

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 No.: IPR2024-00446
Patent No. 8,223,775

Before JON M. JURGOVAN, FREDERICK C. LANEY, and AARON W. MOORE
Administrative Patent Judges.

Petitioner's Demonstrative Exhibit

During Prosecution, the DOCSIS Bypass Feature of Claim 7 Was Allowable

- Throughout prosecution, the Examiner rejected all claims for anticipation or obviousness except for dependent claim 7, indicating that it included allowable subject matter. (Ex. 1004, pp. 149-160; Pet., Paper 2, pp. 3-4)

7. (Previously presented) A cable modem system as claimed in claim 5, wherein the DOCSIS MAC processor is configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput.

(Ex. 1004, p. 134; Pet., Paper 2, pp. 3-4, emphasis added)

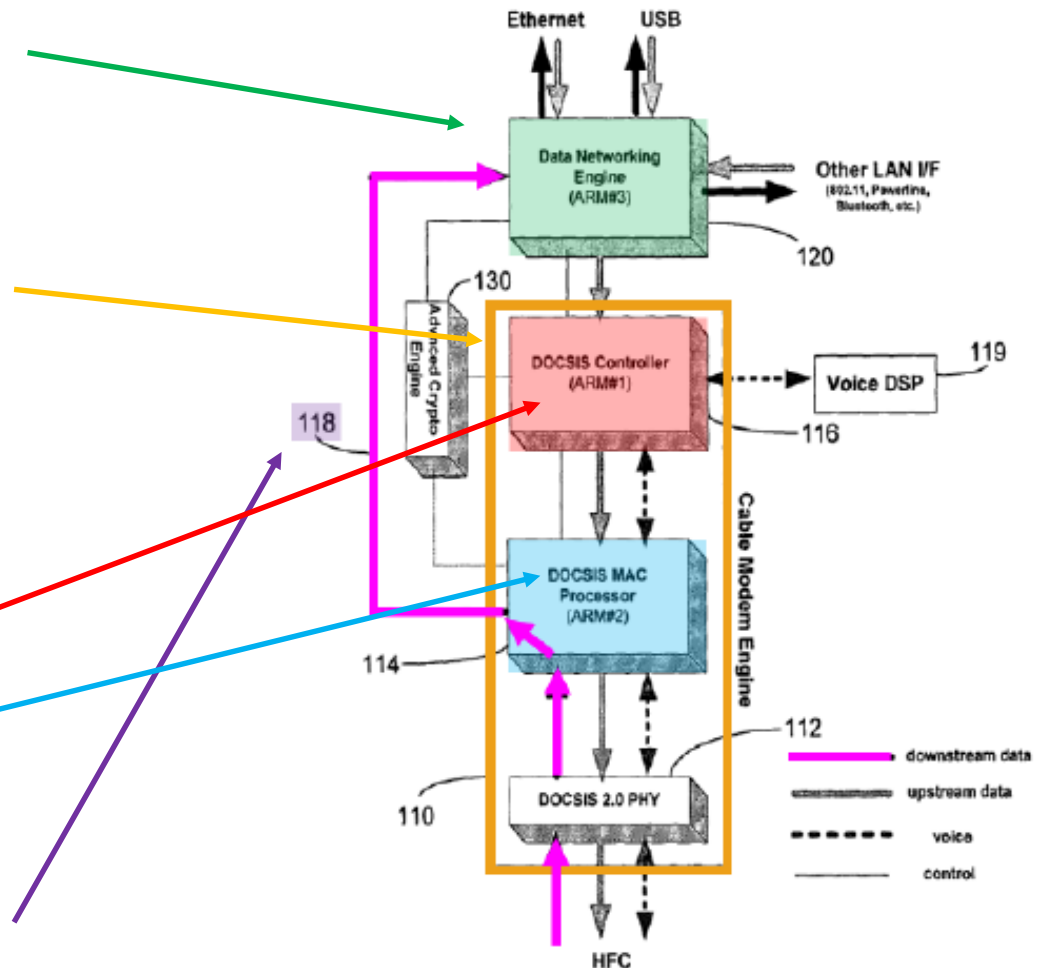
- Applicant amended each of the independent claims to recite the allowable subject matter in claim 7. (Ex. 1004, pp. 66-72; Pet., Paper 2, pp. 3-4; Reply, Paper 23, p. 10; Ex. 1018, Kiaei 2nd Decl., ¶37)

Claim 18 of the '775 Patent

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.



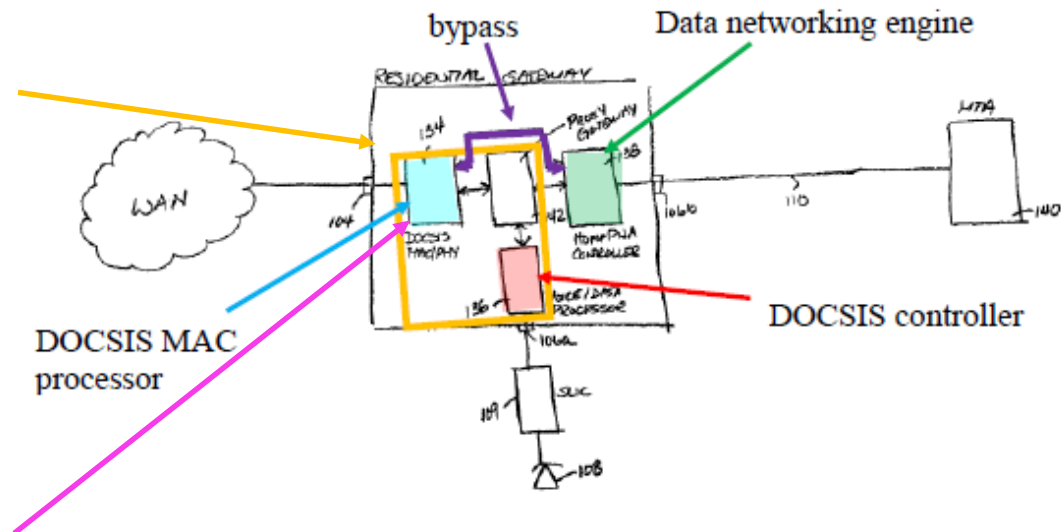
(Ex. 1001, '775 Patent, Claim 18, Fig. 1 (annotated); *see also* Pet., Paper 2, pp. 2-3; Ex. 1002, Kiaei 1st Decl., ¶¶ 48-49)

Claim 18 of the '775 Patent vs. Rabenko

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.



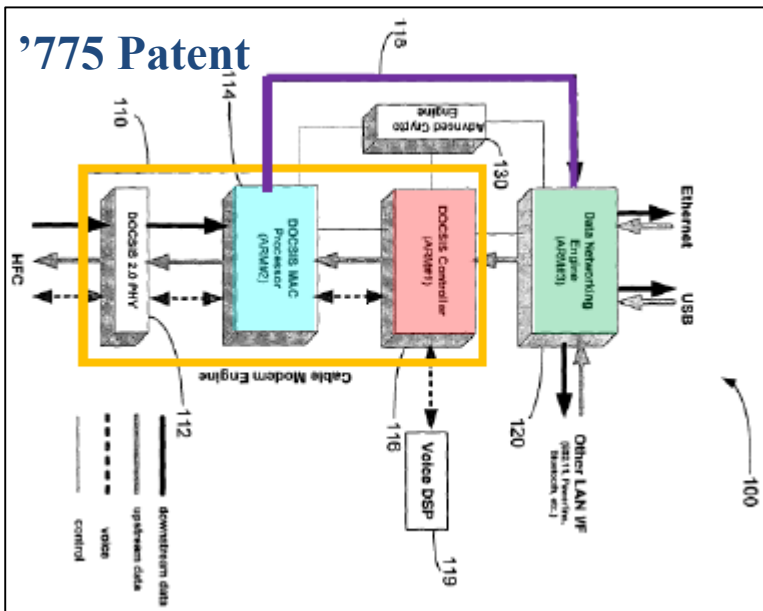
(Ex. 1005, Rabenko, Fig. 1b (annotated); Pet., Paper 2, p. 36; Ex. 1002, Kiaei 1st Decl. ¶ 151)

(Ex. 1001, '775 Patent, Claim 18)

'775 Patent vs. Rabenko

'775 Patent

- Network on left
- **Cable modem engine** including
 - DOCSIS MAC layer
 - DOCSIS controller for voice processing
- Data Networking Engine for home LAN
- Bypass of DOCSIS controller
- LAN side of modem on right

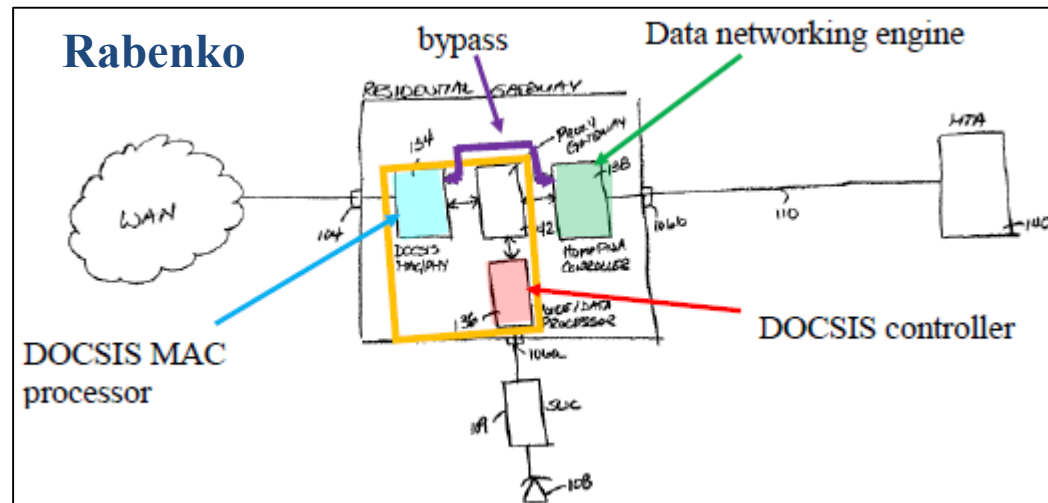


'775 Patent

(Ex. 1001, '775 Patent, 2:55-58, 2:61-67, 3:15-17, 3:49-50, Fig. 1 (rotated and annotated); see also Pet., Paper 2, pp. 2-3, 37; Ex. 1002, Kiaei 1st Decl., ¶¶ 121, 172; Reply, Paper 23, p. 22)

Rabenko

- Network on left
- **(Cable modem engine)** including
 - DOCSIS MAC/PHY 134
 - Proxy gateway 142
 - Voice/data processor 136 (DOCSIS controller) for voice processing
- HomePNA Controller 138 (Data Networking Engine) for home LAN
- Bypass of voice/data processor (DOCSIS controller)
- LAN side of modem on right



(Ex. 1005, Rabenko, ¶¶ [0033]-[0035], [0044]-[0046], [0050], [0074], [0080], [0085], [0087], [0223], [0226], [0268], Fig. 1b, (annotated); see also Pet., Paper 2, pp. 4-6, 14-17, 21-26, 31-34, 36; Ex. 1002, Kiaei 1st Decl., ¶¶ 61-64, 86-89, 96, 106-110, 141-148)

Instituted Grounds

PO Argues for Independent Claims:

- 1) Rabenko's Voice/Data Processor is not a DOCSIS controller
- 2) Rabenko Lacks the Data Networking Engine/Circuit
- 3) Rabenko Lacks the Cable Modem Engine/Circuit
- 4) Rabenko and Rabenko/Kim Lack Independent Software Upgrades

PO Argues for Dep. Claims 2/19:

- 1) Rabenko Lacks "All DOCSIS Functions" Localized in the Cable Modem Engine

PO Argues for Dep. Claim 12:

- 1) Specific Processor Models Not Identified

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

(Pet., Paper 2, pp. 9-10; ID, Paper 11, p. 43; POR, Paper 19, pp. 1-66; Sur-Reply, Paper 31, pp. 1-33)

Rabenko's Voice/Data Processor is a **DOCSIS Controller** as Defined by the '775 Patent

- Like the '775 Patent's DOCSIS controller 116, Rabenko's VDP processes and transports voice over a DOCSIS packet-based network.

(Pet., Paper 2, pp. 2, 4-5, 21-26, 31; Ex. 1002, Kiaei 1st Decl. ¶¶ 106-109, 112-113, 115-117, 134-139; Ex. 1005, Ex. 1005, Rabenko, ¶¶ [0002], [0004]-[0005], [0034], [0045]-[0047], [0074], [0085], [0087], [0098], [0122]; Reply, Paper 23, pp. 4-8; Ex. 1018, Kiaei 2nd Decl., ¶¶ 17-26)

'775 Patent

Processor 114 receives downstream data from, provides upstream data to and exchanges voice data in both directions with DOCSIS PHY 112. It also receives upstream data from, and exchanges voice data in both directions with, controller 116.

Processor 114 = DOCSIS MAC Processor
Controller 116 = DOCSIS Controller

(Ex. 1001, '775 Patent, 3:7-10; Fig. 1;
Pet., Paper 2, pp. 2, 3; Ex. 1002, Kiaei
1st Decl., ¶¶ 48, 49)

Rabenko

FIG. 1a. Conversely, if the DOCSIS MAC/PHY 134 determines that the packet payload is voice, the packet is routed to a proxy gateway 142 to be processed in a manner to be described in greater detail below. The proxy gateway 142 further determines whether the packet is destined for the 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

(Ex. 1005, Rabenko, ¶ [0045]; see also Ex. 1005, Rabenko, ¶¶ [0002], [0004]-[0005], [0034], [0045]-[0047], [0074], [0085], [0087], [0098], [0122]; Pet., Paper 2, pp. 4-5, 21-26, 31; Ex. 1002, Kiaei 1st Decl., ¶¶ 106-109, 112-113, 115-117, 134-139; Reply, Paper 23, pp. 4-8; Ex. 1018, Kiaei 2nd Decl., ¶¶ 17-26)

Rabenko's Voice/Data Processor is a **DOCSIS Controller** as Defined by the '775 Patent

- Like the '775 Patent's DOCSIS controller 116, Rabenko's VDP implements VoIP via PacketCable in its DOCSIS network

(Pet., Paper 2, pp. 1-2, 26, 31, 33; Ex. 1002, Kiaei 1st Decl. ¶¶ 108, 137, 143; Ex. 1005, Rabenko, ¶¶ [0085], [0087], [0108])

'775 Patent

The architecture includes a cable modem engine having a DOCSIS PHY layer with a hardware transmitter and receiver, a DOCSIS MAC processor that implements real-time critical MAC functions for both upstream and downstream communications, and **a DOCSIS controller implementing VoIP functionality.**

(Ex. 1001, '775 Patent, 2:6-11; Pet., Paper 2, pp. 26, 31, 33; 1002, Kiaei 1st Decl. ¶ 108)

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.

(Ex. 1001, '775 Patent, Abstract; Pet., Paper 2, p. 1)

Rabenko

[0085] In the described exemplary embodiment, **the voice and data processor performs a translation function between the packets in a HomePNA LAN format (VOHN) to packets in the VoIP format.** The specific translation is direction dependent. Packets arriving from the HomePNA controller are translated to a VoIP format and delivered to the DOCSIS MAC.

[0087] **The voice and data processor also performs a media and protocol translation between VoIP formats and PCM voice samples which are delivered to or received from the audio processor.**

[0108] Referring to **FIG. 5c**, the GCP logic implements the NCS features of the PacketCable 1.0 specification including protocol transaction management, parsing, verification and formatting of protocol data units (PDUs) and other utility functions.

(Ex. 1005, Rabenko, ¶¶ [0085], [0087], [0108]; *see also* Pet., Paper 2, pp. 31, 33; Ex. 1002, Kiaei 1st Decl. ¶¶ 137, 143)

On Sur-Reply, Patent Owner Construes “DOCSIS Controller” As Controlling “Functions in the DOCSIS Protocol”

- Without explicitly calling it a claim construction argument, Patent Owner argued the claimed “DOCSIS controller” ... must control DOCSIS functions.”
(POR, Paper 19, pp. 6-7, 11-14)
- But, Patent Owner provided no clear distinction of which functions are “DOCSIS functions” and which are not, except to surmise that functional blocks 200-212 of ’775 Fig. 2 are examples of DOCSIS functions, but VoIP-related DOCSIS functions are not (Rabenko-carveout).
(POR, Paper 19, pp. 6-7, 11-13)
- Then, for the first time in its Sur-Reply, Patent Owner explicitly acknowledges it is advancing a claim construction argument with a further narrowed definition—“DOCSIS functions are functions in the DOCSIS protocol.”

(Sur-Reply, Paper 31, p. 6; see also, Sur-Reply, Paper 31, pp. 2-6)

Patent Owner's Own Evidence Establishes that Rabenko's Voice/Data Processor is Controlling "Functions in the DOCSIS Protocol"

- Patent Owner argues that “Indeed, the DOCSIS specification does not define or provide for any VoIP functionality. *See* Ex. 2011 [DOCSIS-Standard] *generally.*”
(POR, Paper 19, p. 13; Ex. 2008, Russ 2nd Dec., ¶ 47, originally emphasis)
- However, consistent with the '775 Patent specification, the Patent Owner-cited DOCSIS Specification (Ex. 2011) does provide VoIP functionality including PacketCable to manage VoIP signaling.
(Reply, Paper 23, p. 3; Ex. 2011, DOCSIS 2.0 Spec., p. 52; Ex. 1018, Kiaei 2nd Decl., ¶¶ 11-12)

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.

(Ex. 2011, DOCSIS 2.0 Spec., p. 52)

Even Under Patent Owner's Last Claim Construction, Rabenko's VDP Teaches the "DOCSIS Controller"

- Patent Owner argues that "DOCSIS functions are functions in the DOCSIS protocol."
(Sur-Reply, Paper 31, p. 6; see also, pp. 2-6)
- In the '775 Patent, the "DOCSIS controller" controls example DOCSIS functions such as those in blocks 200-212, such as **SNMP**, **DHCP**, and **TFTP**.

- The '775 Patent states:

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.

(Ex. 1001, '775 Patent; 3:21-35; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26; POR, Paper 19, pp. 12-13)

- Rabenko's VDP explicitly controls DOCSIS functions of block 206 from the '775 Patent, e.g., SNMP, DHCP, and TFTP**

(Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

Rabenko's VDP Performs DOCSIS Functions As Exemplified in the '775 Patent

- Rabenko's **VDP** explicitly controls DOCSIS functions of block 206

(Ex. 1005, Rabenko, [0097]-[0105]; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

[0104] The provisioning logic 538 also includes DHCP logic 542 that interfaces with an external dynamic host configuration protocol (DHCP) server to assign an IP address to the MTA call client 520.

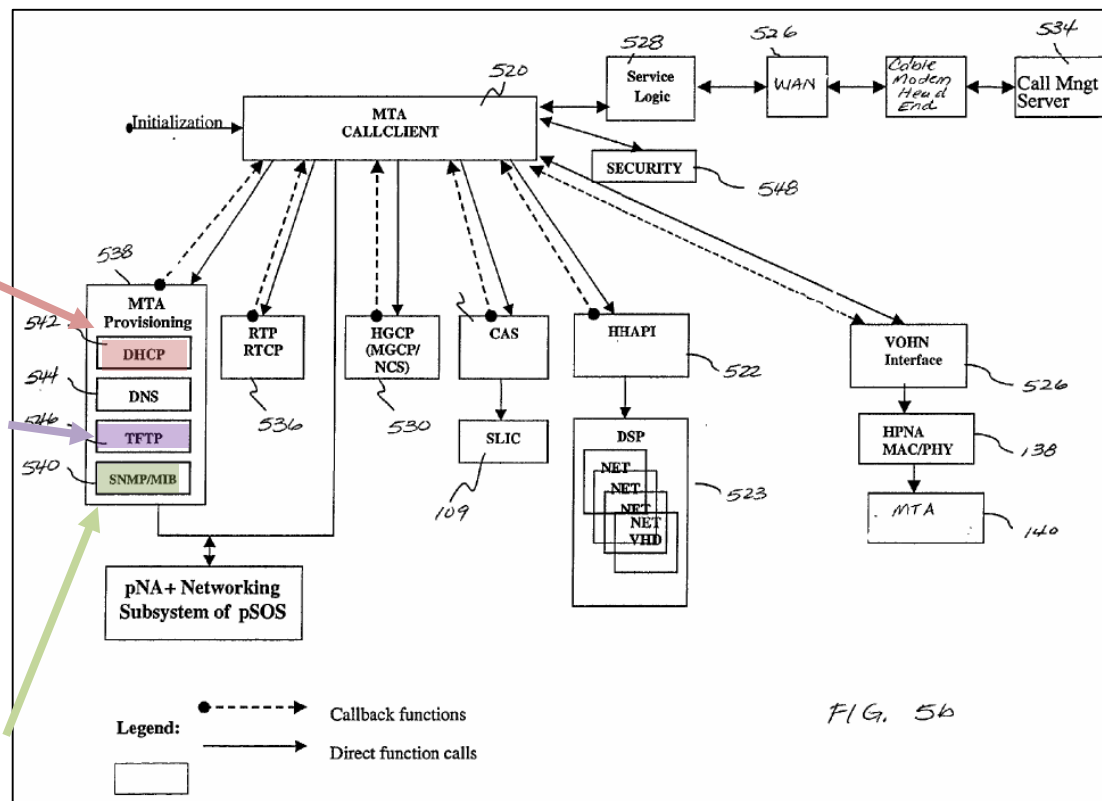
(Ex. 1005, Rabenko, ¶ [0104]; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

[0105] The MTA configuration file is downloaded to the MTA call client 520 from an external trivial file transfer protocol (TFTP) server (not shown) through TFTP logic 546. The TFTP server is a back office network element used

(Ex. 1005, Rabenko, ¶ [0105]; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

The provisioning logic 538 provides initialization, authentication, and registration functions. The provisioning logic 538 also provides attribute definitions required in the MTA configuration file. The provisioning logic 6360 includes a SNMP logic 540 that exchanges device information and endpoint information between the MTA call client 520 and an external control element called a provisioning server (not shown).

(Ex. 1005, Rabenko, ¶ [0103]; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)



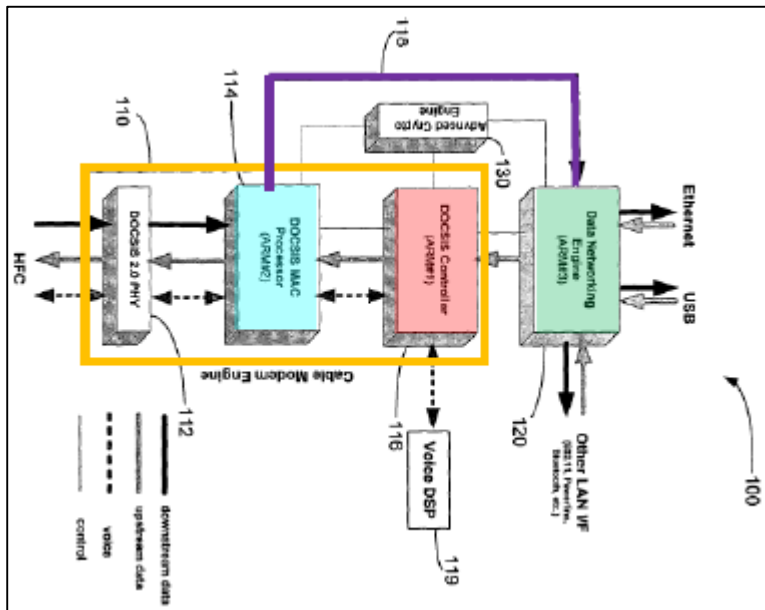
(Ex. 1005, Rabenko, Fig. 5b; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

Rabenko “bypasses” the “DOCSIS controller”

- [18F] “the DOCSIS MAC processor configured to . . . forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput”
- Like the ’775 Patent’s DOCSIS Controller, Rabenko’s VDP is bypassed by downstream PDU packets. (Ex. 1005, Rabenko, Fig. 1b (annotated); *see also* Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl. ¶¶)

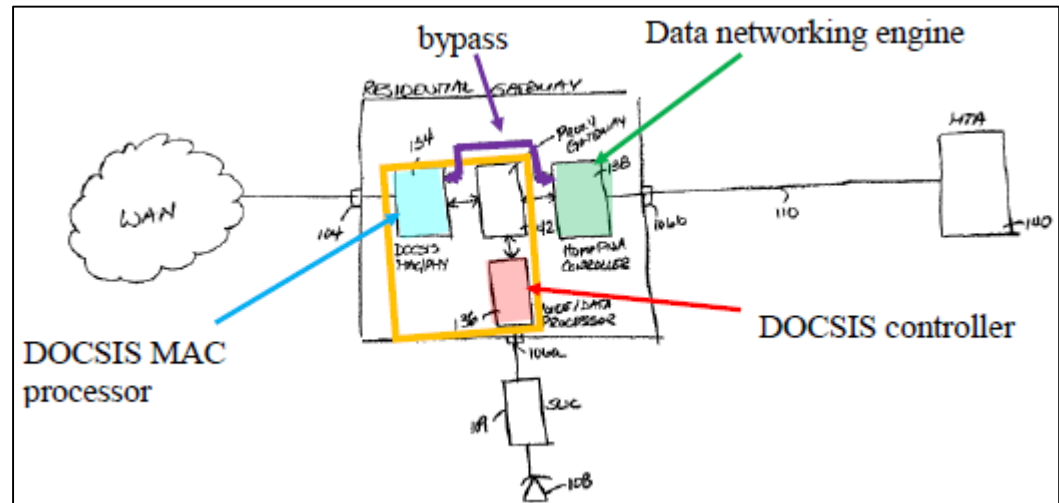
(Ex. 1005, Rabenko, Fig. 1b (annotated); *see also* Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl. ¶¶ 61-64, 106-109, 141-148)

'775 Patent



(Ex. 1001, '775 Patent, Fig. 1 (rotated and annotated); *see also* Pet., Paper 2, pp. 2-3, 37)

Rabenko



(Ex. 1005, Rabenko, Fig. 1b (annotated); *see also* Ex. Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl. ¶¶ 61-64, 106-109, 141-148)

Rabenko's Voice/Data Processor Includes the Proxy Gateway Function

- Rabenko teaches that its proxy gateway functionality can be implemented in its **VDP**.

(Ex. 1005, Rabenko, ¶¶ [0074], [0097]; Pet., Paper 2, p. 5, 24, 26, 31; Ex. 1002, Kiaei 1st Decl. ¶¶ 62, 108, 115, 116, 135, 136; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

- Rabenko also teaches that both the proxy gateway 142 and voice/data processor 136 are bypassed.

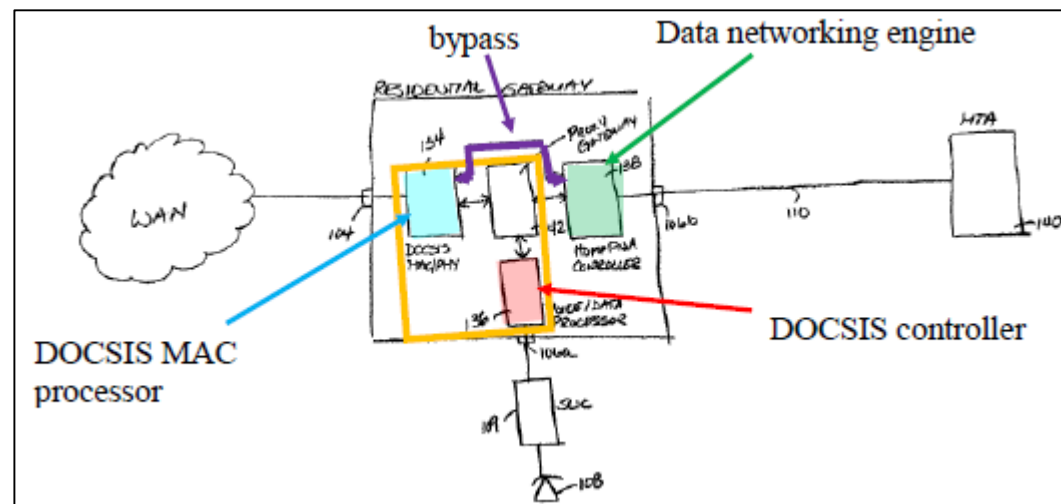
(Pet., Paper 2, p. 5, 24, 26, 31; Ex. 1002, Kiaei 1st Decl. ¶¶ 62, 108, 115, 116, 135, 136; Ex. 1005, Rabenko, ¶¶ [0074], [0097]; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

In the described exemplary embodiment, the voice and data processor 213 includes the proxy gateway function described in connection with FIG. 1b.

(Ex. 1005, Rabenko, ¶ [0074]; Pet., Paper 2, p. 5, 26, 31; Ex. 1002, Kiaei 2nd Decl. ¶¶ 62, 108, 115, 116, 135, 136)

[0097] As indicated above, the proxy gateway function can be implemented in the voice and data processor. In the described exemplary embodiment, the proxy gateway function is implemented with embedded software at the applications layer. Referring to FIG. 5b, the applications layer includes an MTA call client 520 which provides overall control.

(Ex. 1005, Rabenko, ¶ [0097]; Pet., Paper 2, p. 24; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)



(Ex. 1005, Rabenko, Fig. 1b (annotated); Pet., Paper 2, pp. 36, 37, 76; Ex. 1002, Kiaei 1st Decl. ¶ 151)

Rabenko “bypasses” the “DOCSIS controller”

- As Rabenko states:

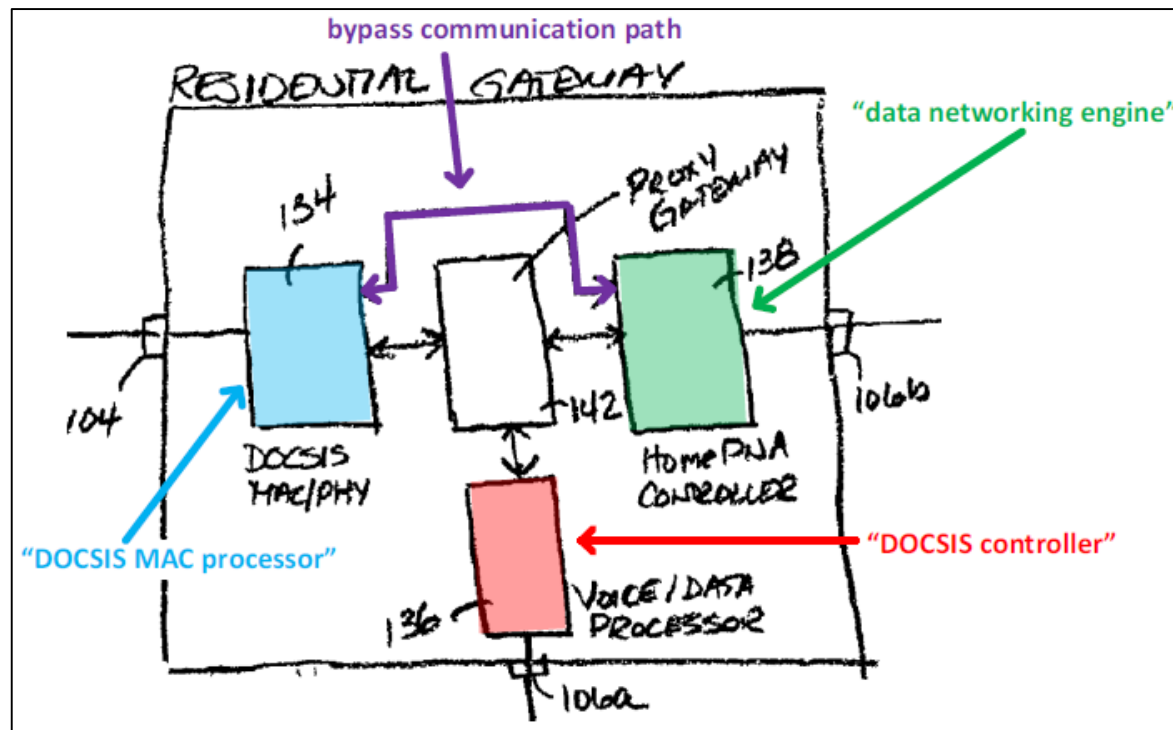
All packets that arrive to or leave from the residential gateway via the WAN must go through the DOCSIS MAC/PHY 134.

(Ex. 1005, Rabenko, ¶ [0044] (emphasis added); see also Pet., Paper 2, pp. 32-34; Ex. 1002, Kiaei 1st Decl. ¶¶ 140-148)

[0045] In the downstream direction, the DOCSIS MAC/PHY 134 determines whether the packet payload is voice or data. If the packet payload is data, then the DOCSIS MAC/PHY 134 routes the packet directly to a HomePNA controller 138.

(Ex. 1005, Rabenko, ¶ [0045] (emphasis added); see also Pet., Paper 2, pp. 32-34; Ex. 1002, Kiaei 1st Decl. ¶¶ 140-148)

Rabenko



(Ex. 1005, Rabenko, Fig. 1b (excerpted, annotated); see also Pet., Paper 2, p. 33; Ex. 1002, Kiaei 1st Decl. ¶ 141)

Patent Owner Argues Rabenko Lacks the Data Networking Engine/Circuit

- The '775 Patent describes the data networking engine 120 as providing bi-directional communications with customer provided equipment (CPE) such as via Ethernet, USB and other LAN I/F communications (802.11, Bluetooth, Powerline, etc.).

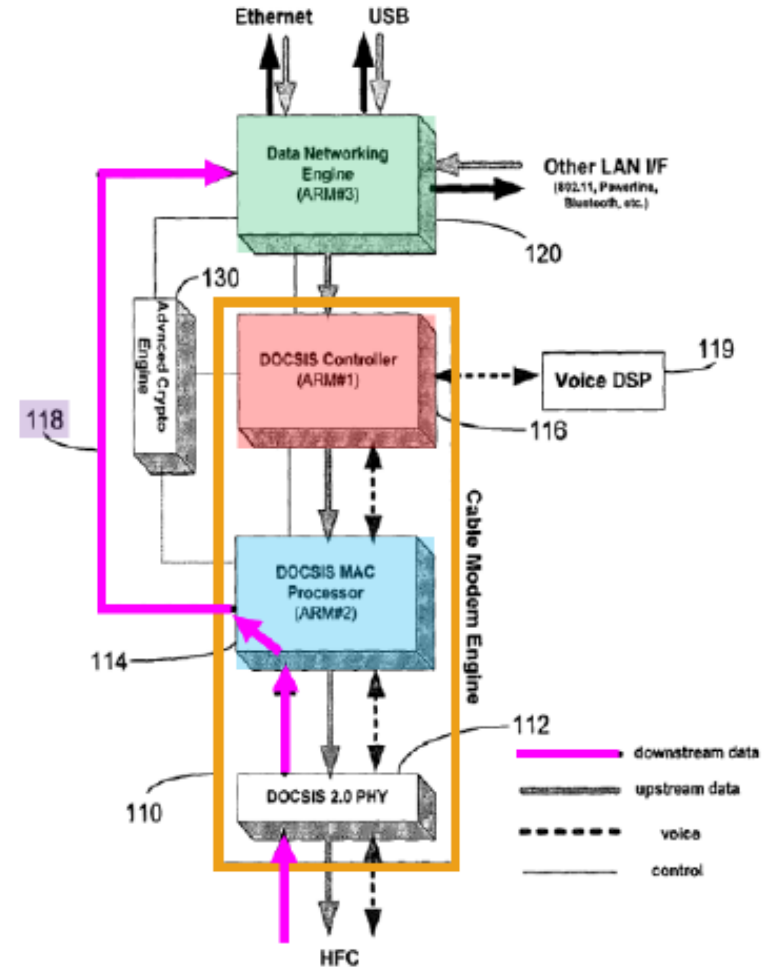
(Ex. 1001, '775 Patent, 3:49-50, Fig. 1; Pet., Paper 2, pp. 1-2, 14; Ex. 1002, Kiaei 1st Decl., ¶ 48)

- The data networking engine 120 is also capable of receiving downstream protocol data unit (PDU) packets from DOCSIS MAC processor 114 while bypassing DOCSIS controller 116.

(Ex. 1001, '775 Patent, 3:15-17; Pet., Paper 2, p. 3; Ex. 1002, Kiaei 1st Decl., ¶ 49)

- The data networking engine is “implemented in a first circuit that includes at least one processor.”

(Ex. 1001, '775 Patent, claim 18; Pet., Paper 2, p. 14; Ex. 1002, Kiaei 1st Decl., ¶ 85)



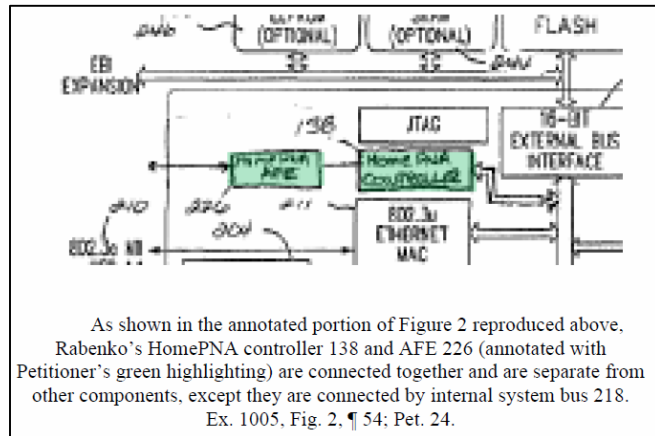
(Ex. 1001, '775 Patent, Claim 18, Fig. 1 (annotated); see also Pet., Paper 2, pp.2-3; Ex. 1002 Kiaei 1st Decl. ¶¶ 48-49)

Rabenko Teaches the Data Networking Engine/Circuit

- Like the '775 Patent's data networking engine, Rabenko's HomePNA controller with AFE facilitates communication over a home LAN as a circuit.

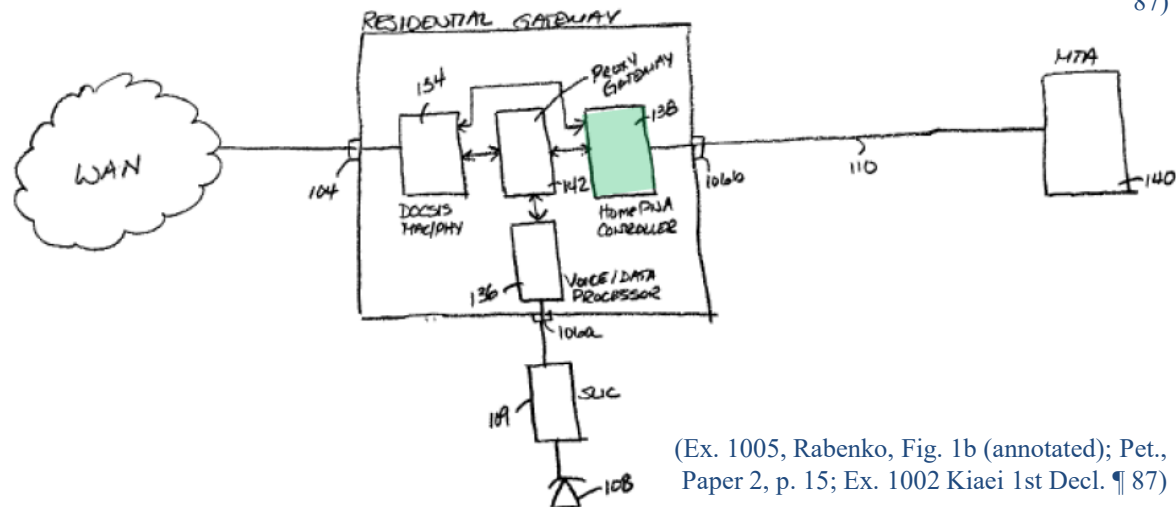
(Pet., Paper 2, pp. 14-16; Ex. 1002 Kiaei 1st Decl. ¶¶ 85-88; ID, Paper 11, p. 21; Ex. 1005, Rabenko, ¶¶ [0045], [0080], [0223], [0226], Figs. 1a-1b, 2)

[0080] A HomePNA controller 138 enables a 4-32 Mbps/sec LAN using existing in home telephone wiring. The HomePNA controller 138 can be a fully integrated MAC/PHY device that provides bi-directional communication with devices such as for example a HomePNA phone, computer etc., operating on a HomePNA LAN via the subscriber port 106b of the residential gateway. The HomePNA



Ex. 1005, Fig. 2, ¶ 54; Pet. 24.

(ID, Paper 11, p. 26)



(Ex. 1005, Rabenko, Fig. 1b (annotated); Pet., Paper 2, p. 15; Ex. 1002 Kiaei 1st Decl. ¶ 87)

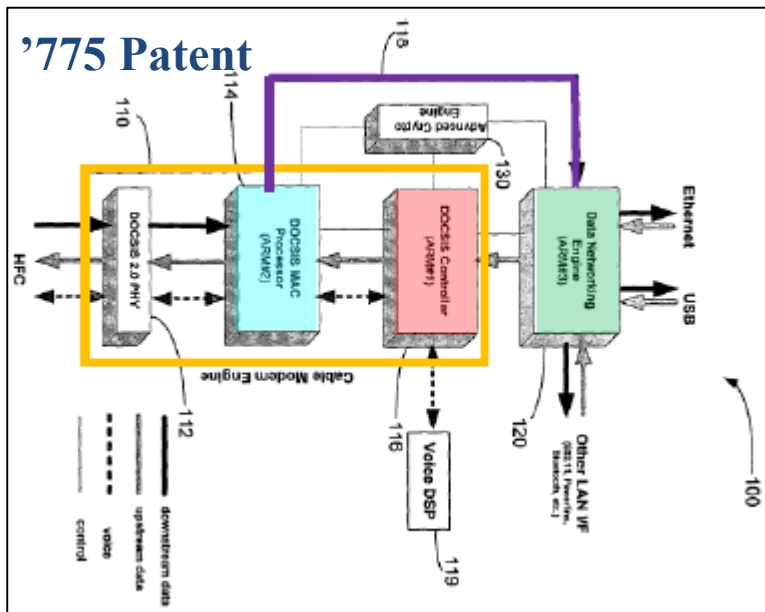
Rabenko Teaches the Data Networking Engine/Circuit

- Like the '775 Patent's data networking engine, Rabenko's HomePNA controller receives data payload packets from DOCSIS MAC/PHY 134.

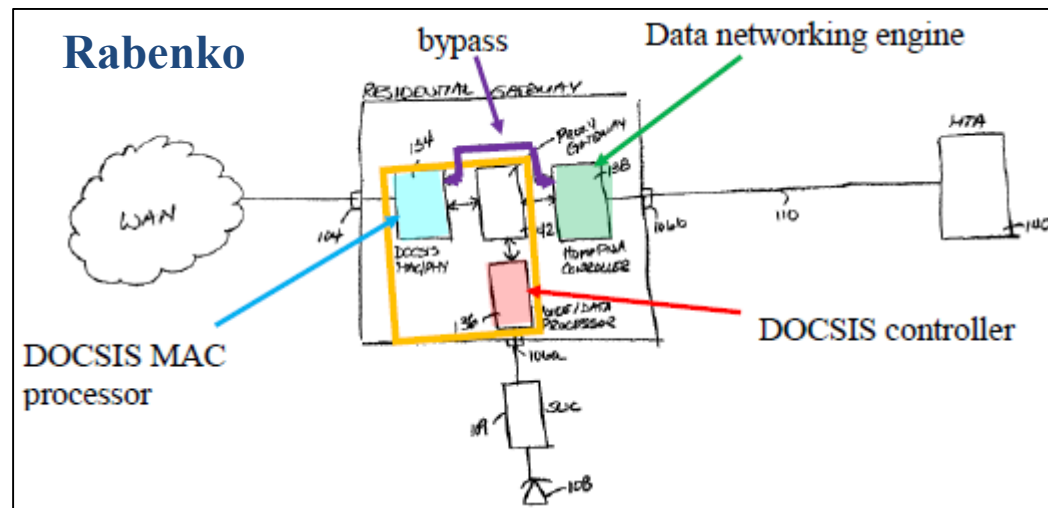
(Pet., Paper 2, pp. 4, 14, 32-34; Ex. 1002 Kiaei 1st Decl. ¶¶ 62, 86, 140-148; Ex. 1005, Rabenko, ¶¶ [0044]-[0045], [0080], Figs. 1a-1b, 2)

[0045] In the downstream direction, the DOCSIS MAC/PHY 134 determines whether the packet payload is voice or data. If the packet payload is data, then the DOCSIS MAC/PHY 134 routes the packet directly to a HomePNA controller 138.

(Ex. 1005, Rabenko, ¶ [0045]; *see also* Pet., Paper 2, pp. 32-34; Ex. 1002, Kiaei 1st Decl. ¶¶ 140-148)



(Ex. 1001, '775 Patent, Fig. 1 (rotated and annotated); *see also* Pet., Paper 2, pp. 2-3, 37)



(Ex. 1005, Rabenko, Fig. 1b (annotated); *see also* Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl. ¶¶ 61-64, 106-109, 141-148)

Rabenko Teaches the Data Networking Engine/Circuit

- Like the '775 Patent's data networking engine, a POSITA would have understood that Rabenko's HomePNA controller includes a processor.

(Pet., Paper 2, p. 16; Ex. 1002 Kiaei 1st Decl. ¶ 87; Ex. 1005, Rabenko, ¶¶ [0045]-[0046], [0080], [0268])

[0080] A HomePNA controller **138** enables a 4-32 Mbits/sec LAN using existing in home telephone wiring. The HomePNA controller **138** can be a fully integrated MAC/PHY device that provides bi-directional communication with devices such as for example a HomePNA phone, computer etc., operating on a HomePNA LAN via the subscriber port **106b** of the residential gateway. The HomePNA

(Ex. 1005, Rabenko, ¶ [0080]; Pet., Paper 2, p. 16; Ex. 1002 Kiaei 1st Decl. ¶ 87)

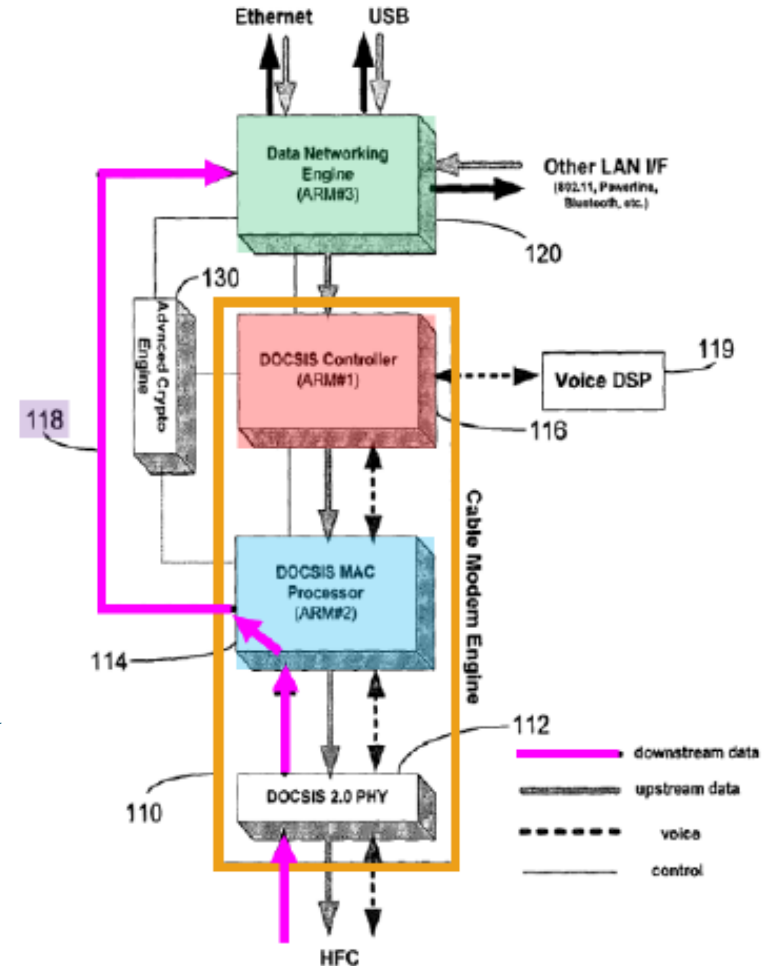
[0268] Those of skill in the art would understand that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented in any number of way including electronic hardware, computer software, or combinations 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.

(Ex. 1005, Rabenko, ¶ [0268]; see also Pet., Paper 2, pp. 26-27; Ex. 1002, Kiaei 1st Decl. ¶ 120)

Patent Owner Argues Rabenko Lacks the Cable Modem Engine/Circuit

- The '775 Patent describes that cable modem engine 110 includes a DOCSIS PHY layer 112, DOCSIS MAC processor 114, and a DOCSIS controller 116.
(Ex. 1001, '775 Patent, 2:55-58 ; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)
- The cable modem engine 110 “receives downstream data, transmits upstream data and receives and transmits voice data from/to an external source” such as “a HFC (hybrid fiber coax) cable.”
(Ex. 1001, '775 Patent, 2:61-67; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)
- The cable modem engine is “implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit.”

(Ex. 1001, '775 Patent, claim 18; Pet., Paper 2, p. 11; Ex. 1002, Kiaei 1st Decl., ¶ 105)



(Ex. 1001, '775 Patent, claim 18, Fig. 1 (annotated); see also Pet., Paper 2, pp.2-3; Ex. 1002, Kiaei 1st Decl., ¶¶ 48-49)

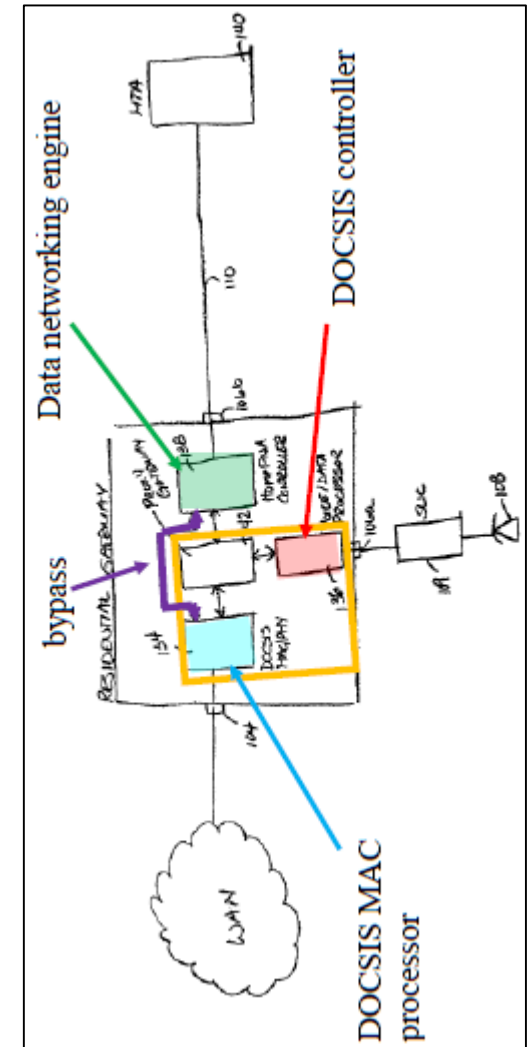
Rabenko Teaches the Cable Modem Engine/Circuit

- Like the '775 Patent, Rabenko's cable modem engine "receives downstream data, transmits upstream data and receives and transmits voice data from/to an external source" such as "a HFC (hybrid fiber coax) cable."
(Ex. 1001, '775 Patent, 2:61-67; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)
- Like the '775 Patent, Rabenko's cable modem engine includes a DOCSIS MAC/PHY layer 134, and a voice/data processor 136 (DOCSIS controller).
(Ex. 1001, '775 Patent, 2:55-58 ; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)
- Rabenko's cable modem engine is "implemented in a second circuit that includes at least one processor, the second circuit being separate from the first circuit."

(Ex. 1001, '775 Patent, 2:61-67; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)

(Ex. 1001, '775 Patent, 2:55-58 ; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)

(Ex. 1001, '775 Patent, claim 18; Pet., Paper 2, p. 11; Ex. 1002, Kiaei 1st Decl., ¶ 105)



(Ex. 1005, Rabenko, Fig. 1b (annotated); see also Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl., ¶¶ 61-64, 106-109, 141-148)

Rabenko Teaches the Cable Modem Engine/Circuit

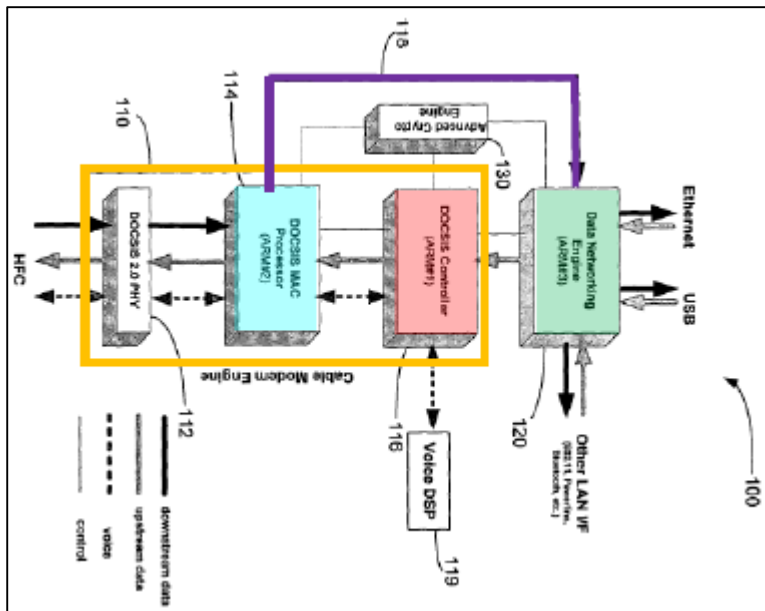
- Like the '775 Patent's cable modem engine, Rabenko's DOCSIS MAC/PHY, proxy gateway, and VDP include a DOCSIS MAC/PHY and a DOCSIS controller.

(Pet., Paper 2, pp. 21-22, 31-34; Ex. 1002, Kiaei 1st Decl., ¶¶ 106-115, 134-148; Ex. 1005, Rabenko, [0044]-[0045], [0074], [0085], [0087], Fig. 1b)

[0045] In the downstream direction, the DOCSIS MAC/PHY 134 determines whether the packet payload is voice or data. If the packet payload is data, then the DOCSIS MAC/PHY 134 routes the packet directly to a HomePNA controller 138.

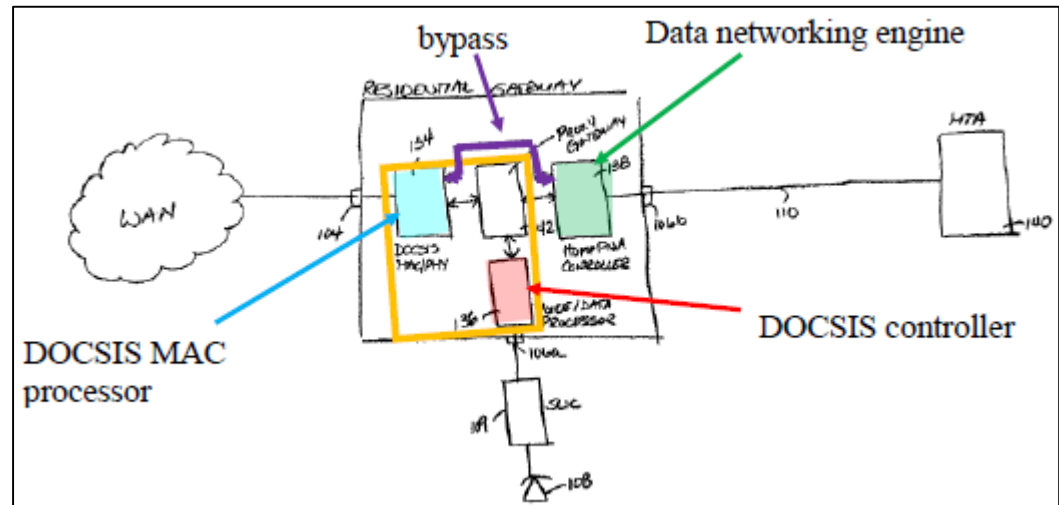
(Ex. 1005, Rabenko, ¶ [0045]; Pet., Paper 2, pp. 32-34; Ex. 1002, Kiaei 1st Decl., ¶¶ 140-148)

'775 Patent



(Ex. 1001, '775 Patent, Fig. 1 (rotated and annotated); see also Pet., Paper 2, pp. 2-3, 37)

Rabenko



(Ex. 1005, Rabenko, Fig. 1b (annotated); see also Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl., ¶¶ 61-64, 106-109, 141-148)

Rabenko Teaches the Cable Modem Engine/Circuit

- Like the '775 Patent's cable modem engine, Rabenko's DOCSIS MAC/PHY, proxy gateway, and VDP provide integrated functions for communicating with a cable head end via hybrid fiber coax (HFC) as a circuit. (Pet., Paper 2, pp. 21-22; Ex. 1002, Kiaei 1st Decl., ¶¶ 106-115; Ex. 1005, Rabenko, [0033], [0050], Fig. 1b)

'775 Patent

As seen in FIG. 1, DOCSIS PHY layer 112 receives downstream data, transmits upstream data and receives and transmits voice data from/to an external source. In one implementation, the external source is a HFC (hybrid fiber coax) cable employing both fiber optic and coaxial cable as an effective means for delivering combined data, video, voice, CATV and other communications.

(Ex. 1001, '775 Patent, 2:61-67; Pet., Paper 2, p. 2; Ex. 1002, Kiaei 1st Decl., ¶ 48)

Rabenko

[0033] The exemplary residential gateway 102 provides a mechanism to convert the physical media and protocols used for the IP network to the physical media and protocols used on the home wire pairs. In the described exemplary embodiment, a DOCSIS (Data Over Cable Service Interface Specification) network is used for delivery of broadband services, such as IP services over the IP network (an HFC network), to the network port 104. A residential gateway 102 with a cable modem can be used to perform this function. Alter-

(Ex. 1005, Rabenko, [0033]; Pet., Paper 2, p. 22; Ex. 1002, Kiaei 1st Decl., ¶ 110)

Rabenko

SIS). 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

(Ex. 1005, Rabenko, [0050]; Pet., Paper 2, p. 22; Ex. 1002, Kiaei 1st Decl., ¶¶ 109-110)

[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

(Ex. 1005, Rabenko, [0044]; Pet., Paper 2, p. 23; Ex. 1002, Kiaei 1st Decl., ¶¶ 106, 110, 112)

Rabenko Teaches the Cable Modem Engine/Circuit

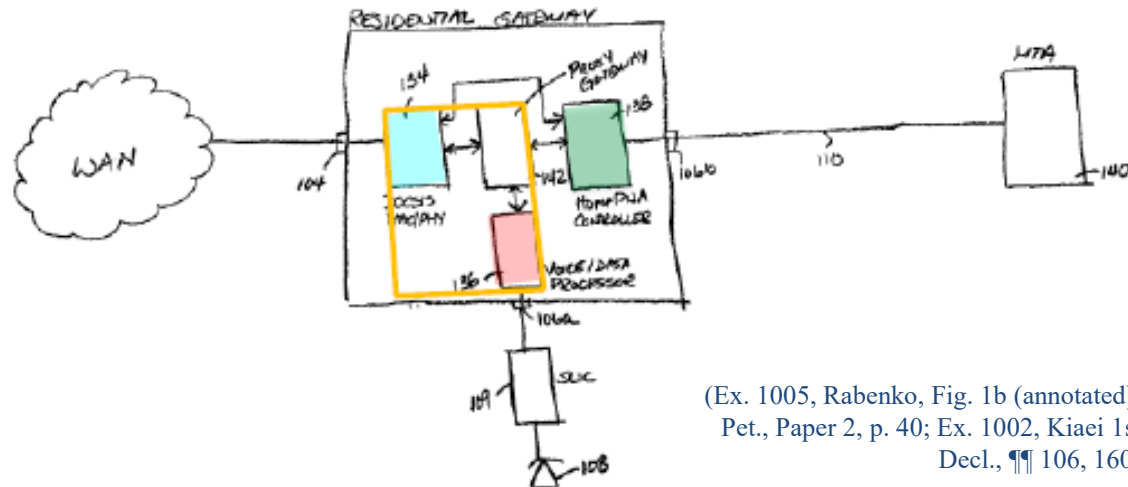
- Like the '775 Patent's cable modem engine, Rabenko's DOCSIS MAC/PHY, proxy gateway, and VDP are implemented in a circuit separate from the circuit of the HomePNA controller and AFE.

(Pet., Paper 2, pp. 21-24; Ex. 1002, Kiaei 1st Decl., ¶¶ 114-119; ID, Paper 11, pp. 26-27; Ex. 1005, Rabenko, Fig. 1b, 2)

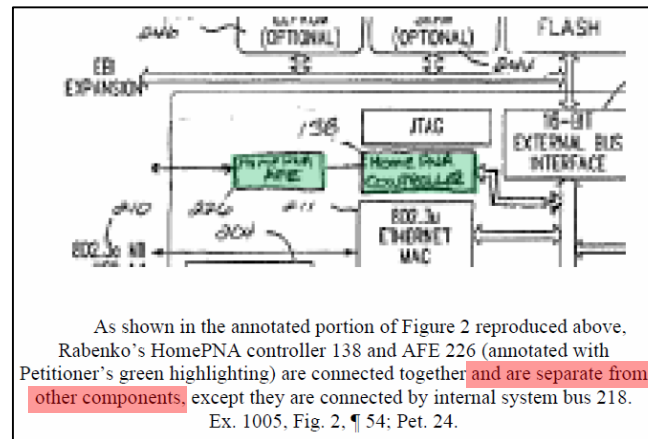
Rabenko

FIG. 1a. Conversely, if the DOCSIS MAC/PHY 134 determines that the packet payload is voice, the packet is routed to a proxy gateway **142** to be processed in a manner to be described in greater detail below. The proxy gateway 142 further determines whether the packet is destined for the 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

(Ex. 1005, Rabenko, [0045]; Pet., Paper 2, p. 23; Ex. 1002, Kiaei 1st Decl., ¶¶ 106-119)



(Ex. 1005, Rabenko, Fig. 1b (annotated);
Pet., Paper 2, p. 40; Ex. 1002, Kiaei 1st
Decl., ¶¶ 106, 160)



(ID, Paper 11, p. 26, annotated in red)

Originally Filed '775 Patent Does Not Mention a “Circuit”

- The original specification and drawings for the '775 Patent never included the word “circuit.”
(Ex. 1004, pp. 5-22; Reply, Paper 23, p. 10; Ex. 1018, Kiaei 2nd Decl., ¶ 37)
- The language of “first circuit” and “second circuit” was first added to the independent claims during prosecution.
(Ex. 1004, pp. 66-72; Reply, Paper 23, p. 10; Ex. 1018, Kiaei 2nd Decl., ¶ 37)
- Accordingly, the ordinary and customary meaning should apply.
(Pet., Paper 2, p. 12; Ex. 1002, Kiaei 1st Decl., ¶ 46)

circuit

(1) A set of electronic components that perform a particular function in an electronic system.

(Ex. 1019, p. 3; Reply, Paper 23, p. 10; Ex. 1018, Kiaei 2nd Decl., ¶ 37)

The Petition Described Rabenko's Data Networking Engine and Cable Modem Engine In Different Circuits

- Patent Owner argues that the Petition fails to “provide a foundation upon which to reach its conclusions” regarding Rabenko’s data networking engine and cable modem engine.

(POR, Paper 19, pp. 24-25; Ex. 2008, Russ 2nd Decl., ¶¶ 66-67)

- Initially, as previously noted by the Board, “Claim 18 does not require a division into structures that is identical to Figure 2 of the ’775 patent and does not require that ‘remaining components’ in Rabenko’s Figure 2 be grouped into one of the two engines.”

(ID, Paper 11, p. 25)

- As previously addressed, the Petition and Dr. Kiaei clearly describe how the identified components in Rabenko’s data networking engine are coupled together, thus comprising a circuit, and how these components perform the claimed home data networking functions in addition to how the identified components in Rabenko’s cable modem engine perform the claimed cable modem functions.

(Pet., Paper 2, pp. 4-6, 14-32; Ex. 1002, Kiaei, 1st Decl., ¶¶ 85-148; Demonstratives 16-25)

Patent Owner Argues Rabenko Lacks Independent Software Upgrades

[18A] 18. A cable modem system comprising: . . .

[18D] the cable modem engine configured to enable upgrades to its software in a manner that is independent of upgrades to the software of the data networking engine,

[18G] . . . wherein the cable modem functions performed by the cable modem engine are completely partitioned from the home networking functions performed by the data networking engine.

(Ex. 1001, '775 Patent, claim 18; Pet., Paper 2, pp. 13, 26, 35; Ex. 1002, Kiaei 1st Decl., ¶¶ 83, 120, 149)

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

(Ex. 1001, '775 Patent, 4:25-28; Reply, Paper 23, pp. 19-20; Ex. 1018, Kiaei 2nd Decl., ¶ 59)

Rabenko Is Configured to Enable Independent Software Upgrades

- Rabenko's HomePNA controller 138 and AFE 226 (in Figure 2) are separate from the remaining residential gateway, including DOCSIS MAC/PHY 134, proxy gateway 142, and voice/data processor 136.

(Pet., Paper 2, pp. 21-23, 26; Ex. 1002, Kiaei 1st Decl., ¶¶ 114-120; ID, Paper 11, pp. 26-27; Ex. 1005, Rabenko, Fig. 1b, 2)



[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.

(Ex. 1005, Rabenko, [0268]; see also Pet., Paper 2, pp. 26-27; Ex. 1002, Kiaei 1st Decl., ¶ 120)

Rabenko Renders Obvious Configured to Enable Independent Software Upgrades

- “[W]hen 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.”

(Pet., Paper 2, p. 27; Ex. 1002, Kiaei 1st Decl., ¶ 122; Ex. 1005, Rabenko, [0268])

- A POSITA knows from Gaspar’s teaching that by “partitioning the MAC and PHY circuits, the MAC circuit can be implemented with a programmable device such as an FPGA. As such, the controller circuit can be debugged or upgraded by modifying the MAC circuit, leaving the PHY circuit intact.”

(Pet., Paper 2, p. 28; Ex. 1002, Kiaei 1st Decl., ¶ 125; Ex. 1006, Gaspar, [0014]; ID, Paper 11, pp. 29-30)

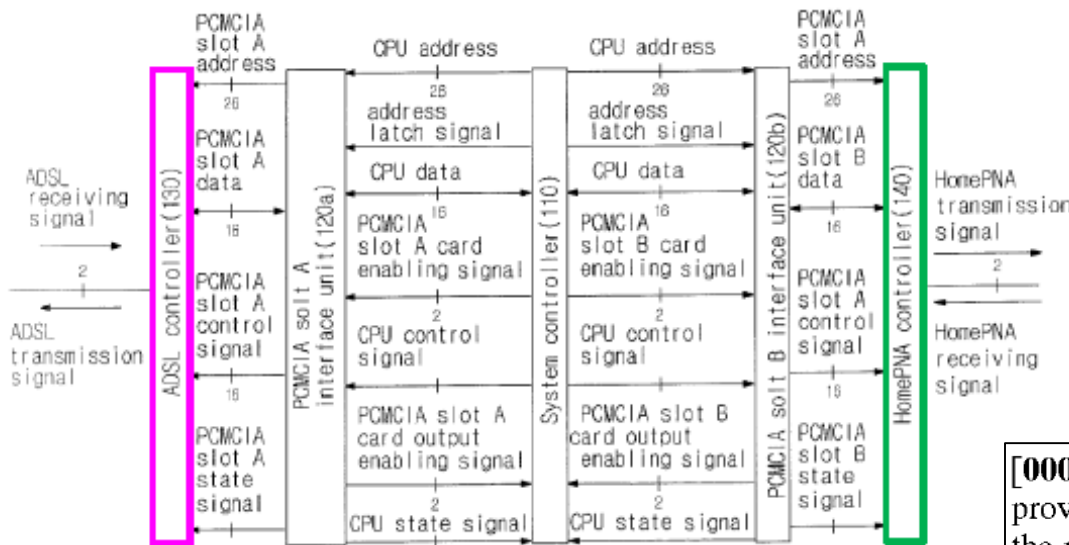
- “One problem with the design of an HPNA controller is that as protocols change or standards evolve, the HPNA controller must be upgraded.”

(Ex. 1006, Gaspar, [0014]; Pet., Paper 2, pp. 27-28; Ex. 1002, Kiaei 1st Decl., ¶ 125)

Rabenko-Kim Renders Obvious Configured to Enable Independent Software Upgrades

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

(Ex. 1007, Kim, [0026]; Pet., Paper 2, p. 29; Ex. 1002, Kiaei 1st Decl., ¶ 127)



(Ex. 1007, Kim, Fig. 3 (annotated); Pet., Paper 2, p. 29; Ex. 1002, Kiaei 1st Decl., ¶ 127)

[0008] It is another object of the present invention to provide a modular-type home gateway system for improving the performance of HomePNA controller or ADSL controller by maintaining the system controller of a home gateway and replacing either a modular-type HomePNA controller or a modular-type ADSL controller, thereby improving the total performance of the home gateway.

(Ex. 1007, Kim, [0008]; Pet., Paper 2, pp. 28, 30-31; Ex. 1002, Kiaei 1st Decl., ¶ 69, 126-131)

Rabenko-Kim Renders Obvious Configured to Enable Independent Software Upgrades

- Similar to Rabenko, Kim describes a home-based telecommunications system that includes a residential gateway. (Ex. 1007, Abstract, [0001]-[0016]; Pet., Paper 2, p. 7; Ex. 1002, Kiaei 1st Decl., ¶ 69)
- Kim’s residential gateway includes a HomePNA controller that provides home networking functionality (like Rabenko’s HomePNA controller) and an ADSL (Advanced Digital Subscriber Line) controller for interfacing with an access network (similar to Rabenko’s DOCSIS MAC/PHY interfacing with the WAN). (Ex. 1007, [0026], [0032]-[0042]; Pet., Paper 2, pp. 7, 28; Ex. 1002, Kiaei 1st Decl., ¶¶ 69, 126)
- Kim addresses a concern of conventional integrated systems that “if a user wants to improve a performance of [the] HomePNA controller or ADSL controller, the whole home gateway system should be improved, thereby incurring a user’s inconvenience as well as cost ineffectiveness.” (Ex. 1007, [0005], with emphasis; Pet., Paper 2, p. 28; Ex. 1002, Kiaei 1st Decl., ¶ 127)

Rabenko-Kim Renders Obvious Configured to Enable Independent Software Upgrades

- Kim's use of modular controllers beneficially provides "a small-sized and economical structure," that results in less cost and inconvenience when updating the controllers.
(Ex. 1007, [0007]; Pet., Paper 2, pp. 29-30; Ex. 1002, Kiaei 1st Decl., ¶ 128)
- It would have been obvious for a POSITA to apply Kim's teachings to Rabenko to yield a system wherein Rabenko's HomePNA controller is independently upgradable from other components (as taught in Kim), such as the DOCSIS MAC/PHY, proxy gateway, and voice/data processor, in order to allow the efficient updating of any of Rabenko's partitioned components, resulting in less cost and inconvenience to the user.
(Pet., Paper 2, p. 30; Ex. 1002, Kiaei 1st Decl., ¶ 129; Ex. 1007, [0002]-[0008])

Patent Owner's Expert Admits It is Well-known that Upgrading Embedded Software is Possible, Albeit Difficult

Embedded software, however, is generally not upgradable. As Dr. Russ explains:

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 following:

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

...

Users are *unable to change or update embedded systems*. They must have good dependability and stability ratings. The user shouldn't have any problems using them for extended periods.

Ex. 2005 [IoT].

(POR, Paper 19, p. 53, annotated in red)

Rabenko's Embedded Software is Optional

[0074] A voice and data processor 213 is used for processing and transporting voice over packet based networks such as PCs running network on a USB (Universal Serial Bus) or an asynchronous serial interface, LANs such as Ethernet, WANs such as IP, Frame Relay (FR), Asynchronous Transfer Mode (ATM), Public Digital Cellular Network such as TDMA (IS-13x), CDMA (IS-9x) or GSM for terrestrial wireless applications, or any other packet based system. The described embodiment of the voice and data processor 213 also supports the exchange of voice, as well as facsimile and modem, between the POTS telephone 108 (see FIG. 1a), or any number of telephony devices, and the 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. In the described exemplary embodiment, the voice and data processor 213 includes the proxy gateway function described in connection with FIG. 1b. Alternatively, the proxy gateway function could be implemented in the MIPS core 228. The functional partitioning of the voice and data processor 213 and the MIPS core 228 can take on various forms depending upon the particular application, the overall design constrains or other relevant factors.

(Ex. 1005, Rabenko, [0074]; Reply, Paper 23, p. 24)

[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.

(Ex. 1005, Rabenko, [0268]; see also Pet., Paper 2, pp. 26-27; Ex. 1002, Kiaei 1st Decl., ¶ 120)

Patent Owner's Expert Admits Embedded Software is Upgradeable

- Patent Owner's expert explaining how to upgrade embedded software:

difficult.”). Upgrading embedded software would require a facility for accessing, verifying, extracting, and installing the upgraded software. At the time, these facilities required another processor and other software, or possibly special hardware or a specialized software “bootloader.” Such upgrades generally interrupt normal operation of the software in question while they occur and require careful design and testing.

(Ex. 2008, Russ 2nd Decl., ¶ 106; POR, Paper 19, pp. 53-54)

- Patent Owner's expert admitting upgrading embedded software is possible, albeit difficult:

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 following:

(Ex. 2008, Russ 2nd Decl., ¶ 105; POR, Paper 19, pp. 53-54)

Patent Owner's Evidence Admits Embedded Software is Upgradeable

- Patent Owner's exhibit admitting that embedded systems can be updated without physical access:

Can embedded systems be reprogrammed or updated?

In some cases, yes. Many modern embedded systems support over-the-air (OTA) updates, allowing for reprogramming without physical access to the device.

(Ex. 2005, p. 4, annotated in red ; POR, Paper 19, pp. 53-54)

- Patent Owner's exhibit admitting that even embedded systems that depend on certain hardware platforms can be upgraded:

5. Hardware Dependence

Because embedded systems are sometimes related to certain hardware platforms, upgrading the system without changing the hardware can be difficult.

(Ex. 2004, p. 8, annotated in red; POR, Paper 19, p. 54)

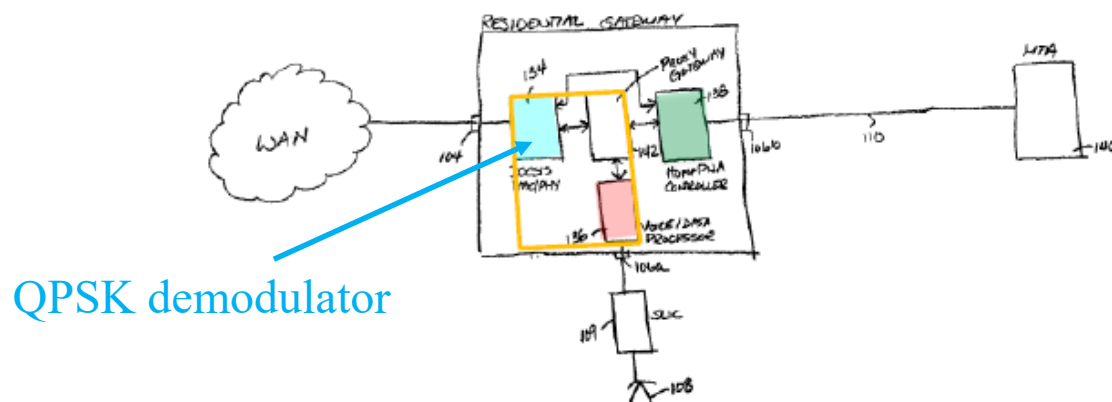
Claim 19: Patent Owner Argues Rabenko Lacks “All DOCSIS Functions” Localized in the Cable Modem Engine

(POR, Paper 19, p. 58)

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

- Patent Owner asserts that “Petitioner fails to account for Rabenko’s QPSK out of band downstream demodulator 206 (‘QPSK demodulator’), which performs DOCSIS functions but is not even alleged to be a part of the CME.”

(POR, Paper 19, pp. 58, 60-62)



Rabenko Teaches the Additional Features of Claim 19

- The Petition identifies functions performed by Rabenko's DOCSIS MAC/PHY 134/212, which the Petition identified as part of Rabenko's cable modem engine.

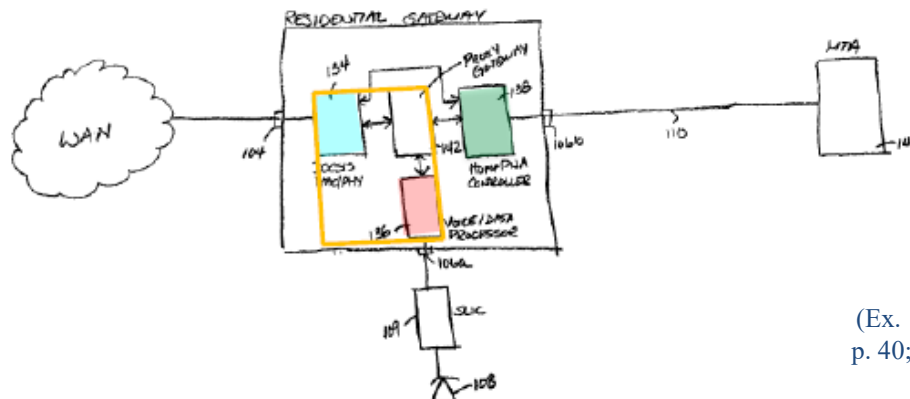
(Pet., Paper 2, p. 39; Ex. 1002, Kiaei 1st Decl., ¶¶ 160-162)

- The Petition further identifies functions performed by Rabenko's voice and data processor 136/213, which the Petition also identified as part of Rabenko's cable modem engine.

(Pet., Paper 2, p. 40)

- Finally, the Petition identified that Rabenko's HomePNA controller 138 does not perform any DOCSIS function.

(Pet., Paper 2, p. 40)



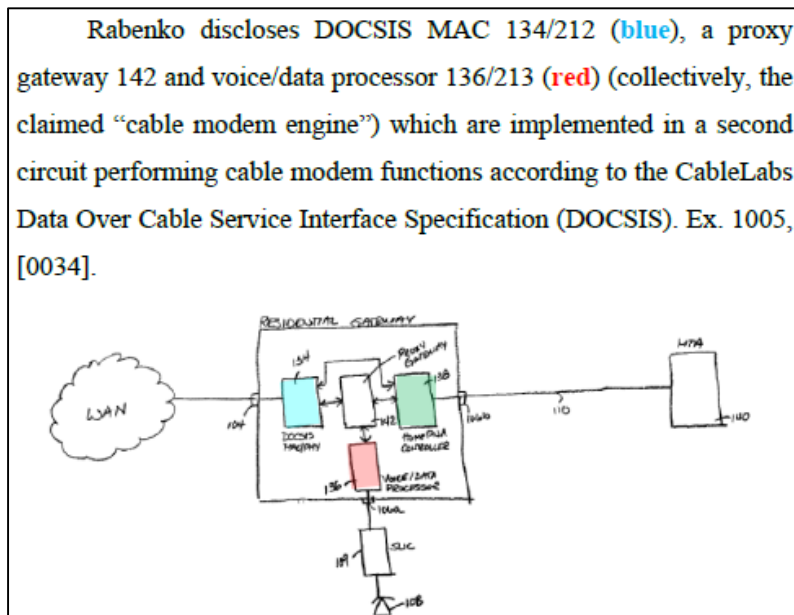
(Ex. 1005, Fig. 1b (annotated); Pet., Paper 2, p. 40; Ex. 1002, Kiaei 1st Decl., ¶¶ 106, 160)

Petitioner Does Account for Rabenko's QPSK Out of Band Demodulator

- For its argument, Patent Owner only identifies a single component of Rabenko, its QPSK demodulator 206, as performing a “DOCSIS function,” and alleges that the Petition and Dr. Kiaei never purport it to be part of Rabenko’s CME.

(POR, Paper 19, pp. 58, 60-62; Ex. 2008, Russ 2nd Decl., ¶ 120)

- Section VI.A.1.c of the Petition, specifically cited for claim 19, states,



(Pet., Paper 2, pp. 21, 39; Ex. 1002, Kiaei 1st Decl., ¶¶ 160-161; Reply, Paper 23, p. 25; Ex. 1018, Kiaei, 2nd Decl., ¶ 69)

Petitioner Does Account for Rabenko's QPSK Out of Band Demodulator

- Immediately thereafter, the Petition cites to paragraph [0050] of Rabenko:

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.

(Pet., Paper 2, pp. 21-22, 39; Ex. 1002, Kiaei 1st Decl., ¶¶ 106, 160-161; Reply, Paper 23, p. 26; Ex. 1018, Kiaei, 2nd Decl., ¶ 71)

- Thus, Rabenko's DOCSIS MAC/PHY 134, as part of the claimed CME, includes a MAC layer and physical (PHY) layer interface.
- QPSK demodulator 206 is a physical layer interface. Any POSITA would have understood that DOCSIS MAC/PHY 134 (**part of the cable modem engine**) would include this interface.

(Pet., Paper 2, pp. 21-22, 39; Ex. 1002, Kiaei 1st Decl., ¶¶ 106, 160-161; Reply, Paper 23, p. 26; Ex. 1018, Kiaei, 2nd Decl., ¶ 71)

Patent Owner's "All DOCSIS Functions Are Localized in the Cable Modem Engine" Argument Is Disassociated From the Contextual Claim Language and the '775 Patent Specification

- If Patent Owner is arguing that all possible DOCSIS functions are actually in the cable modem engine, Patent Owner's argument is inconsistent with the '775 Patent specification and claims.

(Reply, Paper 23, p. 26; Ex. 1018, Kiaei, 2nd Decl., ¶ 73)

- In actuality, claim 19 is setting forth that, as between the two engines in claim 18, all DOCSIS functions are localized within the cable modem engine.

(Reply, Paper 23, p. 26; Ex. 1018, Kiaei, 2nd Decl., ¶ 73)

- If not, claim 19 would contradict the specification of the '775 Patent.

(Reply, Paper 23, p. 26; Ex. 1018, Kiaei, 2nd Decl., ¶ 73)

Patent Owner's "All DOCSIS Functions" Position

Conflicts with the '775 Patent and Claim 4

- The '775 Patent describes an advanced crypto engine 130 implementing a DOCSIS function that is expressly separate from the CME.

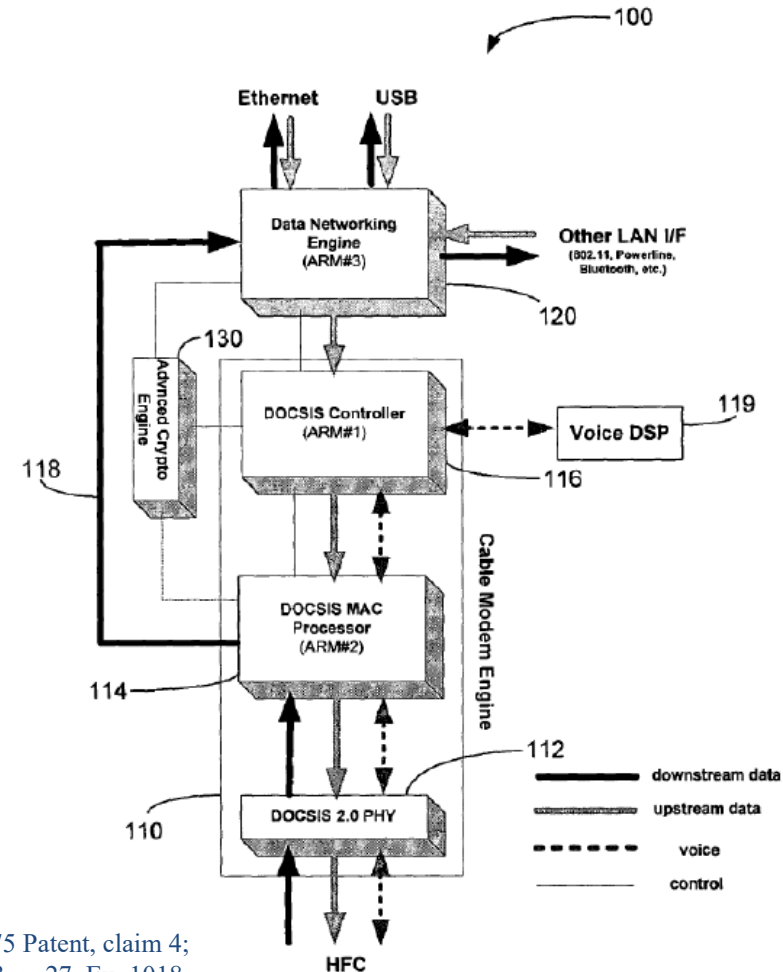
(Reply, Paper 23, p. 27; Ex. 1018, Kiaei, 2nd Decl., ¶ 74)

- "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)."

(Ex. 1001, '775 Patent, 4:4-8 (emphasis added); Reply, Paper 23, p. 27; Ex. 1018, Kiaei, 2nd Decl., ¶ 75)

4. A cable modem system as claimed in claim 1, and further comprising an advanced crypto engine configured to perform all crypto functions for both the data networking engine and the cable modem engine, the advanced crypto engine being separate from both the data networking engine and the cable modem engine.

(Ex. 1001, '775 Patent, claim 4; Reply, Paper 23, p. 27; Ex. 1018, Kiaei, 2nd Decl., ¶ 76)



(Ex. 1001, '775 Patent, Fig. 1; Pet., Paper 2, p. 2)

Claim 12: Patent Owner Argues that Specific Processor Model Numbers are Not Identified in Combinations

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.

(Ex. 1001, '775 Patent, claim 12; Reply, Paper 23, p. 27; Ex. 1018, Kiaei, 2nd Decl., ¶¶ 77-78)

- The Petition establishes that Rabenko, per paragraph [0268] teaches that its embodiments may be implemented in any number of ways.

(Pet., Paper 2, pp. 56-57; Ex. 1002, Kiaei 1st Decl., ¶¶ 229-230; Ex. 1005, Rabenko, ¶ [0268]; Reply, Paper 23, p. 27; Ex. 1018, Kiaei, 2nd Decl., ¶ 78)

- Furthermore, the Petition identified Klein and Kim '678 as teaching the use of the specific processors recited in claim 12 in similar applications.

(Pet., Paper 2, pp. 59-60; Ex. 1002, Kiaei 1st Decl., ¶¶ 227-233; Reply, Paper 23, pp. 27-28; Ex. 1018, Kiaei, 2nd Decl., ¶¶ 77-80)

- A POSITA would have understood that implementing Rabenko's DOCSIS MAC and VDP using the claimed ARM processors would have been an obvious design choice considering "how best to implement the described functionality for each particular application."

(Ex. 1005, Rabenko, ¶ [0268]; Pet., Paper 2, p. 58; Ex. 1002, Kiaei 1st Decl., ¶ 231; Reply, Paper 23, pp. 27-28; Ex. 1018, Kiaei, 2nd Decl., ¶¶ 77-80)

Claim 12: Patent Owner Argues that Specific Processor Model Numbers are Not Identified in Combinations

Rabenko

[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.

(Ex. 1005, Rabenko, [0268]; see also Pet., Paper 2, pp. 56-61; Ex. 1002, Kiaei 1st Decl., ¶¶ 226-237)

[0076] System-on-a-chip **400** includes a CPU **422**, that is a master of system bus **410**. CPU **422** may be an ARM reduced instruction set computer (RISC) CPU with a cache. Exemplary blocks for CPU **422** may be parts designated by ARM Co. as ARM920T and ARM940T.

(Ex. 1015, Kim '678, [0076]; Pet., Paper 2, pp. 8-9, 59-60; Ex. 1002, Kiaei, 1st Decl., ¶ 231-236)

120 for performing logic functions. In one embodiment, the ARM9TDMI from ARM, Ltd. may be used as the RISC microcontroller **120**, although other microcontrollers also may be used. The RISC microcontroller **120** may possess a

(Ex. 1016, Klein, [0008]-[0009], [0024]; Pet., Paper 2, pp. 9, 59-61; Ex. 1002, Kiaei, 1st Decl., ¶ 231-236)

Rebuttal Slides

“in order to boost downstream throughput” is an Intended Result

- The recitation of limitation [18F]: “in order to boost downstream throughput” is an intended result of the “bypassing” and does not limit the apparatus
- As the '775 Patent states:

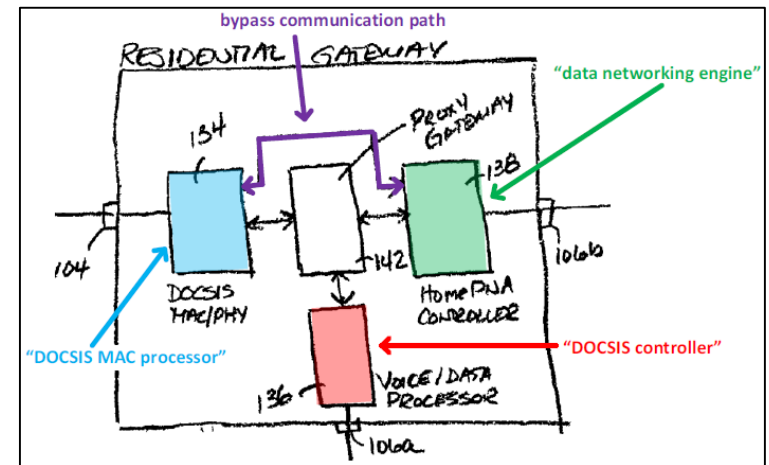
To increase downstream throughput, all processing of DS PDU (protocol data unit) packets is done within processor 114 without involving controller 116. After being processed, DS PDU packets are forwarded by processor 116 directly to data networking engine 120 along path 118, bypassing controller 116.

(Ex. 1001, '775 Patent, 3:11-16; *see also* Pet., Paper 2, pp. 33-34; Ex. 1002, Kiaei 1st Decl. ¶¶ 141-148)

- A POSITA would have understood that as a signal passes through a circuit, by bypassing a component, downstream throughput is increased or “boosted” since the signal travels through fewer components to reach its destination.

(Pet., Paper 2, p. 34; Ex. 1002, Kiaei 1st Decl. ¶¶ 144-148)

(Ex. 1005, Rabenko, Fig. 1b (excerpted, annotated); *see also* Pet., Paper 2, p. 33; Ex. 1002, Kiaei 1st Decl. ¶ 141)



Patent Owner's Implicit Construction and Later Clarification are Wrong and Unsupported by the '775 Patent

- Patent Owner's construction in the parallel District Court proceeding has no Rabenko-induced carve-out.

(Reply, Paper 23, p. 2; Ex. 1018, *see generally*, Ex. 1023, Entropic's Opening Claim Construction Brief)

- No doubt because the intrinsic record of the '775 Patent recognizes that DOCSIS functions include those related to VoIP:

'775 Patent

Functional Partitioning. The gateway cable modem will incorporate a variety of functions beyond the traditional cable modem, including IP routing, network address translation (NAT)/firewall, virtual private network (VPN), web server and VoIP. These functions need to utilize DOCSIS (Data Over Cable Service Interface Specification) services (link-layer

(Ex. 1001, '775 Patent, 1:20-25; Reply, Paper 23, p. 2; Ex. 1018, Kiaei 2nd Decl., ¶ 9)

The PacketCable Infrastructure Exploits and Enhances DOCSIS Access Networks

- The '775 Patent and Rabenko similarly invoke **PacketCable** for implementing VoIP via DOCSIS, **a Specification intended to support IP-based voice over DOCSIS**

(Ex. 1001, '775 Patent, 2:15-19, 3:39-48; Ex. 1005, Rabenko, ¶ [0108]; Pet., Paper 2, pp. 3, 33; Reply, Paper 23, p. 3; Ex. 1018, Kiaei 2nd Decl., ¶ 12-13)

Since its inception the PacketCable initiative has been positioned as an IP-based Multimedia service deployment infrastructure, exploiting and enhancing the underlying QoS capabilities of the DOCSIS 1.1 access network. Based on market demand and technology readiness, VoIP was chosen as the first IP-based service to leverage these unique broadband access network capabilities, as the PacketCable 1.x suite of specifications simultaneously defines both a general QoS-based service delivery framework and a number of telephony-specific functional elements and mechanisms.

(Ex. 1025, PacketCable Specification, p. 2; *see also* Reply, Paper, 23, p. 3; Ex. 1018, Kiaei 2nd Decl., ¶ 12)

Service Flow management is performed through MAC-layer DOCSIS Dynamic Service Add/Change/Delete (DSA/DSC/DSD) messaging, which may be initiated either by the CM or by the CMTS.

(Ex. 1025, PacketCable Specification, p. 8; *see also* Reply, Paper, 23, p. 3; Ex. 1018, Kiaei 2nd Decl., ¶ 12)

Key features of the described Multimedia service delivery framework include:

- Simple, powerful access to DOCSIS[®] 1.1 QoS mechanisms supporting both time and volume-based network resource authorizations

(Ex. 1025, PacketCable Specification, p. 1; *see also* Reply, Paper, 23, p. 3; Ex. 1018, Kiaei 2nd Decl., ¶ 12)

The PacketCable Infrastructure Exploits and Enhances DOCSIS Access Networks

- Similarly, the PacketCable Technical Report states:

PacketCable Multimedia provides access to the full set of CMTS upstream scheduling algorithms as defined in DOCSIS 1.1.

(Ex. 1026, PacketCable Technical Report, p. 13; Ex. 1018, Kiaei 2nd Decl., ¶ 12)

The primary focus of PacketCable 1.x is residential telephony services. As a part of this effort, the Dynamic Quality of Service (DQoS) specification was developed, defining the mechanisms necessary to deliver QoS on the DOCSIS-based access portion of the IP network.

(Ex. 1026, PacketCable Technical Report, p. 34; Ex. 1018, Kiaei 2nd Decl., ¶ 12)

- So, when VoIP is implemented in a DOCSIS network, for example, via PacketCable and as taught by Rabenko, it includes DOCSIS operations.

(Ex. 1001, '775 Patent, 1:20-25; Reply, Paper 23, pp. 2-3; Ex. 1018, Kiaei 2nd Decl., ¶ 9, 12-15)

Patent Owner Fundamentally Misrepresents How Rabenko Operates

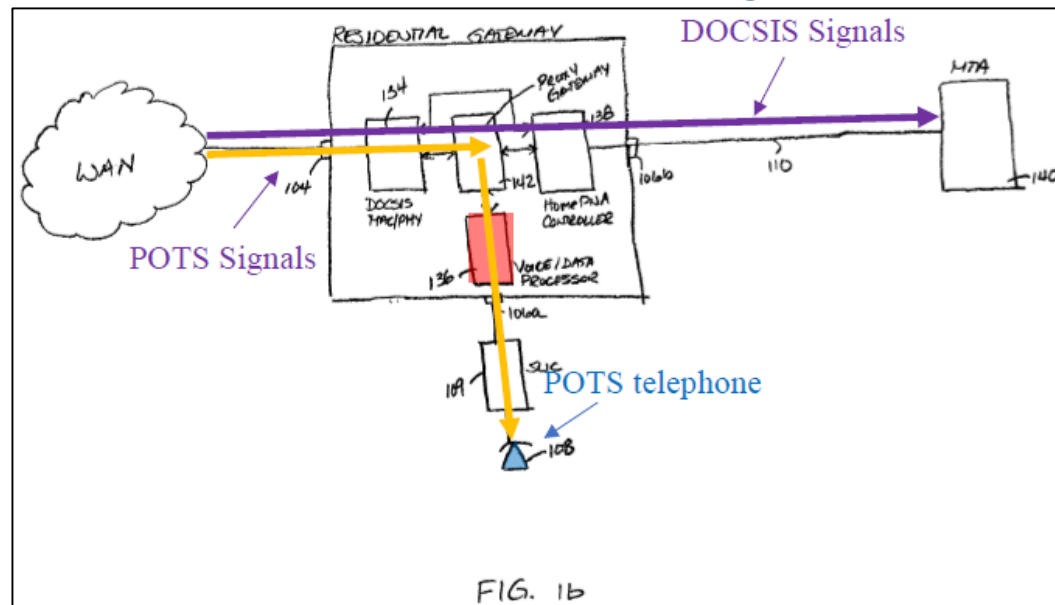
- Patent Owner fundamentally misrepresents Rabenko's teachings around DOCSIS and POTS.
(Reply, Paper 23, pp. 5-7; POR, Paper 19, pp. 14-21; Ex. 1018, Kiaei's 2nd Decl., ¶¶ 18-25)
- Patent Owner misrepresents Rabenko to teach its gateway receiving analog POTS signals.
(Reply, Paper 23, pp. 5-7; POR, Paper 19, pp. 19-21; Ex. 1018, Kiaei's 2nd Decl., ¶¶ 18-25)
- Rabenko receives digital IP DOCSIS packets only.
(Reply, Paper 23, pp. 5-7; POR, Paper 19, pp. 19-21; Ex. 1018, Kiaei's 2nd Decl., ¶¶ 18-25)
- Rabenko's VDP *converts* DOCSIS voice packets to POTS signals.
(Reply, Paper 23, pp. 5-7; POR, Paper 19, pp. 19-21; Ex. 1018, Kiaei's 2nd Decl., ¶¶ 18-25)

Patent Owner Fundamentally Misrepresents How Rabenko Operates

- Relying on its annotated Rabenko Fig. 1b, Patent Owner argues that Rabenko's VDP has nothing to do with DOCSIS but processes signals over POTS.

(POR, Paper 19, pp. 15-21)

PO annotated Rabenko Fig. 1b



(POR, Paper 19, p. 20)

- But Patent Owner misstates and misrepresents Rabenko's teachings: the residential gateway does not receive analog plain old telephone signals (POTS) on the wide area network (WAN)

(Reply, Paper 23, pp. 5-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 19-24)

Rabenko's Gateway Receives DOCSIS Only from the WAN, Not POTS

- Rabenko never describes analog POTS services arriving at its gateway via WAN: Rabenko describes one digital packet-based DOCSIS utilities interface—network port 104.

(Ex. 1005, Rabenko, ¶¶ [0002], [0004], [0005], [0032]-[0034], [0045]-[0047], [0050], [0074], [0098], [0122]; Figs. 1a, 1b; *see also* Pet., Paper 2, pp. 17-18, 21-23, 31, 70; Ex. 1002, Kiaei 1st Decl., ¶¶ 96-97, 210; Reply, Paper 23, pp. 5-7; Ex. 1018, Kiaei, 2nd Decl., ¶¶ 21-24)

[0002] The present invention relates generally to telecommunications systems, and more particularly, to telecommunications systems supporting voice and data services on a shared medium.

- Rabenko's “shared medium” is IP DOCSIS

(Ex. 1005, Rabenko, ¶¶ [0002], [0004], [0005], [0032]-[0034], [0045]-[0047], [0050], [0074], [0098], [0122]; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24; Pet., Paper 2, pp. 17-18, 22, 70; Ex. 1002, Kiaei 1st Decl., ¶¶ 96-97, 210; Reply, Paper 23, pp. 5-7)

By way of example, one port 104 can provide a network pipe to communicate with a WAN (Wide Area Network), such as an IP (Internet Protocol) network that is capable of delivering IP services to the home.

(Ex. 1005, Rabenko, ¶ [0032]; *see also* Pet. Paper 2, pp. 17-18; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶ 21-24)

In the described exemplary embodiment, a DOCSIS (Data Over Cable Service Interface Specification) network is used for delivery of broadband services, such as IP services over the IP network (an HFC network), to the network port 104.

(Ex. 1005, Rabenko, ¶ [0033]; *see also* Pet. Paper 2, pp. 17-18, 22; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶ 21-24)

Rabenko's VDP Converts DOCSIS Voice to POTS

- Rabenko's VDP **converts and processes** received DOCSIS IP packet-based voice to analog POTS signals.

(Ex. 1005, Rabenko, ¶¶ [0033]-[0034], [0044]-[0045], [0047]; Pet., Paper 2, pp. 17-18, 22-23, 25, 32, 47; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24)

[0033] The exemplary residential gateway 102 provides a mechanism to convert the physical media and protocols used for the IP network to the physical media and protocols used on the home wire pairs.

(Ex. 1005, Rabenko, ¶ [0033]; *see also* Pet. Paper 2, pp. 17-18, 22; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶ 21)

To this end, the exemplary residential gateway 102 may include high voltage circuits and processing elements to convert packetized voice delivered over IP network to the continuous analog voltages used for POTS.

(Ex. 1005, Rabenko, ¶ [0034]; *see also* Pet. Paper 2, pp. 17-18, 22; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶ 21)

Rabenko's VDP Converts DOCSIS Voice to POTS (cont.)

- Rabenko's VDP converts and processes received DOCSIS IP packet-based voice to analog POTS signals.

(Ex. 1005, Rabenko, ¶¶ [0033]-[0034], [0044]-[0045], [0047]; Pet., Paper 2, pp. 17-18, 22-23, 25, 32, 47; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24)

All packets that arrive to or leave from the residential gateway via the WAN must go through the DOCSIS MAC/PHY 134.

(Ex. 1005, Rabenko, ¶ [0044]; *see also* Pet. Paper 2, pp. 5, 16, 23, 25, 32; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24)

- Patent Owner confuses Rabenko's description of compatibility with downstream POTS terminal devices as a description of receiving upstream analog POTS signals.

(Ex. 1005, Rabenko, ¶¶ [0003]-[0005], [0032]-[0033], [0041], [0080]; Reply, Paper 23, pp. 5-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 19-24)

[0045] In the downstream direction, the DOCSIS MAC/PHY 134 determines whether the packet payload is voice or data.

...

Conversely, if the DOCSIS MAC/PHY 134 determines that the packet payload is voice, the packet is routed to a proxy gateway 142 to be processed in a manner to be described in greater detail below.

...

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.

(Ex. 1005, Rabenko, ¶ [0045]; *see also* Pet. Paper 2, pp. 5, 16, 23, 25, 32; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24)

Patent Owner's Expert Concedes that DOCSIS Uses Digital Packets Whereas POTS Signals are Analog

- DOCSIS is a **digital IP packet-based** network protocol

(Ex. 1005, Rabenko, ¶¶ [0034], [0044]-[0047], [0083]; *see also* Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 22-24)

- Dr. Russ testifies:

- Q: “IP packets transmitted, for example, in a DOCSIS network are digital; is that correct?”
- A: “Yes.”

(Ex. 1021, Russ Dep., 48:14-18)

- POTS signals are not packet-based, POTS signals are **analog**

(Ex. 1005, Rabenko, ¶¶ [0034], [0045]-[0047]; Ex. 2008, Russ 2nd Decl., ¶ 53; Ex. 1021, Russ Dep., 49:11-17, 52:14-20, 53:8-13; Ex. 1002, Kiaei 1st Decl., ¶ 113; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24; Ex. 2009, Kiaei 1st Depo., 64:16-25, 65:1-22; 82:11-83:24; Pet., Paper 2, p. 23; POR, Paper 19, pp. 16-17; Reply, Paper 23, pp. 6-7)

- Dr. Russ testifies:

- Q: “Isn’t it true, Dr. Russ, that traditional POTS signals—that’s plain old telephone signals—are analog?”
- A: “Yes. Yes. The interface over a POTS connection is analog. For example, voice is analog.”

(Ex. 1021, Russ Dep., 49:11-17)

Patent Owner's Expert Concedes that DOCSIS Uses Digital Packets Whereas POTS Signals are Analog

- Dr. Russ concedes that analog POTS signals are not packetized/depacketized, as described in Rabenko

(Ex. 1018, Kiaei 2nd Decl., ¶¶ 22-24; Ex. 1021, Russ 2nd Depo., 52:14-20, 53:8-13; Reply, Paper 23, p. 7)

- Dr. Russ testifies:
 - Q: “The analog signal can be compressed and decompressed in its analog form?”
 - A: “In the context of POTS, it could be converted to digital and compressed, for example; and then on the other end, decompressed and converted back to analog.”
 - Q: “[I]n the context of POTS, isn’t it true that the analog waveform itself is not packetized and depacketized?”
 - A: “I believe that’s correct, yes.”

(Ex. 1018, Kiaei 2nd Decl., ¶¶ 22-24; Ex. 1021, Russ 2nd Depo., 52:14-20, 53:8-13; Reply, Paper 23, p. 7)

Patent Owner Admits the DOCSIS Signal Traverses the Proxy Gateway Which May be Included in the VDP

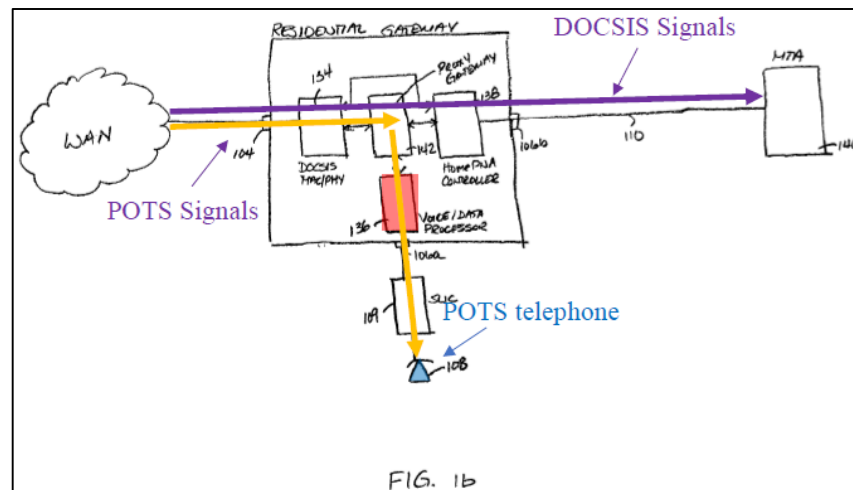
- Rabenko's VDP may include the proxy gateway function

In the described exemplary embodiment, the voice and data processor 213 includes the proxy gateway function described in connection with FIG. 1b. Alternatively, the proxy gateway function could be implemented in the MIPS core 228.

(Ex. 1005, Rabenko, ¶¶ [0074], [0097]; Pet., Paper 2, pp. 24-26; Ex. 1018, Kiaei 2nd Decl., ¶ 25)

- And Patent Owner admits that the DOCSIS signals traverse the proxy gateway (whose functions may be included in the VDP).

Patent Owner annotated Rabenko Fig. 1b



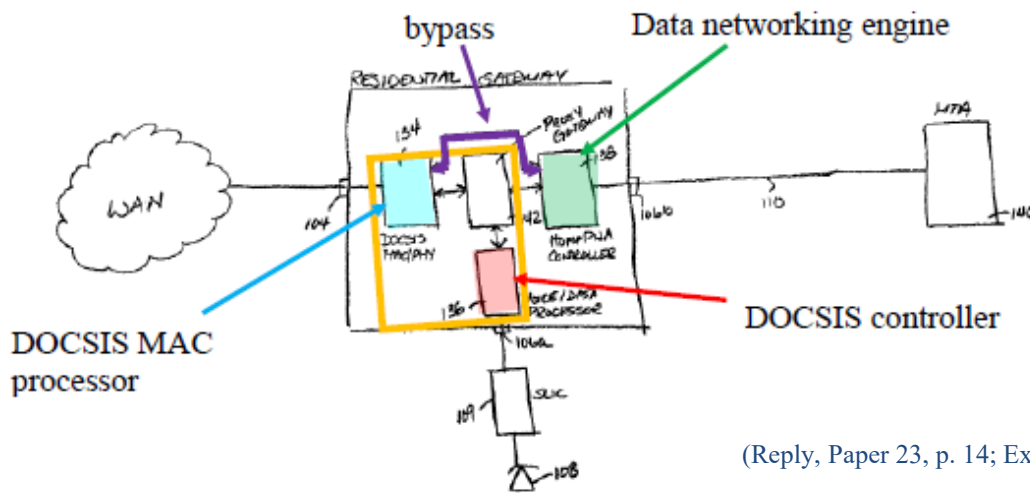
(POR, Paper 19, p. 20)

Rabenko's Circuits

- Patent Owner argues that Rabenko's voice/data processor is not in the same circuit as the DOCSIS MAC/PHY but, rather, is in its own separate circuit because the voice/data processor "processes signals for a POTS telephone."

(Sur-Reply, Paper 31, p. 19)

- Yet, Rabenko's VDP converts and processes received **DOCSIS** IP packet-based voice for use by the subscriber line interface circuit (SLIC) 109.



(Ex. 1005, Rabenko, ¶¶ [0033]-[0034], [0044]-[0045], [0047]; Pet., Paper 2, pp. 17-18, 22-23, 25, 32, 47; Reply, Paper 23, pp. 6-7; Ex. 1018, Kiaei 2nd Decl., ¶¶ 21-24)

(Reply, Paper 23, p. 14; Ex. 1005, Rabenko, Fig. 1b (annotated); Pet., Paper 2, p. 37; Ex. 1002 Kiaei 1st Decl. ¶ 151)

Dr. Kiaei's Alleged Shifting Position on Circuits Is A Strawman Argument

- Citing his deposition, Patent Owner alleges that Dr. Kiaei has taken an inconsistent position on separate circuits.

(POR, Paper 19, p. 26; Ex. 2009, Kiaei 1st Depo., 96:10-97:12)

- Yet, Dr. Kiaei's position never changed from his original declaration and, notably, the portion of his deposition cited by the Patent Owner for support is merely his accounting for the District Court claim construction.

(Reply, Paper 23, p. 12; Pet., Paper 2, pp. 12-13, 38; Ex. 1002, Kiaei 1st Decl., ¶¶ 46-47, 156.)

23	Q. Okay. So the claim also recites the
24	second circuit being separate from the first
25	circuit. To your understanding, how is one
1	circuit separate from another circuit?
2	A. Well, first of all, a separation is not
3	necessarily physically separate, but they are
4	functionally separate, as also was -- <u>my</u>
5	<u>understanding is that that was also part of the</u>
6	<u>claim construction.</u>

(Ex. 2009, Kiaei 1st Depo., 96:23-97:6; Reply, Paper 23, p. 12; POR, Paper 19, p. 26 citing Ex. 2009, Kiaei 1st Depo., 96:10-97:12)

Attacking Dr. Kiaei's Credibility Is A Strawman Argument

- Patent Owner alleges that Dr. Kiaei is not credible since he indicated that Rabenko's Figure 2 "could represent 'purely [] software.'" (POR, Paper 19, p. 33; Ex. 2008, Russ 2nd Dec., ¶ 78)
- Yet neither Petitioner nor Dr. Kiaei ever argues that Rabenko's components within Figure 2 may be utilized as "purely [] software" in teaching the circuits of claim 18. Dr. Kiaei only opined that a system block diagram, such as Rabenko's Figure 2, may be hardware, software, or a combination due to Rabenko's explicit teaching of the same in paragraph [0268]. (Reply, Paper 23, p. 15; Ex. 1018, Kiaei 2nd Dec., ¶ 44; Ex. 2009, Kiaei 1st Depo., 41:10-42:5)

Attacking Dr. Kiaei's Credibility Is A Strawman Argument

[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.

(Ex. 1005, Rabenko, ¶ [0268], emphasis added; Reply, Paper 23, p. 15; Ex. 1018, Kiaei 2nd Dec., ¶ 44)

Patent Owner Mischaracterizes Petitioner's Data Networking Engine in Rabenko

- Patent Owner argues that “[Rabenko’s] Figure 1b in fact reveals a direct connection between the DOCSIS MAC/PHY (allegedly a part of the CME) and the proxy gateway (allegedly a part of the DNE).”

(POR, Paper 19, p. 34, emphasis added)

- Neither the Petition, nor Dr. Kiaei, has ever contended that Rabenko’s proxy gateway was a part of the data networking engine. The Petitioner and Dr. Kiaei have consistently explained that Rabenko’s HomePNA controller 138 and AFE 226 comprise the data networking engine.

(Reply, Paper 23, p. 15; Ex. 1018, Kiaei 2nd Dec., ¶¶ 45-46; Pet., Paper 2, pp. 21, 23, 26)

“Different Problem” Is Irrelevant

- Patent Owner argues that Rabenko does not disclose the required separate circuits because it and the '775 Patent address different problems.
(POR, Paper 19, p. 36; Ex. 2008, Russ 2nd Decl., ¶ 84)
- Irrelevant - Art is analogous so long as it is “from the same field of endeavor, regardless of the problem addressed.” See, e.g., *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1000-1001 (Fed. Cir. 2016).
(Reply, Paper 23, p. 17)
- Rabenko is from the same field of endeavor and teaches the engines, circuits, and completely partitioned functions.
(Reply, Paper 23, p. 17)

Patent Owner Argues There Are “Uncountable” Combinations of Rabenko’s Components

Petitioner relies on just such hindsight. It simplifies the '775 patent's innovations to two “finite options” of “configur[ing] [Rabenko's DNE and CME] to be updated together or separately.” Pet., 27. But it is not so simple. Petitioner relies upon the premise that the CME and DNE are “separate and independent.” Pet., 26-27. So rather than the “finite” set of only two options that Petitioner asserts exist, based on the supposed presence of the DNE and CME, the correct “obvious-to-try” analysis is that there were many—perhaps uncountable—possible combinations of Rabenko's many components, illustrated in its Figure 2, which could be grouped together in innumerable ways, each of which could be upgradeable or not and, if upgradeable, upgradeable in various ways.

(POR, Paper 19, p. 51)

Not All of Rabenko's Components are Relevant

Rabenko's system does indeed include components outside of its CME and DNE, but those components are irrelevant to the analysis required for this particular limitation. Ex. 1018, ¶ 66. Claim 18 is only concerned with the independent upgradeability of the claimed DNE and CME, and thus the Petition correctly posits that there are only two ways that these components can be upgraded – together or separately (i.e., independently). The Petition provides a clear rationale as to why the latter would be used by a POSITA specifically within the particular context of Rabenko's system – to offset the frequent, costly, and time-consuming updates required of standard-compliant devices. Pet. 27-29; Ex. 1018, ¶ 66.

(Reply, Paper 23, p. 23)

Patent Owner Argues a Strawman: Gaspar Does Not Teach Independent Upgrade of an Embedded Cable Modem Engine

Petitioner also argues that it was obvious to try adding independently upgradeable software in view of Rabenko in light of Gaspar. But, similar to Kim, Gaspar merely contemplates upgrades for the HomePNA controller of the alleged DNE, and does not teach upgrading software for *any* components of the CME, much less independently of software for the DNE. Moreover, Gaspar does not teach upgrading embedded software, such as the software in Rabenko.

(POR, Paper 19, p. 56)

Petition Cites Gaspar as Evidence on Upgradeability of Standard-Compliant Devices

- Rabenko's data networking engine includes a standard-compliant device (Pet. 27)
 - Gaspar is evidence that:
 - standard-compliant devices require frequent, costly, and time-consuming updates to maintain compliance with evolving standards
 - there is a need to enable convenient modifications of standard-compliant devices
(Pet., Paper 2, pp. 26-28 (citing Ex. 1006, Gaspar, [0005]-[0006]))
 - A POSITA would have found it obvious to make Rabenko's *already partitioned* data networking engine and cable modem engine independently upgradeable.
(Pet., Paper 2, p. 28)

Patent Owner Argues Strawman: Kim does not Teach a Cable Modem Engine and Only Teaches Independent Upgrades of a Data Networking Engine

Kim Has Nothing To Do With A CME. Kim involves replacing modular pieces of hardware potentially associated with a DNE, not the CME. Specifically, Kim teaches potentially replacing a (i) modular HomePNA controller (allegedly a part of a DNE) and (ii) a modular ADSL controller (which has nothing to do with a DNE or a CME).

(POR, Paper 19, p. 39)

That Rabenko allegedly could be modified such that its HomePNA controller—a component in the alleged DNE—is purportedly “independently upgradeable from other components” does not suggest that components in the alleged *CME* are similarly independently upgradeable from the components in the DNE. Thus, Petitioner at best contends that the DNE could be independently upgraded vis-à-vis the CME. It does not, however, even argue that Rabenko/Kim would render obvious a *CME* “configured to enable upgrades to its software.”

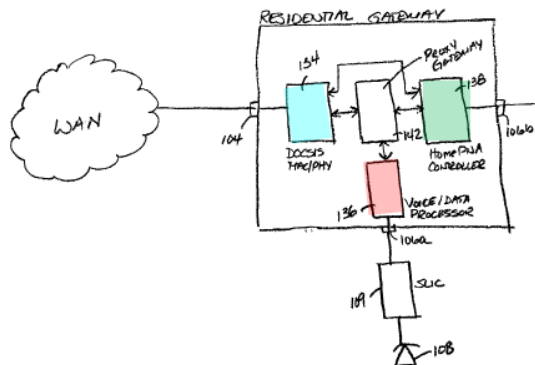
(POR, Paper 19, p. 40)

But Petitioner Never Relies on Kim to Teach a Cable Modem Engine

- Rabenko already teaches a cable modem engine.

(Pet., Paper 2, pp. 21-33)

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)

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.

(Pet., Paper 2, p. 23)

(Pet., Paper 2, p. 21)

Petitioner Relies on Kim's Modularity

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 whole performance of the home gateway. The ADSL controller and the homePNA are embedded in the modular-type home gateway system.

Ex. 1007, [0026]. Kim's use of modular controllers beneficially provides “a small-sized and economical structure,” that results in less cost and inconvenience when updating the controllers. Ex. 1007, [0007]; *see also*, Ex. 1007, [0002]-[0006], [0008].

(Pet., Paper 2, pp. 29-30)

Combined System Teaches Modular Design (Kim) of Rabenko Engines

- Kim's teachings, as applied to Rabenko, would motivate a POSITA to modularly design Rabenko's already-existing components, including its cable modem engine, to ensure independent upgradeability.

(Pet., Paper 2, p. 30; Reply, Paper 23, pp. 17-18; Ex. 1018, Kiaei 2nd Decl., ¶ 52)

Incorporating the modular design of Kim would allow the efficient updating of any of Rabenko's partitioned components. A POSITA would have recognized that such a combination would be using known techniques (implementing the individual components of Rabenko by the modular structure of Kim that allows for independent updating) to improve similar devices (processors, including the HomePNA controller taught in Rabenko and Kim) in the same way (Rabenko's components are conveniently and economically updated independently of each other). Ex. 1007, [0005]-[0007]; Ex. 1002, ¶129.

(Pet., Paper 2, p. 30)

Patent Owner's Sur-Reply Argument Ignores How a *POSITA* Would Have Read Kim

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

(Sur-Reply, Paper 31, p. 26)

Federal Circuit has Rejected Rigid and Siloed Obviousness Analysis

- “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)
- Obvious analysis is an “expansive and flexible approach” and “a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 415, 418.
- Obviousness analysis requires “considering the prior art in context or in combination,” and “le[aves] room for consideration of how background knowledge in the art would have impacted a POSA’s understanding of, or motivation to modify, the []references at issue.” *Janssen Pharms., Inc. v. Teva Pharms. USA, Inc.*, 97 F.4th 915, 928 (Fed. Cir. 2024)

Rabenko and Kim, In Combination, Teach the Claimed Element

- Both are directed to residential networking systems (Pet., Paper 2, pp. 14, 28)
- Rabenko teaches separate engines (Pet., Paper 2, pp. 14-25; ID, Paper 11, pp. 27-28; Reply, Paper 23, pp. 8-16)
- Kim teaches modular components to enable independent upgrades (Pet., Paper 2, pp. 28-30)
- A POSITA would understand Kim to teach modularly designing components of residential networking systems, and that Kim's teachings are not limited to only "two specific controllers that can be replaced." (Pet., Paper 2, pp. 28-31; Reply, Paper 23, pp. 17-18)
 - "[i]t would have been obvious to a POSITA to use Kim's modular technique, enabling the independent updating of its separate controllers to improve Rabenko in the same way by modularly configuring Rabenko's separate components to be similarly independently upgradable." (Ex. 1002, Kiaei 1st Decl., ¶ 129)
 - "[i]ncorporating the modular design of Kim in this way would allow the efficient updating of *any* of Rabenko's partitioned components." (Ex. 1002, Kiaei 1st Decl., ¶ 128)

Patent Owner Argues Kim does not Teach Software Upgrades, It Merely Teaches “Resetting” the Software

Kim, at best, suggests “resetting” software in the context of a power reboot and has nothing whatsoever to do with “upgrading” software.

(POR, Paper 19, p. 41)

words, even if physically swapping a hardware component could theoretically satisfy the claimed requirement of a “software upgrade,” nothing in Kim suggests that its hardware replacements would or could be used for such a purpose. Thus, Kim has nothing to do with “upgrading software.”

(POR, Paper 19, p. 41)

Kim's Modular Replacement Enables an Independent Upgrade

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 whole performance of the home gateway. The ADSL controller and the homePNA are embedded in the modular-type home gateway system.

(Pet., Paper 2, p. 29; Ex. 1007, Kim, [0026])

Kim's Controllers Include Hardware and Software, and Both are Replaced

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

(Reply, Paper 23, pp. 18-19)

Patent Owner Argues Kim’s “Replacing” is not “Configured to *Enable* Upgrades to its Software”

But even if we were to imagine that Kim, somehow, would motivate a POSITA to replace one or more components in Rabenko’s alleged CME, that *still* would not satisfy the limitation. The limitation does not merely require a CME that may be replaced (in whole or in part) and wherein, as a by-product of that replacement, the software is somehow “upgraded.” Rather, the limitation requires a “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.

(POR, Paper 19, p. 42)

Kim and '775 Patent Both *Enable* Independent Upgrades via Partitioning/Modularity

(Pet., Paper 2, pp. 30-31; Ex. 1002, Kiaei 1st Decl., ¶121; Reply, Paper 23, pp. 19-20)

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

(Ex. 1001, '775 Patent, 4:25-28; Reply, Paper 23, p. 19-20; Ex. 1018, Kiaei 2nd Decl., ¶ 59)

The modular-type home gateway system has a small-sized and economical structure by making the HomePNA controller and the ADSL controller as a modular type controller having a PCMCIA interface. 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 whole performance of the home gateway. The ADSL controller and the homePNA are embedded in the modular-type home gateway system.

(Ex. 1007, Kim, [0026]; Pet., Paper 2, pp. 28-29, 31)

Patent Owner's Sur-Reply Admits Modular Replacement Enables an Independent Software Upgrade

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

(Sur-Reply, Paper 31, p. 28)

Kim's Modular Replaceability *Enables* an Independent Upgrade

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

(Reply, Paper 23, p. 20)

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 whole performance of the home gateway. The ADSL controller and the homePNA are embedded in the modular-type home gateway system.

(Pet., Paper 2, p. 29; Ex. 1007, Kim, [0026])

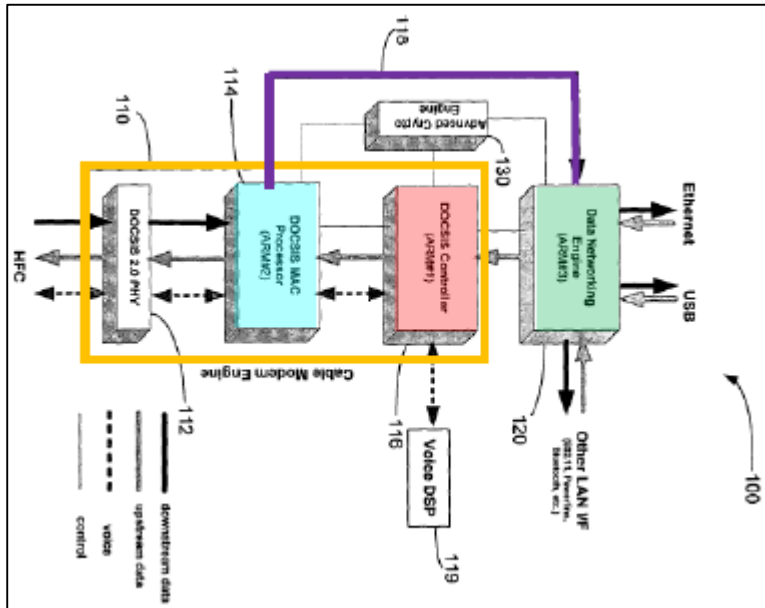
Rabenko Includes the Claimed Data Bus

[18A] 18. A cable modem system comprising: . . .

[18G] a data bus that connects the data networking engine to the cable modem engine, ...

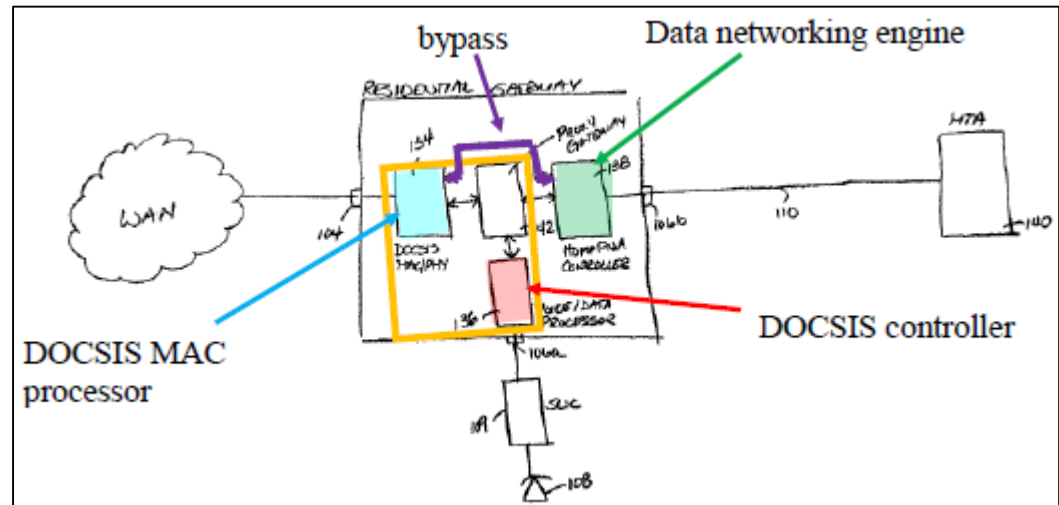
(Ex. 1001, '775 Patent, Claim 18; Pet., Paper 2, pp. 35-38; Ex. 1002, Kiaei 1st Decl. ¶¶ 149-158)

'775 Patent



(Ex. 1001, '775 Patent, Fig. 1 (rotated and annotated); *see also* Pet., Paper 2, pp. 2-3, 37)

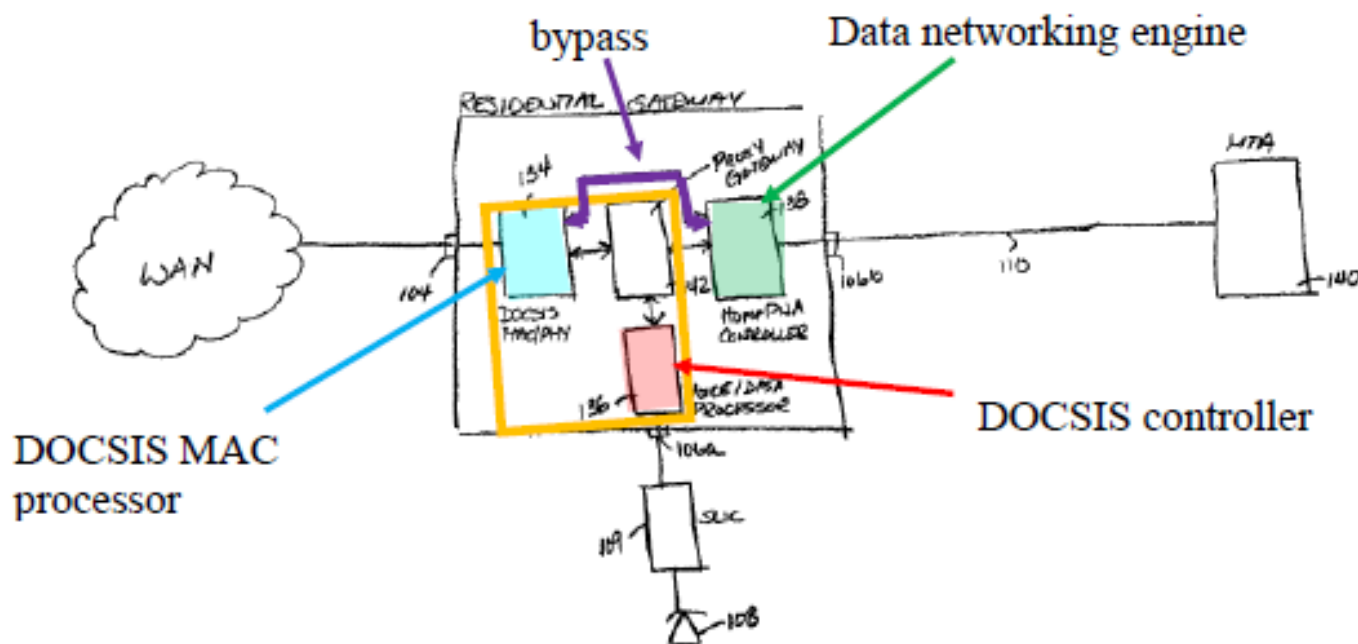
Rabenko



(Ex. 1005, Rabenko, Fig. 1b (annotated); *see also* Pet., Paper 2, pp. 4-6, 21-26, 32-34, 36; Ex. 1002, Kiaei 1st Decl. ¶¶ 61-64, 106-109, 141-148)

Rabenko Teaches the “DOCSIS controller”

Rabenko’s voice and data processor 136/213 [VDP] teaches the claimed “DOCSIS controller”



(Ex. 1005, Rabenko, Fig. 1b (annotated); Pet., Paper 2, p. 36; Ex. 1002, Kiaei 1st Decl. ¶ 151)

The Independent Claims Do Not Require the “DOCSIS Controller” to Do Anything Beyond Being Bypassed

- [18A] 18. A cable modem system comprising: . . .
- [18C] a cable modem engine . . .
- [18E] the cable modem engine including a DOCSIS controller and a DOCSIS MAC processor,
- [18F] the DOCSIS MAC processor configured to process downstream PDU packets and forward the processed packets directly to the data networking engine without the involvement of the DOCSIS controller in order to boost downstream throughput;

Claim 18 does not otherwise qualify “DOCSIS controller”

(Ex. 1001, '775 Patent, Claim 18; Pet., Paper 2, pp. 31-34; Ex. 1002, Kiaei 1st Decl., ¶¶ 134-148; Reply, Paper 23, p. 2; Ex. 1018, Kiaei 2nd Decl., ¶ 8)

Rabenko's VDP Performs DOCSIS Functions of the '775 Patent

- Rabenko's **VDP** implements the proxy gateway functions including MTA call client 520 and provisioning logic 538.

(Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

In the described exemplary embodiment, the voice and data processor 213 includes the proxy gateway function described in connection with FIG. 1b.

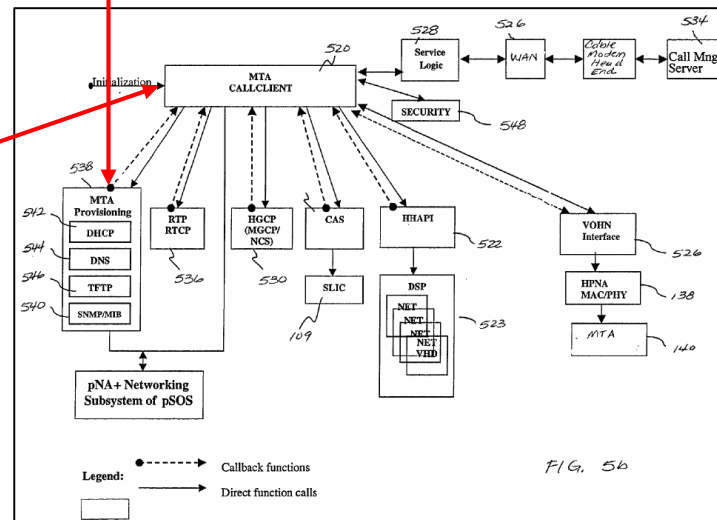
(Ex. 1005, Rabenko, ¶ [0074]; Pet., Paper 2, p. 5, 26, 31; Ex. 1002, Kiaei 2nd Decl. ¶¶ 62, 108, 115, 116, 135, 136)

[0097] As indicated above, the proxy gateway function can be implemented in the voice and data processor. In the described exemplary embodiment, the proxy gateway function is implemented with embedded software at the applications layer. Referring to FIG. 5b, the applications layer includes an MTA call client 520 which provides overall control.

(Ex. 1005, Rabenko, ¶ [0097]; Pet., Paper 2, p. 24; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

[0103] The described exemplary embedded MTA call client 520 may include MTA device provisioning logic 538 that enables the embedded MTA call client 520 to register and provide subscriber services over the DOCSIS network 526.

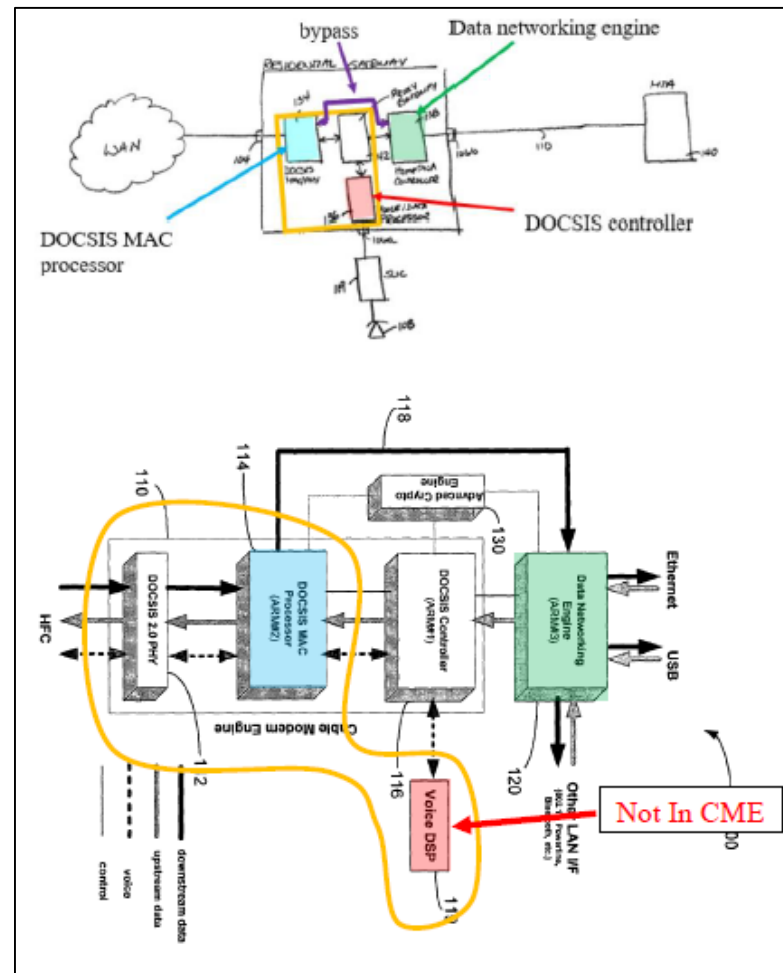
(Ex. 1005, Rabenko, ¶ [0103]; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)



(Ex. 1005, Rabenko, Fig. 5b; Reply, Paper 23, pp. 7-8; Ex. 1018, Kiaei 2nd Decl., ¶ 26)

Patent Owner's Comparison of the '775 Patent's Fig. 1 to Rabenko's Fig. 1b

- Patent Owner argues a new argument in Sur-Reply:
 - An “accurate apples-to-apples comparison between the figures only confirms that Rabenko lacks a DOCSIS controller, forcing Petitioner to arbitrarily shoehorn a voice DSP into the CME, contrary to the '775's disclosure.”
(Sur-Reply, Paper 31, p. 22)
 - Accordingly, because Rabenko's voice/data processor equates to the '775 Patent's digital signal processor 119, it cannot be a DOCSIS controller since it is outside the cable modem engine 110.
(Sur-Reply, Paper 31, pp. 21-23)



(Sur-Reply, paper 31, p. 22)

Rabenko's Circuits

- The '775 Patent's original specification and drawings never included the word “circuit” since the term was only added during prosecution.

(Ex. 1004, pp. 5-22, 66-72; Reply, Paper 23, p. 10; Ex. 1018, Kiaei 2nd Decl., ¶ 37)

- Patent Owner's response to this argument is “per Figure 2” “and its attendant disclosure, the '775 patent clearly depicts a partitioned [data networking engine] and [cable modem engine] that are ‘completely decoupled’ from each other.”

(Sur-Reply, Paper 31, p. 20)

- Yet, as previously discussed and based upon the ordinary and customary meaning, Rabenko provides the same level of disclosure of separate circuits as does the '775 Patent.

(Reply, Paper 23, p. 10; Ex. 1018, Kiaei 2nd Decl., ¶¶ 37-38)