance with the CableHome specification.

Functional Partitioning. Cable modem 100 completely partitions data networking functions (advanced bridging/routing, NAT/firewall, VPN, web server and CableHome applications) from DOCSIS cable modem functionality. This is accomplished by localizing data networking functions in the data networking engine processor and localizing cable modem functions in the cable modem engine processor. Additionally, PacketCable VoIP functionality (embedded MTA) is implemented within cable modem engine 110 to address the facts that embedded MTA is closely coupled with cable modem MAC services and that the latency and jitter of voice packets needs to be minimized.



'775: Separation And Functional Partitioning Is Critical Aspect Of Patented Inventions



Flexibility. 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. From a development standpoint, the architecture should facilitate different software-partnering models, including all in-house, software components licensing, and OEM vendor-differentiating design. From a multiple system operator (MSO) perspective, it is highly desirable to be able to independently provision, maintain and upgrade revenue-producing gateway services and basic broadband access services.



Performance. The gateway cable modem should be able to support a large number of simultaneous data application sessions originated from/terminated on multiple CPE (customer provided equipment) devices. VoIP applications must not be adversely impacted by an concurrent data applications, and the data path for voice packets must be optimized to minimize delay and jitter.



Cost. The gateway cable modem chip should have a small incremental hardware cost/functional increase relative to stand-alone cable modem chips.



Software Re-Use. It should be possible to carry over existing cable modem software to the new gateway cable modem without major changes. The existing software running on network processors should be easily portable to run on the gateway platform without major adaptation.

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

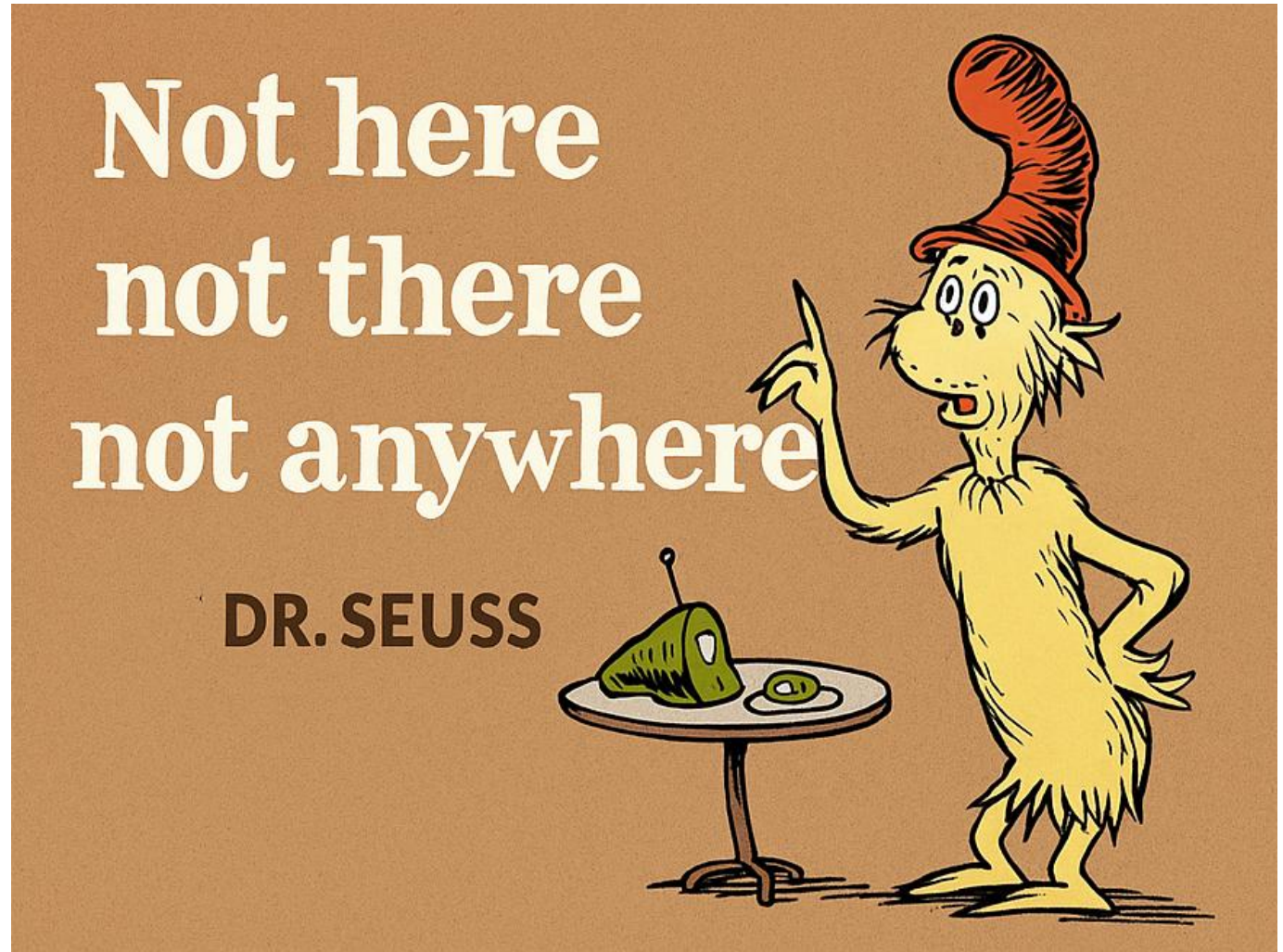
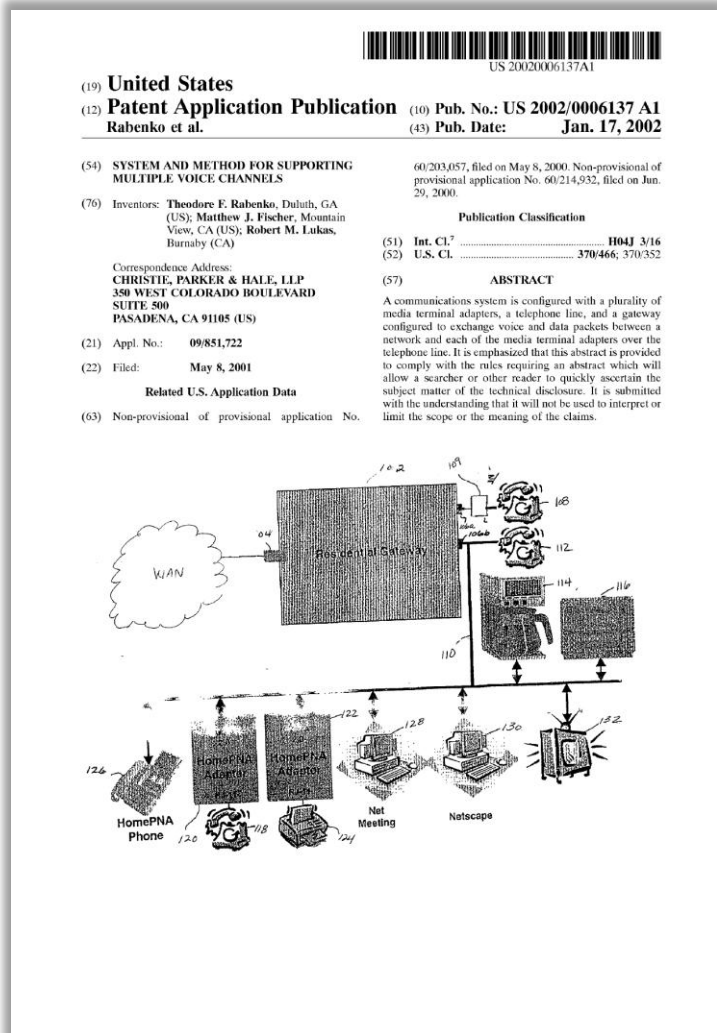
Petition: Conclusory Assignment Of Rabenko Elements To First Circuit And Second Circuit

PETITION FOR *INTER PARTES* REVIEW



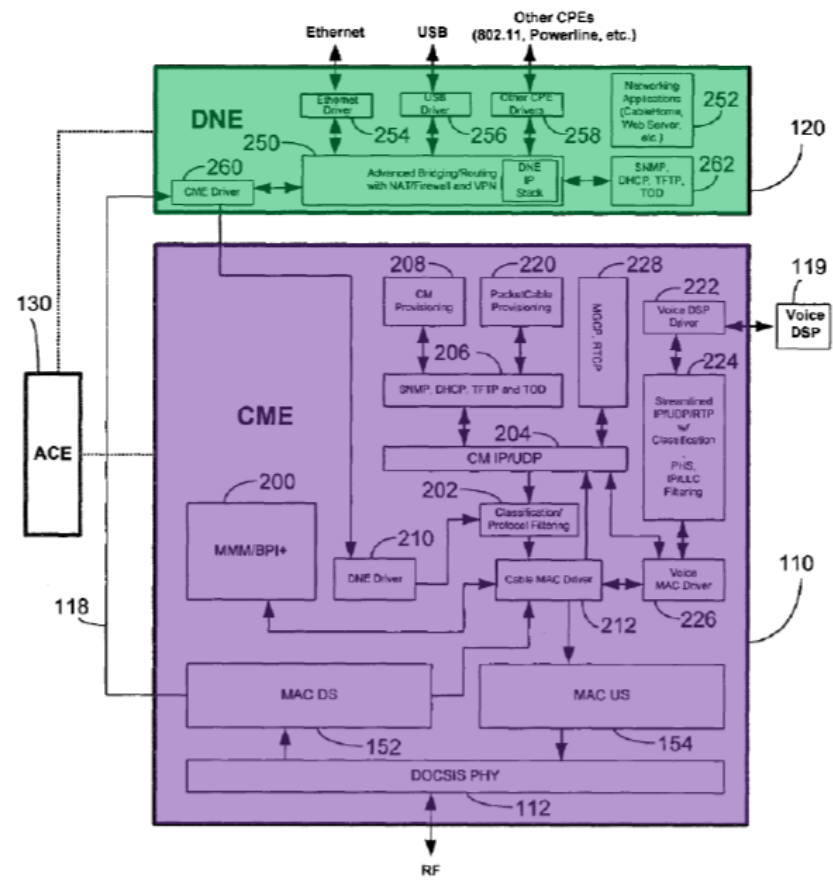
As described above in Section VI.A.1.b, HomePNA controller 138 can be a fully integrated MAC/PHY device. Ex. 1005, [0080]. As shown in Fig. 1b above, Rabenko discloses that DOCSIS MAC 134/212 (**blue**), proxy gateway 142, and voice/data processor 136/213 (**red**) (“second circuit”) are separate components from HomePNA controller 138 and AFE 226 (“first circuit”). Ex. 1005, Fig. 1b.

Rabenko Never Mentions A DNE Or A CME, Much Less Ones In Separate, Partitioned Circuits

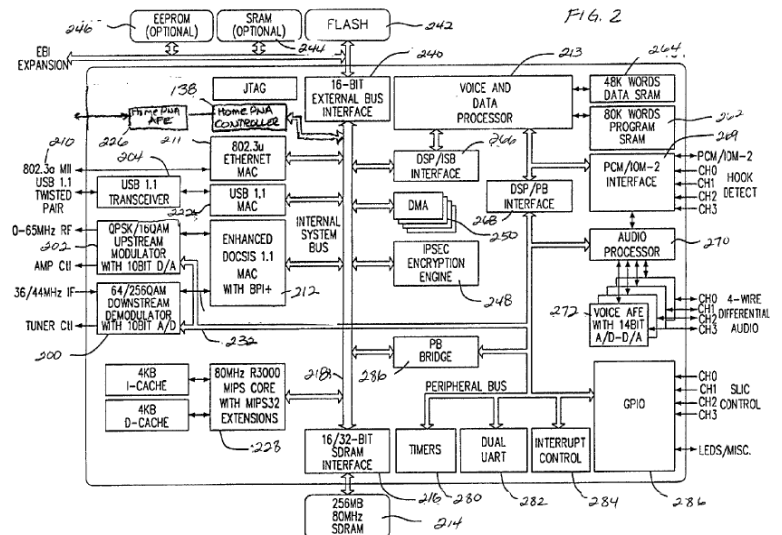


Unlike '775, Rabenko's Figures Do Not Suggest A DNE & CME In Separate, Partitioned Circuits

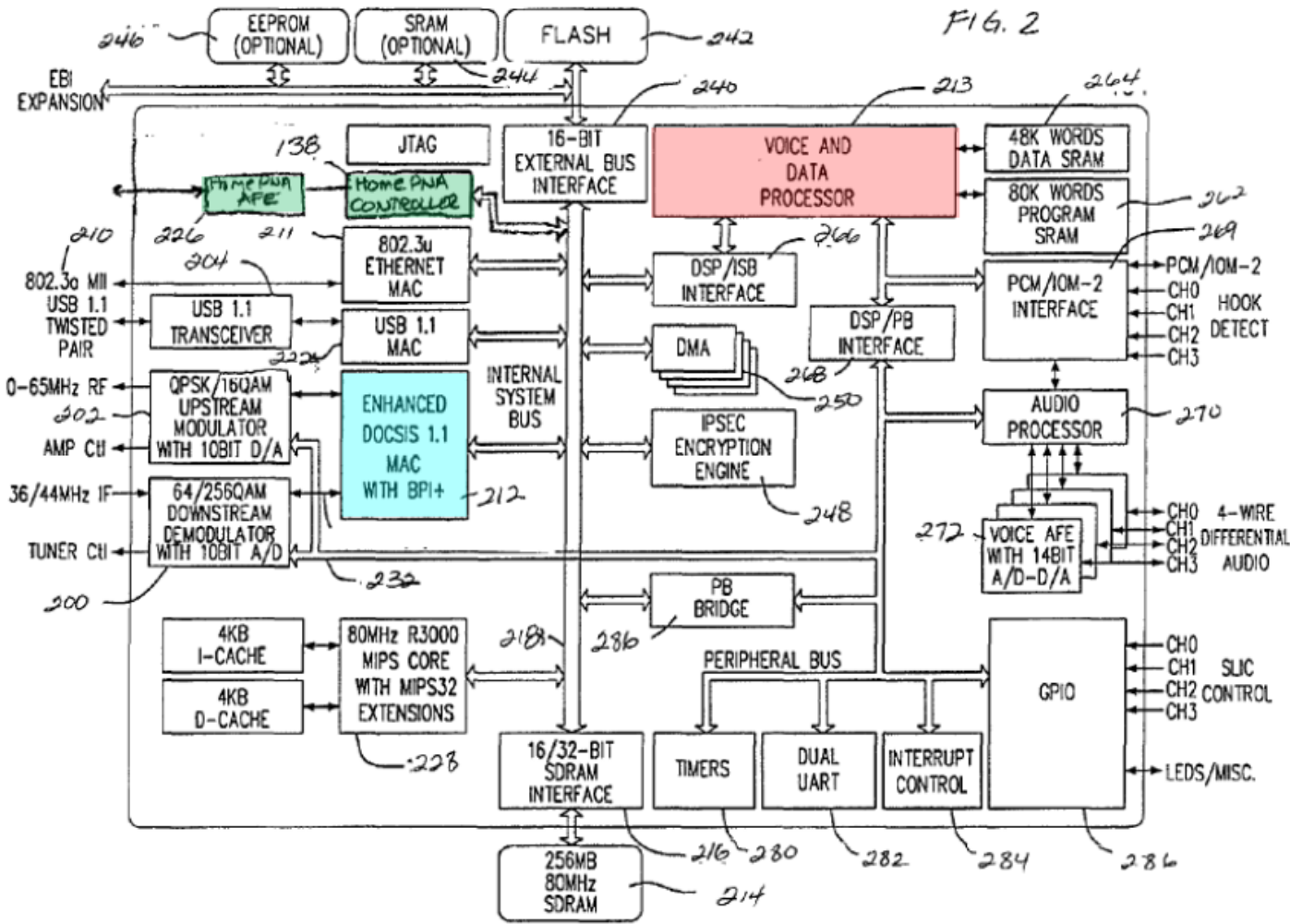
'775: clear disclosure of separate, partitioned circuits



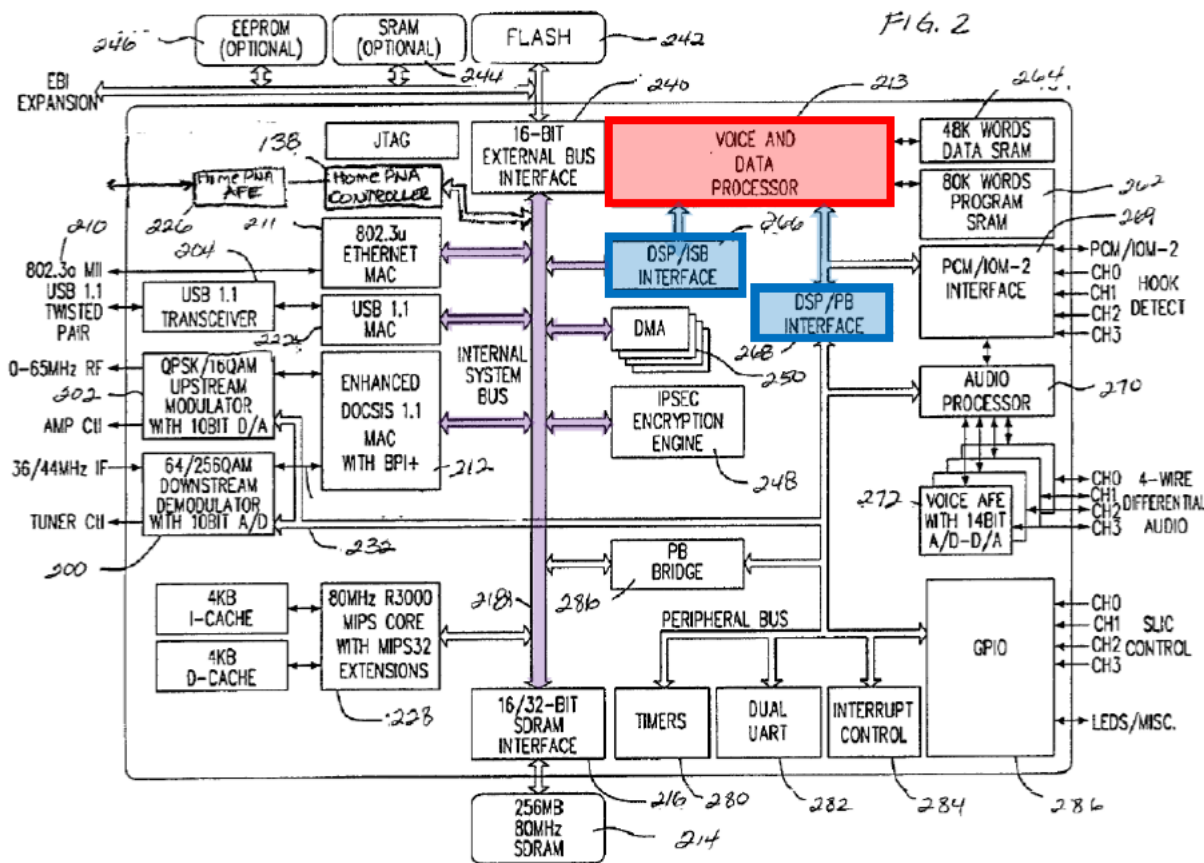
Rabenko: not so much



Petitioner Arbitrarily Assigns Elements To DNE & CME

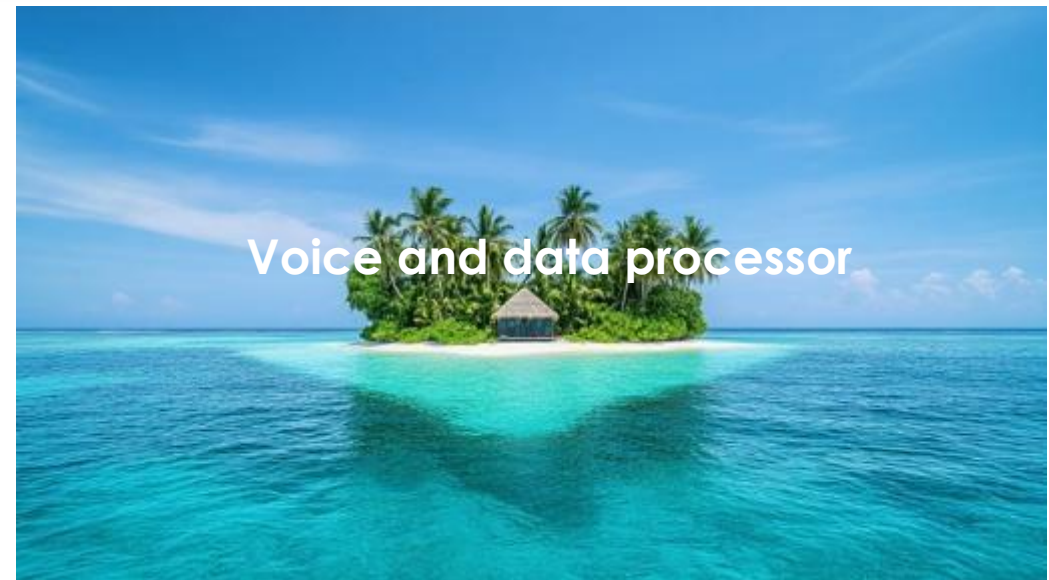


Rabenko's VDP: Not Directly On Internal Bus And Connected Through Interfaces

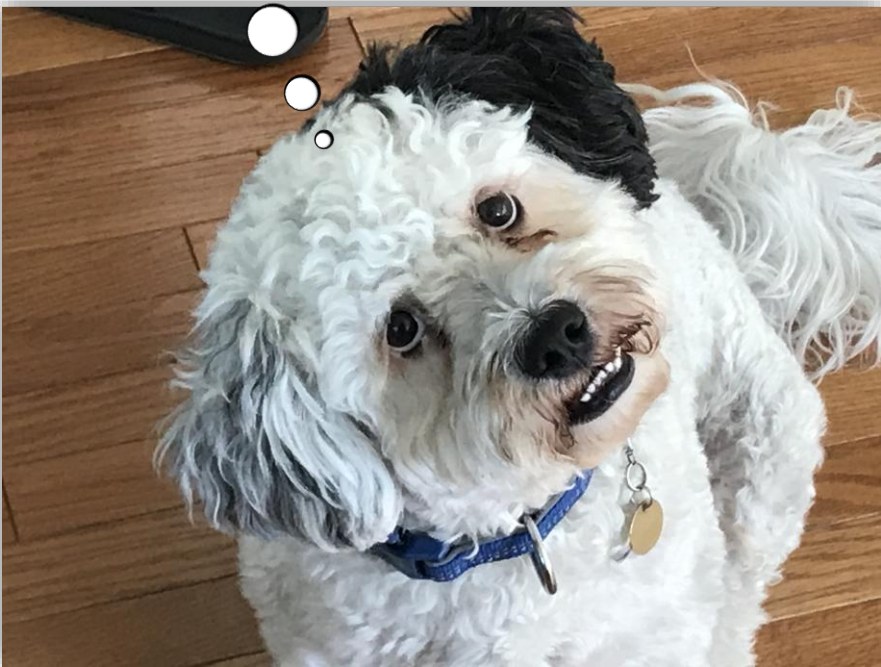
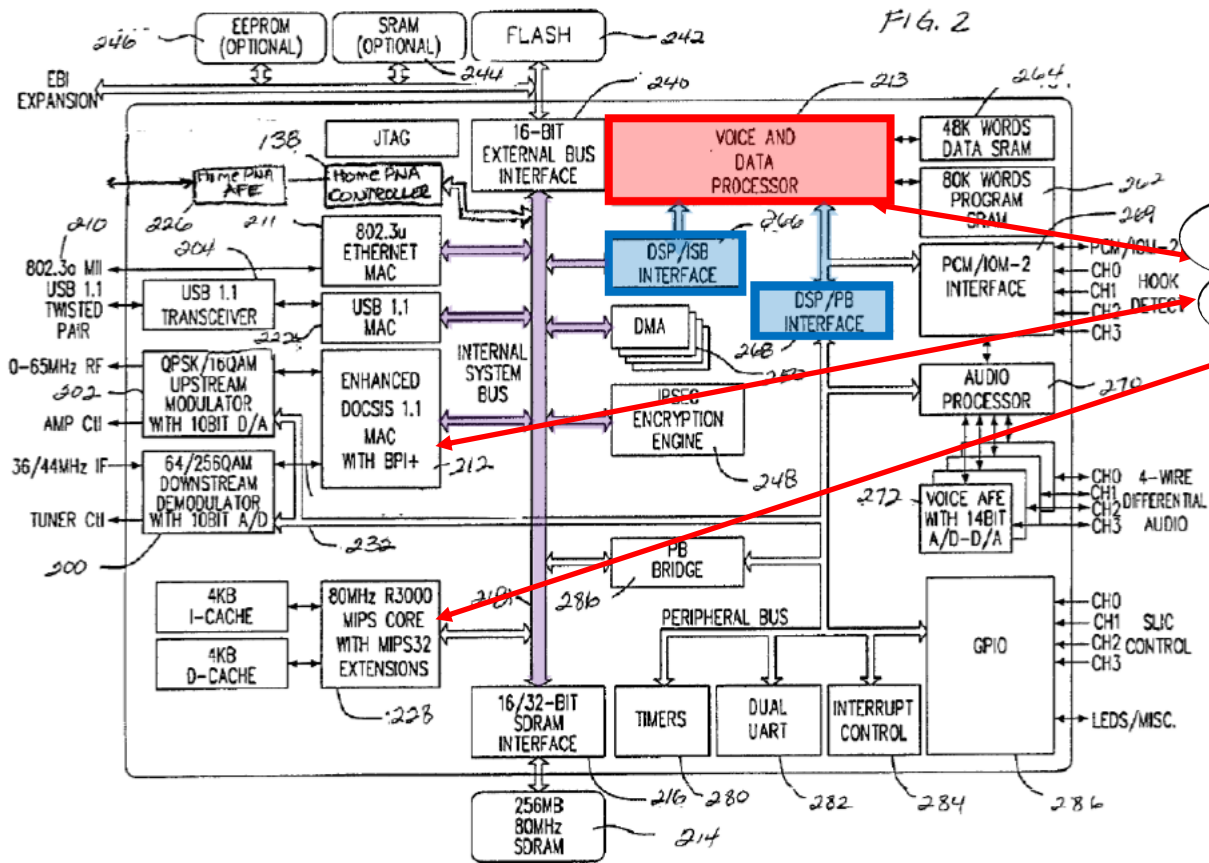


[0075] The embedded communications software is preferably run on a programmable digital signal processor (DSP). In an exemplary embodiment the voice and data processor 260 utilizes a ZSP core from LSI Logic Core ware library for mid to high end telecommunications applications. The DSP core may include an internal instruction RAM 262 and an internal data RAM 264. The voice and data processor 213 interfaces with the ISB 218 via a DSP/ISB interface 266 and a peripheral bus 232 via a DSP/PB interface 268.

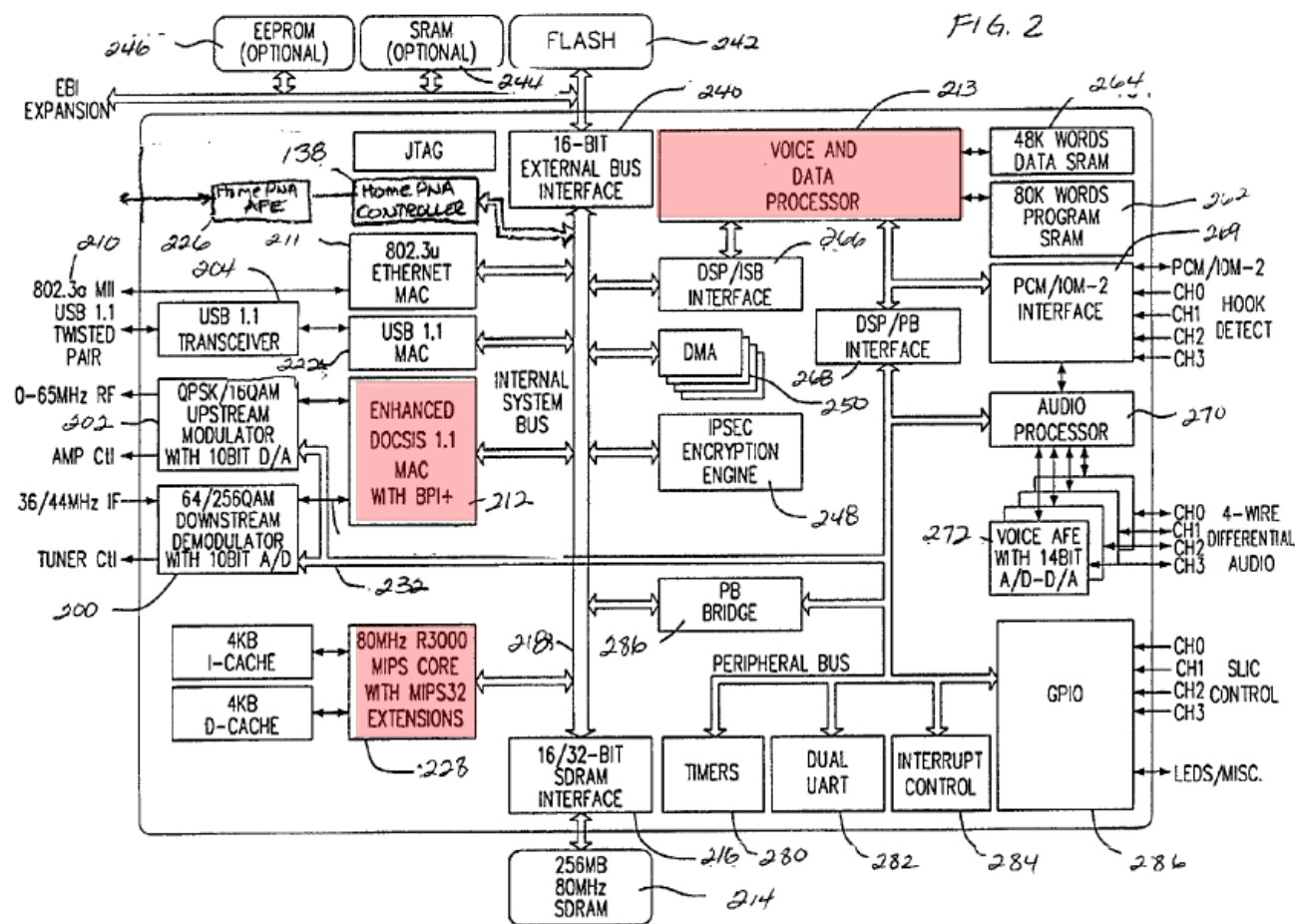
Voice and data processor



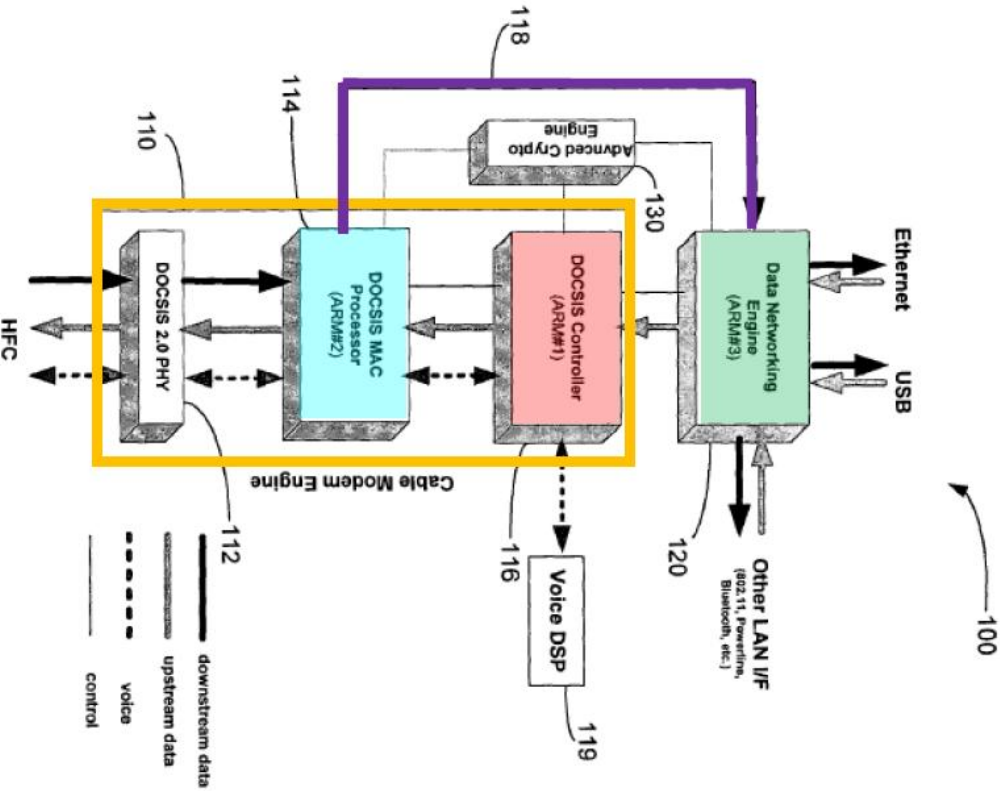
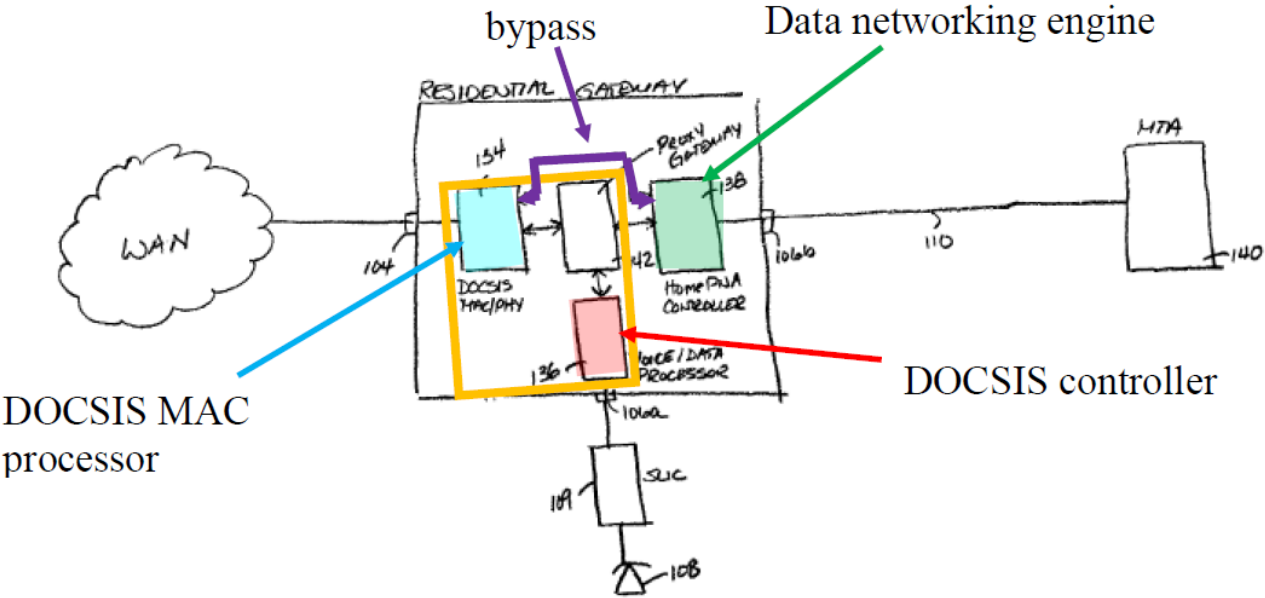
Petitioner's Addition Of VDP To CME Is Arbitrary



Petitioner's Gerrymandered CME Is Unsupported



Petitioner Relies Heavily Upon A Comparison Of The '775's Figure 1 And Rabenko's Figure 1b



Petitioner Does Not Give A Colorable Reason Why Rabenko's VDP Would Be In The CME

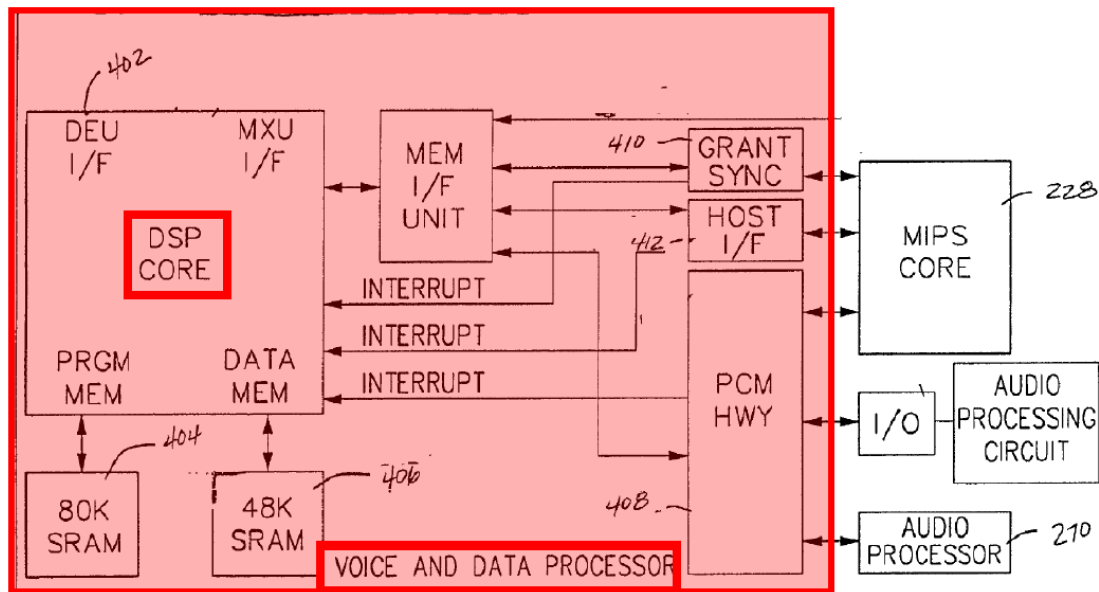


Again, Rabenko's VDP Is A Voice DSP

(19) **United States**

(12) Patent Application Publication

Rabenko et al.



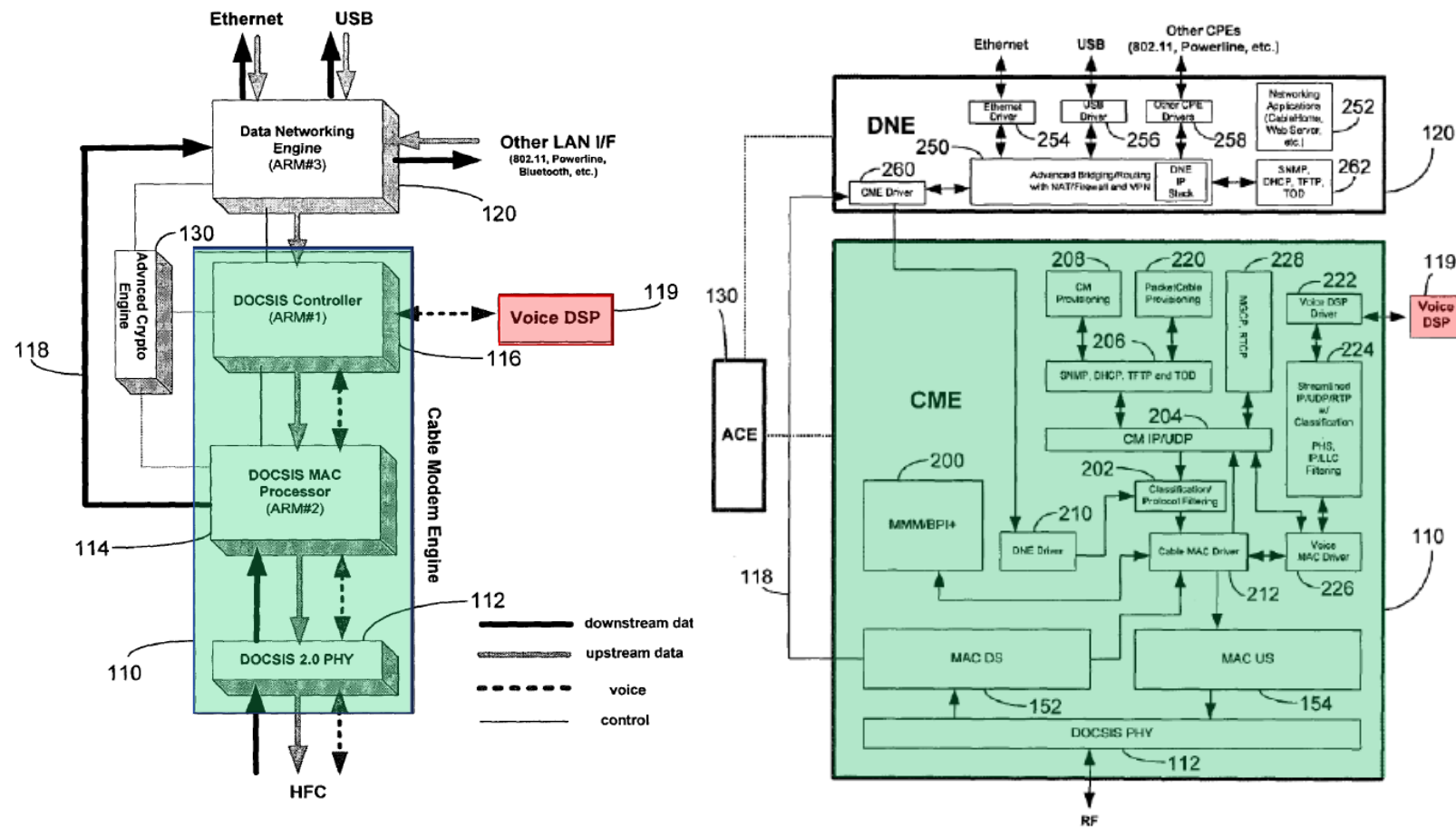
[0011] FIG. 4 is a system block diagram of an exemplary DSP based voice and data processor;

[0075] The embedded communications software is preferably run on a programmable digital signal processor (DSP). In an exemplary embodiment the voice and data processor 260 utilizes a ZSP core from LSI Logic Coreware library for mid to high end telecommunications applications. The DSP core may include an internal instruction RAM 262 and an internal data RAM 264. The voice and data processor 213 interfaces with the ISB 218 via a DSP/ISB interface 266 and a peripheral bus 232 via a DSP/PB interface 268.

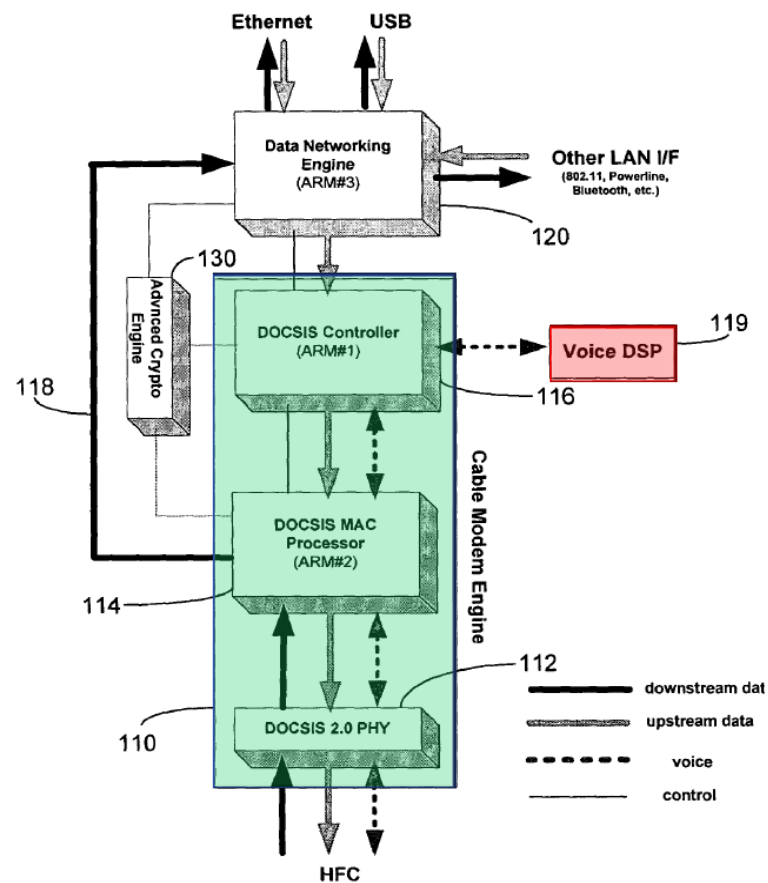
[0089] An exemplary voice and data processor may be implemented with a programmable DSP software architecture as shown in FIG. 4. This architecture includes a high speed DSP 402 with program memory 404, preferably on the order of about a 80K word SRAM, and data memory 406 preferably on the order of about a 48K word SRAM. A PCM highway 408 provides the voice and data processor access to the audio processor optional external audio processing circuits. A grant synchronizer 410 facilitates upstream transmission. The grant synchronizer 410 signals the DSP 402 that a pending grant is about to arrive at the residential gateway from the WAN so as to allow the DSP 402 to synchronize itself to scheduled grants at the residential gateway. A host interface 412 transfers data, control and status messages between the DSP 402 and the MIPS core.

'775: Voice DSP Is Not A DOCSIS Controller And Is Outside Of The CME Altogether

US 8,223,775 B2



Petitioner's Expert Agrees: The "775's Voice DSP Is Outside the CME



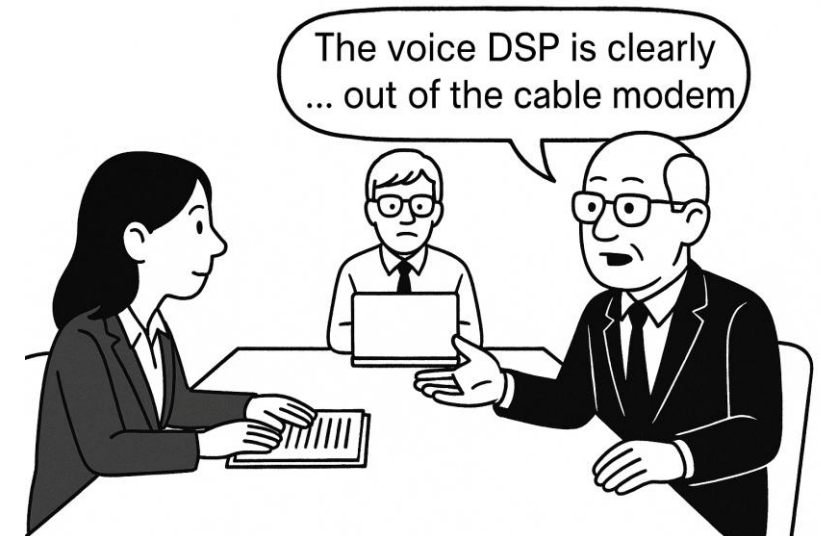
DEPOSITION OF SAYFE KIAEI

A. Now, before I answer that on the voice DSP, in Figure 1 also it shows the voice DSP block 119 which is outside of the cable modem engine that the cable modem engine is interfacing with.

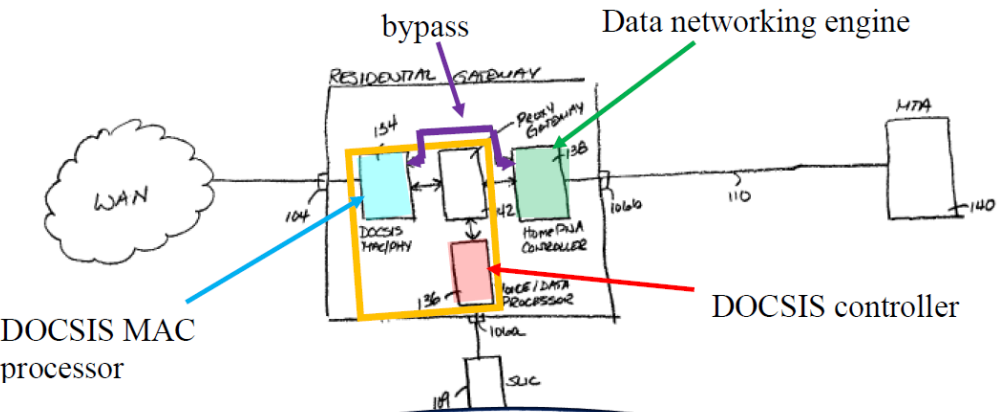
Would you like me to answer your last question now?

Q. Yes, please.

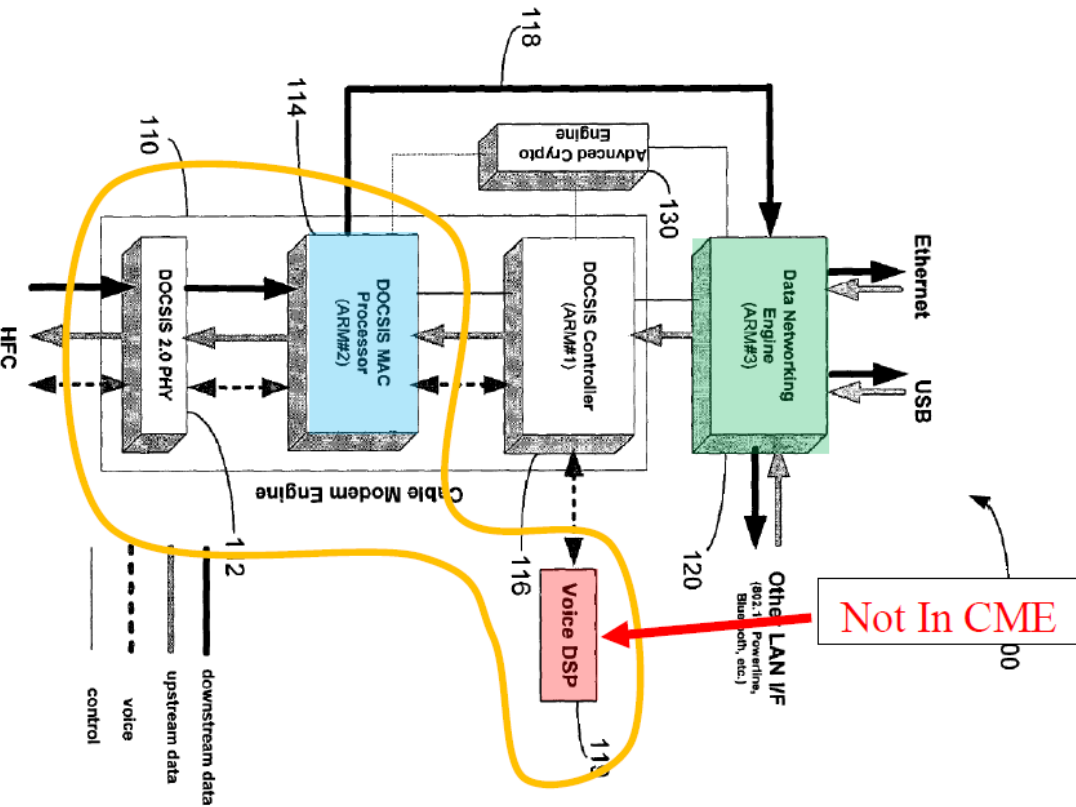
A. Okay. I just wanted to clarify. I notice that voice DSP was also used in -- was clearly shown in that figure out of the cable modem.



Apples-to-Apples Comparison: Petitioner Would Have You Believe A Voice DSP— That Is External To The CME—Is A DOCSIS Controller

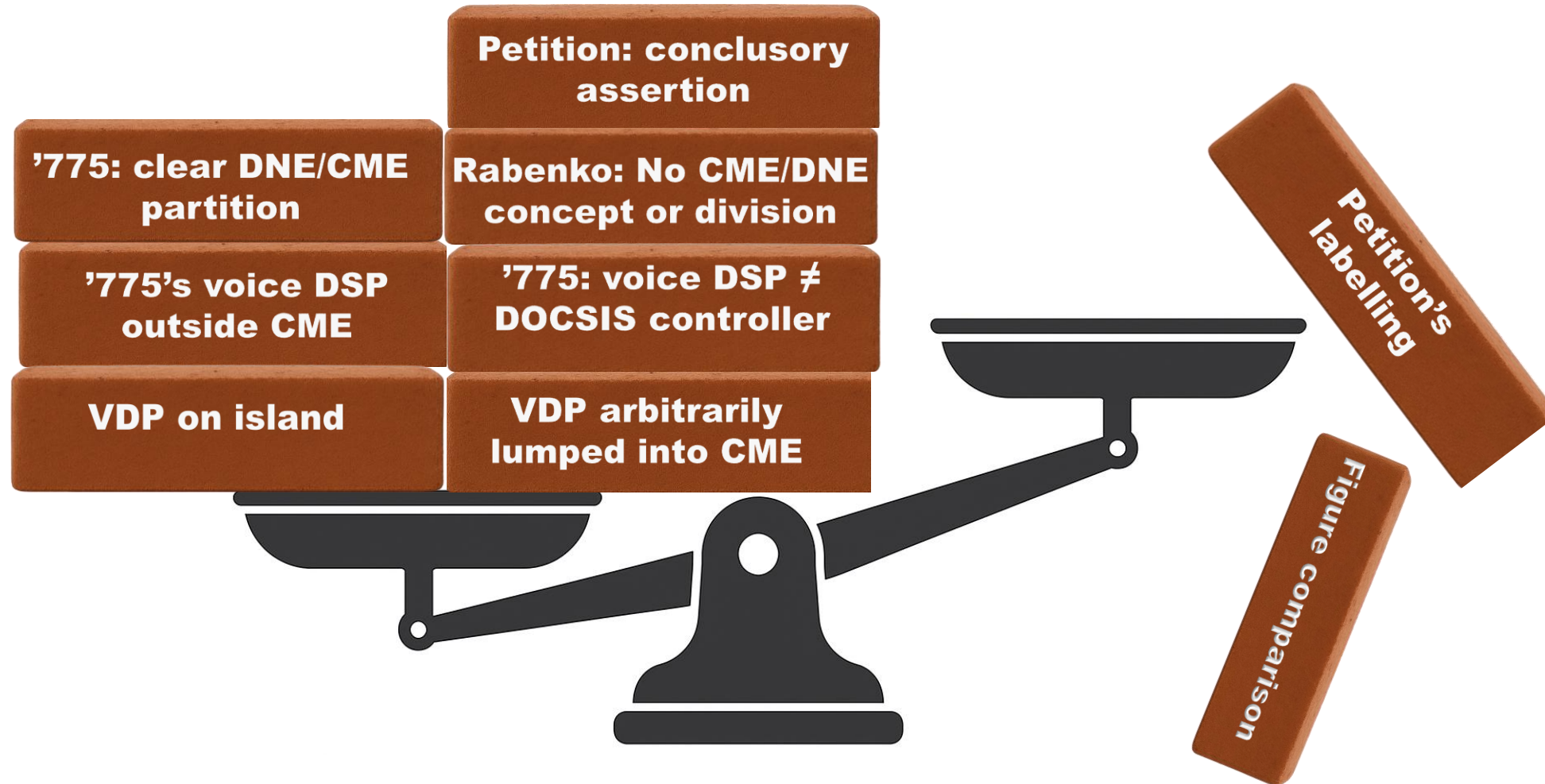


The voice DSP is a DOCSIS controller in the CME



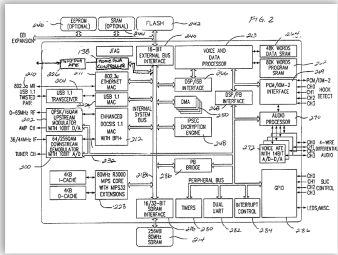
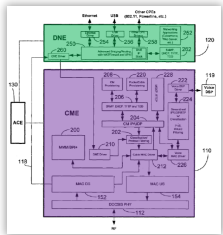
Not In CME

Petitioner Failed To Prove Rabenko Discloses Separate, Functionally Partitioned CME And DNE

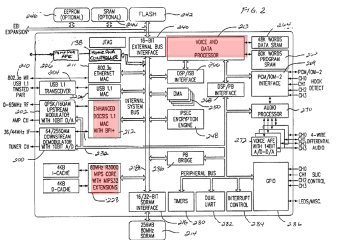


Petitioner's CNE/DNE Argument Fails At Every Step

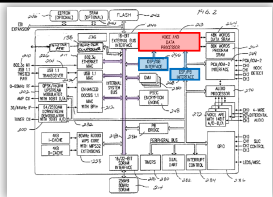
Unlike the '775, Rabenko identifies no CME or DNE



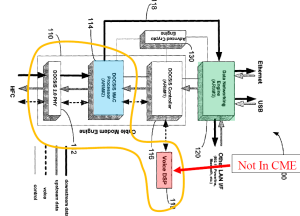
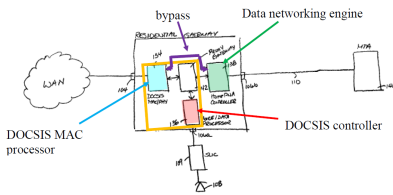
Alleged circuits are gerrymandered, *ipse dixit* identifications



Rabenko's VDP is labelled as being in CME even though it is on an island



Petitioner includes VDP in CME even though it is a voice DSP and the '775's voice DSP is clearly outside the CME



Petitioner Fails To Show:

Limitations Not Met	Grounds	Claims
“DOCSIS Controller”	All	All
DNE & CME in “Separate” “Circuits” with “Completely Partitioned” Functions	All	All
CME “Configured to Enable [Independent] Upgrades to its Software”	All	All
“All DOCSIS Functions are Localized” in the CME	A-D	2, 19
“DOCSIS MAC Processor is an ARM9TDMI-Based RISC Processor” & “DOCSIS Controller is an ARM940-Based RISC Processor”	I-P	12

A CME “Configured To Enable [Independent] Upgrades To Its Software”

(12) **United States Patent**
Li et al.

(54) **ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM**

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

(21) Appl. No.: **10/675,566**

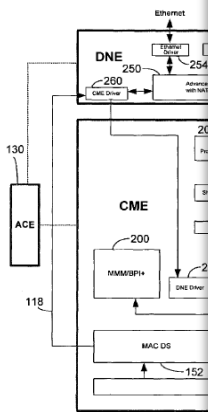
(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**
US 2005/0071492 A1 Mar. 31, 2005

(51) **Int. Cl.**
H04L 12/46 (2006.01)

(52) **U.S. Cl.** **370/401; 709/249**

(58) **Field of Classification Search** **709/249**
See application file for complete search history.



18. A cable modem system comprising:
a data networking engine implemented in a first circuit that includes at least one processor, the data networking engine programmed with software that when executed by the at least one processor of the first circuit causes the data networking engine to perform home networking functions including interfacing with customer provided equipment;
a cable modem engine implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit, the cable modem engine programmed with software that when executed by the at least one processor of the second circuit causes the cable modem engine to perform cable modem functions other than the home networking functions performed by the data networking engine, the cable modem functions including interfacing with cable media, and 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, the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor, the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput; and
a data bus that connects the data networking engine to the cable modem engine, wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine.

including interfacing with cable media, and 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, the cable

Independent Software Upgradeability Is A Key Aspect Of The Claimed Inventions



DECLARATION OF SAMUEL H. RUSS, PH.D.

US 8,223,775 B2

97. The claims require that the CME be “*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. This feature allows for flexibility so that upgrades can be implemented with minimum impact on the overall system. *Id.*, 4:10-57. Specifically, independent upgradability of the software of the DNE and CME is “highly desirable” because it allows the system to “independently provision, maintain and upgrade revenue-producing gateway services and basic broadband access services ... with minimum impact on the cable modem.” *Id.*, 1:37-1:40.

Flexibility. 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. From a development standpoint, the architecture should facilitate different software-partnering models, including all in-house, software components licensing, and OEM vendor-differentiating design. From a multiple system operator (MSO) perspective, it is highly desirable to be able to independently provision, maintain and upgrade revenue-producing gateway services and basic broadband access services.

Petitioner's First Theory: Rabenko-Kim Teaches Independent Software Upgrades Via Replacing Hardware

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775

Filing Date: September 30, 2003

Issue Date: July 17, 2012

Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

PETITION FOR *INTER PARTES* REVIEW

Kim teaches that its residential gateway is “modular-type” such that the HomePNA controller and the ADSL controller are partitioned and can be independently upgraded:

Further, even when improving the performance of HomePNA controller or ADSL controller, the modular-type home gateway system maintains the system controller of the home gateway and replaces either the HomePNA controller or the ADSL controller, thereby improving the

the user. Ex. 1007, [0002]-[0008]. Thus, it would have been obvious to a POSITA to use Kim’s technique of enabling the independent updating of its partitioned controllers to improve Rabenko in the same way by configuring Rabenko’s separate components to be similarly independently updateable. *Id.*

Kim Teaches Replacing Alleged DNE Components...Not CME Components

DECLARATION OF SAMUEL H. RUSS, PH.D.

89. Kim involves replacing modular pieces of hardware potentially associated with a DNE, not the CME. Specifically, Kim teaches potentially replacing a modular HomePNA controller (allegedly a part of a DNE) and a modular ADSL controller (which has nothing to do with a DNE or a CME). Ex. 1007 [Kim] [0001] (“either the modular-type HomePNA controller or ADSL controller is replaced, thereby improving the total performance of the home gateway device.”), [0008] (similar), [0026] (similar). Thus, Kim’s teachings do not relate to the components comprising the CME and suggest nothing with respect to any alleged CME.

(19) **United States**

(12) **Patent Application Publication**
Kim et al.

a conventional outdoor telephone line. The HomePNA controller and the ADSL controller are modular type controllers having PCMCIA (Personal Computer Memory Card International Association) interface. To improve the performance of the HomePNA controller or the ADSL controller, a system controller of a home gateway device is not changed, but either the modular-type HomePNA controller or ADSL controller is replaced, thereby improving the total performance of the home gateway device.



That One Thing Is Replaceable Does Not Suggest Another Thing Is



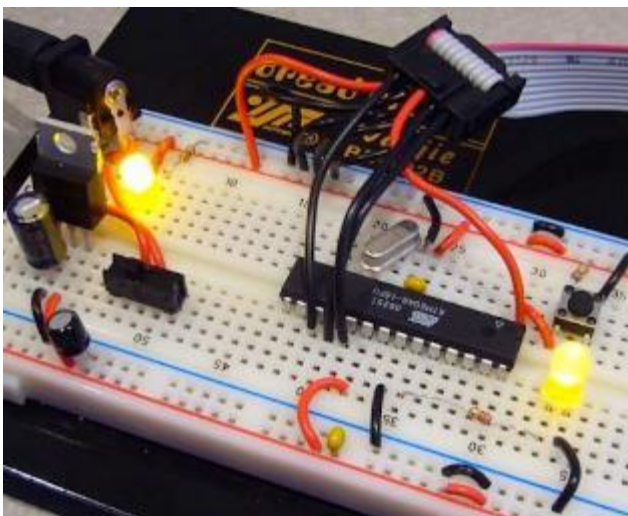
Petitioner's Explanation Of How Rabenko Teaches An Independently Upgradeable CME?



Replacing “Detachabl[e]” Components Does Not Suggest Replacing A Portion Of A “Highly Integrated” Circuit

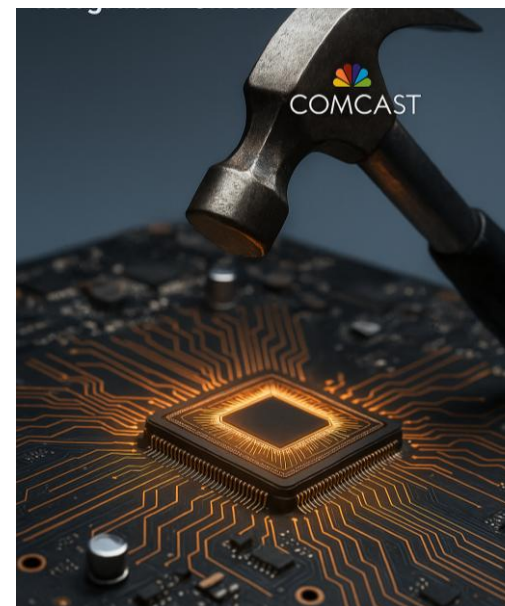
- (19) **United States**
(12) **Patent Application Publication**
Kim et al.

[0014] wherein the HomePNA controller and the ADSL controller formed as a modular type are detachably connected to the system controller through a predetermined interface, and provides a bridge function between a home network and an access network.



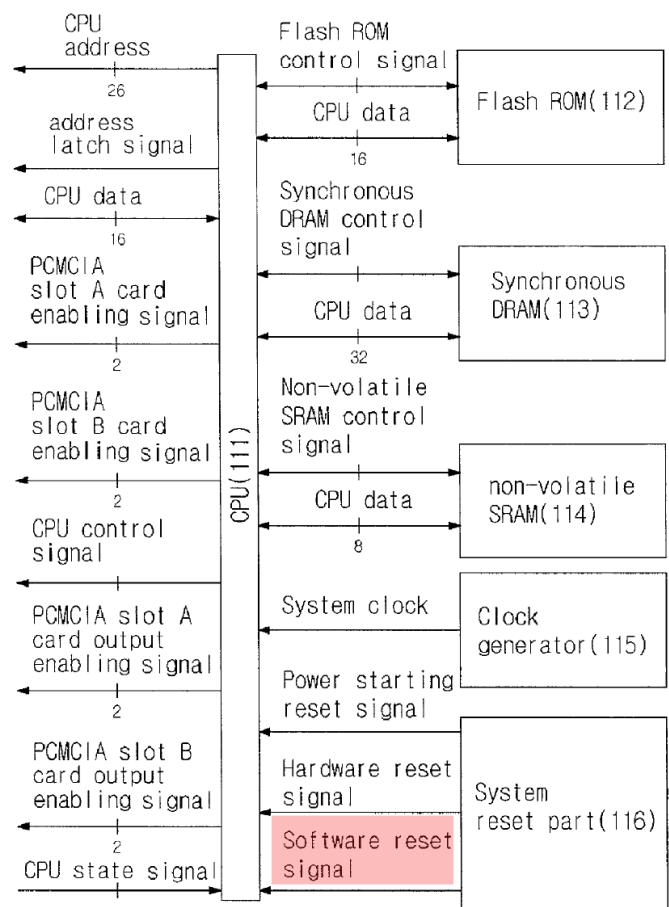
- (19) **United States**
(12) **Patent Application Publication**
Rabenko et al.

[0050] An exemplary embodiment of the residential gateway is shown schematically in FIG. 2. The described exemplary embodiment may provide a highly integrated solution implemented in a single chip that is compliant with the Data Over Cable Service Interface Specification (DOCSIS). DOCSIS was developed to ensure that cable modem



Kim's Only Mentions Of Software: A "Software Reset Signal"

FIG. 4



(19) **United States**
(12) **Patent Application Publication**
Kim et al.

[0048] A clock generator 115 generates a system clock, and transmits the system clock to the CPU 111. A system reset part 116 generates a power starting reset signal, a hardware reset signal, and a software reset signal, and transmits them to the CPU 111.

No Evidence Kim Teaches Upgrading Or Replacing Software



Even If New Hardware Results In New Software, The Claims Require A CME “Configured To Enable [Independent] Upgrades To Its Software”



DECLARATION OF SAMUEL H. RUSS, PH.D.

93. Moreover, the limitations requires “cable modem engine

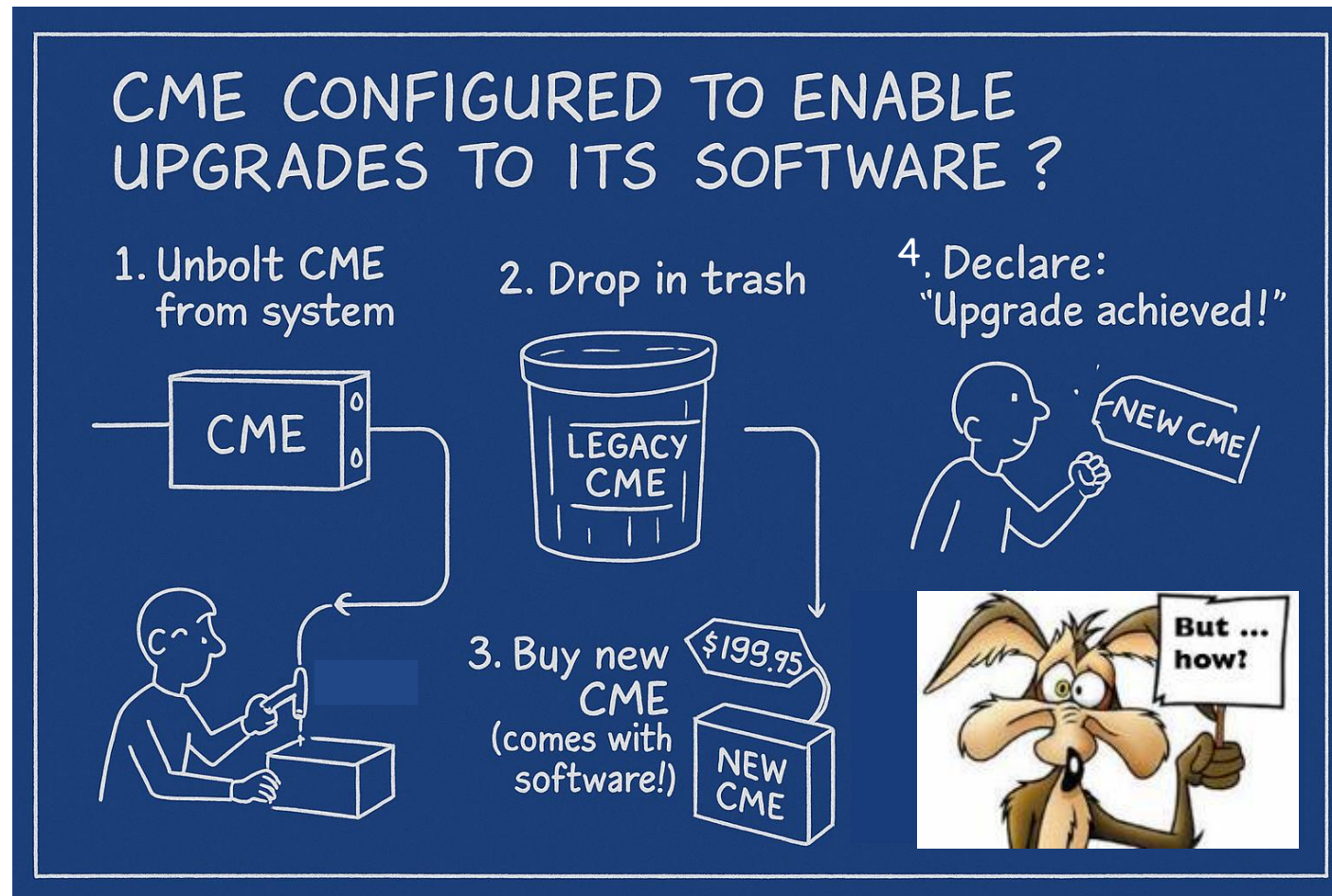
configured to enable upgrades to *its* software.” In other words, the claim requires

that cable modem engine hardware—whose software is being upgraded—itself be

configured to enable such an upgrade. The limitation does not merely require a



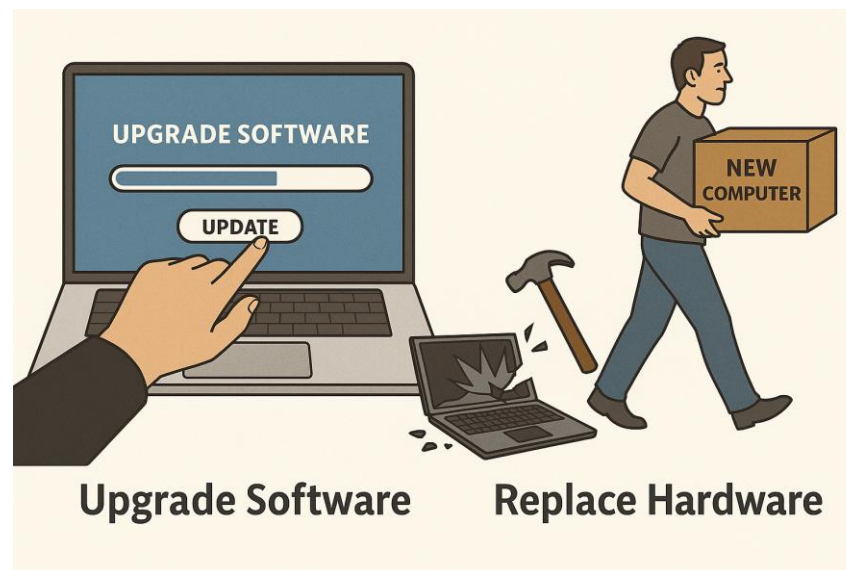
Replacing A CME Does Not Teach Or Suggest A CME “Configured To Enable Upgrade To Its Software”



Replacing Hardware Is Different From Upgrading “Its” Software

DECLARATION OF SAMUEL H. RUSS, PH.D.

95. Moreover, Petitioner’s proposed combination at most amounts to replacing software. But replacing software via new hardware results in new software on new hardware, not “*upgrades to its* software.” I also do not see any



'775: Teaches Third-Party Software Upgrades Via Software-Partnering And Licensing Models; Not Replacing Hardware

US 8,223,775 B2

Flexibility. Since the data networking and cable modem functions are decoupled and implemented in different processors **110** and **120**, independent software upgrading and maintenance of these functions is feasible. From a development standpoint, the architecture can facilitate different software-partnering models, such as complete in-house development, software-components licensing and OEM vendor-differentiating design. In particular, data networking engine **120** provides third parties and OEMs with a dedicated computational platform to develop advanced services outside of the baseline cable modem and VoIP/PacketCable services, minimizing their support dependency on the cable modem provider. Moreover, the software architecture within cable modem engine **110** is designed in a modular way so that the PacketCable E-MTA can be implemented with minimum impact on the cable modem.



Petitioner Failed To Prove That Rabenko-Kim Teaches A CME “Configured To Enable [Independent] Upgrades To Its Software”



Second Theory: “Obvious To Try” Based On Rabenko Alone

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775

Filing Date: September 30, 2003

Issue Date: July 17, 2012

Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

software of the HomePNA controller 138 and AFE 226, Rabenko does teach 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.* 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. A POSITA would recognize that these options are equally obvious to try. A POSITA,

Single-Reference Obviousness Faces A High Bar



“In cases in which ‘common sense’ is used to supply a missing limitation, as distinct from a motivation to combine, moreover, **our search for a reasoned basis for resort to common sense must be searching.** And, this is particularly true where the missing limitation **goes to the heart of an invention.**”

-Arendi S.A.R.L. v. Apple Inc., 832 F.3d 1355, 1363 (Fed. Cir. 2016)

“we have invoked common sense to fill in a missing limitation **only when ‘the limitation in question was unusually simple and the technology particularly straightforward.’**”

-DSS Tech. Mgm’t v. Apple Inc., 885 F.3d 1367, 1374-75 (Fed. Cir. 2018)



Petitioner Concedes Rabenko “Does Not Explicitly Teach” Independent Software Upgrades

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775

Filing Date: September 30, 2003

Issue Date: July 17, 2012

Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

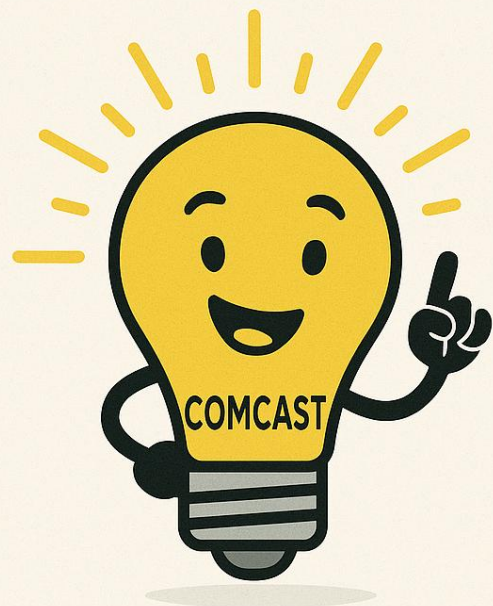
PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

PETITION FOR *INTER PARTES* REVIEW

Although Rabenko does not explicitly teach that any of DOCSIS MAC 134/212, proxy gateway 142, or voice/data processor 136/213 is configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the HomePNA controller 138 and AFE 226, Rabenko does teach that

Petitioner Suggests That Rabenko's Boilerplate Renders Obvious An Independently Upgradeable CME

Everything is obvious now!



Rabenko et al.

[0268] Those of skill in the art would understand that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented in any number of way including electronic hardware, computer software, or combinations of both. The various illustrative components, blocks, modules, circuits, and steps have been described generally in terms of their functionality. Whether the functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans recognize the interchangeability of hardware and software under these circumstances, and how best to implement the described functionality for each particular application.

CAFC: Proposal To Vary All Parameters Does Not Establish Obviousness



“Obvious to try” 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.”

In re Kubin, 561 F.3d 1351, 1359 (Fed. Cir. 2009)

Not Obvious To Try: Rabenko's Embedded Software Is Not Upgradeable

DECLARATION OF SAMUEL H. RUSS, PH.D.

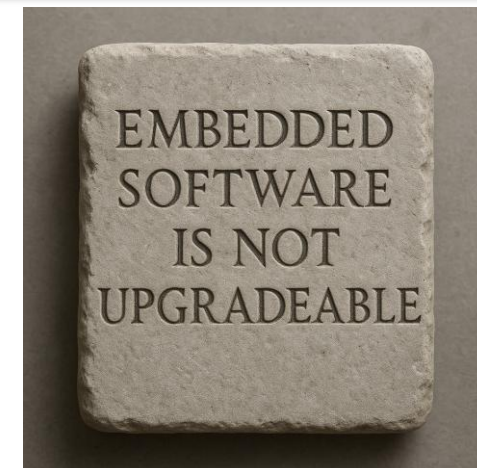
105. It was well-known that upgrading “embedded” software (at least without changing the hardware that is used) generally is impossible or at least difficult. For instance, “key features of embedded systems” may include the
106. Such “embedded” software is generally rigid and fixed, incapable of being upgraded without replacing or modifying the accompanying hardware. Ex. 2005 [IoT] (“An embedded system is an integration of programmable software and hardware that may have *fixed capabilities*.”); Ex. 2004 [Monarch] (“Once an embedded system is developed [y]ou are *not able to alter, enhance or upgrade*.”).

Rabenko et al.

cable head end. The voice and data processor 213 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.

described exemplary embodiment, the proxy gateway function is implemented with **embedded software** at the applications layer. Referring to **FIG. 5b**, the applications layer

[0122] The interaction of an **exemplary embedded MTA call client** and the MTA 140 may best be illustrated in the context of a typical voice communication across the DOC-SIS network. The table set forth in **FIG. 5f** illustrates the call



Dr. Russ: Industry Standard (e.g., Scientific Atlantic's Explorer 4200) Was All-Or-Nothing Software Upgrades



DEPOSITION OF SAMUEL H. RUSS, Ph.D.

Q. Was the Explorer 4200 able to receive and execute software upgrades generally?

A. Yes. It would receive -- you know, the -- the entire software would get replaced with a new version. But, yes, it could receive software upgrades.



Petitioner Also Relies Upon Gaspar To Fill In The Gaps

PETITION FOR *INTER PARTES* REVIEW

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775

Filing Date: September 30, 2003

Issue Date: July 17, 2012

Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

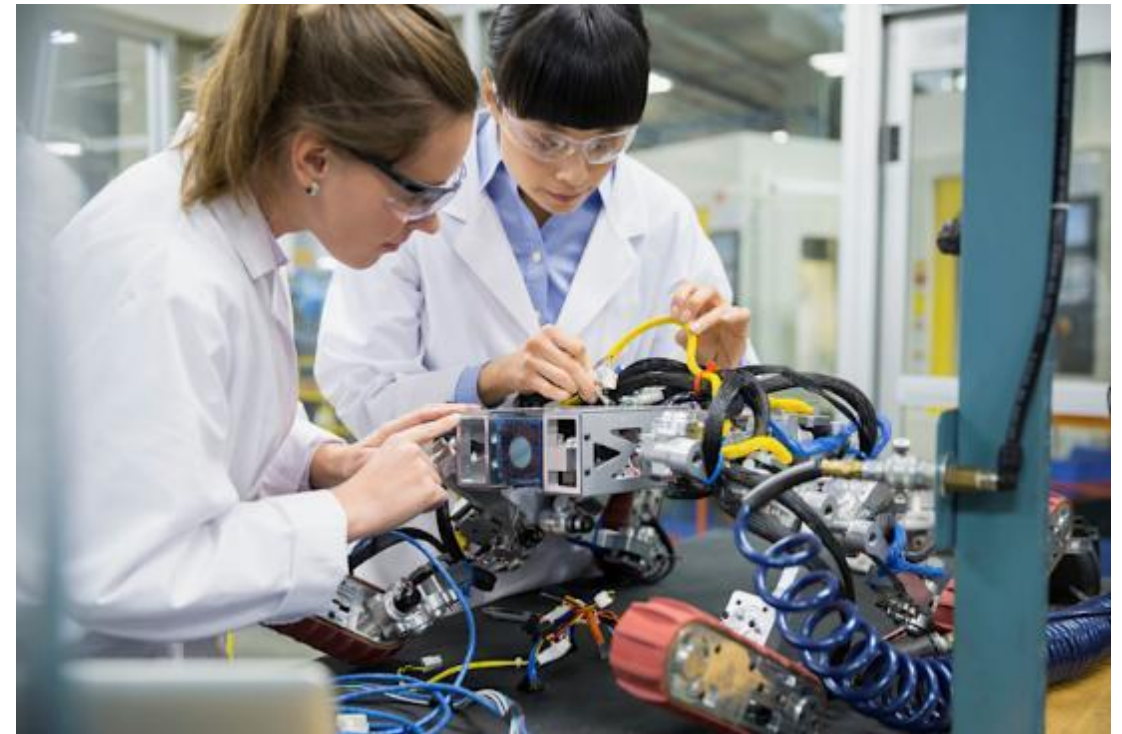
set forth in full.” Ex. 1005, [0034]. A POSITA would have understood that a standard-compliant device would have to be frequently updated or replaced to maintain compliance with evolving standards. See, e.g., Ex. 1006, [0005] (“as protocols change or standards evolve, the HPNA controller must be upgraded.”). A POSITA would have known that such frequent upgrades could be “costly and time-consuming” and thus, when designing a system that includes a HomePNA controller, a POSITA would have recognized the need to “enable convenient modifications” of the controller. Ex. 1006, [0005]-[0006]. Thus, a POSITA would have found it

Gaspar: Only Addresses Upgradeability During “Design Process,” *i.e.*, Before A Device Exists

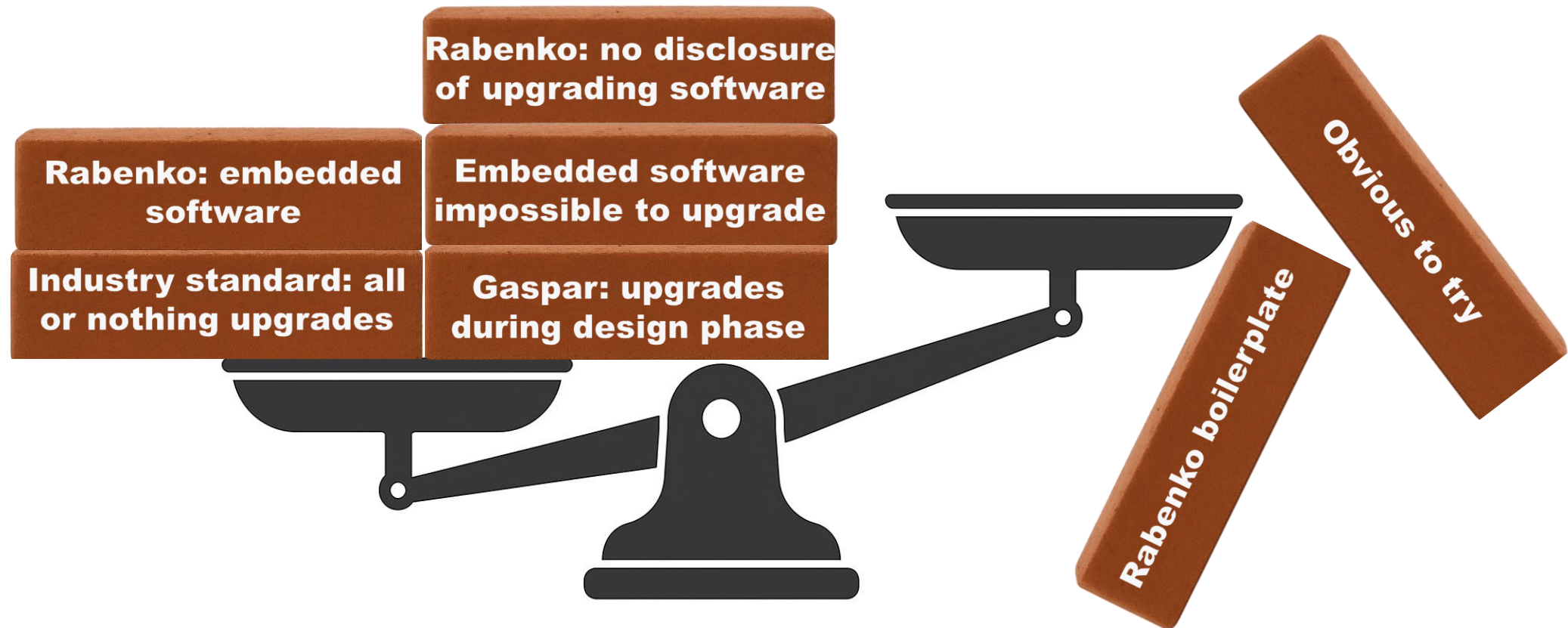
(19) **United States**

(12) **Patent Application Publication**
Gaspar

[0005] One problem with the design of an HPNA controller is that as protocols change or standards evolve, the HPNA controller must be upgraded. For example, a home phone line network needs to comply with the current version of the HPNA specification. **If an upgrade is required during the design process,** the HPNA controller must redesigned. Accordingly, upgrading can be costly and time consuming.



Petitioner Failed To Prove That Rabenko Alone Teaches A CME “Configured To Enable [Independent] Upgrades To Its Software”



Petitioner Fails To Show:

Limitations Not Met	Grounds	Claims
“DOCSIS Controller”	All	All
DNE & CME in “Separate” “Circuits” with “Completely Partitioned” Functions	All	All
CME “Configured to Enable [Independent] Upgrades to its Software”	All	All
“All DOCSIS Functions are Localized” in the CME	A-D	2, 19
“DOCSIS MAC Processor is an ARM9TDMI-Based RISC Processor” & “DOCSIS Controller is an ARM940-Based RISC Processor”	I-P	12

Claims 2 & 19 Require “All DOCSIS Functions Are Localized In The Cable Modem Engine”



(12) **United States Patent**
Li et al.

(10) **Patent No.:** US 8,223,775 B2
(45) **Date of Patent:** Jul. 17, 2012

(54) ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

(21) Appl. No.: 10/675,566

(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**

US 2005/0071492 A1 Mar. 31, 2005

(51) Int. Cl.
H04L 12/46 (2006.01)

(52) U.S. Cl. 370/401; 709/249

(58) **Field of Classification Search** 709/249

See application file for complete search history.

20 Claims, 2 Drawing Sheets

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,944,706	B2 *	9/2005	Schain et al.	709/250
2001/0039600	A1 *	11/2001	Brooks et al.	710/126
2006/0080650	A1 *	4/2006	Winters et al.	717/168

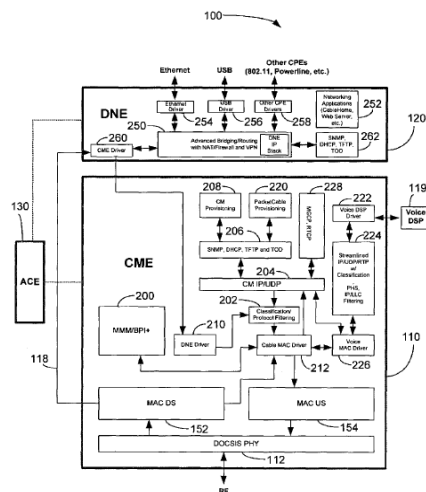
* cited by examiner

Primary Examiner — Patrice Winder

(74) *Attorney, Agent, or Firm* — James Sze; Duane Morris LLP

(57) **ABSTRACT**

A cable modem system and architecture. A cable modem engine performs all cable modem functions, and a data networking engine performs all data and home networking functions. The cable modem engine is completely partitioned from the data networking engine. DOCSIS and VoIP functionality is implemented in the cable modem engine. The VoIP functionality may be in accordance with the Packet-Cable specification. The data networking functionality provided by the data networking engine may be in accordance with the CableHome specification.



19. A cable modem system as claimed in claim 18, wherein all DOCSIS functions are localized in the cable modem engine.

'775: All DOCSIS Functions Localized Within CME



US008223775B2

(12) **United States Patent**
Li et al.

(10) **Patent No.:** **US 8,223,775 B2**
(45) **Date of Patent:** **Jul. 17, 2012**

(54) **ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM**

(75) **Inventors:** **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

(73) **Assignee:** **Entropic Communications, Inc.**

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

(21) **Appl. No.:** **10/675,566**
(22) **Filed:** **Sep. 30, 2003**

(65) **Prior Publication Data**
US 2005/0071492 A1 Mar. 31, 2005

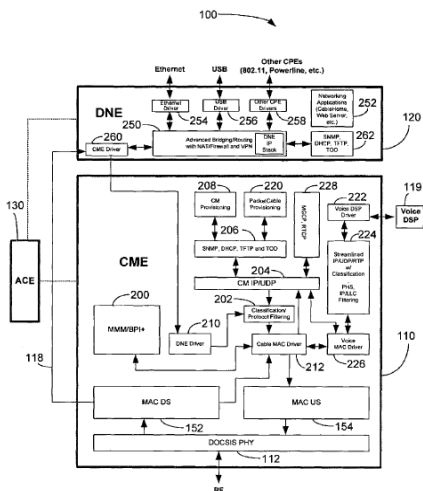
(51) **Int. Cl.** **H04L 12/46** (2006.01)
(52) **U.S. Cl.** **370/401; 709/249**
(58) **Field of Classification Search** **709/249**
See application file for complete search history.

(56) **References Cited**
U.S. PATENT DOCUMENTS
6,944,706 B2 * 9/2005 Schain et al. 709/250
2001/0039600 A1 * 11/2001 Brooks et al. 710/126
2006/0080630 A1 * 4/2006 Winters et al. 717/168
* cited by examiner

Primary Examiner — Patrice Winder
(74) **Attorney, Agent, or Firm** — James Sze; Duane Morris LLP

(57) **ABSTRACT**
A cable modem system and architecture. A cable modem engine performs all cable modem functions, and a data networking engine performs all data and home networking functions. The cable modem engine is completely partitioned from the data networking engine. DOCSIS and VoIP functionality is implemented in the cable modem engine. The VoIP functionality may be in accordance with the PacketCable specification. The data networking functionality provided by the data networking engine may be in accordance with the CableHome specification.

20 Claims, 2 Drawing Sheets



US 8,223,775 B2

Cable modem engine 110 implements the entire DOCSIS cable modem functionality and is further divided into three

Functional Partitioning. Cable modem 100 completely partitions data networking functions (advanced bridging/routing, NAT/firewall, VPN, web server and CableHome applications) from DOCSIS cable modem functionality. This is accomplished by localizing data networking functions in the data networking engine processor and localizing cable modem functions in the cable modem engine processor. Addi-



Petitioner: All DOCSIS Functions Are Localized In The CME Because DOCSIS MAC/PHY And VDP Perform DOCSIS Functions And The DNE Does Not

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775
Filing Date: September 30, 2003
Issue Date: July 17, 2012
Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

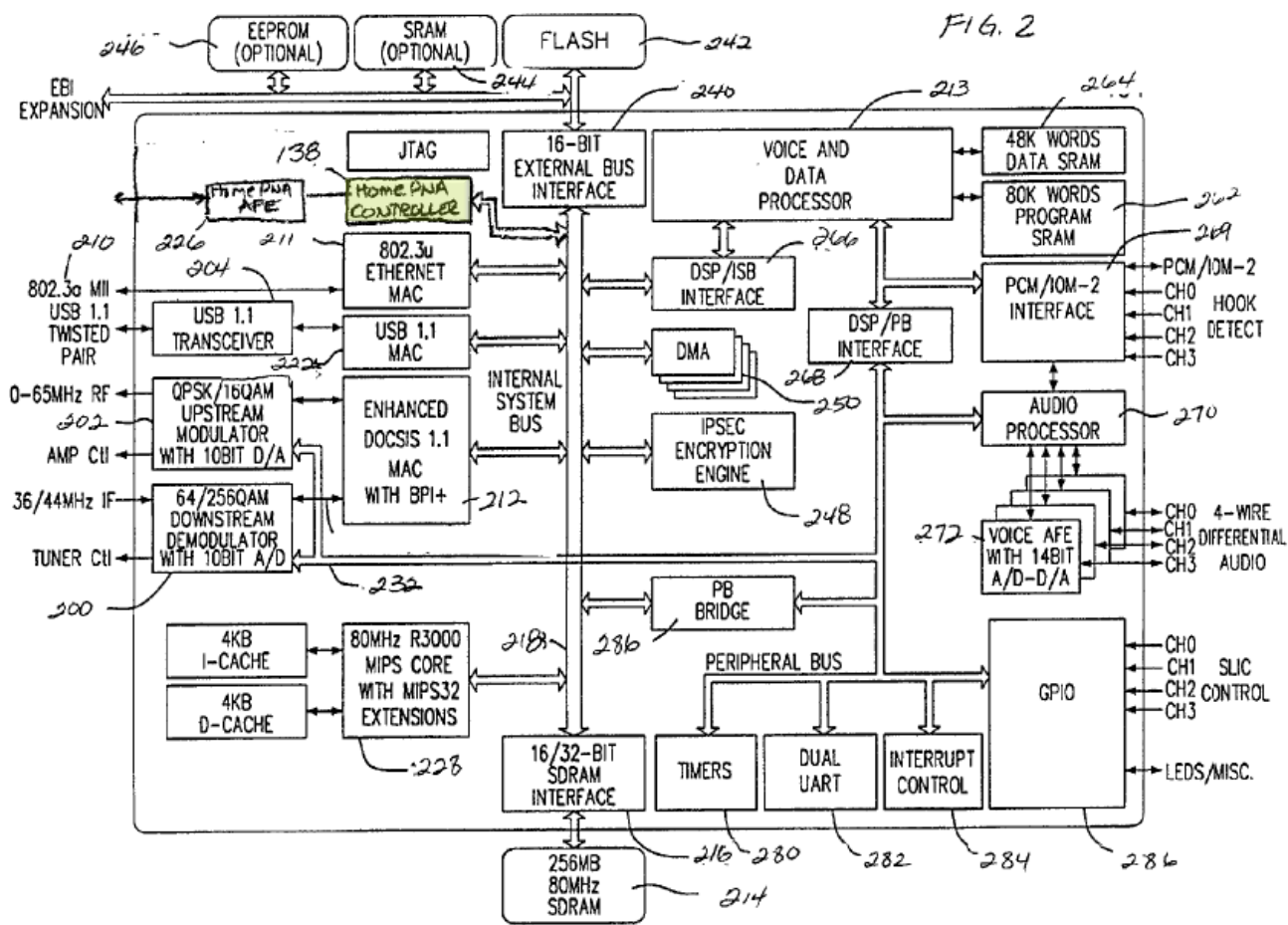
PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

PETITION FOR *INTER PARTES* REVIEW

components of the cable modem engine in Rabenko. As described above in Section VI.A.1.c, Rabenko's DOCSIS MAC 134/212 performs cable modem functions according to the CableLabs DOCSIS. Ex. 1005, [0034], [0044]. Rabenko describes

Like 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. Ex. 1005, [0074], [0085], [0087]. Rabenko's HomePNA controller 138 performs no DOCSIS functions.

That One Of Rabenko's Components Does Not Perform DOCSIS Functions Is Not Enough To Show That All DOCSIS Functions Are Localized In The CME



Petitioner Does Not Include “QPSK Demodulator” In Its Mapping Of The CME

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775
Filing Date: September 30, 2003
Issue Date: July 17, 2012
Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

PETITION FOR INTER PARTES REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*



Undisputed: Rabenko's QPSK Demodulator Performs DOCSIS Functions



DECLARATION OF SAMUEL H. RUSS, PH.D.

120. Rabenko's QPSK out of band downstream demodulator 206 performs DOCSIS functions. As discussed, DOCSIS is the standard for transmitting data between the cable head-end and a cable modem inside a residence. Ex. 2011 [DOCSIS] 1; *see also* Ex. 1005 [Rabenko] [0050] ("DOCSIS was developed to ensure that cable modem equipment built by a variety of manufacturers is compatible"). As Dr. Kiaei testified, DOCSIS functions at least relate to the DOCSIS specification. Ex. 2009 [Kiaei-Depo.] 24:12-27:11. Consistent with this, Rabenko's "QPSK out of band downstream demodulator 206 is configured to receive out of band MPEG-2 encoded message from the cable head end." Ex. 1005 [Rabenko] [0050]; Ex. 2011 [DOCSIS-2.0] 13 (defining QPSK), 62 (discussing using QPSK modulation), 72 (similar). Note that this comports with

- (19) **United States**
(12) **Patent Application Publication**
Rabenko et al.

[0050] An exemplary embodiment of the residential gateway is shown schematically in FIG. 2. The described exemplary embodiment may provide a highly integrated solution implemented in a single chip that is compliant with the Data Over Cable Service Interface Specification (DOCSIS). DOCSIS was developed to ensure that cable modem equipment built by a variety of manufacturers is compatible, as is the case with traditional dial-up modems. The described exemplary embodiment can provide integrated functions for communicating with a cable head (not shown) end via the network port 104. By way of example, a QPSK upstream modulator 202 is configured to transmit data to the cable head end, and a QAM downstream demodulator 200 is configured to receive data from the cable head end, and a QPSK out of band downstream demodulator 206 is configured to receive out of band MPEG-2 encoded messages from the cable head end.

Reply: Not All Of '775's DOCSIS Functions Are Localized To The CME Because '775's Advanced Crypto Engine Performs DOCSIS Functions

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2024-00446
Patent 8,223,775

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

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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

'775: Advanced Crypto Engine Only Provides Hardware Support And Does Not Perform Functions



(12) **United States Patent**
Li et al.

(10) **Patent No.:** US 8,223,775 B2
(45) **Date of Patent:** Jul. 17, 2012

(54) ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

(21) Appl. No.: 10/675,566

(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**

US 2005/0071492 A1 Mar. 31, 2005

(51) Int. Cl.

(52) *H04L 12/46* (2006.01) **370/401, 700/249**

(58) **Field of Classification Search** 709/249

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,944,706	B2 *	9/2005	Schain et al.	709/250
2001/0039600	A1 *	11/2001	Brooks et al.	710/126
2006/0080650	A1 *	4/2006	Winters et al.	717/168

* cited by examiner

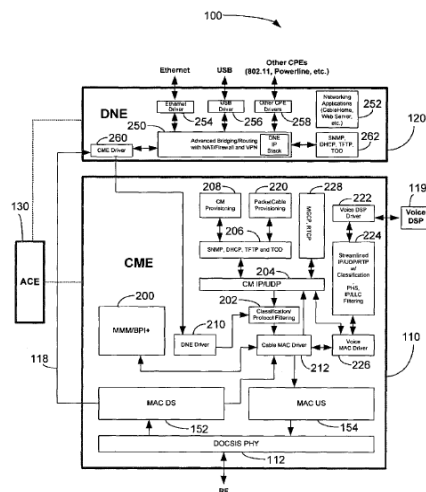
Primary Examiner

(74) *Attorney, Agent, or Firm* — James Sze; Duane Morris LLP

(57) **ABSTRACT**

A cable modem system and architecture. A cable modem engine performs all cable modem functions, and a data networking engine performs all data and home networking functions. The cable modem engine is completely partitioned from the data networking engine. DOCSIS and VoIP functionality is implemented in the cable modem engine. The VoIP functionality may be in accordance with the Packet-Cable specification. The data networking functionality provided by the data networking engine may be in accordance with the CableHome specification.

20 Claims, 2 Drawing Sheets



1

Comcast, Ex. 1001

US 8,223,775 B2

Advanced crypto engine 130 provides hardware support for crypto functions. These include common crypto functions required by the baseline DOCSIS link-layer security, Packet-Cable voice security and data-networking security (e.g. VPN). These functions include DES/3DES, AES and HMAC-MD5/SH-1.

Processor 114 implements real-time critical MAC functions for both upstream (US) and downstream (DS) communications. These functions include US and DS synchronization, DS MAC address filtering, DS protocol filtering, US and DS PHS, concatenation, fragmentation, MAP processing, US transmission scheduling, as well as DOCSIS link-layer DES encryption and decryption. Processor 114 receives down-

Reply: Petition Included “QPSK Demodulator”

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Case IPR2024-00446
Patent 8,223,775

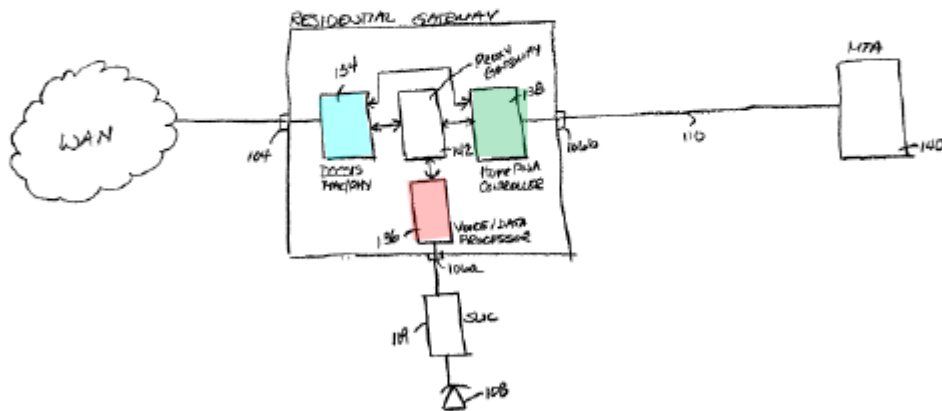
PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE UNDER
37 C.F.R. §42.23

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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

Petition: Only Block-Quoted Rabenko [0050] To Show That The Cable Modem Is DOCSIS-Compliant

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



Ex. 1005, Fig. 1b (annotated)

Specifically, Rabenko discloses,

PETITION FOR *INTER PARTES* REVIEW

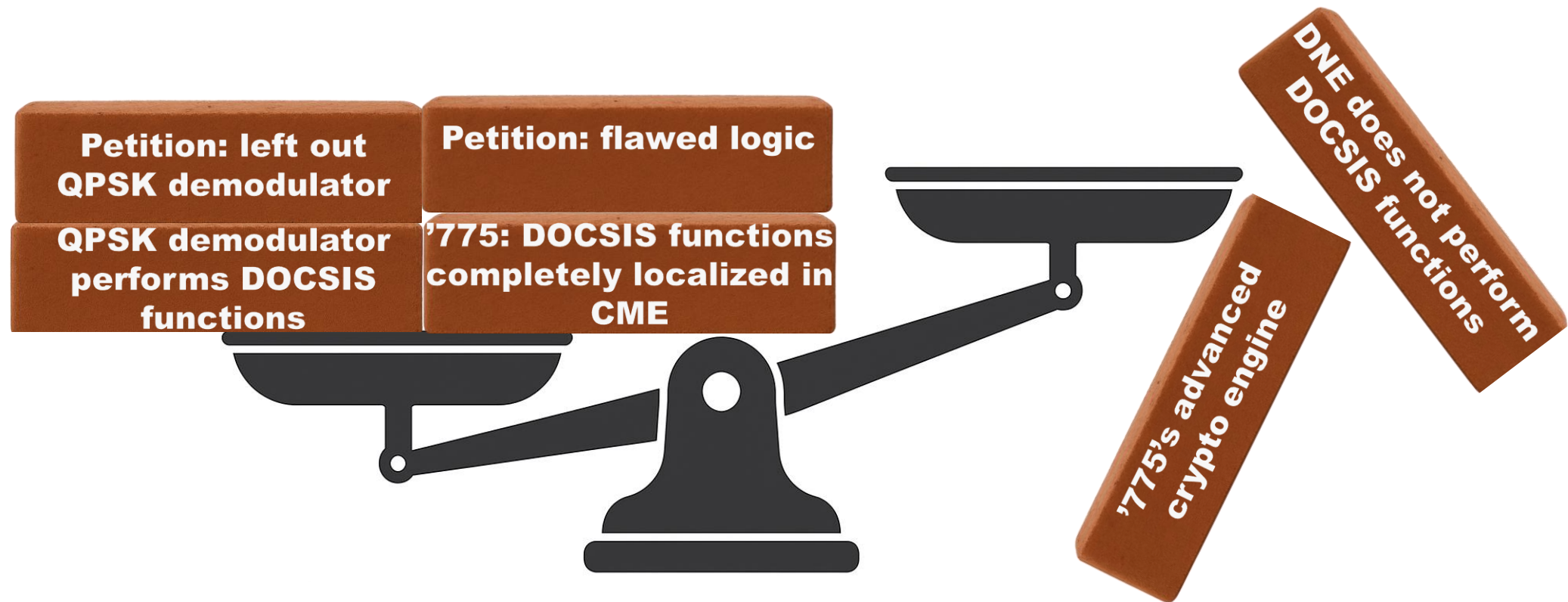
DOCSIS was developed to ensure that cable modem equipment built by a variety of manufacturers is compatible, as is the case with traditional dial-up modems. The described exemplary embodiment can provide integrated functions for communicating with a cable head (not shown) end via the network port 104. By way of example, a QPSK upstream modulator 202 is configured to transmit data to the cable head end, and a QAM downstream demodulator 200 is configured to receive data from the cable head end, and a QPSK out of band downstream demodulator 206 is configured to receive out of band MPEG-2 encoded messages from the cable head end.

Ex. 1005, [0050].

Petitioner And Dr. Kiaei Provide No Evidence Or Explanation That A POSITA Would Understand The QPSK Demodulator Is Part Of The DOCSIS MAC/PHY



Petitioner Failed To Prove That Rabenko Teaches “All DOCSIS Functions Are Localized In” The CME



Petitioner Fails To Show:

Limitations Not Met	Grounds	Claims
“DOCSIS Controller”	All	All
DNE & CME in “Separate” “Circuits” with “Completely Partitioned” Functions	All	All
CME “Configured to Enable [Independent] Upgrades to its Software”	All	All
“All DOCSIS Functions are Localized” in the CME	A-D	2, 19
“DOCSIS MAC Processor is an ARM9TDMI-Based RISC Processor” & “DOCSIS Controller is an ARM940-Based RISC Processor”	I-P	12

Claim 12 Requires “The DOCSIS MAC Processor Is An ARM9TDMI-Based RISC Processor” And “The DOCSIS Controller Is An ARM940-Based RISC Processor”



(12) **United States Patent**
Li et al.

(10) **Patent No.:** US 8,223,775 B2
(45) **Date of Patent:** Jul. 17, 2012

(54) ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE GATEWAY CABLE MODEM

(56) **References Cited**

U.S. PATENT DOCUMENTS

(75) Inventors: **Gordon Y. Li**, San Diego, CA (US);
Yoav Hebron, San Diego, CA (US)

6,944,706	B2 *	9/2005	Schain et al.	709/250
2001/0039600	A1 *	11/2001	Brooks et al.	710/126
2006/0080650	A1 *	4/2006	Winters et al.	717/168

* cited by examiner

(73) Assignee: **Entropic Communications, Inc.**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 2220 days.

Primary Examiner — Patrice Winder

(74) *Attorney, Agent, or Firm* — James Sze; Duane Morris LLP

(21) Appl. No.: 10/675,566

(22) Filed: **Sep. 30, 2003**

(65) **Prior Publication Data**

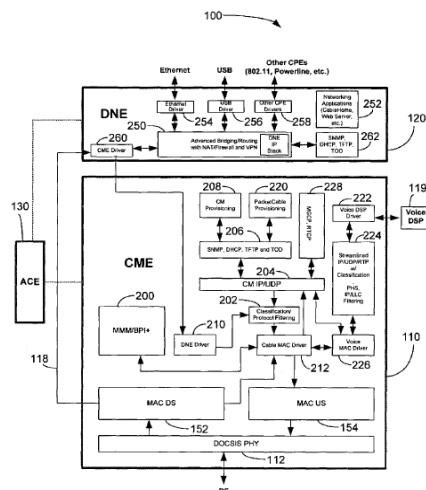
US 2005/0071492 A1 Mar. 31, 2005

(51) **Int. Cl.**
H04L 12/46 (2006.01)

(52) U.S. Cl. 370/401; 709/249

(58) **Field of Classification Search** 709/249
See application file for complete search history.

20 Claims, 2 Drawing Sheets



1

Comcast, Ex. 1001

12. A cable modem system as claimed in claim 11, wherein the DOCSIS MAC processor is an ARM9TDMI-based RISC processor, and wherein the DOCSIS controller is an ARM940-based RISC processor.

Petitioner: Concedes None Of The References Recite Claim 12 But Argues RISC Processors Were An Obvious Design Choice And “Commonly Known”

PETITION FOR *INTER PARTES* REVIEW

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Although none of Rabenko, Gaspar, Kim, or Lu specifically recite an ARM9TDMI-based or an ARM940-based RISC processor, a POSITA would have found it obvious to implement the functions of the DOCSIS MAC processor and DOCSIS controller using commonly-known and available processors, selected

THE ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Although Rabenko does not explicitly disclose a ARM9TDMI-based RISC processor for DOCSIS MAC 134/212 or an ARM940-based RISC processor for voice/data processor 136/213, these would have been an obvious design choice as would have been understood by a POSITA. A POSITA would have known that a

It was generally known before the priority date of the '775 Patent that an ARM9TDMI-based RISC processor was a commonly known processor for accommodating digital logic processing functions, such as in Rabenko's DOCSIS MAC, in products that demand the highest levels of performance with small size, low cost, and low power consumption, as shown by Klein. Ex. 1016, [0008]. Klein

from ARM, Ltd., among others, that may be used. *Id.*, [0024]. Similarly, it was generally known before the priority date of the '775 Patent that an ARM940-based RISC processor was a commonly known processor for offering high probability that a functional block having bus ownership can perform its operation compared to conventional exclusive bus arbitration schemes as shown by Kim '678. Ex. 1015,

Institution Decision: Questioned “Whether Petitioner Has Sufficiently Demonstrated” Claim 12

Trials@uspto.gov
571-272-7822

Paper 11
Date: September 3, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

IPR2024-00446
Patent 8,223,775 B2

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

PARVIS, *Administrative Patent Judge*.

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

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

Regarding claim 12, Petitioner acknowledges “none of Rabenko, Gaspar, [or] Kim . . . specifically recite an ARM9TDMI-based or an ARM940-based RISC processor.” Pet. 56. At this stage, we question whether Petitioner has sufficiently demonstrated that the further recitation in claim 12 would have been an obvious design choice in view of the teachings of Rabenko, Gaspar, Kim, and Lu. *Id.* at 58. Because Petitioner demonstrates

Undisputed: No References Describe An ARM9TDMI-Based RISC DOCSIS MAC Processor Or An ARM940-Based RISC DOCSIS Controller

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,

v.

ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

Patent No. 8,223,775
Filing Date: September 30, 2003
Issue Date: July 17, 2012
Title: ARCHITECTURE FOR A FLEXIBLE AND HIGH-PERFORMANCE
GATEWAY CABLE MODEM

Inter Partes Review No.: IPR2024-00446

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. § 42.100 *et seq.*

PETITION FOR *INTER PARTES* REVIEW

Although none of Rabenko, Gaspar, Kim, or Lu specifically recite an ARM9TDMI-based or an ARM940-based RISC processor, a POSITA would have found it obvious to implement the functions of the DOCSIS MAC processor and DOCSIS controller using commonly-known and available processors, selected



Undisputed: Klein And Kim '678 Have Nothing To Do With Cable Modem Architecture And Are Not Analogous Art



(19) **United States**
(12) **Patent Application Publication**
Kim et al.

(54) **SYSTEM ON A CHIP HAVING SYSTEM BUS, EXTERNAL BUS, AND BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES. SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES** (52) (57)

(19) **United States**
(12) **Patent Application Publication**
Klein, JR.

(54) **PIPELINED RECONFIGURABLE DYNAMIC INSTRUCTION SET PROCESSOR** (52)

“Two criteria have evolved for determining whether prior art is analogous:

- (1) whether the art is from the **same field of endeavor**, regardless of the problem addressed, and
- (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is **reasonably pertinent to the particular problem with which the inventor is involved.**”

In re Clay, 966 F.2d 656, 658-59 (Fed. Cir. 1992)
(modified formatting)

Petitioner Failed To Prove “DOCSIS MAC Processor Is An ARM9TDMI-Based RISC Processor” And “DOCSIS Controller Is An ARM940-Based RISC Processor”





Reserve

Petitioner Never Asked Dr. Russ About Rabenko During Deposition

Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

COMCAST CABLE COMMUNICATIONS, LLC,
Petitioner,
V.
ENTROPIC COMMUNICATIONS, LLC,
Patent Owner.

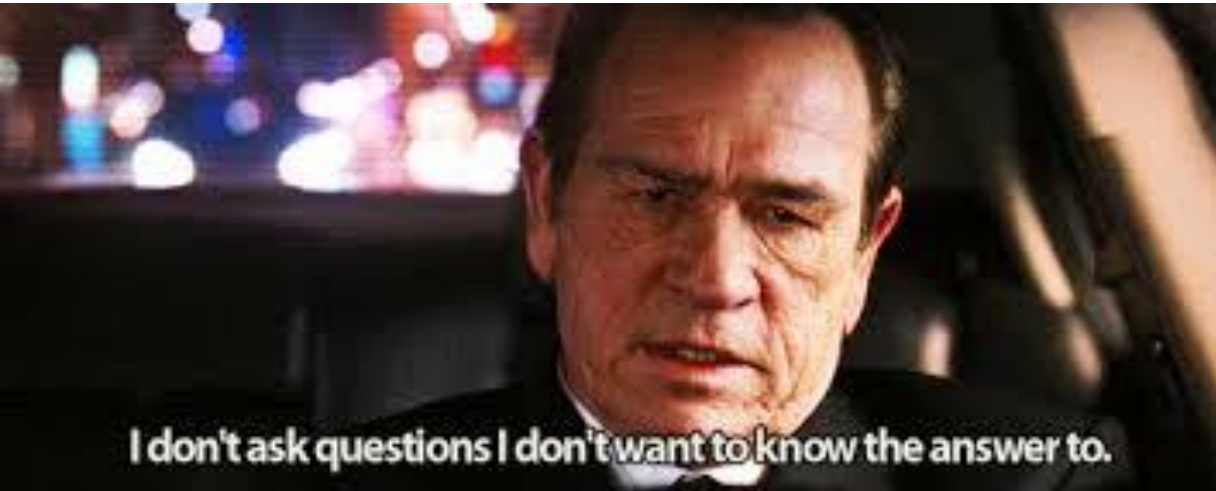
Case IPR2024-00446
Patent 8,223,775

REMOTE DEPOSITION OF SAMUEL H. RUSS, Ph.D.

FRIDAY, MARCH 7, 2025

9:04 A.M. EST

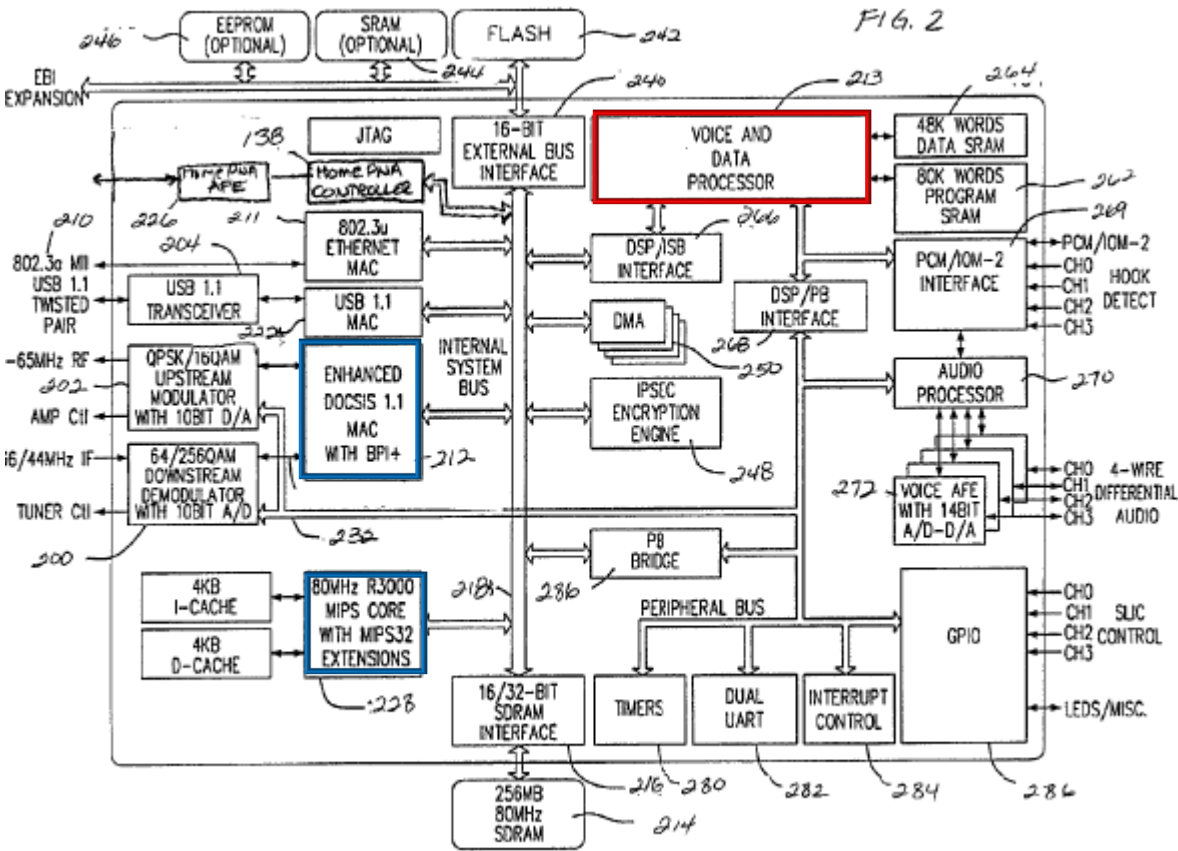
REPORTED BY CINDY A. HAYDEN, RMR, CRR



Dr. Kiaei's Explanations Of "Separate" Circuits Would Put Rabenko's VDP Outside Of The Second Circuit

DECLARATION OF SAYFE KIAEI

114. As I describe above in Section IX.A.1.b, Rabenko describes that its HomePNA controller 138 can be a fully integrated MAC/PHY device. Ex. 1005, [0080]. As shown in Figure 1b above, Rabenko discloses that DOCSIS MAC/PHY 134/DOCSIS MAC 212 (blue), proxy gateway 142, and voice/data processor 136/213 (red) (claimed "second circuit") are separate from HomePNA controller 138 and AFE 226 (claimed "first circuit"). Ex. 1005, Fig. 1b.



Dr. Kiaei's Alternative Explanation Of "Partitioned" Circuits Also Puts The VDP Outside The Second Circuit

Rabenko et al.

DEPOSITION OF SAYFE KIAEI, Ph.D.

without referring to Rabenko, what is a circuit as used in Claim 18?

MR. FLEMING: Objection; form.

THE WITNESS: A person skilled in the art looking at Claim 18 as a circuit, they would understand that the circuit could include a processor, a software, and other components that performs the functions required and those are circuits. That is a circuit.

[0044] FIG. 1b is an exemplary functional block diagram that describes the flow of packets in the residential gateway described in connection with FIG. 1b. A DOCSIS MAC/PHY 134 provides an interface to the WAN within the residential gateway 102. All packets that arrive to or leave from the residential gateway via the WAN must go through the DOCSIS MAC/PHY 134. The DOCSIS MAC/PHY 134 translates the packet format from DOCSIS to an internal format that, at least in some embodiments, is protocol independent.

packet is destined for the POTS telephone, the packet is routed to a voice and data processor 136 for decompression and depacketization in a manner to be described in greater detail below. The voice and data processor 136 generates an analog voice signal from the decompressed signal and delivers the analog voice signal to the POTS telephone 108 via the SLIC 109. If the proxy gateway 142 determines that